CTBTO PREPARATORY COMMISSION | preparatory commission for the comprehensive nuclear-test-ban treaty organization

REQUEST FOR PROPOSAL

To: ALL BIDDERS

CTBTO Ref. No.: **2025-0068/RAHMAN**
(PLEASE QUOTE ON ALL COMMUNICATIONS)

Tel. No.: +43 (1) 26030-6350
E-mail: procurement@ctbto.org

Attn:
Phone:
Fax:
Email:

Date: 2 June 25

Subject: Provision of Software Engineering Services for Radionuclide (RN) Data Analysis

Deadline for Submission: 2 Jul 25 ***Vienna Local Time:*** 17:00

The Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (hereinafter referred to as the 'Commission') hereby invites you to submit a proposal that meets the requirements of the attached documents.

You are kindly requested to complete and return the acknowledgement form by email as soon as possible.

If you have any questions you should contact the email address indicated above.

Yours Sincerely,

OiC
for: Sally Alvarez de Shreiner
Chief, Procurement Services Section

preparatory commission for the comprehensive nuclear-test-ban treaty organization

CTBTO PREPARATORY COMMISSION

ACKNOWLEDGEMENT FORM

Solicitation No: 2025-0068	***Closing Date:*** 2 Jul 25
Title: Provision of Software Engineering Services for Radionuclide (RN) Data Analysis	***Vienna Local Time:*** 17:00

Procurement Staff: Fazal Rahman ***CTBTO Req. No.:*** 0010026979

Please complete 'A' or 'B' or 'C'
and Return

WITHIN FIVE (5) DAYS

THE PREPARATORY COMMISSION FOR THE
COMPREHENSIVE NUCLEAR-TEST-BAN TREATY ORGANIZATION (CTBTO)

by email to
procurement@ctbto.org

A: We shall submit our proposal

Company Name: ______________________

By: ____________________ Contact Name: ______________________
(date)

Email/Tel: ______________________

B: We may submit and will advise

Company Name: ______________________

By: ____________________ Contact Name: ______________________
(date)

Email/Tel: ______________________

C: We will not submit a proposal for the following reason(s)

___ our current workload does not permit us to take on additional work at this time;
___ we do not have the required expertise for this specific project;
___ insufficient time to prepare a proper submission;
___ other (please specify) ______________________

Company Name: ______________________
Contact Name: ______________________
Email/Tel: ______________________

INSTRUCTIONS FOR PREPARATION AND SUBMISSION OF PROPOSALS

1. General

The Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (the Commission) with its headquarters in Vienna is the International Organization mandated to establish the global verification system foreseen under the Comprehensive Nuclear-Test-Ban Treaty (CTBT), which is the Treaty banning any nuclear weapon test explosion or any other nuclear explosions. The Treaty provides for a global verification regime, including a network of 321 stations worldwide, a communication system, an International Data Centre and on-site inspections to monitor compliance with the Treaty.

This Request for Proposal (RFP) is for the ***PROVISION OF SOFTWARE ENGINEERING SERVICES FOR RADIONUCLIDE (RN) DATA ANALYSIS ON A CALL-OFF BASIS*** (hereinafter referred to as the "Services") as described in the Terms of Reference.

The Proposal shall meet all requirements stated in the Terms of Reference and be submitted in accordance with these Instructions for Preparation and Submission of Proposals. For this project, the Commission is seeking capabilities, which will ensure that the services are delivered and the tasks are accomplished expeditiously and at a reasonable cost.

2. Documents included in this RFP

This RFP consists of the following documents:

(a) Letter of Invitation
(b) These Instructions for Preparation and Submission of Proposals and Bidder's Statement and the following Attachments:
  - Attachment 1: Technical Compliance Matrix
  - Attachment 2a: Evaluation Criteria and Method – LOT1
  - Attachment 2b: Evaluation Criteria and Method – LOT2
  - Attachment 3: Format of Financial Proposal
  - Attachment 4: Procedure for submission of electronic offers in 2 sealed files
(c) Statement of Confirmation
(d) Vendor Profile Form
(e) The Commission's Model Contract and its Annexes A – C;
  - The Commission's General Conditions of Contract (Annex A) – incorporated herein by reference, found at www.ctbto.org under CTBTO General Conditions of Contract
  - The Commission's Terms of Reference (Annex B)

Note: In the event of award, the Proposal will be incorporated as Annex C to the Contract.

3. Amendment of RFP Documents

At any time prior to the closing date for submission of Proposal, the Commission may, for any reason, modify the RFP documents by amendment. The Commission may consider extending the deadline in order to allow adequate time for considering the modifications in the preparation of the Proposal.

4. Language of the Proposal

The Proposal and all correspondence and documents relating to it shall be in English.

Format and Submission of the Proposal

The Proposal shall be typed, dated and signed by an official legally authorized to enter into contracts on behalf of your organization. The Proposal shall not contain any interlineation, erasures or overwriting except as necessary to correct errors, in which case such corrections shall be initialled by the authorized person(s) signing the Proposal.

The Proposal shall be submitted electronically according to the attached "PROCEDURE FOR SUBMISSION OF ELECTRONIC OFFERS IN TWO (2) SEALED FILES".

The Proposal shall be received not later than the closing date indicated in the Letter of Invitation.

5. Request for Clarifications and Contacting the Commission

The Commission will issue clarifications, if required. Bidders are requested to e-mail any questions pertaining to this RFP as soon as possible after receipt of the solicitation documents, but in any case, no later than **10 business days prior to the Closing Date**. No requests for clarifications will be entertained after this time. Questions will only be accepted via e-mail sent to:

E-mail: procurement@ctbto.org
Subject: Request for Clarifications re RFP No. 2025-0068/RAHMAN

The Commission will make all reasonable efforts to issue the clarifications not later than 7 business days prior to the Closing Date.

Except in the case of responding to an RFP clarification, no bidder shall contact the Commission on any matter relating to the Proposal after its submission and until the award of the Contract. Any attempt to influence the Commission in its evaluation of the Proposal or the contract award decision may result in the rejection of the Proposal.

6. Eligible Goods and Services

The services and goods (if any) to be rendered under the Contract shall have their origin in the States Signatories of the Comprehensive Nuclear-Test-Ban Treaty (CTBT), a list of which is available in the CTBTO website at www.ctbto.org under Status of Signatures and Ratifications | CTBTO. For purposes of this paragraph, "the origin" means the place from where the materials, goods and/or from which the services are supplied.

7. Type of Contract and Payment

The Commission intends to conclude firm fixed unit prices Call-off Contract based on the attached Model Contract. The terms and conditions of payment for services are described in Clause 13 of the attached Model Contract.

8. Preparation of the Proposal

Bidders may opt to bid for Software engineering support for radionuclide processing and supporting software (LOT 1) and/or, Software engineering support for GrandSIM Monte Carlo based simulation software (LOT 2), or both LOTs, as defined in the Terms of Reference. Bidder shall indicate clearly the LOT or LOTs for which they bid and submit separate offers for each LOT.

CONTENT OF THE PROPOSAL

The Proposal shall contain, but not necessarily be limited to, the information described below.

The Proposal shall be composed of the following separate parts:

I. **Technical Proposal**; and
II. **Financial Proposal**;

providing, but not limited to, the following information:

PART I: TECHNICAL PROPOSAL

Please state the reference number and the date of this RFP in the Proposal and any correspondence relating to it.

No pricing/financial information shall be included in the Technical Proposal. Note however that a complete list of the items being offered (without the prices) shall be included in the Technical Section of the Proposal.

Bidders are required to complete and follow Attachment 1: Technical Compliance Matrix provided as part of Instructions for Preparation and Submission of Proposals.

Point of Contact
The Proposal shall state the contact details and address (name, telephone and fax numbers, and e-mail address) of the person/point of contact in your company dealing with this RFP.

Bidder's Statement, Statement of Confirmation and Vendor Profile Form
The attached Bidder's Statement, Statement of Confirmation and Vendor Profile Form shall be duly filled-in, signed and submitted as part of the Technical Proposal.

Description of Services, Minimum Content and Compliance Matrix for Technical Proposal
An explanation of the bidder's understanding of the services to be provided and an overall preliminary operational plan for the execution of the services following the attached Minimum Content and Mandatory Requirements of the Technical Proposal and including the Technical Compliance Matrix, all provided in Attachment 1.

The Proposal shall also provide any other relevant issue which the bidder would like to bring to the attention of the Commission whether or not having cost implications.

Qualifications
Documentary evidence of the bidder's qualifications to provide the Services, which shall establish to the Commission's satisfaction that the bidder has technical capability necessary to perform the Contract and other necessary ongoing services as required in compliance with all the requirements and qualifications set forth in the Terms of Reference (for each LOT) (see Attachment 1 to this RFP – Technical Compliance Matrix).

Commission's Inputs
A description of the expected inputs/resources to be made available by the Commission and at what stage of the services.

Personnel

The Technical Proposal shall include:

(a) A statement that the capacity of the Contractor, in terms of qualified manpower resources, is adequate to conduct the Work.
(b) A statement of availability of the personnel, and the minimum period required before starting the work under the Contract;
(c) A list of capable and experienced personnel, including their function and duration of assignment as key staff to work under this Contract (such as Project Manager or Team Leader, etc);
(d) Curriculum vitae of the key staff proposed for this contract, including experience with standards and technical experience to perform the Work.
(e) Details of key personnel identified at (c) and (d) above, which shall include at a minimum the following information:
    a. Name.
    b. Nationality.
    c. Role.
    d. Employed since. (Please specify whether the key personnel are a permanent member or rather, if they are contracted for the duration of the Contract on an ad-hoc basis.)
    e. Type(s) of Service(s) set specified in the Terms of Reference, which the key personnel will perform.

Please note that it is the bidder's responsibility alone to obtain **work permits or visa or similar** for the personnel proposed to implement this project. The Commission will make no effort nor accept any responsibility for obtaining work permits or visa or similar for the Contractor's personnel.

Use of former Preparatory Commission for the CTBTO ("Commission") employees in the preparation of a Proposal:

A bidder must <u>not</u>, in the absence of prior written approval from the Commission, permit a person to contribute to, or participate in, any process relating to the preparation of a Proposal or the procurement process if the person:

a. At any time during the 12 months immediately preceding the date of issue of the Solicitation was an official, agent, servant or employee of, or otherwise engaged by the Commission;
b. At any time during the 24 months immediately preceding the date of issue of the Solicitation was an employee of the Commission personally engaged, directly or indirectly, in the definition of the requirements, project or activity to which the Solicitation relates.

Sub-Contractors
Names, legal status, address and qualifications of subcontractor(s), if any, and the scope of the subcontracted services. The Proposal shall provide a statement that your organization shall be fully responsible for the performance of sub-contractors. All sub-contractors shall be legally established

in one of the CTBTO States Signatories the list of which is available at www.ctbto.org under Status of Signatures and Ratifications | CTBTO.

PART II: FINANCIAL PROPOSAL

In the Financial Proposal, Bidders are required to define the following:

(a) The Financial Proposal shall be submitted in the format set out in Attachment 3 "Format of Financial Proposal" attached herewith. Bidders shall provide all the information requested in this matrix but may provide additional related content as attachments. This will be evaluated as part of the responsiveness of the Financial Proposal. A Proposal that fails to meet this requirement may be disqualified and not be considered for further evaluation.

(b) The bidder shall quote firm fixed person-day fees/rates in EURO or US Dollars for the duration of the contract. The quoted fees/rates should include all overheads and ancillary expenses, unless included as firm-fixed "Other Costs", or otherwise stated in Attachment 3 "Format of Financial Proposal".

(c) Note that clear and detailed explanations would enable us to evaluate the Proposal promptly and proceed with fewer requests for clarifications/justifications in a later stage. This is also a factor influencing the decision for Contract award.

Indirect Taxes
In principle the Commission is exempt from taxes. Since the arrangement under which such exemption is respected varies from country-to-country, the selected bidder will be informed by the Commission whether tax exemption will occur at source or whether taxes paid by the selected bidder will be reimbursed by the Commission upon submission of the original supporting documentation. **"Taxes"** means all direct and indirect taxes (including value added tax, general sales tax or goods and services tax), assessments, fees, customs duties, liens and charges in as much as they are levied in conclusion or implementation of the Contract, including customs restrictions and charges of similar nature in respect of articles imported or exported for the Commission's official use.

For Austrian companies

The price quoted shall be net of Taxes. All applicable Taxes payable by the selected bidder at the conclusion or implementation of the Contract in respect of the goods/services shall be quoted separately or be separately identified on the Proposal together with information on the nature of the tax and its method of calculation.

For European Union (EU) Companies

The price quoted shall be net of Taxes. All applicable Taxes payable by the selected bidder at the conclusion or implementation of the Contract in respect of the goods/services shall be quoted separately or separately identified on the Proposal together with information on the nature of the Tax and its method of calculation. Due to the VAT exemption applicable to the Commission, no VAT will be charged to the Commission by the EEC Suppliers under the Contract (Ref. EU VAT Council Directive 2006/112/EC, Article 151).

For Non-EU Companies

The price quoted shall be net of Taxes. All applicable Taxes payable by the selected bidder at the conclusion or implementation of the Contract in respect of the goods/services shall be quoted separately or be separately identified on the Proposal together with information on the nature of the tax and its method of calculation. For deliveries to Vienna, Austria, and due to the tax exemption at source applicable to the Commission, no Taxes shall be charged to the Commission under the Contract.

9. Completeness and Correctness of the Proposal

The Commission reserves the right to verify all information furnished by you in the Proposal through a source of its choice. Any inaccurate information so given may lead to the rejection of the Proposal.

10. Validity of the Proposal

The Proposal shall be valid for 90 (ninety) days after the deadline for its submission to the Commission, unless an extension of validity has been requested by the Commission.

11. Correction of Errors

The Commission will check the Proposal for any arithmetic errors. If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected.

12. Evaluation of the Proposal

a) The Commission, based on the evaluation criteria and method given in Attachment 2 “Evaluation Criteria and Method”, will determine the Proposal that ‘most effectively satisfies the technical and operational requirements set out in the solicitation documents’ in accordance with the criteria specified in Attachment 2.

b) The Commission reserves the right, as it deems appropriate, to award to a single bidder, to award to multiple bidders in any combination or not to award to any of the bidders as a result of this RFP.

13. Clarification and Negotiations of the Proposal

The Commission reserves the right to request clarifications on the Proposal and to enter into negotiations regarding technical or commercial aspects of the Proposal before awarding the contract under this RFP.

14. Modification and Withdrawal of Proposal

Bidders may modify or withdraw their Proposals after their submission, provided that written notice of the modification or withdrawal is received by the Commission by the closing date for the submission of the Proposal. The Proposal may not be modified subsequent to the closing date.

15. The Commission’s Right to Reject the Proposal

The Commission reserves the right to accept or reject the Proposal or to annul this procurement process at any time prior to the award of contract without having to inform the bidders of the grounds therefore, without thereby incurring any liability to the bidders.

16. Costs of preparation and submission of the Proposal

Bidders shall bear all the costs associated with the preparation and submission of their Proposal and the Commission will not be responsible or liable for those costs, regardless of the outcome of this RFP.

17. Proprietary Information

All documentation and information contained in this RFP are proprietary to the Commission and shall not be duplicated, used or disclosed -in whole or in part- for any purpose other than to evaluate them and respond to the Commission's request for Proposal or otherwise without prior written agreement of the Commission.

BIDDER'S STATEMENT **PLEASE STATE BELOW & SUBMIT WITH PROPOSAL**
Delivery Time:
Shipping weight (kg) and Volume (m^3) – if applicable:
List of recommended consumables and spares including prices and details on local availability, if applicable (please tick): ☐ For one year period ☐ For a period of …………………………
Warranty period applicable (it shall be for a **minimum of 24 months**, starting from the acceptance of the goods/services by the Commission) – please tick below as applicable: ☐ For a two year period ☐ For a period of …………………………
Availability of local service in Vienna, Austria (if any):
State country of origin or assembly of all items quoted:
Quantity discount and early payment discount (if any):
Include documentary evidence of qualifications to perform the order, which shall establish to the Commission's satisfaction that the bidder has the financial, technical and production capability necessary to perform the order in its entirety and to provide spare parts and other necessary on-going services as required. Included in the Proposal: **Yes** ☐ **No** ☐
Confirmation that the bidder has reviewed the Commission's General Conditions of Contract, Draft Model Contract, and agreed to all terms and conditions. **Yes** ☐ **No** ☐ **Remarks:**
With regards to the software provided with the equipment, state and confirm whether the software licenses are transferable to third parties, i.e. the Commission or the Commission's State Signatories list available at www.ctbto.og under Status of Signatures and Ratifications | CTBTO. Yes ☐ No ☐ Not applicable ☐ Remarks:
Name: **Name & Title of Contact Person:** **Signature & date:**

MINIMUM CONTENT OF TECHNICAL PROPOSAL AND TECHNICAL COMPLIANCE MATRIX

RFP No. 2025-0068/RAHMAN

PROVISION OF SOFTWARE ENGINEERING SERVICES FOR RADIONUCLIDE (RN) DATA ANALYSIS ON A CALL-OFF BASIS

Below sets out the ***Minimum content of the Proposal and the Mandatory Requirements of the Technical Proposal****.* Bidders are requested to demonstrate compliance with the requirements and add any further information in support of their Proposal. Please refer to the relevant section of the Terms of Reference for further explanation of the requirements. The information provided will form an integral part of the technical evaluation process.

Part II of this document must be completed and returned as part of the Proposal.

Part I

Item		Minimum content
1.	**Executive Summary**	Provide an overview of the proposal
2.	**Experience, Resources and Project Management**	
2.1	Corporate Profile and Values	• Brief background of the company, mission/vision, ownership, size, location, number of personnel by type profile, etc. • Company business structure and its authority to execute all Work under the Contract. • If a consortium, provide a clear explanation of the business relationship between the members and governance for the execution of this project. • In case the Bidder requires the services of subcontractors, the Proposal shall include: a) Relationship of the Bidder's business to any subcontractor(s) that will be used. b) Names, addresses, legal status, and qualifications of major sub-contractor(s) proposed by your organization. c) The scope of work and nature of subcontracting.
2.2	Corporate Experience	The proposal should detail the Bidder's experience in executing work of similar scope and complexity.

2.3 Requirements for the Contractor	The Proposal should address and describe all requirements spelled out under Section III. (Scope of Work) the Terms of Reference (ToR).
3. Meeting the Requirements	
3.1 Understanding of the ToR	• Please describe your understanding of the services that are to be provided under this ToR, detailing key assumptions that impact the Technical Proposal. • Please describe how you propose to address the tasks listed in Section III. (Scope of Work) of the ToR.
4. Contractor's key staff	
4.1. Visa & Work Permits	Provide written confirmation that the Bidder understands and agrees to take responsibility for obtaining any Visa and/or work permits, which may be required to perform the Work under the Contract. The CTBTO does not sponsor work permits for contractors.
4.2. Documentation and Reporting	• Provide written assurance that all reports, documentation, and communication (written and oral) supplied to the Commission shall be in English and submitted in electronic form. • Provide written assurance that all documentation will adhere to the IDC Documentation Standards, samples of which will be provided to the successful Contractor.
5. Model Contract	
	A statement that the bidder has carefully reviewed the Model Contract and its Annexes and is in agreement with all its terms and conditions.

Part II – Compliance Matrix

Ref No. of ToR	**Requirements** *A section-by-section response to each section of the Terms of Reference is included in the Proposal*	**Bidder's Response** *Please tick whichever is applicable*		Indicate the section in your Proposal and ensure that it is sufficiently described in the Proposal
		"Yes"	**"No"**	
Meeting Requirements in General – LOT1 and LOT2				
General	Extent to which all aspects of the ToR have been addressed in sufficient detail and clarity.			
General	Understanding of the scope of work and the responsibilities of the Contractor			
VII	Confirmation that the Contractor shall develop and maintain a Risk Management plan in accordance section VIII of the ToR.			
V.1 Requirements for the Contractor for RN SW Engineering Support & GrandSIM – LOT1 and LOT2				
V.1.1.	At least six (6) staff are included in the Team Roster that collectively meet the requirements as described in Section V.2.4 and V.2.5. This shall apply for the initial roster and throughout the Contract period.			
V.1.2.	Demonstrated experience implementing at least three (3) projects of similar scope and complexity in the last seven (7) years.			
V.1.3.	Demonstrated experience, in two of the last five (5) years, in using a recognized formal project management methodology (how the work is to be managed and controlled, risk management, reporting, planning and assurance of quality), such as PRINCE2.			
V.1.4.	Demonstrated experience, in two of the last five (5) years, in using an Agile framework, such as Scrum.			

V.1.5.	Staff turnover has been and is kept below 20% per year over the past three (3) years.			
V.1.6.	All reports, documentation, and communication (written and oral) supplied to the Commission shall be in English and submitted in an electronic form.			
V.1.7.	Working hours of relevant staff (e.g. project manager and lead developers) assigned to a Software Team, to overlap at least three (3) hours with the Commission's working hours (9am to 5pm CET), as deemed necessary by the Commission.			
V.2.4 Requirements for each member of the Team Roster – LOT1 and LOT2				
V.2.4.1	A university degree in Computer Science, Mathematics, Physics, software engineering, nuclear engineering or related scientific/technical subject (with accompanying explanation).			
V.2.4.2	At least two (2) years of recent experience using Agile framework such as Scrum.			
V.2.4.3	At least one (1) year of recent experience working with a ticket management system such as Jira.			
V.2.5 Skills and experience amongst the members of the Team Roster (RN SW Engineering Support) – LOT1				
V.2.5.1	A minimum of five (5) or more years of experience over the past seven (7) years, in software engineering (eliciting use cases and requirements, design, development, support, maintenance and enhancement, documentation) for operational software systems.			
V.2.5.2	Demonstrated experience in at least two (2) or more projects in the development and integration of complex operational software systems, for radionuclide applications or a related field.			
V.2.5.3	A minimum of three (3) or more years of experience, providing software maintenance and support services for complex and custom software systems.			
V.2.5.4	A minimum of five (5) or more years over the past ten (10) years of experience			

	in all stages of software development using C++ programming language.			
V.2.5.5	A minimum of five (5) or more years over the past ten (10) years of experience in all stages of software development Python programming language.			
V.2.5.6	At least three (3) or more years within the past five (5) professional experience using Qt framework as a widget toolkit.			
V.2.5.7	A minimum of three (3) or more years over the past five (5) years, in the development of web applications, preferably Sencha Ext JS (Sencha cmd).			
V.2.5.8	At least five (5) or more years within the past ten (10) of professional experience with SQL and database programming, ideally using Oracle and/or PostgreSQL databases, experience designing data access layers and data models for an application.			
V.2.5.9	Working knowledge and experience in two (2) of the last five (5) or more years using the GNU Autotools and RPM for software packaging, compilation and distribution.			
V.2.5.10	Experience in two (2) or more of the last five (5) years with scripting techniques for automated testing and continuous integration and deployment. Details shall be provided.			
V.2.5.11	A minimum of two (2) or more years of experience with GitLab CI/CD.			
V.2.5.12	A minimum of two (2) or more years of experience as a Technical Writer on projects with similar scope, that demonstrate the solid understanding of Software development methodologies and the ability to conduct research into a wide range of IT issues and proven ability to write technical documentation.			
V.2.5.13	Developer on at least two (2) or more projects involving programming using 2D/3D scientific visualization libraries (visualizations of time series, histograms, surface plots, scatter plots, spectrograms).			
V.2.5 Skills and experience of (key) personnel to be met for GrandSIM – LOT2				

V2.5.1.5	At least 3 or more years of experience working with GEANT4 Monte Carlo simulation software with a focus on modelling of radiation detection systems. Detailed examples must be provided.			
V2.5.2	Demonstrated experience in at least two (2) or more projects in the development and integration of complex operational software systems, for radionuclide applications or a related field.			
V2.5.3	A minimum of three (3) or more years of experience, providing software maintenance and support services for complex and custom software systems.			
V2.5.4	A minimum of five (5) or more years over the past ten (10) years of experience in all stages of software development using C++ programming language.			
V2.5.5	A minimum of five (5) or more years over the past ten (10) years of experience in all stages of software development Python programming language.			
V2.5.8	At least five (5) or more years within the past ten (10) of professional experience with SQL and database programming, ideally using Oracle and/or PostgreSQL databases, experience designing data access layers and data models for an application.			
V2.5.9	Working knowledge and experience in two (2) or more of the last five (5) years using the GNU Autotools and DNF/RPM for software packaging, compilation and distribution			
V2.5.13	Developer on at least two (2) or more projects involving programming using 2D/3D scientific visualization libraries (visualizations of time series, histograms, surface plots, scatter plots, spectrograms).			

Attachment 2a
Evaluation Criteria and Method
Lot 1: Software Development and Maintenance of RN SW

Ref No. in TOR	1.QUALIFICATION REQUIREMENTS (PASS/FAIL) for RN SW Engineering Support	PASS/FAIL
	Requirements for the Contractor (PASS /FAIL)	**PASS/FAIL**
V.1.1	At least six (6) staff are included in the Team Roster that collectively meet the requirements as described in Section V.2.4 and V.2.5. This shall apply for the initial roster and throughout the Contract period	**PASS**/FAIL
V.1.2	Experience implementing at least three (3) projects of similar scope and complexity in the last seven (7) years	**PASS**/FAIL
V.1.3	Minimum of two years of experiance in the last five (5) years, in using a recognized formal project management methodology (how the work is to be managed and controlled, risk management, reporting, planning and assurance of quality), such as PRINCE2.	**PASS**/FAIL
V.1.4	Minimum two years of expreinace in the last five (5) years, in using an Agile framework, such as Scrum.	**PASS**/FAIL
V.1.5	A staff turnover below 20% per year over the past 3 years	**PASS**/FAIL
V.1.6	All reports, documentation, supplied to the Commission shall be in English and submitted in an electronic form.	**PASS**/FAIL
V.1.7	Statement and or Evidence that the Contractor will be able to adjust the working hours of staff assigned to the Software Team, to overlap at least three hours with the Commission's working hours (9am to 5pm CET), as deemed necessary by the Commission.	**PASS**/FAIL
	Requirements for the Contractor's Personnel (PASS /FAIL) for RN SW Engineering Support	**PASS/FAIL**
V2.4.1	A university degree in Computer Science, Mathematics, Physics, software engineering, nuclear engineering or related scientific/technical subject (with accompanying explanation).	**PASS**/FAIL
V2.4.2	At least two (2) years of recent experience using Agile framework such as Scrum.	**PASS**/FAIL
V2.4.3	At least one (1) year of recent experience working with a ticket management system such as Jira.	**PASS**/FAIL

Only bidders who pass all above criteria will be considered for the point system evaluation (2nd stage)

No.	2.TECHNICAL REQUIREMENTS - EVALUATION CRITERIA AND METHOD (RN SW)	Points		
	Quality of the Proposal	**Max Points**	**Factor**	**Weighted score**
Gerneral	Extent to which all aspects of the ToR have been addressed in sufficient detail and clarity.	5	4	20
General	Understanding of the scope of work and the responsibilities of the Contractor	5	3	15
VII	Risk Management Plan supplied and in sufficient detail (Risks may include but are not limited to technical challenges, changes in project requirements/scope, resource constraints, schedule delays, integration difficulties, and third-party software dependencies).	5	3	15
	Subtotal	**15**		**50**
	Required Experience Contractor's personnel (RN SW Engineering Support)	**Max Points**	**Factor**	**Weighted score**
V2.5.1	A minimum of five (5) or more years of experience over the past seven (7) years, in software engineering (eliciting use cases and requirements, design, development, support, maintenance and enhancement, documentation) for operational software systems.	5	2	10
V2.5.2	Experience in at least two (2) or more projects in the development and integration of complex operational software systems, for radionuclide applications or a related field.	5	2	10
V2.5.3	A minimum of three (3) or more years of experience, providing software maintenance and support services for complex and custom software systems.	5	2	10
V2.5.4	A minimum of five (5) or more years over the past ten (10) years of experience in all stages of software development using C++ programming language.	5	3	15
V2.5.5	A minimum of five (5) or more years over the past ten (10) years of experience in all stages of software development Python programming language.	5	3	15
V2.5.6	At least three (3) ore more years within the past five (5) professional experience using Qt framework as a widget toolkit.	5	2	10
V2.5.7	A minimum of three (3) or more years over the past five (5) years, in the development of web applications, preferably Sencha Ext JS (Sencha cmd).	5	2	10
V2.5.8	At least five (5) or more years within the past ten (10) of professional experience with SQL and database programming, ideally using Oracle and/or PostgreSQL databases, experience designing data access layers and data models for an application.	5	2	10
V2.5.9	Working knowledge and experience in 2 or more of last 5 years using the GNU Autotools and RPM for software packaging, compilation and distribution.	5	0.5	2.5
V2.5.10	Experience in 2 or more of last 5 years with scripting techniques for automated testing and continuous integration and deployment. Details shall be provided.	5	1	5
V2.5.11	A minimum of two (2) or more years of experience with GitLab CI/CD.	5	0.5	2.5
V2.5.12	A minimum of two (2) or more years of experience as a Technical Writer on projects with similar scope, that demonstrate the solid understanding of Software development methodologies and the ability to conduct research into a wide range of IT issues and proven ability to write technical documentation.	5	1	5
V2.5.13	Developer on at least two (2) or more projects involving programming using 2D/3D scientific visualization libraries (visualizations of time series, histograms, surface plots, scatter plots, spectrograms).	5	1	5
	Subtotal	**65**		**110**
	TOTAL - Technical Evaluation	**80**		**160**

EVALUATION METHOD:

1. **Technical Evaluation:**

The technical evaluation process will be done in two stages:

1) Stage 1: Technical proposals will first be evaluated against the mandatory requirements outlined in section 1 above, on a PASS/FAIL basis.
Compliance with all mandatory requirements is required in order to pass stage 1 of the technical evaluation and to be further considered for stage 2 of the evaluation p
2) Stage 2: The technical proposals that have passed stage 1 of the technical evaluation process, will be evaluated against the weighted criteria set forth in the evaluat
In order to pass this stage, bidders must obtain a minumim **score of 100** and in accordance with the scoring table indicated below:

TABLE 2

Points	Scoring
0	Unsatisfactory - Response incomplete, inadequate and/or non-responsive to the criterion. Bidder does not clearly understand the criterion.
1 - 2	Weak - Does not meet the minimum technical, functional, or performance related criterion.
3	Good - Meets the minimum requirements of the criterion.
4	Very good - Exceeds the criterion in some areas.
5	Excellent - Exceeds the criterion in all areas.

2. **Financial and commercial evaluation**

Once the technical evaluation is finalized, the financial offers of the technically compliant bidders will be evaluated in accordance with the formula given below:

X= Max Available Points * Y/Z

Legend:
X= points to be assigned to the offer being evaluated
Y= price of the lowest priced, technically compliant offer
Z= price of the offer being evaluated

The Contract will be awarded to the bidder who receives the highest combined score resulting from the technical and financial evaluations.
The weight of the technical and financial components is 60% and 40% respectively, subject to contractual acceptability

The Contract will be awarded to the bidder who receives the highest combined score resulting from the technical and financial evaluations, subject to contractual and commercial acceptability.

Attachment 2b
Evaluation Criteria and Method
Lot 2: GrandSIM

Ref No. in TOR	1.QUALIFICATION REQUIREMENTS (PASS/FAIL) for GrandSIM	PASS/FAIL
	Requirements for the Contractor (PASS /FAIL)	**PASS/FAIL**
V.1.1	At least six (6) staff are included in the Team Roster that collectively meet the requirements as described in Section V.2.4 and V.2.5. This shall apply for the initial roster and throughout the Contract period	**PASS**/FAIL
V.1.2	Demonstrated experience implementing at least three (3) projects of similar scope and complexity in the last seven (7) years	**PASS**/FAIL
V.1.3	Demonstrated experience, in two of the last five (5) years, in using a recognized formal project management methodology (how the work is to be managed and controlled, risk management, reporting, planning and assurance of quality), such as PRINCE2.	**PASS**/FAIL
V.1.4	Demonstrated experience, in two of the last five (5) years, in using an Agile framework, such as Scrum.	**PASS**/FAIL
V.1.5	A staff turnover below 20% per year over the past 3 years	**PASS**/FAIL
V.1.6	All reports, documentation, and communication (written and oral) supplied to the Commission shall be in English and submitted in an electronic form.	**PASS**/FAIL
V.1.7	Documented statement or evidence that the Contractor will be able to adjust the working hours of staff assigned to the Software Team, to overlap at least three hours with the Commission's working hours (9am to 5pm CET), as deemed necessary by the Commission.	**PASS**/FAIL
	Requirements for the Contractor's Personnel (PASS /FAIL) for GrandSIM	**PASS/FAIL**
V2.4.1	A university degree in Computer Science, Mathematics, Physics, software engineering, nuclear engineering or related scientific/technical subject (with accompanying explanation).	**PASS**/FAIL
V2.4.2	At least two (2) years of recent experience using Agile framework such as Scrum.	**PASS**/FAIL
V2.4.3	At least one (1) year of recent experience working with a ticket management system such as Jira.	**PASS**/FAIL

Only bidders who pass all above criteria will be considered for the point system evaluation (2nd stage)

No.	2.TECHNICAL REQUIREMENTS - EVALUATION CRITERIA AND METHOD (GrandSIM)	Points		
	Quality of the Proposal	**Max Points**	**Factor**	**Weighted score**
Gerneral	Extent to which all aspects of the ToR have been addressed in sufficient detail and clarity.	5	4	20
General	Understanding of the scope of work and the responsibilities of the Contractor	5	3	15
VII	Risk Management Plan supplied and in sufficient detail (Risks may include but are not limited to technical challenges, changes in project requirements/scope, resource constraints, schedule delays, integration difficulties, and third-party software dependencies).	5	3	15
	Subtotal	**15**		**50**
	Skills and experience of (key) personnel to be met for GrandSIM (GrandSIM)	**Max Points**	**Factor**	**Weighted score**
V2.5.1.5	At least 3 or more years of experience working with GEANT4 Monte Carlo simulation software with a focus on modelling of radiation detection systems. Detailed examples must be provided.	5	4	20
V2.5.2	Demonstrated experience in at least two (2) or more projects in the development and integration of complex operational software systems, for radionuclide applications or a related field.	5	1	5
V2.5.3	A minimum of three (3) or more years of experience, providing software maintenance and support services for complex and custom software systems.	5	1	5
V2.5.4	A minimum of five (5) or more years over the past ten (10) years of experience in all stages of software development using C++ programming language.	5	2	10
V2.5.5	A minimum of five (5) or more years over the past ten (10) years of experience in all stages of software development Python programming language.	5	2	10
V2.5.8	At least five (5) or more years within the past ten (10) of professional experience with SQL and database programming, ideally using Oracle and/or PostgreSQL databases, experience designing data access layers and data models for an application.	5	1	5
V2.5.9	Working knowledge and experience in two (2) or more of the last five (5) years using the GNU Autotools and DNF/RPM for software packaging, compilation and distribution	5	1	5
V2.5.13	Developer on at least two (2) or more projects involving programming using 2D/3D scientific visualization libraries (visualizations of time series, histograms, surface plots, scatter plots, spectrograms).	5	1	5
	Subtotal	**40**		**65**
	GrandSIM total	**55**		**115**

EVALUATION METHOD:

1. Technical Evaluation:

The technical evaluation process will be done in two stages:

1) Stage 1: Technical proposals will first be evaluated against the mandatory requirements outlined in section 1 above, on a PASS/FAIL basis.
Compliance with all mandatory requirements is required in order to pass stage 1 of the technical evaluation and to be further considered for stage 2 of the evaluation process;
2) Stage 2: The technical proposals that have passed stage 1 of the technical evaluation process, will be evaluated against the weighted criteria set forth in the evaluation matrix above.
In order to pass this stage, bidders must obtain a minumim score of 75 and in accordance with the scoring table indicated below:

TABLE 2

Points	Scoring
0	Unsatisfactory - Response incomplete, inadequate and/or non-responsive to the criterion. Bidder does not clearly understand the criterion.
1 - 2	Weak - Does not meet the minimum technical, functional, or performance related criterion.
3	Good - Meets the minimum requirements of the criterion.
4	Very good - Exceeds the criterion in some areas.
5	Excellent - Exceeds the criterion in all areas.

2. Financial and commercial evaluation

Once the technical evaluation is finalized, the financial offers of the technically compliant bidders will be evaluated in accordance with the formula given below:

X= Max Available Points * Y/Z

Legend:
X= points to be assigned to the offer being evaluated
Y= price of the lowest priced, technically compliant offer
Z= price of the offer being evaluated

The weight of the technical and financial components is **60% and 40% respectively**, subject to contractual acceptability.

The Contract will be awarded to the bidder who receives the highest combined score resulting from the technical and financial evaluations, subject to contractual and commercial acceptability.

ATTACHMENT 3

Format of Financial Proposal

RFP No. 2025-0068/RAHMAN:
PROVISION OF SOFTWARE ENGINEERING SERVICES FOR RADIONUCLIDE (RN) DATA ANALYSIS ON A CALL-OFF BASIS

MAX QUANTITY UNDER EACH PERIOD	CALL-OFF PERIOD 1 - 3 years OR for max of 3900 person-days in EUR or USD	CALL-OFF PERIOD 2 (OPTIONAL) - 2 years OR for max of 2600 person-days in EUR or USD	CALL-OFF PERIOD 3 (OPTIONAL) - 2 years OR for max of 2600 person-days in EUR or USD
Staff fee - Off-site			
Staff fee - On-site			
Travel costs	Estimated maximum of **6 return trips**	Estimated maximum of **4 return trips**	Estimated maximum of **4 return trips**
Return transport cost for 1 return trip for 2 staff of the Contractor (if applicable) - (on a separate sheet please specify the point of departure/destination and break down of lump sum proposed)			
Other costs (if applicable)			
Overall total			

NOTES:
1) Please specify currency (USD or Euro only). The rates shall be firm and fixed throughout the term of the Contract.

2) This is a unit-based Contract. The exact number of working days will be determined/called-off in the form of Work Order (WO) at the rates quoted in this Attachment.

3) The person-days noted are an upper limit, and the Commission reserves the right, at its sole discretion, to call-off fewer person-days or no person-days at all.

4) Estimated costs for travel based on the most economic and direct route shall be specified in the Financial Proposal. Bidders shall indicate whether the travel costs (without DSA) are firm and fixed for the duration of the Contract, or they are estimated. In the case the travel costs are estimated, payment shall be based on actual costs against relevant supporting documentation e.g. invoices for travel, and shall not exceed 10% of the estimate.

5) If applicable, Daily Subsistance Allowance (DSA) shall be calculated based on the values provided by the International Civil Service Commission (ICSC) https://icsc.un.org/. Daily subsistance/per diem will be reimbursed at the applicable Daily Subsistance Allowance (DSA) rate of the United Nations (and UN EUR/USD exchange rate, if applicable).

Attachment 4

"Procedure for Submission of Electronic Offers in 2 Sealed Files"

The Commission invites you to submit your sealed offer (Bid, or Proposal) in response to the solicitation forming part of this request.

Please be sure to follow the instructions below very carefully, so that the documents you submit are encrypted, and cannot be opened without an encryption key (password). If the documents are not encrypted, they will not be accepted as part of this tender process.

CRITICAL INFORMATION:

Create separate zip files for the technical offer and the financial offer (labelling them clearly in the title) with different encryption keys. Instructions for how to do this are provided below.

Step 1: You provide the encryption key (password) for the *Technical Offer only* (in accordance with the below instructions)!

Step 2: After the Commission has performed the evaluation of the Technical Offer, if your Technical Offer is considered to be acceptable, the Commission will request the encryption key (password) for the Financial Offer you have already submitted by the tender Deadline.

Should you have any questions, please send an email to procurement@ctbto.org.

We recommend that you leave yourself plenty of time to complete the below process (including getting any necessary assistance from the Commission), as late offers will not be accepted.

INSTRUCTIONS:

1. In a **WINDOWS** environment, one way of meeting the requirements is as follows.

   We recommend using the open-source, free software **7-zip**, but if you are comfortable with other tools, the result should be the same, as long as you can apply encryption to the archive. In the below, we'll use 7-zip as an example. (You can download the 7-zip code for Windows at: 7-zip.org)

2. In **LINUX** environment, you can use, for instance, "sha1sum" on the command line.

Creating the archives for submission

Regardless of whether the offer is a single file, or a collection of files, the files are easier to manage if delivered as a single, compressed file. Compressing the archive is a common way to meet size limitations in email systems.

As an example of how to submit your offer in the required format: assuming you are supplier "SOFTCOMP" and have the following files related to the offer for "RFP 2020-0010/EDWALD". *(You will need to replace these elements with the real information for your actual offer in line with the relevant Instructions for Preparation and Submission of Proposals/Bids.)* Assuming further that you have installed the 7-zip software on the Windows system you are using.

We will only go through the creation of the Technical Offer (Proposal/Bid) component; the Financial Offer (Proposal/Bid) component is similar.

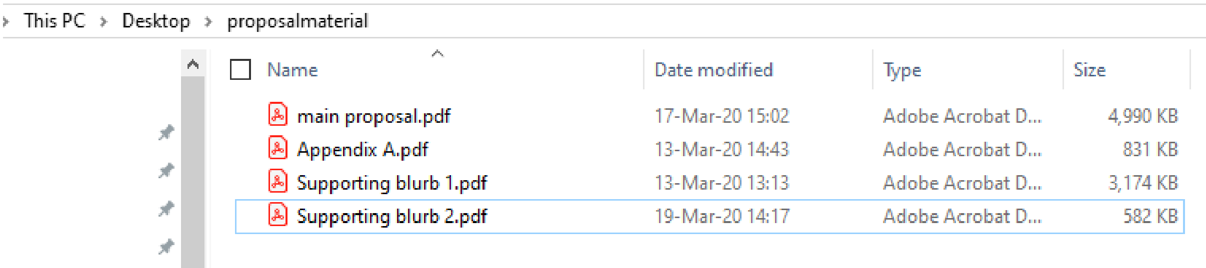


Figure 1 An example set of files to be submitted

Select the four files and right-click; a Dialog box pops up, with one of the options being "**7-ZIP >**". Hover your cursor over the " **>**" part and a few more options appear, select the "**Add to archive**" option.

Another dialog box pops up (see 'Figure 2, *Creating an Archive*', next page):

Using the standard Windows methods, select a suitable location for the archive (if you don't change it, the archive gets created right where the selected files are), and give it a name in the form of: "SOFTCOMP-2020-0010-EDWALD-TECHNICAL-BID", of course replacing all the elements with the true values for the offer in question: the actual company indicator, and the actual RFP/ITB identification string. Note that it is not possible to put a slash "/" in the file name, and therefore put a dash "-" instead. Leave the file extension ".zip' as is.

Leave all the other settings as is, except: **add a password to the encryption** (see figure 2 below). This is done by typing the same password (of your choosing) twice in the two text fields in the lower right hand corner.

Make a note of this password. You must choose different passwords for the two zip archives, that is, the Technical and the Financial Proposal/Bid.

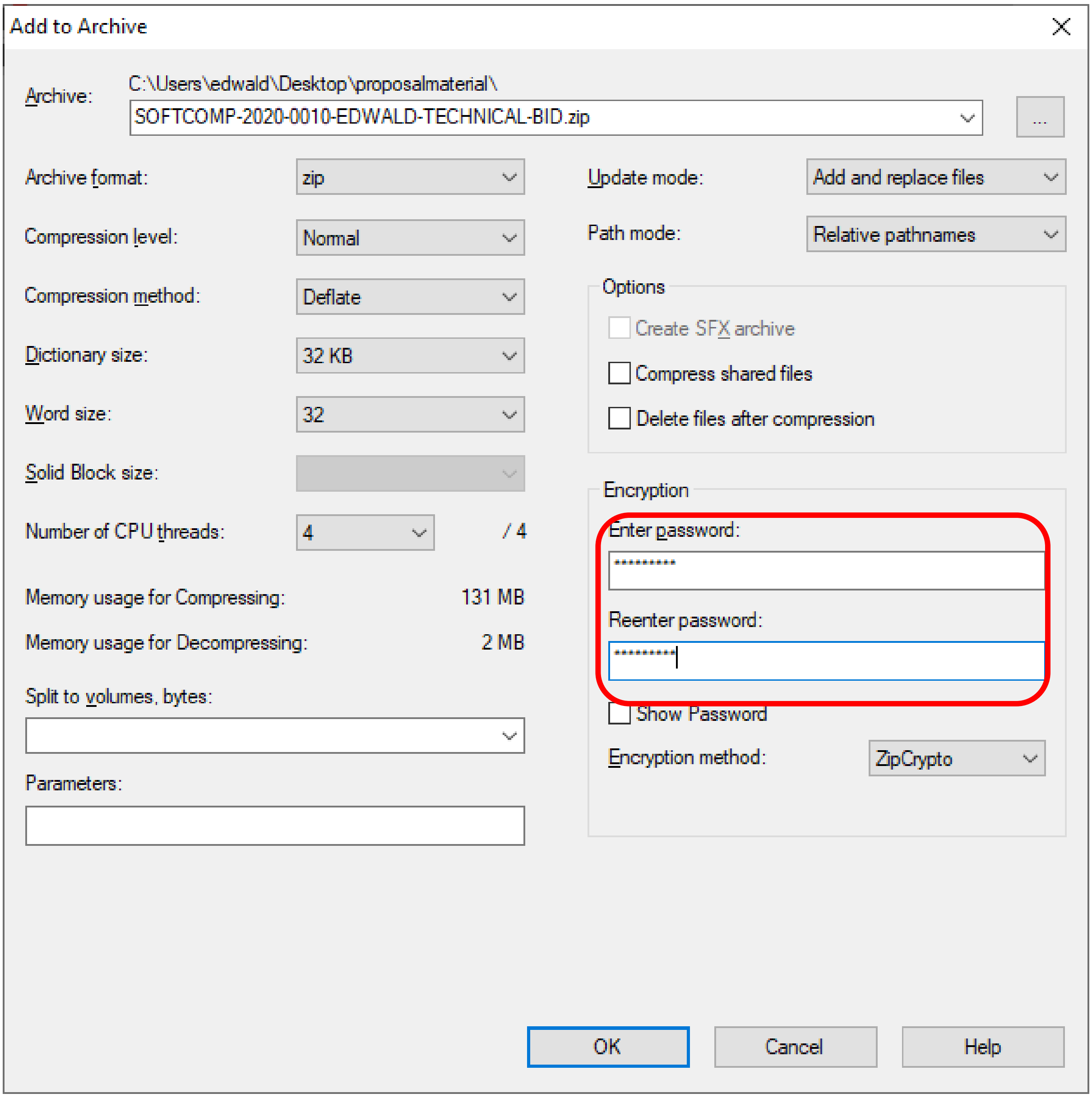


Figure 2 Creating an Archive

Now, we seek the “SHA1 Hash”, and electronic fingerprint of the archive you have just created. The hash is a string calculated from your file(s) and can be used to guarantee that the file has not been modified since you created it. Any change to the file will result in a different hash value.

There are many ways of calculating this; two common options are decribed below.

If the appropriate functionality is available in your Windows environment: Select the compressed archive in the Windows file manager, (eg. SOFTCOMP-2020-0010-EDWALD-TECHNICAL-BID.zip) and right click. One of the options to select is "**CRC SHA >**". Hovering over the " **>**" brings a few more options to light, select the **SHA-1** option. A smaller dialog pops up: (see Figure 3, *SHA1* below). Clicking Ctrl-C grabs the contents of this box. You can close the box after copying the contents. (You can paste the contents into a mail message, for instance.)

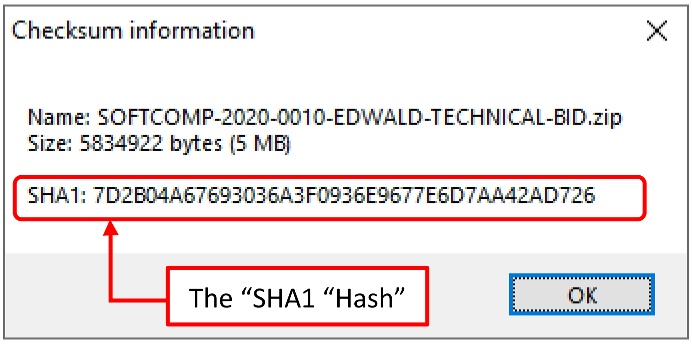


Figure 3 SHA1

If this CRC SHA function is not available by 'right-click' on your Windows version, you can also do this from 'the command line', a slightly more complicated way. Open a CMD window (see sidebar below), move to the folder where your archive is, and execute the command: "`certutil -hashfile` *`SOFTCOMP-2020-0010-EDWALD-TECHNICAL-BID.zip`* `sha1`" where you obviously replace the name of the file with your real file name. The output of this command is the SHA1 "hash". You can copy-and-paste the string for use in the email (below).

Sidebar: How to open a CMD window in Windows: The way to open a Command window (or 'terminal') depends on the version of Windows you have. The different methods are very clearly described in the following article, but a quick internet search will find multiple descriptions. https://www.lifewire.com/how-to-open-command-prompt-2618089

Finally,

1. Create a new email, Subject: example- "SOFTCOMP-2020-0010-EDWALD". Add the two compressed archives, that is, the Technical Offer and the Financial Offer archives as attachments. The text of the email should contain the SHA1 information for both archives. **SEND THIS TO:** sealed_bids@ctbto.org (note that there is an underscore "_" between "sealed" and "bids"). (Should the email become larger than your mail system allows, you can

try sending the two archives in separate emails. Take care to include the right SHA1 information with each file.)

2. Create a new email, Subject: example- "SOFTCOMP-2020-2010-EDWALD-Technical Offer" the contents of which must contain the Encryption Key for the Technical Offer (the password you used when creating the Technical Offer). (Again, note the underscore between 'bid' and 'keys'.)
   SEND THIS TO: bid_keys@ctbto.org

   IMPORTANT NOTE: As stated above, only send the Encryption Key for the Technical Offer to the bid_keys@ctbto.org mailbox when sending your Technical and Financial Offer to the sealed_bids@ctbto.org mailbox. You shall only send the Encryption Key for the Financial Offer to the Commission if and when informed by the Commission that your Technical Offer had been evaluated as "technically acceptable".

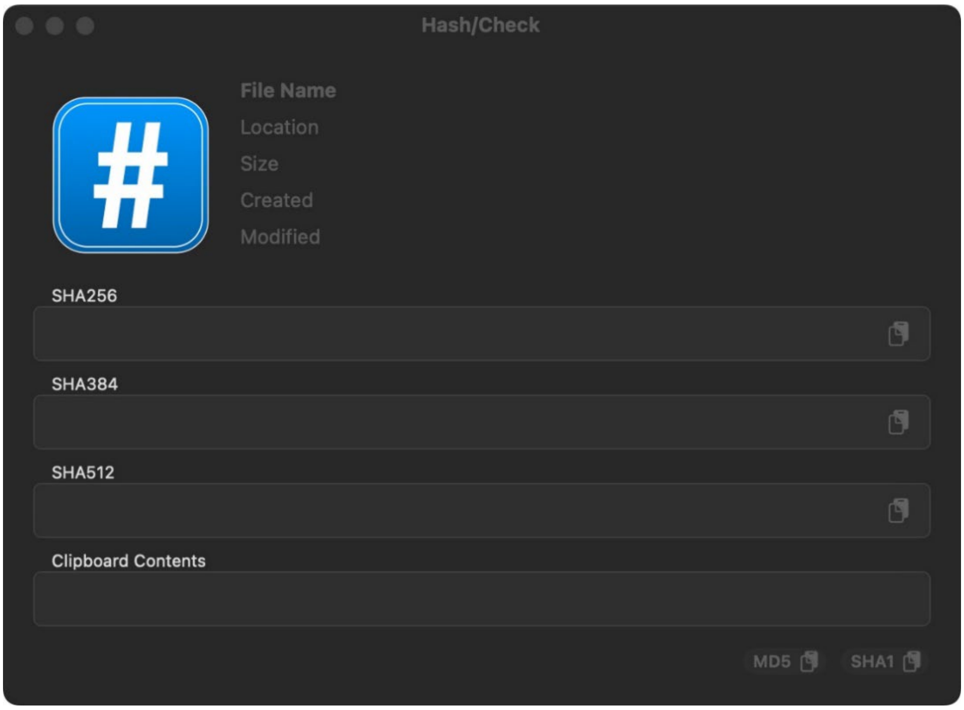
   The Financial Offer Encryption Key will need to be provided by you to the same e-mail (bid_keys@ctbto.org) within 48 hours of the Commission's request, clearly marked in Subject: Encryption Key for (example):"SOFTCOMP 2020-2010 EDWALD-Financial Offer". If your Offer is not considered "technically acceptable", the Commission will not request an Encryption Key for your Financial Offer, and it will remain unopened.

   As mentioned above, should you have questions or difficulties, please send an e-mail to procurement@ctbto.org.

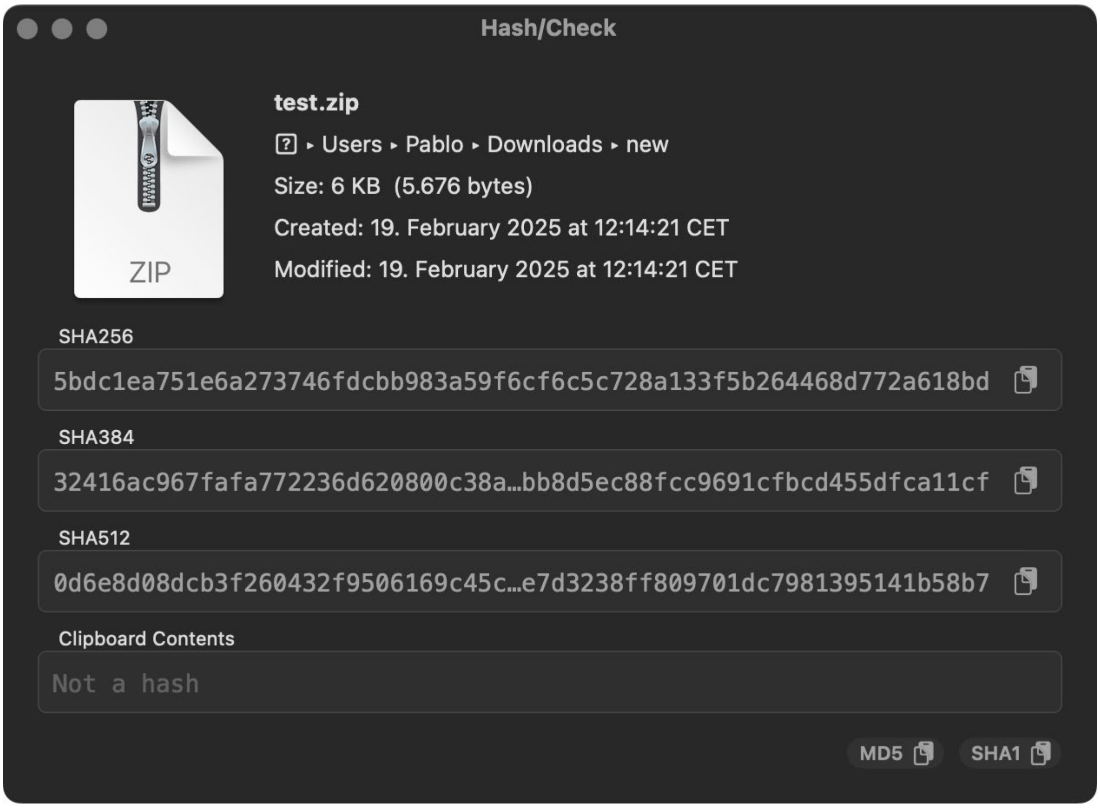
For MAC users:

1. Please download Hash/Check app: https://apps.apple.com/at/app/hash-check/id1550525767?l=en-GB&mt=12

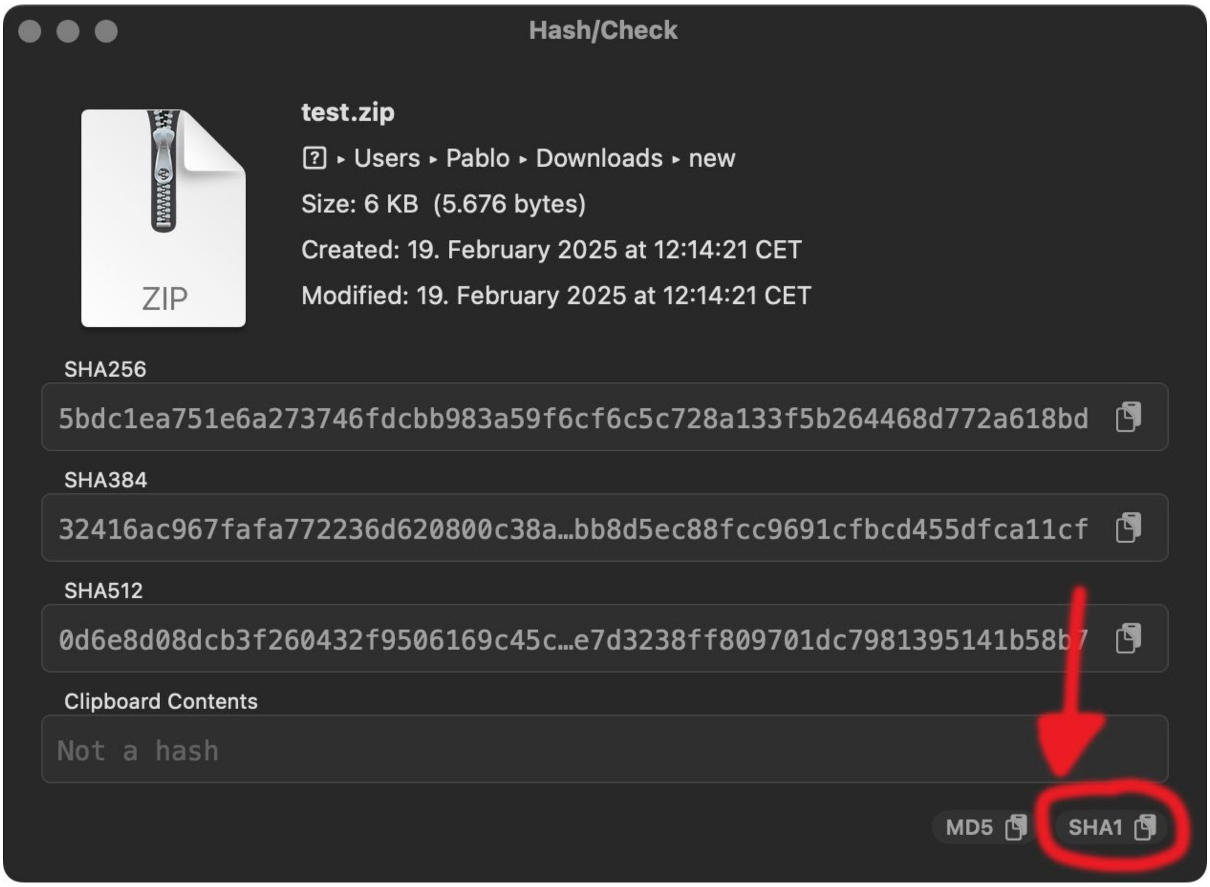
2. It is very simple to use. After installing, just open the app and click on "File" to open the zip file you want to inspect.



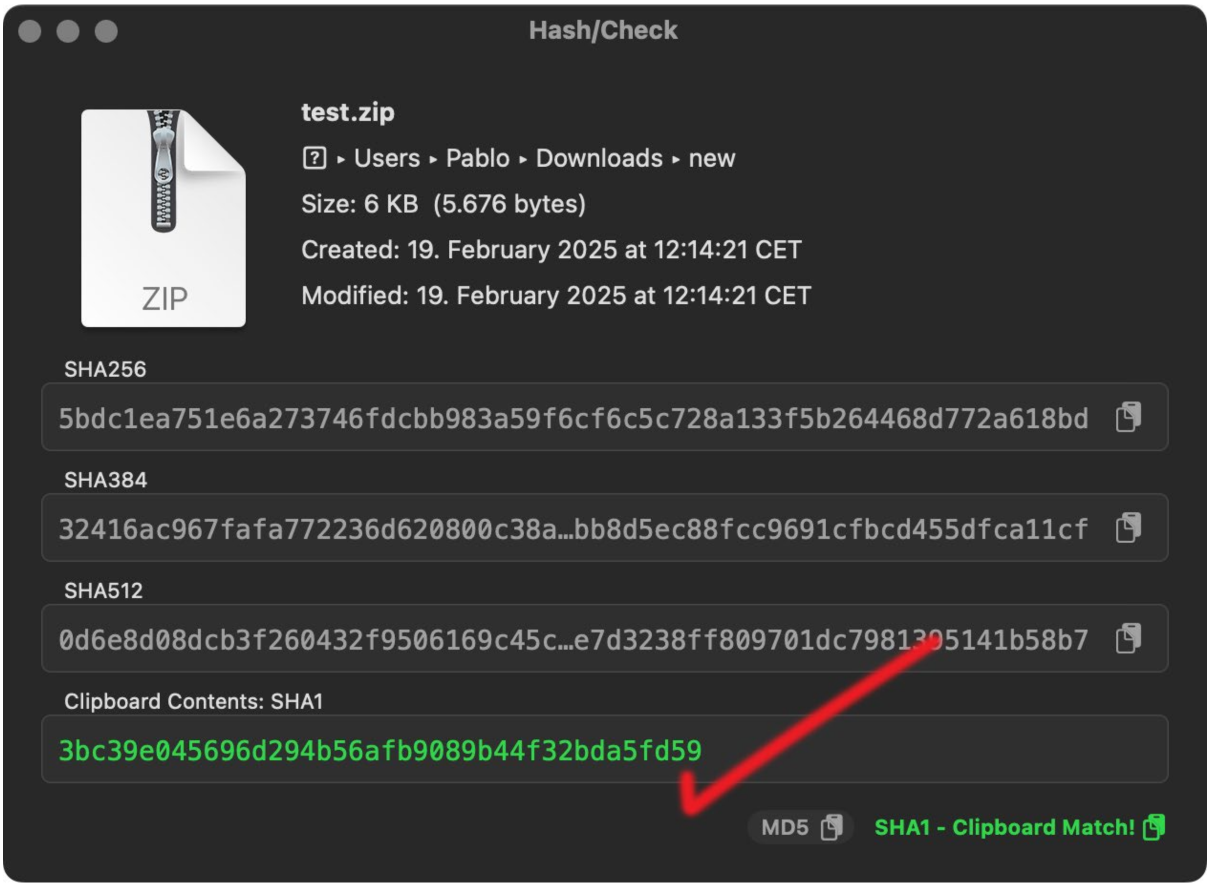
3. Please use your submitted technical and financial proposals



4. And it automatically creates several different hash values … --- But the one we need SHA1 is not there …
So you press on the little SHA1 icon on the bottom right …



5. The SHA1 hash is calculated and copied to the clipboard automatically for further use.



-----------------------------------OR--

Another alternative would be to use the terminal and the command: shasum /path/to/file
Here is a little tutorial on how to use it. It is strait forward and simple to use. Please see attached the instructions as a pdf as well.
https://osxdaily.com/2012/02/05/check-sha1-checksum-in-mac-os-x/

Finally,

1. Create a new email, Subject: example- “SOFTCOMP-2020-0010-EDWALD”. Add the two compressed archives, that is, the Technical Offer and the Financial Offer archives as attachments. The text of the email should contain the SHA1 information for both archives. **SEND THIS TO:** sealed_bids@ctbto.org (note that there is an underscore “_” between “sealed” and “bids”). (Should the email become larger than your mail system allows, you can try sending the two archives in separate emails. Take care to include the right SHA1 information with each file.)

2. Create a new email, Subject: example- "SOFTCOMP-2020-2010-EDWALD-Technical Offer" the contents of which must contain the Encryption Key for the Technical Offer (the password you used when creating the Technical Offer). (Again, note the underscore between 'bid' and 'keys'.)
   SEND THIS TO: bid_keys@ctbto.org

   IMPORTANT NOTE: As stated above, only send the Encryption Key for the Technical Offer to the bid_keys@ctbto.org mailbox when sending your Technical and Financial Offer to the sealed_bids@ctbto.org mailbox. You shall only send the Encryption Key for the Financial Offer to the Commission if and when informed by the Commission that your Technical Offer had been evaluated as "technically acceptable".

   The Financial Offer Encryption Key will need to be provided by you to the same e-mail (bid_keys@ctbto.org) within 48 hours of the Commission's request, clearly marked in Subject: Encryption Key for (example):"SOFTCOMP 2020-2010 EDWALD-Financial Offer". If your Offer is not considered "technically acceptable", the Commission will not request an Encryption Key for your Financial Offer, and it will remain unopened.

   As mentioned above, should you have questions or difficulties, please send an e-mail to procurement@ctbto.org.

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MODEL CONTRACT

(Shopping Cart No. XXX)
(SAP No. XXXX)

between

THE PREPARATORY COMMISSION

FOR THE COMPREHENSIVE NUCLEAR-TEST-BAN TREATY

ORGANIZATION

and

THE NAME OF THE CONTRACTOR

for

PROVISION OF SOFTWARE ENGINEERING SERVICES FOR RADIONUCLIDE (RN) DATA ANALYSIS ON A CALL-OFF BASIS

This Contract comprises this cover page, a table of contents, 9 (nine) pages of text, a signatories page, a List of Annexes and 3 (three) Annexes (A to C)

June 2025

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MODEL CONTRACT

This CONTRACT is entered into between the PREPARATORY COMMISSION FOR THE COMPREHENSIVE NUCLEAR-TEST-BAN TREATY ORGANIZATION (hereinafter referred to as the "Commission"), having its office located at Wagramer Strasse 5, 1400 Vienna, Austria, and [NAME OF THE CONTRACTOR] (hereinafter referred to as the "Contractor"), having its registered office located at ____________________ [address] (both hereinafter individually referred to as the "Party" and collectively as the "Parties").

The Parties hereto mutually agree as follows:

1 DEFINITIONS

In this Contract, words and expressions shall have the same meanings as respectively assigned to them in the General Conditions of Contract and the Terms of Reference. In addition, the following words and expressions shall have the meanings hereby assigned to them:

"Annex A" means the Commission's General Conditions of Contract.

"Annex B" means the Commission's Terms of Reference.

"Annex C" means the Contractor's Proposal.

"Contract" means this document, its Annexes and any further modifications or such further documents as may be expressly incorporated in this Contract by the Parties in accordance with Clause 21 (Contract Amendment) below.

"Contractor" means the legal entity named in the preamble of this Contract or its successors. The Contractor shall be the only interface for all matters pertaining to execution of the Work under this Contract.

"Party(ies)" means the Commission and/or the Contractor, as the context requires.

"Rule(s)" means any regulation(s), official directive(s), ordinance(s), guideline(s), customs and practices.

"Services" means the activities or tasks to be performed by the Contractor under the Contract as requested by the Commission under the WO.

"Software" means the software and the source code described in Annex B and developed by the Contractor under this Contract.

"Taxes" shall mean all direct and indirect taxes (including value added tax, general sales tax or goods and services tax), assessments, fees, customs duties, liens and charges, insofar as much as they are levied in conclusion or implementation of the Contract, including customs restrictions and charges of a similar nature in respect of articles imported or exported for the Commission's official use**.**

“Work” means all the goods and services to be provided by the Contractor, including its affiliates and/or subcontractors, in order to fulfil all its obligations under the Contract, and the remedying of any defects therein.

“Work Orders (‘WO’)” mean orders issued by the Commission which specify the (parts or portions of) Work to be performed by the Contractor upon request by the Commission in accordance with Annexes B and C.

2 AIM OF THE CONTRACT

The aim of this Contract is the “*Provision of Software Engineering Services for Radionuclide (RN) Data Analysis on a Call-off Basis”* (hereinafter referred to as the “Work”) to the Commission.

3 ENTRY INTO FORCE AND DURATION OF THE CONTRACT

The Contract shall enter into force upon the date of the last signature by the authorized Representatives of the Parties (hereinafter referred to as the “**Effective Date**”) and shall be valid until the Parties fulfill all their obligations hereunder.

4 COMMENCEMENT AND COMPLETION OF THE WORK

(a) The Commission shall have the right, but not the obligation, to call-off the Works in the form of WO within a period of three (3) years from the Effective Date or the performance of a maximum of 3,900 (three thousand nine hundred) person-days by the Contractor, whichever occurs first (hereinafter referred to as the “**Call-off Period**”). The commencement and completion date for the performance of the Works (hereinafter referred to as “**Commencement Date**” and “**Completion Date**”, respectively) will be set out in the respective WO.

(b) The Commission shall have the option to extend the Call-off Period two (2) times, each extension of two (2) years or the performance of a maximum of 2,600 (two thousand six hundred) person-days by the Contractor, whichever occurs first subject to the availability of funds, under the same terms and conditions as those of this Contract. The Commission will inform the Contractor about its intention to extend the Work at least one (1) month prior to the expiry of the relevant Call-off Period. The optional extensions will be implemented through a written notification to the Contractor by the Commission.

5 STANDARD OF WORK

The Contractor shall perform the Work in a workmanlike manner in conformity with standard professional practices, using qualified personnel and in strict accordance with the Contract. The Contractor shall furnish the highest skill and judgement and cooperate with the Commission, including all the Commission's consultants and agents, in best furthering the interests of the Commission and the aim of this Contract. The Contractor shall provide efficient business administration and supervision, and it shall perform the Work in the best way and in the most expeditious and economical manner consistent with the requirements of the Contract.

6 RESPONSIBILITIES OF THE CONTRACTOR

(a) The Contractor shall provide the Work described in Annexes B and C.

(b) The Contractor shall provide qualified English-speaking personnel as necessary to perform the Work under this Contract. The key persons shall be available for possible tasks related to the Work throughout the duration of the Contract period. Any replacement of the key personnel shall be made in accordance with Clause 7 of Annex A.

(c) The Contractor acknowledges that after the completion of the Work under this Contract, the Commission shall own the Software and source code described in Annex B and developed under this Contract, and the Contractor shall have no rights in that Software or source code unless granted by the Commission under Clause 24 of this Contract or in writing under a separate agreement".

7 ORGANISATION OF CONTRACT IMPLEMENTATION

(a) During the term of the Contract, the Commission has the right, but not the obligation, to initiate performance of the Work through the issuance of individual WOs in accordance with Annex B based on the firm fixed unit prices set out in Annex C. The Contractor shall not perform any Work if not requested by the Commission through an WO. However, the Contractor may propose a WO for the Commission's evaluation.

(b) The WO issued by the Commission shall be the basis for acceptance, invoicing and payment of any Work performed by the Contractor.

(c) The performance of the Work shall be made in full in accordance with the respective WO. Partial service performance of a WO will not be accepted and reimbursed without prior written agreement by the Commission.

(d) The Work shall be performed at the place and within the approved Work Plan specified in the relevant WO.

(e) The Commission may revise a WO as and when it may deem necessary.

8 WARRANTY

(a) The provisions of Clause 28 of Annex A shall apply to the Work performed by the Contractor.

(b) The Contractor shall ensure that the Commission shall experience no loss of service or support level by sub-contractors or repair agents acting on behalf of the Contractor.

9 PERMITS, NOTICES, LAWS AND ORDINANCES

(a) The Contractor shall obtain and pay for all permits and inspections necessary for the proper execution and completion of the Work that are customarily obtained upon execution of this Contract and that are legally required at the time the Proposal is received by the

Commission. This shall include, but not be limited to, work permits, visa, or similar documents.

(b) The Contractor shall give all notices required by the nature of the Work.

(c) If the Contractor notices that the Work or any part thereof required under this Contract is not in accordance with applicable laws and Rules, or with technical or safety standards, it shall promptly notify the Commission thereof in writing.

10 PROTECTION OF PERSONS AND PROPERTY

(a) The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programmes in connection with the Work.

(b) The Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury and loss to:

(i) all employees on the Commission's premises and all other persons who may be affected thereby;

(ii) all the Work, equipment, its spare parts, materials and supplies to be incorporated therein, whether in storage on or off the Commission's premises, which are under the care, custody or control of the Contractor or any of its subcontractors; and

(iii) other property on the Commission's premises or adjacent thereto.

(c) The Contractor shall give all notices and comply with all applicable laws and Rules bearing on the safety of persons and property and/or their protection from damage, injury and loss.

(d) The Contractor shall erect and maintain, as required by existing conditions and progress of the Work, all reasonable safeguards for the safety and protection of persons and property, including posting danger signs and other warnings against hazards and promulgating safety regulations.

(e) When the use or storage of combustible, explosive or other hazardous materials is necessary for the execution of the Work, the Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel.

(f) The Contractor shall be responsible for the prevention of accidents on the Commission's premises during the execution of the Work.

(g) In any emergency affecting the safety of persons or property, the Contractor shall promptly act to prevent threatened damage, injury and loss.

(h) The Contractor shall promptly remedy all damage and loss to any property, referred to in Sub-Clause (b) above, caused in whole or in part by the Contractor, any subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable and for which the Contractor is responsible under Sub-Clause (b) above, except damage and loss attributable to the acts or omissions of the Commission or anyone directly or indirectly employed by it, or of anyone for whose acts the Commission may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to its obligations under Clause 9 of Annex A.

11 RESPONSIBILITIES OF THE COMMISSION

The Commission shall designate members of its staff to act as points of contact for the Contractor to ensure that the Work is carried out in accordance with Annexes B and C and shall promptly notify the Contractor thereof. The Commission shall respond promptly to requests for information by the Contractor regarding the Work.

12 CONTRACT PRICE

(a) The Commission shall pay to the Contractor, in consideration of the full and proper performance of its obligations under the Contract, as follows:

(i) For each WO issued during the firm Call-off Period specified in sub-Clause 4(a) above, the firm fixed day rate pursuant to Annex C and, if applicable, the variable costs (travel costs and other expenditure) pursuant to Annex C;

(ii) subject to sub-Clause (b) below, for each WO issued during the first optional extension of the Call-off Period specified in Clause 4(b) above, the firm fixed unit prices pursuant to Annex C and, if applicable, the variable costs (travel costs and other expenditure) pursuant to Annex C;

(iii) subject to sub-Clause (b) below, for each WO issued during the second optional extension of the Call-off Period specified in sub-Clause 4(b) above, the firm fixed unit prices pursuant to Annex C and, if applicable, the variable costs (travel costs and other expenditure) pursuant to Annex C;

(hereinafter referred to as the “Contract Price”).

(b) In the event that the Commission decides to extend the Call-off Period before the end of the initial 36-month period, as foreseen in Clause 4 of this Contract, the Contactor will be reimbursed for the person-days called off in this period as follows:

(i) until the expiry of the initial Call-off Period, the daily rate set out in subparagraph (a)(i) above;

(ii) after the expiry of the initial Call-off Period, the daily rate agreed for the optional extension (subparagraph (a)(ii), or (iii) above).

(c) The firm fixed unit prices set out in Annex C shall be held fixed for the entire duration of the Contract.

(d) The Contract Price shall cover all costs and expenses incurred by the Contractor for the full and proper performance of all relevant obligations under the Contract (including travel, allowances, management and remuneration of the personnel, national income tax, medical insurance, and social security contributions).

(e) **[PLEASE IDENTIFY WHETHER TAXES ARE APPLICABLE UNDER THIS CONTRACT AND SELECT ONE OF THE FOLLOWING OPTIONS AT THE TIME OF AWARD]:**

The Contractor shall be reimbursed by the Commission for such taxes on the basis of actual amounts paid and duly documented by the Contractor as per Clause 13(e) below.

OR

No Taxes are applicable under this Contract.

13 PAYMENT

(a) The Contract Price shall be paid upon satisfactory completion of each deliverable for the Work and satisfactory completion of each WO and submission of the following:

i) Invoice drawn up in accordance with this Clause 13;

ii) Any other documentation that might be required under the applicable WO.

(b) The Commission will make the payments to the Contractor on the basis of an invoice submitted by the Contractor as per sub-Clause (d) below. All payments shall be made within 30 (thirty) days of the receipt and acceptance of the invoice, provided that the Work has been satisfactorily completed and has been accepted by the Commission.

(c) The making of any payment hereunder by the Commission shall not be construed as an unconditional acceptance by the Commission of the Work accomplished by the Contractor up to the time of such payment.

(d) The Contractor shall submit an invoice electronically, from the Contractor's official e-mail address in PDF format, duly signed and stamped by the Contractor and submitted to the Commission's email address specified in Clause 22 below. Each invoice shall contain the Contract number (CTBTO and SAP numbers), detailed banking instructions, including the name and address of the Contractor's bank, account number, account holder's name and SWIFT, IBAN and/or ABA codes for payment by electronic transfer.

[PARAGRAPH (e) BELOW ONLY APPLIES IF THERE ARE TAXES (SEE CLAUSE 12 (d) ABOVE). IF NO TAXES ARE APPLICABLE UNDER THIS CONTRACT, PARAGRAPH (e) SHOULD BE OMITTED.]

(e) Applicable Taxes payable by the Contractor and/or its subcontractor(s) in respect of the Work shall be invoiced separately or be separately identified on the invoice. Actual payment of the Taxes must primarily be supported by original documentation such as invoices, bank account statements, transfer orders, or receipts issued by the local tax or customs authorities. If submission of such original documentation is not possible for justifiable reasons, their copies could be accepted by the Commission provided that they are duly signed and certified by local tax or customs authorities. In case the currency in which the Taxes are levied is not the currency of the Contract, bank statements (or equivalent) showing the exchange rate used for the conversion should be submitted to the Commission, in addition to any other supporting documentation.

14 TEMPORARY SUSPENSION OF WORK

The Commission may, at any time, temporarily suspend the Work, in whole or in part, being performed by the Contractor under this Contract by giving 30 (thirty) days' advance notice in writing to the Contractor. The Work so suspended shall be resumed by the Contractor on the basis of a revised time schedule and on terms and conditions to be mutually agreed upon between the Parties.

15 DELAYS AND EXTENSION OF TIME

(a) If the Contractor is delayed at any time in the progress of the Work by any act or omission of the Commission or by any of its employees, or by any other contractor employed by the Commission, or by changes in the Work ordered by the Commission, or by any causes beyond the Contractor's reasonable control, or by any other cause which the Commission determines may justify the delay, then the time for completion of the Work shall be extended by an amendment to this Contract in accordance with Clause 21 below for such reasonable time as the Commission may determine.

(b) Any request for extension of the time for reasons referred to in Clause 15(a) above shall be submitted to the Commission not later than 20 (twenty) days after the commencement of the delay, otherwise said request shall be deemed to be waived. Such request shall state grounds for the delay and shall provide an estimate of the probable effect of such delay on the progress of the Work.

16 CONTRACTOR'S CLAIMS AND REMEDIES

In no event shall the Contractor make any claim against the Commission for or be entitled to additional costs or compensation resulting from any delays in the progress or completion of the Work or any portion thereof, whether caused by the acts or omissions of the Commission, including, but not limited to, damages related to overheads, loss of productivity, acceleration due to delay and inefficiency. The Contractor's sole remedy in such event shall be an extension of time for completion of the Work, provided the Contractor otherwise meets the requirements and conditions set forth in this Contract.

17 ENTIRE AGREEMENT

This Contract represents the final agreement in respect of the Work and shall supersede all prior agreements and representations between the Parties in this respect. Annexes A to C shall constitute integral parts of this Contract and shall be of full force and effect.

18 DISCREPANCIES

If there are discrepancies or conflicts between any of the documents that are part of this Contract, the document to prevail shall be given precedence in the following order:

(i) This document;

(ii) The Commission's General Conditions of Contract (Annex A);

(iii) The Commission's Terms of Reference (Annex B);

(iv) The Contractor's Proposal (Annex C);

(v) The relevant WO.

19 SEVERABILITY

If any term and/or provision of this Contract is or becomes invalid, illegal or unenforceable, the validity, legality and enforceability of the remaining provisions of this Contract shall not in any way be affected or impaired thereby.

20 NO WAIVER

Failure by a Party to enforce a right shall not be deemed to be a waiver of that right unless otherwise expressly provided in this Contract.

21 CONTRACT AMENDMENT

No modification of, or change in, this Contract, or waiver of any of its provisions, or additional contractual relationship with the Contractor shall be valid unless approved in the form of a written amendment to this Contract, signed by duly authorized Representatives of the Parties.

22 TRANSMISSION OF NOTICES AND OTHER DOCUMENTS

Notices, invoices, reports and other documentation under the Contract shall be delivered or sent to the relevant Party as follows (or to such person/title, address or email address as the Party may substitute by notice after the date of the Contract):

(a) The Commission:

For Contractual Issues:
Chief, Procurement Section
Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO)
Vienna International Centre
Wagramerstrasse 5, P.O. Box 1200
1400 Vienna, Austria
Tel: + (43 1) 26030 6350
E-mail: procurement@ctbto.org

For submission of invoices:
Accounts Payable
CTBTO Financial Services Section
Vienna International Centre
Wagramerstrasse 5, P.O. Box 1200
1400 Vienna, Austria
Tel: + (43 1) 26030 6292
E-Mail: Payable_Invoices@ctbto.org

For invoices related enquiries:
Payments@ctbto.org

(b) The Contractor:

<u>For Contractual Issues and Invoices and Related Enquiries:</u>

Name: …………….
Title ……………….
Address ………………
Tel: ……………………
Email: ………………..

23 EFFECTIVENESS

(a) Except as provided below, any communication in connection with the Contract will be deemed to be given as follows:

(i) if delivered in person, at the time of delivery;

(ii) if by registered mail or courier, when received;

(iv) if by electronic communication, when retrievable by the Commission in document form.

(b) A communication given under Clause 23(a) above that is received or becomes retrievable on a non-working day or after business hours at the seat of the Commission will only be deemed to be given on the next working day of the Commission.

24 SOFTWARE LICENCE

The Commission hereby grants the Contractor a non-exclusive, non-transferable, irrevocable license to use the Software for the duration of the Contract and for the purpose of doing the Work under the Contract. The use of the source code is only for the duration of the Contract and for the Work required under the Contract. All title, ownership rights and intellectual property rights in and to the Software shall remain with the Commission. The Contractor acquires no title, right or interest in the Software, other than the license(s) specifically granted herein by the Commission.

IN WITNESS hereof, the duly authorized Representatives of the Parties have executed this Contract:

For and on behalf of **the PREPARATORY COMMISSION FOR THE COMPREHENSIVE NUCLEAR-TEST-BAN TREATY ORGANIZATION:**

____

Name and Position

Date: __________________ Place: Vienna, Austria

For and on behalf of **[REGISTERED NAME OF THE CONTRACTOR]:**

____

Name and Position

Date: ___________________ Place: ______________

LIST OF ANNEXES

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ANNEX B: THE COMMISSION’S TERMS OF REFERENCE

ANNEX C: THE CONTRACTOR’S PROPOSAL

ANNEX B

TERMS OF REFERENCE

FOR THE PROVISION OF

SOFTWARE ENGINEERING SERVICES FOR RADIONUCLIDE (RN) DATA ANALYSIS

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I. Introduction

The Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (hereinafter referred to as the “Commission”) operates a global verification regime to monitor compliance with the Comprehensive Nuclear-Test-Ban Treaty. It provides timely data, assessments and other products and services to Signatory States of the Treaty. The International Monitoring System (IMS), consisting of 337 monitoring facilities worldwide, is managed from the Commission’s International Data Centre (IDC) in Vienna, Austria. More information can be found under www.ctbto.org.

The Commission develops and operates software to acquire, transmit, receive, monitor and process data from seismic, hydro-acoustic, infrasound and radionuclide stations from around the world. The data are transmitted to the IDC.

The IDC is responsible for continuously monitoring and reporting on the operational status of the IMS facilities, of communication links, and of its own processing systems. The IDC provides immediate notification to those responsible should the operational performance of any component fail to meet agreed levels set out in the relevant operational manual.

With the combined objectives of building up, maintaining, sustaining and operating the IMS network, and with supporting IDC activities from data acquisition to bulletin production while staying synchronised with the latest technological and scientific advancements, the Commission seeks to establish a new Contract for the provision of software engineering services to support IDC in maintaining and improving the radionuclide analysis software thus assuring best possible data quality and availability using state of the art scientific and computational methods.

II. Background

The Commission operates software to process radionuclide data measured at radionuclide monitoring stations around the globe and transmitted multiple times daily to the IDC in Vienna. The analysis methods apply to several radionuclide monitoring technologies: analysis of the gamma-ray spectra from isotopes associated with airborne particulates, gamma-ray spectra from noble gas (xenon) isotopes, and beta-gamma coincidence detection of xenon isotopes. The analysis software is used to calculate radioactivity concentrations of the isotopes in the air. The software includes an initial automatic analysis which is followed by an interactive review. The interactive review process may involve a reprocessing and reanalysis of the automated results with different parameters or calibrations.

The list in Appendix A : "List of RN_Apps", describes the principal set of the applications that are currently used in the radionuclide data analysis, processing and management of the data flow. The results of the processing are distributed in prescribed bulletins to Authorized Users. A selection of relevant documentation is also provided when noted:

a. "iNSPIRE manual v2.24" is the user's guide for both the HPGe (particulate and noble gas) and beta-gamma (noble gas) interactive review software (see Attachment A).
b. "GrandSIM" is a Python and GEANT4 based Monte Carlo simulation tool to model the interaction of radiation with matter. It is used to model the performance of radiation detection systems to generate semi-empirical efficiency calibrations and to calculate cascade correction factors.
c. "RNToolkit" is a web application to display and review the current and historical analysis results of the automated and interactive analyses. It includes capabilities for isotopic ratio analysis, and statistical assessments of data.
d. "CTBTO radionuclide DB schema" describes the relationships in the database used to store and organize the raw data and results of analysis and processing (see Attachment B).
e. "Formats and Protocols for Messages v8.1" describes the technical specifications and formats of the raw data and processed products that derived from the analysis of the raw data (see Attachment C).
f. "AutoSaint_SDD" describes the current software design for the automatic HPGe analysis software Autosaint for particulate stations and SPALAX xenon systems (see Attachment D). As part of this contract, the automated spectral analysis performed by this software will be re-developed with new algorithms for eventual integration into the radionuclide processing pipeline.

The current operating system in use is RedHat Enterprise Linux (RHEL) 7.9, which will be migrated to RHEL 9.x during the period of this contract. Upgrades to newer versions of RHEL may also occur throughout the Contract lifespan.

The automated processing software is mostly written in ANSI C, with some supporting libraries in C++. A few programs are in Java (to be migrated to Python during contract).

The new iNSPIRE platform is written in Python using the Qt framework as a widget toolkit. The software accesses the CTBTO Oracle RDBMS using ODBC and JDBC libraries. There are several support programs and scripts written in PERL and Python that also require service or migration during the Contract.

Since 2013, the Commission also provides radionuclide software components to the Member States of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) to allow them to perform their verification tasks. The NDC software called NDC-in-a-Box (NIAB) is designed to align as closely as possible with the IDC software.

The Commission has continued its development of software in relation to radionuclide monitoring technologies for On Site Inspection (OSI) by using concepts and components of the NDC-in-a-Box (NiaB) software package and tasks may be required to customize the NiaB for OSI purposes.

III. SCOPE OF WORK

The Commission seeks to establish a three (3) year Contract, with additional two (2) optional extensions of two (2) years each in accordance with the schedule and upper limit shown in Table 1 and subject to availability of funds. These Terms of Reference (hereinafter referred to as "ToR") form the technical framework for the supply of on-site and off-site software engineering services for radionuclide processing software (hereinafter referred to as "Services") by a main contractor for each service identified below and up to 2 (two) backup Contractors.

Two software engineering services are sought, and the Contractor must provide at least one of the following two services (lots) with preference given to suppliers who can support both:

Lot 1: Software engineering support as detailed in Section IV for all radionuclide processing and supporting software as listed in Appendix A: List of RN App.

Lot 2: Software engineering support for GrandSIM Monte Carlo based simulation software modules based upon the GEANT4 simulation toolkit in modelling all aspects of radiation interactions with detection systems.

The maximum volume of work under the Call-off Periods is shown in the table below. This volume serves only as an indication, and the Commission reserves the right, at its sole discretion, to call-off less or no person-days at all. The maximum number of days includes both off-site and on-site work.

Table 1

	Years	Estimated Person-days per Year	Total
Initial Call-Off Period	3	1300	3900
1st Extension	2	1300	2600
2nd Extension	2	1300	2600
Contract Total			**9100**

The following software engineering services are sought (see Section IV for the detailed requirements):

- IV.1 Software Development and Enhancement (Lots 1 and 2)
- IV.2 Software Support and Maintenance (Lots 1 and 2)
- IV.3 Software Testing Support (Lots 1 and 2)
- IV.4 Technical Writing (Lots 1 and 2)
- IV.5 Software Architecture Expertise (Lots 1 and 2)
- IV.6 GrandSim Support (Lot 2 only)

IV. PROVISION OF SOFTWARE ENGINEERING SERVICES

This section breaks down the description of the Services into separate types of work.

IV.1 Software Development and Enhancement (Lots 1 and 2)

IV.1.1 Work Specifications

In general, the Work involves the review and execution of the software design and implementation phases, and the delivery of code and documentation, which can be used to construct and deploy systems.

In particular, the Work may involve the following tasks:

- A review of the requirements specifications, any existing systems and databases and additional information requirements and comments expressed by the Commission's project manager. The outcome of this step shall be a revised requirements document forming the basis for planning the Work.
- Analysis of the requirement and design of the deliverables.
- Scheduling of the deliverables and estimating the effort to execute the Work.
- Delivery and acceptance support of each deliverable.
- Delivery of the documentation agreed for each project which will provide the Commission staff with a sound understanding of the rationale of the developed component, so that these staff can maintain and expand the system accordingly.
- Participate in virtual or in-person scrum meetings to discuss technical and implementation issues. These meetings will be 1 hour or less and are normally held on a weekly basis during core hours of the PTS (9 AM – 5 PM CET).

The detailed scope of the Service and specific requirements for a Software Project will be defined at the time when the Commission requests the Contractor to submit a Project/Work Plan (see Section VI).

IV.1.2 Deliverables

The deliverables shall follow standards specified by the Commission, which are based on industry best practices. The deliverables may include:

- A statement of the requirements / objectives of the software component.
- Source code as per PEP 8 (Python) Google Style Guidelines (C++) or other agreed coding standards when applicable. The use of Python docstrings are mandatory in all Python code.
- Test plans, test cases, test scripts and test results (of unit test, integration and system test and when applicable regression test).
- Results of review and inspection (architectural, database design, code, documentation when applicable).
- Technical documentation including design documents for the software components as per agreed standards.
- Workshops or (tele)conferences for knowledge transfer to the Commission staff.
- Recommendations / guidelines to help the Commission staff adhere to the implementation / design concepts.

- Changelog: a description of what changes were made relative to the previous release, along with a list of files that were modified by each change. Each release shall also include a list of outstanding items to be done, including any known defects.
- Release Highlights providing high-level details of changes

At the time when Work is called-off (see Section VI), the Commission may select deliverables from the above list, or request other deliverables deemed relevant to the project.

IV.2 Software Support and Maintenance (Lots 1 and 2)

IV.2.1 Work Specifications

In general, the Work involves the review and execution of the software transition and operation phases through the provision of support and maintenance services, mainly for custom software systems.

In particular, the Work may involve the following tasks:

- Perform remote troubleshooting.
- Provide proactive and/or reactive support services.
- Analysis of the current functionality of a software system.
- Provide and/or implement software patches and updates.
- Migrations for major releases of software.
- Implement deployment and release policies.
- Provide installation and usability assistance.
- Provide training or other services associated with operating the software.
- Track and perform software license code updates and upgrades (when applicable).

The detailed scope of the Service and specific requirements for a Software Project will be defined at the time when the Commission requests the Contractor to submit a Project/Work Plan (see Section VI).

IV.2.2 Deliverables

The deliverables shall follow standards specified by the Commission, which are based on industry best practices. The deliverables may include:

- Training materials.
- Source code as per PEP 8 (Python), Google Style Guidelines (C++) or other agreed coding standards when applicable.
- Test plans, test cases, test scripts and test results (of unit test, integration and system test and when applicable regression test).
- Updated technical documentation for the software components, as per agreed standards.
- Workshops or (tele)conferences for knowledge transfer.
- Changelog: a description of what changes were made relative to the previous release, along with a list of files that were modified by each change. Each release shall also include a list of outstanding items to be done, including any known defects.
- Release Highlights providing high-level details of changes

- Monitoring Reports: regular reports on the performance and health of the software, including metrics such as uptime, response times, and system usage.

At the time when Work is called-off (see Section VI), the Commission may select deliverables from the above list, or request other deliverables deemed relevant to the project.

IV.3 Software Testing Support (Lots 1 and 2)

IV.3.1 Work Specifications

In general, software testing support may be requested to assure that the delivered product meets the requirements and its quality goals.

In particular, the Work may involve the following tasks:

- Complete test preparation and execution.
- Audit code coverage.
- Work from software specifications to identify test data requirements and generate required test data.
- Design, support the implementation and automate tests (unit tests, integration tests and system tests, and when applicable regression tests).
- Correct errors by making appropriate changes and rechecking the program to ensure that the desired results are produced.
- Report software defects and priorities.
- Consult with managerial, engineering and technical personnel of the Commission to consolidate test efforts, identify bottlenecks, risk analysis and mitigation, and quality improvement as well as to coordinate test efforts and adapt to changing requirements and fast paced release schedules.
- Consult with development team to troubleshoot and resolve project issues both technical and non-technical in nature.

The detailed scope of the Service and specific requirements for a Software Project will be defined at the time when the Commission requests the Contractor to submit a Project/Work Plan (see Section VI).

IV.3.2 Deliverables

The deliverables shall follow standards specified by the Commission, which are based on industry best practices. The deliverables may include:

- Test plans / cases / scripts.
- Test results (of unit test, integration and system test and when applicable regression test).
- Documented test standards

At the time when Work is called-off (see Section VI), the Commission may select deliverables from the above list, or request other deliverables deemed relevant to the project.

IV.4 Technical Writing (Lots 1 and 2)

IV.4.1 Work Specifications

In particular, the Work may involve the following tasks:

- Compiling all documentation for business requirements by working with the Commission and development teams to capture, document and manage IT related documents including:
- Interviewing subject matter experts.
- Conversion of and updating of user manuals in LaTeX format or other format acceptable to the project manager.
- Writing and updating Help files.
- Distilling relevant information and presenting that information in an easy-to-understand format using text, screen shots, photographs, drawings, sketches, diagrams, and charts.
- Maintaining document repository.
- Contributing to and communicating documentation standards and provide training where required.
- Analysing IT project requirements to determine and deliver types of documents needed.
- Plan, design, research, write, and edit a range of documents, including user guides and manuals, technical specifications, training materials, user policies, for both print and online media.

The detailed scope of the Service and specific requirements for a Software Project will be defined at the time when the Commission requests the Contractor to submit a Project/Work Plan (see Section VI).

IV.4.2 Deliverables

The deliverables shall follow standards specified by the Commission, which are based on industry best practices. The deliverables may include, in the form of print and electronic media:

- User guides and manuals.
- Help files.
- Technical specifications.
- Release and deployment documentation.

The above list is not exhaustive. At the time when Work is called-off (see Section VI), the Commission may select deliverables from the above list, or request other deliverables deemed relevant to the project.

IV.5 Software Architecture Expertise (Lots 1 and 2)

IV.5.1 Work Specifications

In general, the Work involves the review and execution of the software design and implementation phases, and the delivery of code and documentation which can be used to build and deploy systems.

In particular, the work may involve the following tasks:

- Architecture Analysis – understand and document functional, non-functional and business requirements, environmental context and development time.
- Architecture Design – elaborate architecture with documentation.
- Architecture Evaluation – audit an existing software architecture and design.
- Architecture Evolution - maintain and adapt an existing software architecture.
- Develop Software Standards.

The detailed scope of the Service and specific requirements for a Software Project will be defined at the time when the Commission requests the Contractor to submit a Project/Work Plan (see Section VI).

IV.5.2 Deliverables

The deliverables shall follow standards specified by the Commission, which are based on industry best practices.

At the time when Work is called-off (see Section VI), the Commission may select deliverables from the above list, or request other deliverables deemed relevant to the project.

IV.6 GrandSIM Support (Lot 2 only)

The work specifications and deliverables for GrandSIM are identical to all preceding specifications in Sections IV.1 through IV.5. However, due to the highly specialized nature of this project, extensive specialized experience in GEANT4 Monte Carlo modelling is required. For this reason, this item has been placed in a separate category.

V. Requirements for the Contractor and the Team Roster

V.1 Contractor's requirements (Lots 1 and 2)

The Contractor shall meet the following mandatory requirements:

1. At least six (6) staff are included in the Team Roster that collectively meet the requirements as described in Section V.2.4 and V.2.5. This shall apply for the initial roster and throughout the Contract period.
2. Demonstrated experience implementing at least three (3) projects of similar scope and complexity in the last seven (7) years.
3. Demonstrated experience, in two of the last five (5) years, in using a recognized formal project management methodology (how the work is to be managed and controlled, risk management, reporting, planning and assurance of quality), such as PRINCE2.
4. Demonstrated experience, in two of the last five (5) years, in using an Agile framework, such as Scrum.
5. Staff turnover has been and is kept below 20% per year over the past three (3) years.
6. All reports, documentation, and communication (written and oral) supplied to the Commission shall be in English and submitted in an electronic form.
7. Working hours of relevant staff (e.g. project manager and lead developers) assigned to a Software Team, to overlap at least three (3) hours with the Commission's working hours (9am to 5pm CET), as deemed necessary by the Commission.

V.2 Team Roster (Lots 1 and 2)

V.2.1 Constitution of the Team Roster

The Contractor shall provide details of staff that are expected to be involved in the performance of Work on-site and/or off-site for the Commission. At a minimum, the following information shall be provided for each of these staff:

- Name
- Role
- Employed since
- Type(s) of Service(s) from Section IV which the staff will perform.
- Curriculum Vitae

The Contractor shall demonstrate:

- The capacity of the suggested Team Roster to address all Services described in section IV and that each member of the Team Roster shall be appropriately skilled and experienced to carry out the role for the assigned services.
- The compliance of the suggested Team Roster with requirements set out in sections V.2.4 and V.2.5.
- The capability and capacity of the suggested Team Roster to provide Software Services in the environment described in Section VII.

V.2.2 Maintenance of the Team Roster, conditions of revision

The Contractor shall maintain an up-to-date version of the Team Roster for the duration of the Contract. The Contractor shall be responsible to inform the Commission when members of the Team Roster are to be removed or added to the Team Roster, and if the details of a member are modified.

If the Commission estimates that the Team Roster lacks capacity or capability to perform a specific work within the specified timeframe or quality, the Contractor shall provide, within fourteen (14) working days after a request is made by the Commission, the details of skilled and experienced member to be added to the Team Roster for consideration by the Commission.

The Commission shall be entitled to confirm whether or not the proposed Team Roster revision is acceptable.

V.2.3 Software Team

Prior to the issuance of an FRD, as described in the Section VI, the Contractor will be required to propose to the Commission a list of the Software Team members that will be working under this FRD. This Software Team shall be selected from the Team Roster.

The Contractor shall ensure that each member of the Software Team:

- is dedicated to the project during the development period (unless otherwise agreed); and
- is not re-assigned from the project without the prior written consent of the Commission.

The Contractor shall satisfy the following mandatory requirements:

- Establishment of a pre-screening process to identify suitable staff.
- Provision documented evidence that the proposed Software Team is appropriately skilled and experienced to carry out the work plan.
- Replacement of unsatisfactory performing Software Team members or provision of specific training to address a gap in knowledge identified after a Software Team member has started his or her assignment, at no cost for the Commission, upon request by the Commission.
- Establishment of an induction program, at no cost for the Commission, to help new members of the Software Team become productive within a predefined period after the acceptance of the start of their assignment for the Commission. The duration of the period will be from one (1) to three (3) months depending on the type of service.
- Ensuring that the knowledge is retained in the team roster in case of staff turnover, at no cost for the Commission.
- Informing the Commission of a planned change of a team member with a minimum of one (1) month notice to allow for enough time for the pre-screening process.
- Confirmation that the Software Team shall continuously keep abreast of the technological advancements, thereby supporting the Commission by delivering high-quality and innovative software solutions.

The Contractor shall be proactive in identifying and proposing additional resources and/or expertise to the Software Team based on the current needs for the Software Project.

The Commission shall be entitled to confirm whether the proposed Software Team is acceptable.

The Commission reserves the right to seek an immediate replacement for any Software Team member, as determined by the Commission. In such cases, the Commission will request a replacement of the

Contractor staff, with equal or greater qualifications and experience, to complete the tasks. If no suitable replacement consultant can be agreed upon, the Commission reserves the right to terminate the assignment of the Software Team member with immediate effect. Continuity of staff is an important consideration. The Contractor shall therefore take necessary measures to ensure a seamless transition when taking over the Services and keep changes to staff being assigned to the Commission to a minimum throughout the duration of the Contract.

V.2.4 Requirements for each member of the Team Roster (Lots 1 and 2)

Each of the Contractor's staff on the Team Roster must have the following minimum qualifications:

1. A university degree in Computer Science, Mathematics, Physics, software engineering, nuclear engineering or related scientific/technical subject (with accompanying explanation).
2. At least two (2) years of recent experience using Agile framework such as Scrum.
3. At least one (1) year of recent experience working with a ticket management system such as Jira.

V.2.5 Skills and experience amongst the members of the Team Roster

The following skills and experience shall be available in the initial Team Roster, and maintained for the duration of the Contract:

1. A minimum of five (5) or more years of experience over the past seven (7) years, in software engineering (eliciting use cases and requirements, design, development, support, maintenance and enhancement, documentation) for operational software systems. (LOT 1)
2. Demonstrated experience in at least two (2) or more projects in the development and integration of complex operational software systems, for radionuclide applications or a related field. (LOT 1 and LOT 2)
3. A minimum of three (3) or more years of experience, providing software maintenance and support services for complex and custom software systems. (LOT 1 and LOT 2)
4. A minimum of five (5) or more years over the past ten (10) years of experience in all stages of software development using C++ programming language. (LOT 1 and LOT 2)
5. A minimum of five (5) or more years over the past ten (10) years of experience in all stages of software development Python programming language. (LOT 1 and LOT 2)
6. At least three (3) or more years within the past five (5) professional experience using Qt framework as a widget toolkit. (LOT 1)
7. A minimum of three (3) or more years over the past five (5) years, in the development of web applications, preferably Sencha Ext JS (Sencha cmd). (LOT 1)
8. At least five (5) or more years within the past ten (10) of professional experience with SQL and database programming, ideally using Oracle and/or PostgreSQL databases, experience designing data access layers and data models for an application. (LOT 1 and LOT 2)
9. Working knowledge and experience in two (2) or more of the last five (5) years using the GNU Autotools and RPM for software packaging, compilation and distribution. (LOT 1 and LOT 2)
10. Experience in two (2) or more of the last five (5) years with scripting techniques for automated testing and continuous integration and deployment. Details shall be provided. (LOT 1)
11. A minimum of two or more (2) years of experience with GitLab CI/CD. (LOT 1)
12. A minimum of two (2) or more years of experience as a Technical Writer on projects with similar scope, that demonstrate the solid understanding of Software development

methodologies and the ability to conduct research into a wide range of IT issues and proven ability to write technical documentation. (LOT 1)

13. Developer on at least two (2) or more projects involving programming using 2D/3D scientific visualization libraries (visualizations of time series, histograms, surface plots, scatter plots, spectrograms). (LOT 1 and LOT 2)

The Contractor shall ensure that, in addition to all mandatory requirements listed in Section V.2.4, the following minimum requirements are met when selecting each member of the team that is to provide Software Engineering Services listed in Section IV. Below is the summary of the specific requirement for the specific types of software services:

V.2.5.1.1 Requirements for the Software Team members to deliver Software Development and Enhancement (Lot 1)

- Requirements listed in Section V.2.5: 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 13

V.2.5.1.2 Requirements for the Software Team members to deliver Software Support and Maintenance (Lot 1)

- Requirements listed in Section V.2.5: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13

V.2.5.1.3 Requirements for the Software Team members to deliver Software Testing Support (Lot 1)

- Requirements listed in Section V.2.5:10, Requirements for the Software Team members to deliver Technical Writing
- Requirements listed in Section V.2.5: 12

V.2.5.1.4 Requirements for the Software Team members to deliver Software Architecture Expertise (Lot 1)

- Requirements listed in Section V.2.5:2, 5, 6, 10, 11

V.2.5.1.5 Requirements for the Software Team members to deliver GrandSIM Support (Lot 2)

- Requirements listed in Sections V.2.5: 2, 3, 4, 5, 8, 9, 13
- At least 3 or more years of experience working with GEANT4 Monte Carlo simulation software with a focus on modelling of radiation detection systems. Detailed examples must be provided.

The Commission may ask for Services as described in Section IV.

V.3 WO Project Call-off

The work will be called off in the form of Work Orders (WOs). Each WO shall include the exact scope of work and the required deliverables to be performed and delivered by the Contractor.

V.3.1 Initiating Work

Since the IDC follows the Scrum software development methodology, WOs generally follow Scrum sprints and cover software development services to be performed within approximately four (4) weeks. Therefore, a WO is issued during a sprint planning meeting, and the work items to be addressed in that WO (sprint) are recorded in the Commission's Jira-based tracking system. Initiation of the sprint constitutes the issuance of the WO. In the case of a WO issued outside of the Scrum framework, the Commission will supply the work to be performed in writing to the Contractor. The Contractor shall respond with an estimate of the number of person-days required to complete the work and the delivery date. After the estimate and delivery date are accepted, the Commission will issue the WO to the Contractor.

The Contractor shall perform the work only after receipt of the WO.

V.3.2 Completion and Acceptance

At the end of a particular WO, the Contractor shall submit to the Commission the deliverables within the period of performance stated in the respective WO. The deliverables may include:

- Updated Software Design Documents.
- Updated Software User Guide.
- Updated source code or configuration files.

Typically, in accordance with the Scrum methodology, the Contractor will present the work performed during the sprint, including demonstrations of the newly developed software, within the Sprint Review meeting.

VI. Standards and Working Environment

VI.1 Software and Database Environment

Most of the software is designed to run on open-source UNIX / Linux (e.g. RHEL 7.9 and Rocky 9.5+ operating environment). The processing software is mostly written in ANSI C and/or Python, with some supporting libraries in C/C++. A few programs are in Java (to be migrated to Python). There are a number of support programs and scripts written in shell or Perl. Details on the languages used in the applications are given in Appendix A: List of RN Apps.

Most software accesses Oracle (IDC environment), PostgreSQL or MySQL (NiaB) based RDBMS using ODBC libraries. It is expected that there will be a migration from Oracle to PostgreSQL during the life of this contract.

The primary languages intended for future software development are Python and PostgreSQL. There will also be a migration from RHEL 7.9 to RHEL 9.x.

Git is used as Software Versioning System.

VI.2 Work Environment

For on-site Services provided at the Commission's headquarters in Vienna, Austria, the Commission will provide at its premises a suitable work environment (workspace, room for meetings, presentations and trainings, standard stationary, Internet connection) for the Contractor's personnel to perform the Services under the Contract, as required. The Contractor shall arrange for laptop computers and telephones required to execute the on-site work. The Commission will also make reasonable efforts to cooperate with the Contractor in connection with its performance under the Contract, including, but not limited to, reasonable and timely access to Commission's personnel, documentation, and databases and other necessary identified sources of information.

The working language at the Commission's headquarters in Vienna, Austria, is English, and the normal weekly working hours is forty (40), Monday to Friday. Exceptionally, there may be a need to work overtime or on Saturdays and Sundays. The working period in a given day will be defined on the basis of actual needs even though the usual working hours from Mondays to Fridays are between 08:00 AM and 06:00 PM.

For off-site work, the Contractor shall provide its own infrastructure, hardware and software environment necessary for the completion of its work under the Contract. The Contractor shall communicate with the Commission by telephone, or electronic mail, as appropriate. All costs incurred by the Contractor as a result of such communication with the Commission for the performance of work under the Contract, shall be borne by the Contractor.

If needed, remote access to the relevant infrastructure (servers, VLANs, databases) in the Commission's network will be provided to the Contractor. Infrastructure comprises, but is not limited to software, servers, VLANs and databases.

Most of the Work is expected to be carried out off-site. On-site days may be requested by the Commission and will be agreed upon prior to the issuance of the FRD. Up to 2 trips per calendar year for up to 2 staff to work at the premises of the Commission in Vienna, Austria for 5 days each trip may be requested with the exclusion of work performed under Section IV.6.

VII. Risk Management

The Contractor shall provide a business continuity plan and thorough risk assessment plan at the project's commencement to identify potential risks that could impact the successful execution of the outlined software development activities in these Terms of Reference, including contingency plans, as appropriate. Risks may include but are not limited to technical challenges, changes in project requirements/scope, resource constraints, schedule delays, integration difficulties, and third-party software dependencies. The risk assessment plan should be consistently updated, aligning with the delivery of project milestones or significant accomplishments.

Upon the project's satisfactory completion, the Contractor shall conduct a final review of the initially identified risks. Risks that have been effectively mitigated or did not materialize should be officially closed, accompanied by appropriate documentation. The insights gained from the risk management process should be methodically documented and shared with the Commission, thereby contributing to the knowledge repository for forthcoming software development endeavours.

VIII. Appendix A: List of RN Apps

Software	Language	Platform	Description
inspire	Python	IDC, NiaB	GUI to view/reprocess samples
autostrada	Python	IDC, NiaB	Processes NGBG samples
rnpicker	Python	IDC, NiaB	Generates ARRs, RRRs and URRs
autosaint	C	IDC, NiaB	Processes non-NGBG samples
bgtools	C++	IDC, NiaB	QC calibration correction
rnscripts	csh, bash, Perl	IDC	Ingestion pipeline
rnpipeline	Pro*C, Java	IDC, NiaB	
autoross	C++	IDC	Automatic SOH tool
calval	Python	IDC, NiaB	Calibration validation
bg_calval	Python	IDC, NiaB	Calibration validation
ndcrn/scripts	csh, bash	NiaB	Ingestion pipeline
ndcrn/rms_inputNG	Java	NiaB	Ingests message files into database
ndcrn/rms_mar_auto	Java	NiaB	Auto-assigns samples
ndcrn/rms_arr	Java	NiaB	Generates ARRs
nms-client	Python	NiaB	Retrieves samples from the IDC

CTBTO PREPARATORY COMMISSION

preparatory commission for the comprehensive nuclear-test-ban treaty organization

iNSPIRE

iNtegrated Software Platform for Interactive Radionuclide rEview

A Users' Guide

iNSPIRE

Version 2.24.0 – September 2024

Document Version History

Version	Date	Author	Comments / main reason(s) for baseline changes
0.5.3	08.05.2017	Hakim Gheddou, *Radionuclide Officer*, Software Integration Unit, Software Applications Section, International Data Centre Division CTBTO Preparatory Commission Tel.: (+43 – 1) 26030 6336 e-mail: Abdelhakim.Gheddou@ctbto.org	First version for training and testing purposes. Implemented functionality: beta-gamma coincidence Noble Gas.
0.8.0	06.11.2017	Hakim Gheddou	Added sections for two new features: - Energy calibration check and update; - Isotope removal. Updated sections: - Sample metrics flag panel; - Spectrum display window; - Analysis results.
1.0.0	02.03.2018	Hakim Gheddou	Removed ABGAM related sections. Refactored the structure. Added sections for two new features: - Data assignment; - Revoking a sample release.
1.3.0	04.02.2019	Hakim Gheddou	Included new features as implemented in iNSPIRE version 1.3.0
1.6.0	04.03.2019	Matthias Auer *Nuclear Physicist* Instrumental Software Technologies, Inc. (ISTI) matthiasauer@isti.com	Included new features and bug fixes as implemented in iNSPIRE version 1.6.1
1.7.0	23.06.2020	Hakim Gheddou	Upgraded for iNSPIRE version 1.7.0

1.9.0	09.10.2020	ISTI	Included new features as implemented in iNSPIRE version 1.9.0
1.9.1	25.10.2020	Hakim Gheddou	Added a new section (4.6) on data downloading and processing
1.9.2	08.01.2021	Sid Hellman	Formatting improvements
2.6.0	02.05.2023	Hakim Gheddou	Extended the user guide to particulates and HPGe noble gas functionalities. Thorough refactoring of the document.
2.24.0	12.07.2024	ISTI and Ian Hoffman	Updated for iNSPIRE version 2.24.0

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1. Introduction

The CTBTO International Data Centre (IDC) developed a novel software application for the interactive analysis of Radionuclide spectral data from the International Monitoring System (IMS). The tool is dubbed *iNSPIRE*, an acronym for iNtegrated Software Platform for Interactive Radionuclide rEview.

Data from both particulate stations and Noble Gas systems are handled by the new version of *iNSPIRE*.

iNSPIRE is a Python language/ Qt framework as a widget toolkit-based license-free application. It runs on Linux Operating System under the standard configuration IDC and NDC-in-a-Box environments (file system structure and database schema of the Radionuclide pipeline).

iNSPIRE provides relevant features and dedicated functionalities to Analysts to check the data quality, perform the standard interactive review and introduce necessary corrections to automatic processing results, as appropriate, and release sample spectra which produce Reviewed Radionuclide Reports (RRR).

In addition to sample spectra analysis, the GUI is also used to interactively check all auxiliary spectral data *(gas and detector backgrounds, Quality Control, calibration, blank) as well as spike spectra.*

iNSPIRE software allows assignment of spectra to individual Analysts with required roles and permissions as configured in the database. Interactive changes are only allowed when the spectrum is assigned to the current user.

This updated User's Guide provides a functional description of *iNSPIRE* software application, related to the second major release, which now covers particulates as well as both beta-gamma coincidence-based and HPGe-based noble gas data.

Before focusing on *iNSPIRE* functionalities, the classification parameters of spectral data are introduced in the first section of the document. General features of the GUI, ranging from database login to sample release, are then described from the user perspective.

Some sections (such as data loading, sample information, data quality check, general comments, product handling, …) are common to particulates and noble gas. Sample type specific functionalities are described in independent sections.

2. Classification of spectral data

Spectral data of the CTBTO Radionuclide monitoring technology (particulates stations and noble gas systems) are classified unambiguously in the file system and the database tables. This allows differentiated processing flowcharts and proper access mechanisms to raw data and analysis results.

The classification scheme is based on four attributes: ***sample type, data type***, ***spectral qualifier***, *and* ***status***.

2.1. Sample type

Three high level identifiers are used for *sample type* to distinguish between different monitoring systems used in the IMS radionuclide network:

- Spectra from particulates stations: **P**
- Ge-HP based noble gas spectra: **G**
- Beta-gamma coincidence based noble gas systems spectra: **B**

The sample type is recorded as SAMPLE_TYPE in the GARDS_SAMPLE_DATA database table.

2.2. Data type

Spectra are also classified according to data type. This reflects the spectrum measured entity. The followings settings are used:

- Sample spectrum (SAMPLEPHD): **S**
- Detector background (DETBKPHD): **D**
- Blank filter (BLANKPHD): **B** (SPECIFIC TO PARTICULATES)
- Gas background (GASBKPHD): **G** (SPECIFIC TO SOME NOBLE GAS TECHNOLOGIES)
- Efficiency calibration (CALIBPHD): **C**
- Quality control (QCPHD): **Q**
- Spiked sample (SPIKEPHD): **K**

The data type is recorded as DATA_TYPE in the GARDS_SAMPLE_DATA database table.

2.3. Spectrum qualifier

A spectrum is qualified according to acquisition time in the measurement cycle. spectrum qualifier (commonly called spectral qualifier) is either FULL or PREL based on acquisition time *vs.* the system cycle.

- **FULL** spectrum is used for the final spectrum after the data acquisition is completed (examples of nominal acquisition time: 24 hours for particulates and HPGe SPALAX, 12 hours for SAUNA II, 6 hours for SAUNA III).
- Preliminary or **PREL** spectra have acquisition times of 2, 4, 6, … hours – that is, the normal two-hourly spectra sent from IMS stations, excluding the final FULL spectrum.

2.4. Spectrum status

In addition to SAMPLE_TYPE, DATA_TYPE and SPECTRAL_QUALIFIER which are inherent to the data message itself, each spectrum is classified according to its `STATUS` along the processing/analysis workflow.

There are two categories of status in terms of triggering actions:

- Status value as applied by the processing pipeline in automatic mode.
- Status value which can be set interactively by Analysts via the review tool.

Status conditions applied during automatic processing and interactive analysis:

Processed	**`P`**	The spectrum has been processed successfully through the automatic pipeline and, for sample FULL spectra, an Automated Radionuclide Report was generated. *The spectrum is ready for interactive review*.
Analysis	**`A`**	The spectrum was meant to be processed but it has stopped in the Analysis (*post-parsing*) phase of the automatic pipeline. *Remedial actions may be possible to recover from failure*.
Unprocessed	**`U`**	The spectrum was not intended to be processed automatically. *This is the case of most PREL spectra which are not all processed in order to optimize the usage of disk space.*
Under Quality control	**`Q`**	After a spectrum has been released by the Analyst, the status is changed from **P** to **Q** and the spectrum enters a queue for quality-control assessment. During this period, the spectrum can be manually revoked by a user with appropriate permissions (i.e. quality-control officer) as defined in the database. Otherwise, once the pre-set waiting time is elapsed, the spectrum status changes automatically from **Q** to **R**.
Reviewed	**`R`**	The interactive review process has been completed, and the spectrum has been released (with or without categorization) and reviewed product(s) such as Reviewed Radionuclide Report (RRR, SSREB if applicable) was generated.

Status conditions applied during special study analysis:

Temporarily expertized	**`e`**	After a spectrum has been released by a Scientist or Lead Analyst in RMSEXPERT schema (if there is a request for a Special Study), the status is changed from **R** to **e** and the spectrum enters a queue for quality-control assessment. During this period, the spectrum can be manually revoked by a user with appropriate permissions (i.e. quality-control officer) as

		defined in the database. Otherwise, once the pre-set waiting time is elapsed, the spectrum status changes automatically from **e** to **E**.
Expertized	`E`	The expert review process has been completed, and the spectrum has been released (with or without categorization) and Updated product(s) such as Updated Radionuclide Report (URR) were generated.

Status conditions applied manually:

Failed	`F`	The failure during the automatic pipeline analysis is irresolvable: the spectrum is effectively faulty, and the failure is permanent. *No remedial action can be undertaken to overcome the failure.*
Duplicate	`D`	Occasionally, two Sample Pulse Height Data (SPHD) messages are sent from IMS stations to describe the same sample (e.g., as a corrective action after a format problem with the first message or just because of a software issue at the station). The Analyst decides which one of the two spectra is more appropriate for the interactive analysis. The other spectrum is then labelled as Duplicated. With this labelling only one RRR per measurement cycle will be generated for the station. This interactive action will change the status to 'D' in the database so that the spectrum in question will be automatically filtered out by future runs of queries that are used for various purposes as well as by those involved in different applications.
Bad	`B`	A spectrum is marked as Bad if faulty data is sent inadvertently from a station, for which products should not be released (lack of CTBT verification value). Although, an ARR would have been generated if the automatic processing was successful. This also includes situations where a full-sample spectrum is faulty, and the Analyst decides to use a PREL spectrum preceding the FULL spectrum as an alternative option. In such a situation, the original FULL spectrum is labelled as Bad so that any confusion of apparently having two sample spectra on the same day can be avoided. A third category of samples that will be marked as Bad covers cases where SOH data analysis clearly shows a malfunctioning of key modules of the system.

		Finally, samples that are accompanied by unphysical values for at least one sample metric (such as negative processing time or air volume) are also marked as Bad.
Viewed	**V**	The spectrum has been marked Viewed – that is, it has been processed successfully and examined by an analyst but is not intended to be released, and no products are to be generated. This status applies to QC, calibration, blank, background, and preliminary spectra which have been examined and are subsequently removed from the assignment queue of an analyst.

3. Login to the database

Upon launching *iNSPIRE* application by invoking the scripts:

- `run_inspire` (in the IDC environment)
- `rms_inspire` (in the NDC-in-a-Box)

on the command line in a terminal, the user is prompted for the login (DB account *username & password*) as shown in Figure 1.

Alternatively, the database connection window is also brought up via the menu item **DB connection** of the **File** menu.

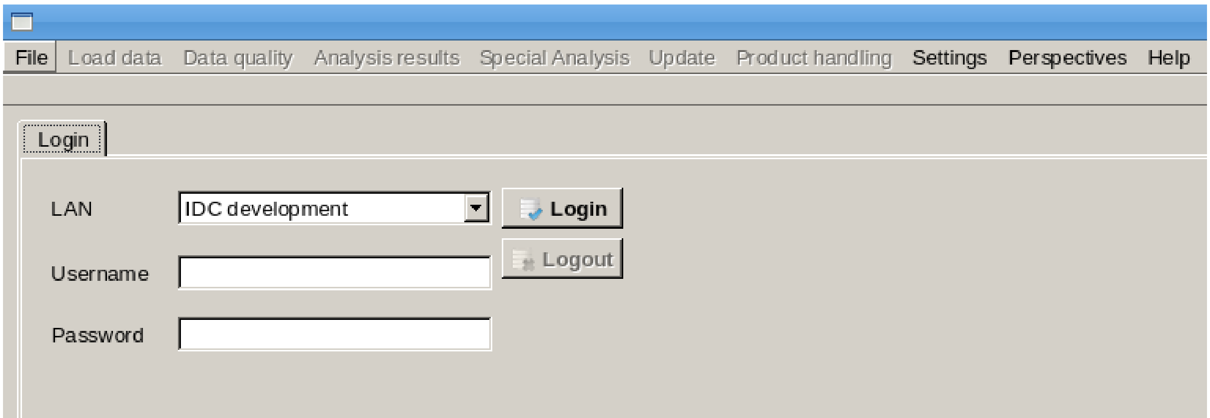


Figure 1: Database connection window

By default, the software will automatically select the database pertaining to the LAN where the software was started from by the user. These are: IDC development, IDC testbed, IDC operations or NDCRN (in NDC-in-a-Box).

Login:

1. Enter your username and password in the Edit fields next to **Username** and **Password**.
   Note: in NDC-in-a-Box environment, the default Username/Password are `rnanalyst/rnanalyst` and the LAN is automatically set to `NDCRN`.
2. Then click on the button **Login** to proceed with the login.

Upon successful login, the data loading window is brought up, with the assignment queue as default.

4. Analysis workflow

iNSPIRE GUI software provides workflow for review of samples. There are workflow buttons on the top of *iNSPIRE* GUI which reflect the high-level steps in a sample review process: **Load Data, Quality Check, Calibration, Reprocess, Review comments,** and **Release.**

The workflow guides the user to perform the analysis in sequence: quality check after loading a sample, to perform the review, reprocess as appropriate and release the sample.

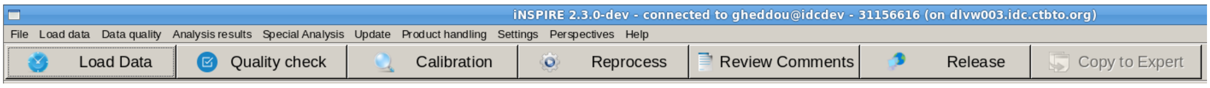


Figure 2: Analysis workflow toolbar

The workflow is presented in a series of toolbar buttons that analysts progress through during their routine work. However, this workflow is not enforced, and a user can select any step in the analysis process by selecting the desired button.

Note: The step **Copy to Expert** is not part of the routine analysis but related to special studies context. This functionality only applies in the IDC environment in case there is a formal request from Signatory States or the PTS to carry out a special study on a specific IMS sample spectrum, and release an Updated Radionuclide Report (RRR).

The following sections of the document describe the main steps as involved in the workflow:

- Spectrum selection options.
- Spectra assignment/ reassignment.
- Verification of sample metrics against established thresholds.
- Colour coded time series of single parameters.
- Checking the correctness of energy calibration, including available calibration options.
- Updating the energy calibration
- Visualizing the spectra in 2D beta-gamma coincidence mode.
- Visualizing 1D gamma and beta plots (singles, projected and gated).
- Data reprocessing as appropriate.
- Adding general comments to sample spectra.
- Releasing sample spectra with or without category
- Changing spectrum status (marking as Bad, Duplicate, Viewed).
- Revoking a temporary release.

5. Options for spectrum selection

Three possibilities are available for selecting a spectrum to load:

(a) from the sample assignment queue,

(b) using the selection window to browse the database using relevant filters

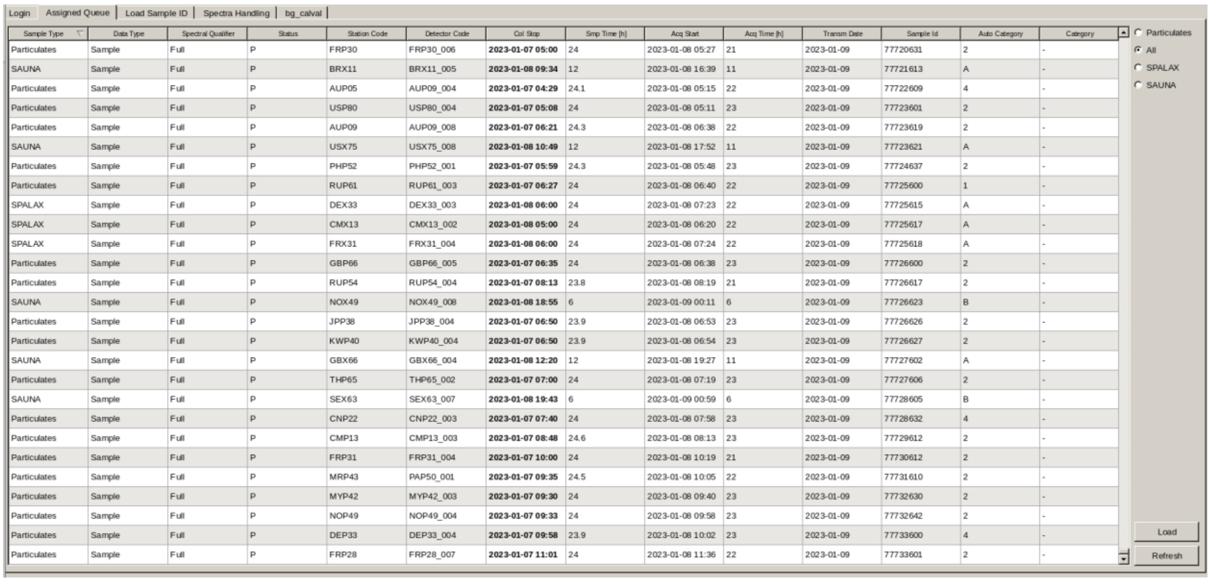
(c) by entering a valid sample identification (SID) number

5.1. USING THE ASSIGNMENT QUEUE

Automatic assignment of spectra to individual analysts (users) can be performed in the automatic processing pipeline. Furthermore, spectra can also be (re)assigned either externally or via *iNSPIRE* related link.

The user can display spectra that are previously assigned to him or her by selecting the tabulation **Assignment Queue** under **Load Data** frame or by clicking the submenu item **Assignment Queue** under the menu item **Load Data**.

This results in a display of samples that are assigned to the current user (Analyst) as in Figure 3.



Login | Assigned Queue | Load Sample ID | Spectra Handling | bg_calval

Sample Type	Data Type	Spectral Qualifier	Status	Station Code	Detector Code	Col Stop	Smp Time [h]	Acq Start	Acq Time [h]	Transm Date	Sample Id	Auto Category	Category
Particulates	Sample	Full	P	FRP30	FRP30_006	**2023-01-07 05:00**	24	2023-01-08 05:27	21	2023-01-09	77720631	2	-
SAUNA	Sample	Full	P	BRX11	BRX11_005	**2023-01-08 09:34**	12	2023-01-08 16:39	11	2023-01-09	77721613	A	-
Particulates	Sample	Full	P	AUP05	AUP09_004	**2023-01-07 04:29**	24.1	2023-01-08 05:15	22	2023-01-09	77722609	4	-
Particulates	Sample	Full	P	USP80	USP80_004	**2023-01-07 05:08**	24	2023-01-08 05:11	23	2023-01-09	77723601	2	-
Particulates	Sample	Full	P	AUP09	AUP09_008	**2023-01-07 06:21**	24.3	2023-01-08 06:38	22	2023-01-09	77723619	2	-
SAUNA	Sample	Full	P	USX75	USX75_008	**2023-01-08 10:49**	12	2023-01-08 17:52	11	2023-01-09	77723621	A	-
Particulates	Sample	Full	P	PHP52	PHP52_001	**2023-01-07 05:59**	24.3	2023-01-08 05:48	23	2023-01-09	77724637	2	-
Particulates	Sample	Full	P	RUP61	RUP61_003	**2023-01-07 06:27**	24	2023-01-08 06:40	22	2023-01-09	77725600	1	-
SPALAX	Sample	Full	P	DEX33	DEX33_003	**2023-01-08 06:00**	24	2023-01-08 07:23	22	2023-01-09	77725615	A	-
SPALAX	Sample	Full	P	CMX13	CMX13_002	**2023-01-08 05:00**	24	2023-01-08 06:20	22	2023-01-09	77725617	A	-
SPALAX	Sample	Full	P	FRX31	FRX31_004	**2023-01-08 06:00**	24	2023-01-08 07:24	22	2023-01-09	77725618	A	-
Particulates	Sample	Full	P	GBP66	GBP66_005	**2023-01-07 06:35**	24	2023-01-08 06:38	23	2023-01-09	77726600	2	-
Particulates	Sample	Full	P	RUP54	RUP54_004	**2023-01-07 08:13**	23.8	2023-01-08 08:19	21	2023-01-09	77726617	2	-
SAUNA	Sample	Full	P	NOX49	NOX49_008	**2023-01-08 18:55**	6	2023-01-09 00:11	6	2023-01-09	77726623	B	-
Particulates	Sample	Full	P	JPP38	JPP38_004	**2023-01-07 06:50**	23.9	2023-01-08 06:53	23	2023-01-09	77726626	2	-
Particulates	Sample	Full	P	KWP40	KWP40_004	**2023-01-07 06:50**	23.9	2023-01-08 06:54	23	2023-01-09	77726627	2	-
SAUNA	Sample	Full	P	GBX66	GBX66_004	**2023-01-08 12:20**	12	2023-01-08 19:27	11	2023-01-09	77727602	A	-
Particulates	Sample	Full	P	THP65	THP65_002	**2023-01-07 07:00**	24	2023-01-08 07:19	23	2023-01-09	77727606	2	-
SAUNA	Sample	Full	P	SEX63	SEX63_007	**2023-01-08 19:43**	6	2023-01-09 00:59	6	2023-01-09	77728605	B	-
Particulates	Sample	Full	P	CNP22	CNP22_003	**2023-01-07 07:40**	24	2023-01-08 07:58	23	2023-01-09	77728632	4	-
Particulates	Sample	Full	P	CMP13	CMP13_003	**2023-01-07 08:48**	24.6	2023-01-08 08:13	23	2023-01-09	77729612	2	-
Particulates	Sample	Full	P	FRP31	FRP31_004	**2023-01-07 10:00**	24	2023-01-08 10:19	21	2023-01-09	77730612	2	-
Particulates	Sample	Full	P	MRP43	PAP50_001	**2023-01-07 09:35**	24.5	2023-01-08 10:05	22	2023-01-09	77731610	2	-
Particulates	Sample	Full	P	MYP42	MYP42_003	**2023-01-07 09:30**	24	2023-01-08 09:40	23	2023-01-09	77732630	2	-
Particulates	Sample	Full	P	NOP49	NOP49_004	**2023-01-07 09:33**	24	2023-01-08 09:58	23	2023-01-09	77732642	2	-
Particulates	Sample	Full	P	DEP33	DEP33_004	**2023-01-07 09:58**	23.9	2023-01-08 10:02	23	2023-01-09	77733600	4	-
Particulates	Sample	Full	P	FRP28	FRP28_007	**2023-01-07 11:01**	24	2023-01-08 11:36	22	2023-01-09	77733601	2	-

Particulates
All
SPALAX
SAUNA

Load
Refresh

Figure 3: Sample assignment queue

The display window provides information related to the following sub-set of spectrum identification parameters:

- Sample type
- Data type
- Spectrum qualifier (**Qualifier**)
- Spectrum status in the workflow (**Status**)
- Station code (**Station**)
- Detector code (**Detector**)

- Sample collection start (**Col Start**)
- Sample collection stop (**Col stop**)
- Sample collection, in days (**Smp Time (d)**)
- Spectrum acquisition start timestamp (**Acq Start**)
- Spectrum acquisition stop timestamp (**Acq Stop**)
- Spectrum acquisition time, in hours (**Acq Time (h)**)
- Sample identification number (**SID**)
- Sample auto category (**Auto Category**)
- Sample category (**Category**)

Assigned spectra can be sorted in different possible ways by clicking on header items of the grid. Note both ascending and descending modes are available.

To load a spectrum from the queue:

1) Select the corresponding row in the list,
2) Then, press the button **Load** or double click on the row with the left mouse button.

5.2. BROWSING FROM THE DATABASE

Activating the **Select Data from Database** sub-menu item of the **Load Data** menu or selecting the tabulation **Spectra Handling** under **Load Data** frame brings up the selection facility window as shown in Figure 4.

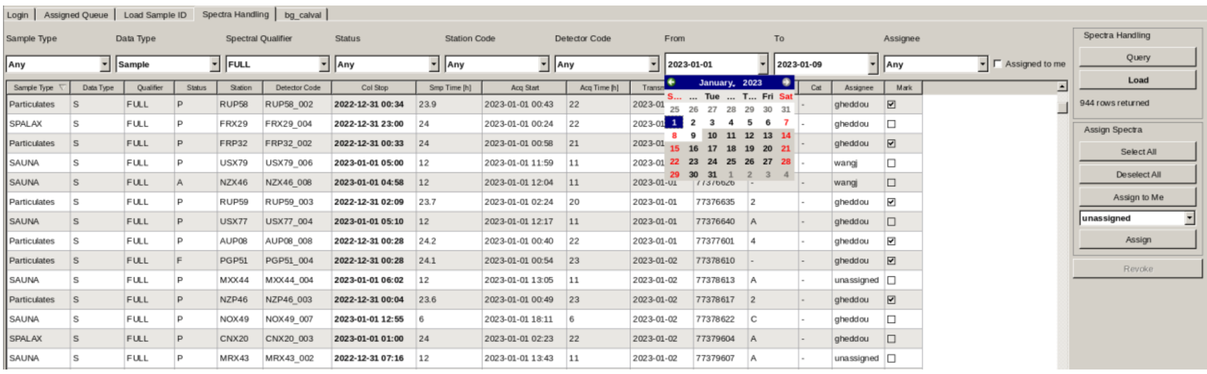


Figure 4: Data selection window

Notes on the Figure:

The following filtering parameters can be used according to individual cases of selection criteria:

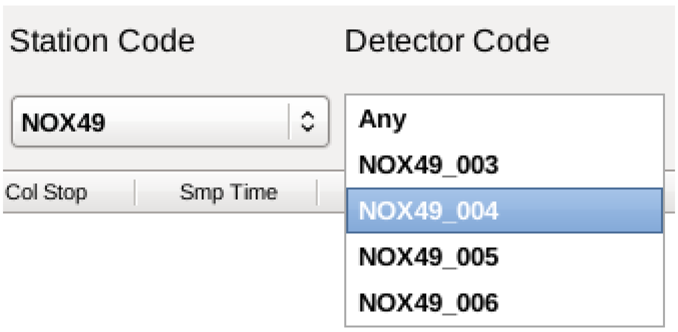
- Sample type: *Particulates, Noble Gas beta-gamma or HPGe Noble Gas.*
- Data type: *individual data type or all available datatypes (sample, detector background, gas background, quality control, blank, calibration, spike, all).*
- Spectrum qualifier: *PRE spectra, FULL spectra or both.*
- Spectrum analysis status: *individual status or All.*
- Station code: *individual station or all available stations.*
- Detector code: *individual detector or all available detectors.*
- Timeframe (From To) of sample collection stop or spectrum acquisition start (depending on data type), for which a date picker is brought up.
- Assignee: Database username of Analyst to whom the spectrum is currently assigned.

In addition, the checkbox **Only assigned to me** can be optionally activated (default: deactivated).

5.2.1. DATA SELECTION FILTERS

To optimize the data selection time, detector codes and station codes are dynamically refreshed.

- Upon selection of a **Station Code**, only associated detectors (and **Any**) are shown in the **Detector Code** dropdown combo box for selection.



- Upon selection of a **Detector Code**, associated station is automatically set in the **Station Code** dropdown combo box.

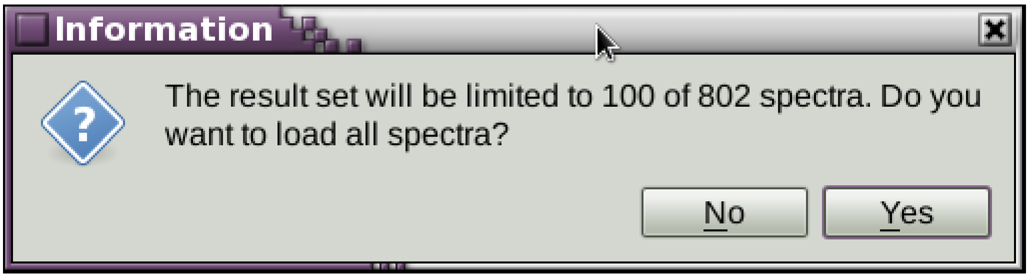
When the selection parameters are set as appropriate, the search is activated by pressing the button **Query**.

If the list of spectra matching the pre-selection filters is below or equal to 100, they will be automatically returned with relevant information.

In case the list of spectra matching the pre-selection filters exceeds 100, a confirmation message is brought up asking the user to choose among two options:

(a) **No**: Load only 100 spectra – *in order to speed-up the process.*

(b) **Yes:** Load all spectra – *the process will then take longer than (a).*



5.2.2. Assigning spectra

The **Spectra handling** window offers a feature for (re)assigning spectral data (to current or other user), using the following sub-actions of step 1:

(a) Select data type S, spectral qualifier FULL, status P.

(b) Set the time frame to include the sample spectra to assign or reassign.

(c) Select the current *Assignee*.

(d) Press the button **Query**.

At this point, the list returns sample spectra that satisfy selection criteria.

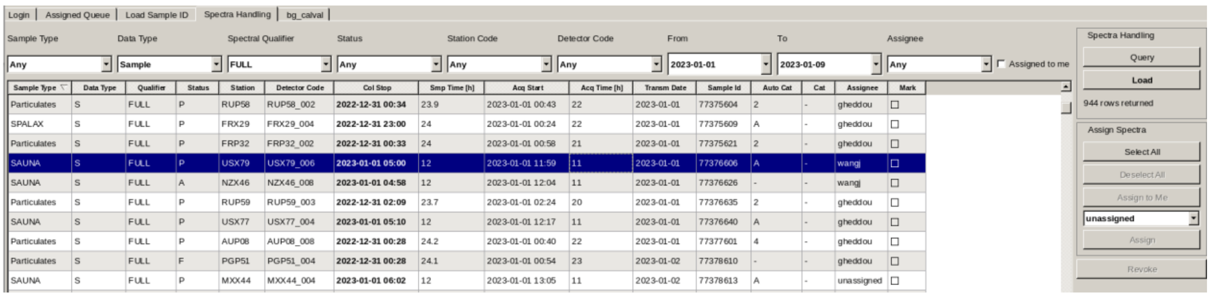


Figure 5: Spectra assignment feature – step 1

Complete the assignment by running the following sub-actions of step 2:

(e) In the returned sample spectra list, mark the sample(s) to (re)assign by ticking the corresponding check box widget in the last column (named “Mark”) of the grid.

(f) Select the (new) assignee from the dropdown list in the Assign Spectra combo box;

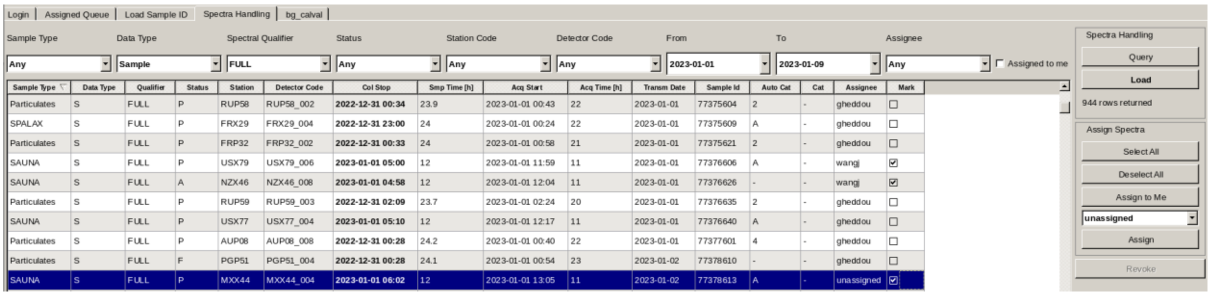


Figure 6: Spectra assignment feature – step 2

Finally,

(g) Press the button **Assign**.

*Note: in case the spectra are to be assigned to current user, the button **Assign to Me** substitutes the steps (f) and (g).*

As a result, the selected sample(s) will get transferred into the assignment queue of the selected assignee.

5.3. LOADING A SPECIFIC SPECTRUM

If the spectrum identification number of the spectrum of interest is known, the best option is to use the sub-menu item **Load Sample_ID** of the **Load Data** menu or select the tabulation **Load Sample_ID** under **Load Data**.

The window contains a text field where the Sample_ID of interest can be entered. The spectrum can then be assigned to current user and/or loaded just by clicking on the **Load** and/or **Assign to Me** buttons, respectively.

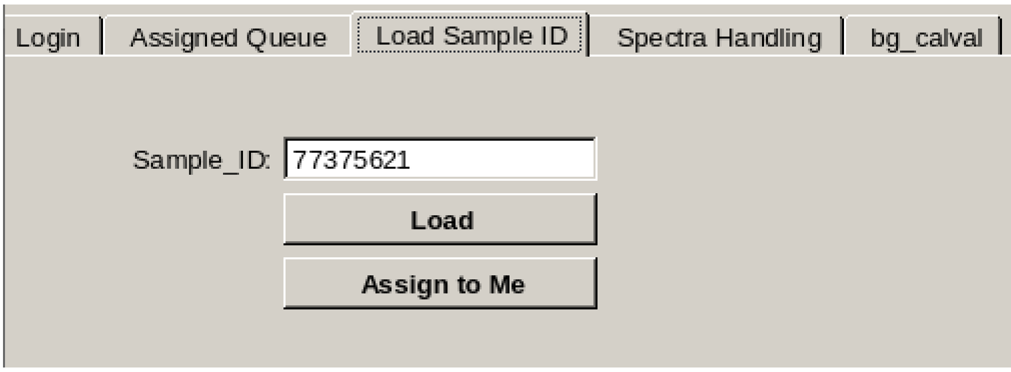


Figure 7: Loading Sample_ID

The Sample_ID may be associated to any data type and any spectral qualifier, provided that the status is under one of the following values:

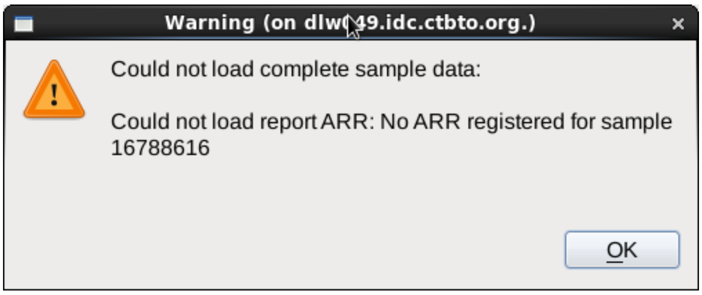
- successfully processed (P)
- temporary release (Q)
- final release (R)
- duplicate (D)
- viewed (V)
- bad (B)

- temporarily expertized (e)
- expertized (E)

While loading valid Sample_ID (using one of the data selection options above), the following message window with a progress bar is shown in modal mode.

5.3.1. CHECKING FOR COMPLETENESS

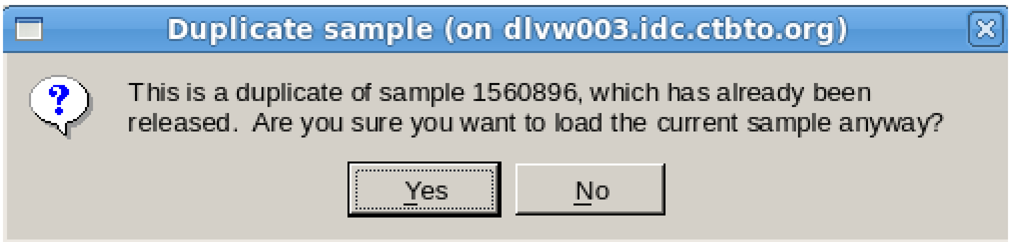
Upon sample spectrum loading, a warning message is brought up if ARR is not available in the file system.



5.3.2. CHECKING FOR DUPLICATES

On data loading, the system performs a check if the current Sample_ID is not a duplicate of an already released sample spectrum.

Example:



5.4. DOWNLOADING AND PROCESSING DATA

In the NDC-in-a-Box environment, the user can download radionuclide raw spectral data from within *iNSPIRE* GUI. This is in **NMS_client** tab which is accessible from the toolbar button **Load Data**.

This functionality works with CTBTO Single Sing On (SSO) credentials with Principal User privileges that need to be provided in the bottom left corner.

The functionality applies to both particulates and noble gas. The left panel offers options for selecting the period of interest (default: previous 7 days), data type(s) and stations.

The user can select several data types (by ticking corresponding check boxes) and/or several stations at the same time.

By maintaining the shift key pressed, the user can select two or several consecutive stations in a row with the up/down arrow keys (or mouse click). Combining the Ctrl key with mouse click(s) allows the user to select multiple stations from the list.

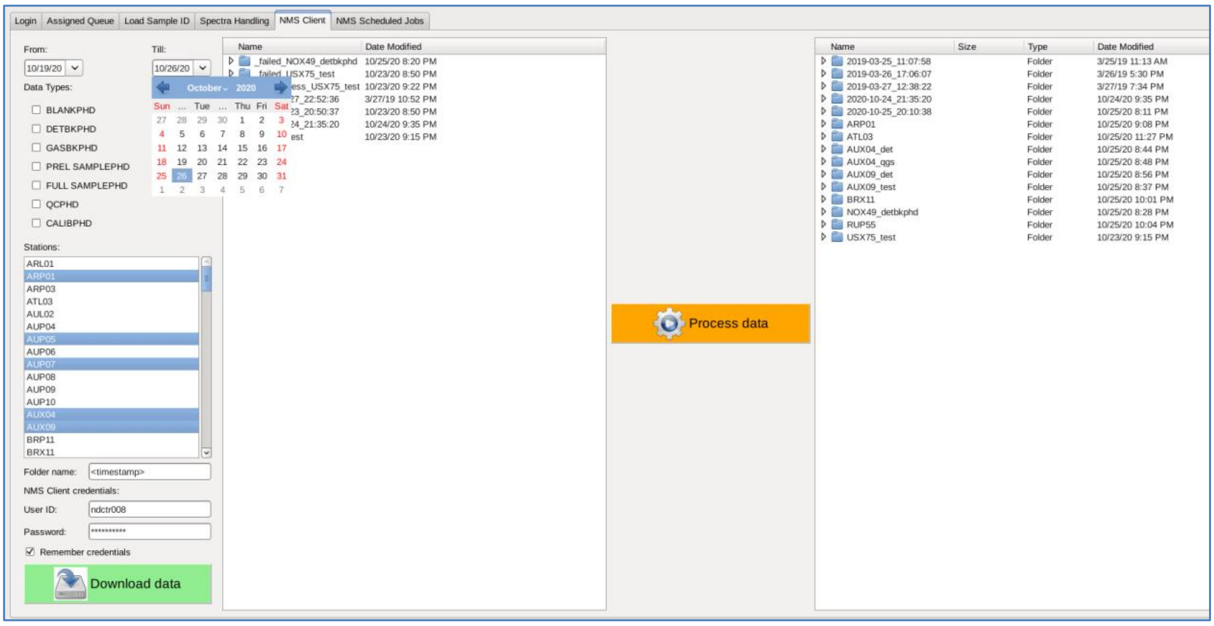


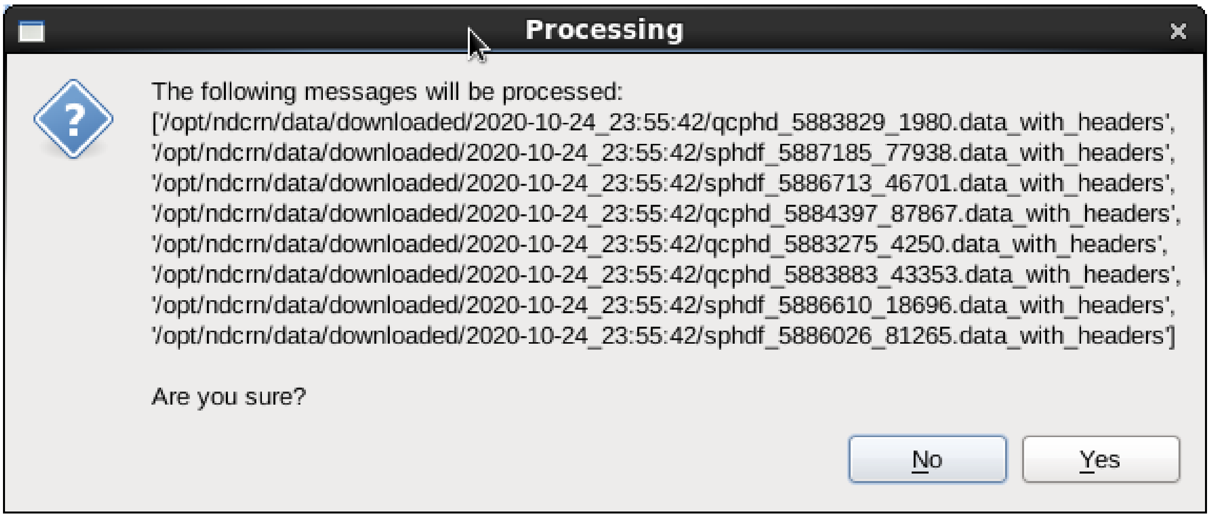
Figure 8: Data downloading and processing window

Once the selection filters are all set, hitting the **Download data** button will start data downloading and a progress status window will be brought-up. Upon completion, the user needs to close the window for performing subsequent steps. The data will be downloaded to `${NDCRN_HOME}/data/download/<sub-folder>`. By default, `<sub-folder>` name takes the current date-time stamp.

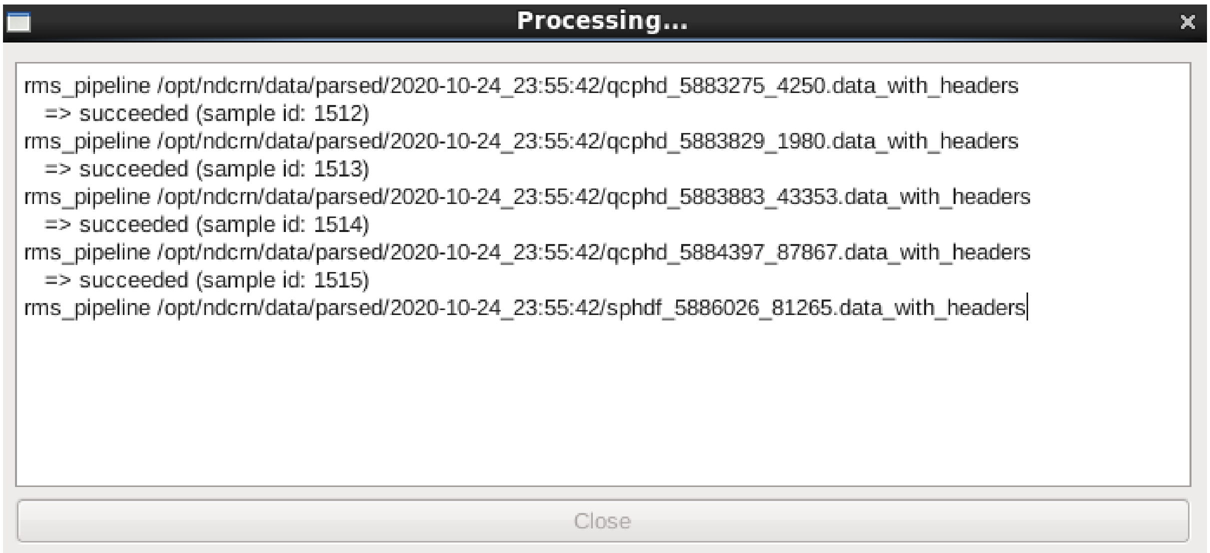
Downloaded data can be automatically processed from within the same *iNSPIRE* window.

The user has the option to process individual spectra by selecting from the data list in `<sub-folder>` before hitting the "**Process data**" button. For processing all data, it is enough to double-click the `<sub-folder>` name.

In both cases, a confirmation message will be brought-up to the user.



The processing progress status will then be displayed.



Successfully processed spectra will be moved

from: `${NDCRN_HOME}/data/download/<sub-folder>`

to: `${NDCRN_HOME}/data/parsed/<sub-folder>`.

Failed messages will remain in `${NDCRN_HOME}/data/download/<sub-folder>`.

6. Review functionalities

The following functionalities are accessible from toolbar buttons and main menu items. They are shown in child windows:

- Loading data
- Sample metrics
- Sample categorization
- PHD messages
- Automatic and reviewed reports
- Processing logfiles
- Calibrations checking and updating
- Reprocessing
- General comment editor
- Releasing
- Revoking

Particulates specific functionalities:

- Isotope Response Function
- Tc-Ge tool
- Baseline tool
- Background stripping
- Peak browser
- Review panel (peak/nuclide oriented)
- Station history
- Activity summary

HPGe SPALAX noble gas specific window:

- HPGe xenon window
- Baseline tool
- Peak Search window (in read only mode), since there is no need for peak identification in interactive mode.

6.1. BETA-GAMMA NOBLE GAS

This view, as in Figure 9, shows three different graphical representations of spectral data:

- Beta-gamma coincidence histogram.
- Beta spectra.
- Gamma spectra.

along with:

- Sample information
- Sample categorization
- Analysis results

These display modes are available for sample (or spike), gas background, detector background and QC spectra.

Button captions are dynamically adapted to the data type of the main spectrum and associated data.

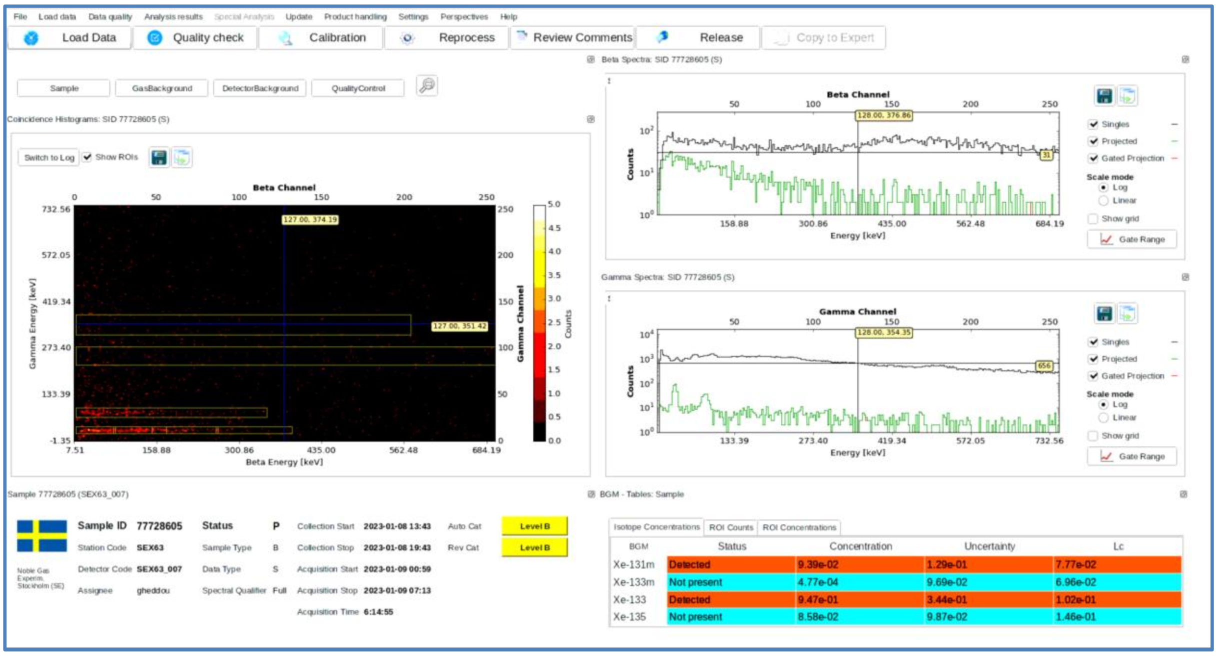


Figure 9: Main window for beta-gamma noble gas

The plots use Energy (keV) on the bottom and channel on the top axes.

Cursor annotations tooltips show energy/channel value with 2 decimals.

The three spectra (2D coincidence, beta and gamma) are automatically synchronized also in zoom mode. By changing the zoom of any of them, the other ones get automatically scaled to the same energy/channel range.

Saving as *.png* image and copying to clipboard are available for all plots.

6.2. PARTICULATES

The interface for a particulate sample is shown in Figure 10, which shows the spectra along with:

- Sample information
- Sample categorization
- Peak browsing
- Peak/nuclide oriented interactive review panels

and buttons for specific utilities:

- Baseline tool
- Isotope Response Function (IRF) window
- Tc-99m, Ge-75m (Tc-Ge) tool
- Background stripping window

These view items are available for sample, spike, blank, calibration, detector background, QC as well as preliminary spectra of the main.

Button captions are dynamically adapted to the data type of the main spectrum and associated data.

Figure 10: Main window for particulates

The plots use Energy (keV) on the bottom and channel on top horizontal axes. Counts are displayed on the vertical axis.

Cursor annotations tooltips show current energy/channel value with 2 decimals and associated counts.

Saving as a *.png* image and copying to clipboard are available.

6.3. HPGe NOBLE GAS

The interface for a HPGe noble gas sample is shown in Figure 11, which shows the spectra along with:

- Sample information
- Sample categorization
- Peak browsing

and buttons for specific utilities:

- Baseline tool
- HPGe Xenon window

These view items are available for sample, spike, blank, calibration, detector background, QC as well as preliminary spectra of the main.

Button captions are dynamically adapted to the data type of the main spectrum and associated data.

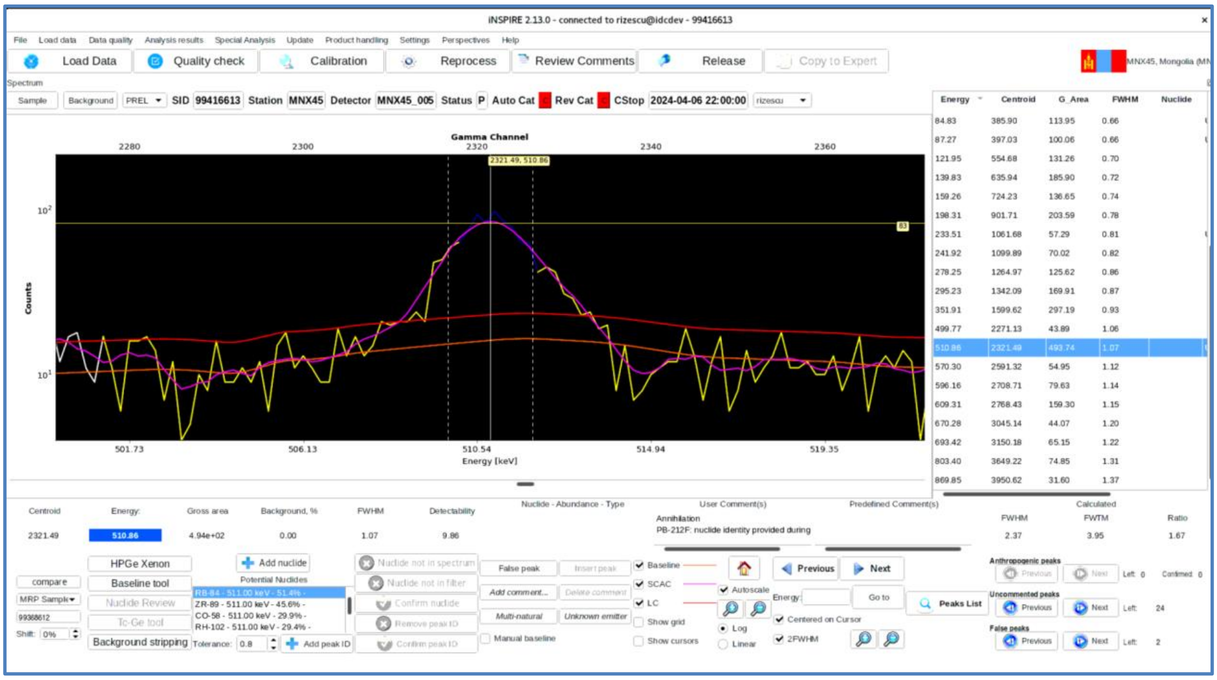


Figure 11: Main window for HPGe noble gas

The plots use Energy (keV) on the bottom and channel on top horizontal axes. Counts are displayed on the vertical axis.

Cursor annotations tooltips show current energy/channel value with 2 decimals and associated counts.

Saving as *.png* image and copying to clipboard are available for all plots.

7. Spectrum information

This panel displays detailed information on spectrum identification parameters. These consist of the following items as shown in Figure 12, Figure 13, and Figure 14.

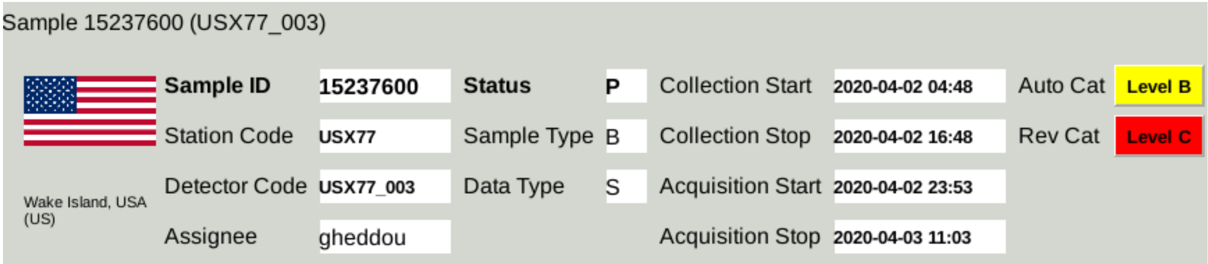


Figure 12: Spectrum information panel for beta-gamma noble gas

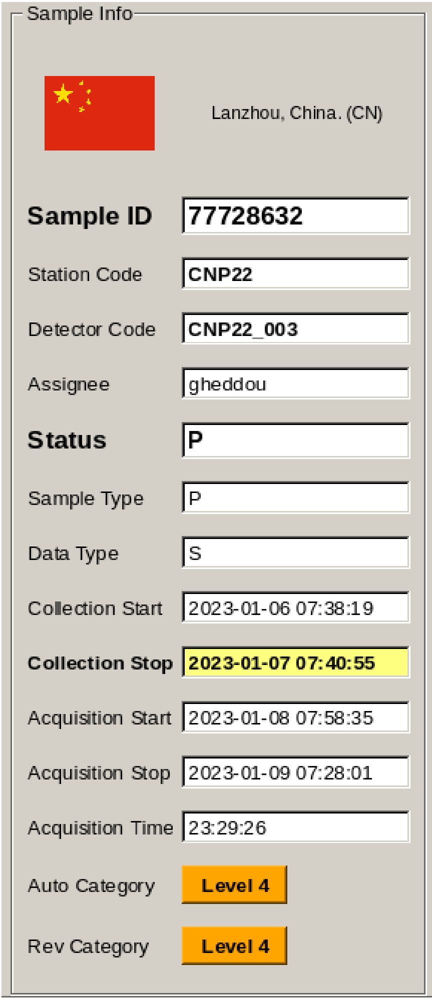


Figure 13: Spectrum information panel for particulates

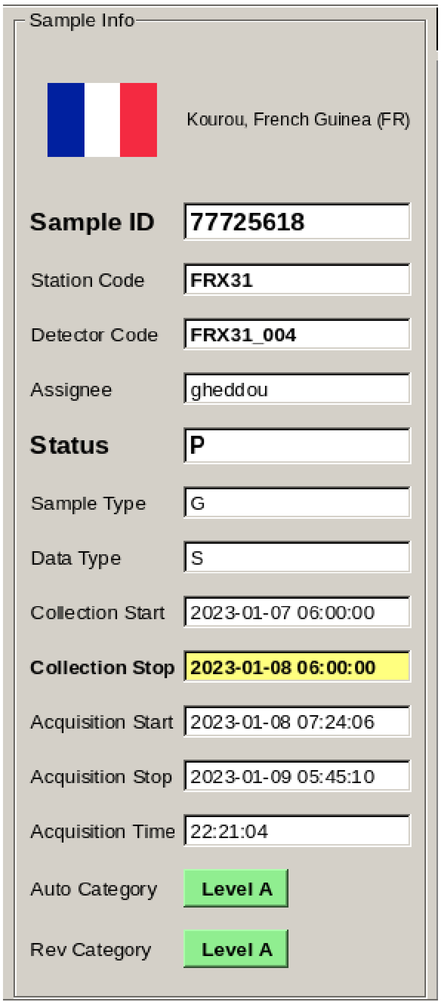


Figure 14: Spectrum information panel for HPGe noble gas

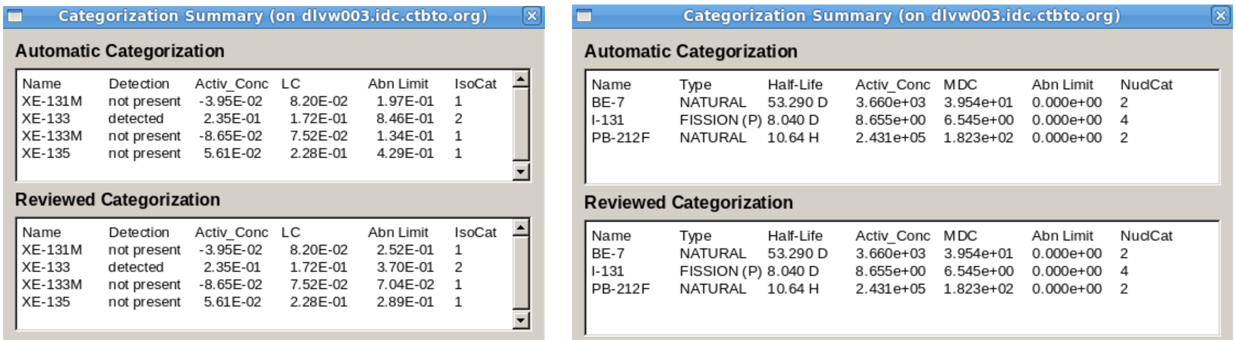
The spectrum identification details include:

- **Station code**.
- **Detector code**.
- **Assignee:** Database username of Analyst to whom the spectrum is currently assigned.
- **Sample_ID**: spectrum identification number as assigned by the automatic processing pipeline.
- **Sample type**: *(**B:** beta-gamma noble gas, **G:** HPGe noble gas; **P:** Particulates)*
- **Data type**: type of spectral data *(**S**: Sample, **B**: Blank filter, **C**: Calibration, **D**: Detector background, **G:** gas background, **Q**: Quality Control, **K**: spiked sample);*
- **Status**: processing status of the spectrum *(**U**: Unprocessed, **P**: Processed, **A**: Analysed by the parsing program but not processed yet or failed the processing, **B**: marked as Bad, **D**: marked as Duplicate, **Q**: Temporarily Released, **R**: Released, **e**: temporarily expertized, **E**: Expertized). Note that statuses "e" and "E" don't apply to routine analysis mode (in RMSMAN database schema) but only in case of a URR is generated (in RMSEXPERT database schema) in the framework of a special study.*
- **Collection start**: date and time of air sampling start.
- **Collection stop**: date and time of air sampling stop.
- **Acquisition start**: date and time of spectrum acquisition start.
- **Acquisition stop**: date and time of spectrum acquisition stop.
- **Auto Category**: sample category based on automatic processing results.
- **Category**: automatic and reviewed sample category based on interactive review of the spectrum.

Automatic category and reviewed category are mapped to background colour of respective semaphores:

- For noble gas (Level A: green; Level B: yellow; Level C: red; without category: neutral).
- For particulates (Level 1: blue; Level 2: green; Level 3: yellow; Level 4: orange; Level 5: red; without category: neutral)

In IDC environment, clicking on either category semaphore shows isotope category results in both automatic and reviewed mode. Whereas in the NDC-in-a-Box environment, displayed information corresponds to updated category.



Categorization Summary (on dlvw003.idc.ctbto.org)

Automatic Categorization

Name	Detection	Activ_Conc	LC	Abn Limit	IsoCat
XE-131M	not present	-3.95E-02	8.20E-02	1.97E-01	1
XE-133	detected	2.35E-01	1.72E-01	8.46E-01	2
XE-133M	not present	-8.65E-02	7.52E-02	1.34E-01	1
XE-135	not present	5.61E-02	2.28E-01	4.29E-01	1

Reviewed Categorization

Name	Detection	Activ_Conc	LC	Abn Limit	IsoCat
XE-131M	not present	-3.95E-02	8.20E-02	2.52E-01	1
XE-133	detected	2.35E-01	1.72E-01	3.70E-01	2
XE-133M	not present	-8.65E-02	7.52E-02	7.04E-02	1
XE-135	not present	5.61E-02	2.28E-01	2.89E-01	1

Categorization Summary (on dlvw003.idc.ctbto.org)

Automatic Categorization

Name	Type	Half-Life	Activ_Conc	MDC	Abn Limit	NuclCat
BE-7	NATURAL	53.290 D	3.660e+03	3.954e+01	0.000e+00	2
I-131	FISSION (P)	8.040 D	8.655e+00	6.545e+00	0.000e+00	4
PB-212F	NATURAL	10.64 H	2.431e+05	1.823e+02	0.000e+00	2

Reviewed Categorization

Name	Type	Half-Life	Activ_Conc	MDC	Abn Limit	NuclCat
BE-7	NATURAL	53.290 D	3.660e+03	3.954e+01	0.000e+00	2
I-131	FISSION (P)	8.040 D	8.655e+00	6.545e+00	0.000e+00	4
PB-212F	NATURAL	10.64 H	2.431e+05	1.823e+02	0.000e+00	2

Figure 15: Detailed categorization parameters (Left: noble gas isotopes; Right: particulate nuclides)

8. Data quality flagging system

Quality Control (QC) flags for FULL sample spectra is shown in Figure 16.

These sample metrics measure the spectral data quality from the CTBT verification value point of view. If the sample metrics are not met, but the sample still has verification value, the sample is released without category.

8.1. SAMPLES METRICS FOR CURRENT SAMPLE

The left panel of Figure 16 displays the sample metrics that are currently used in the IDC review policy for noble gas and particulates data. The values for the currently loaded sample are displayed next to each parameter flag. These are compared to reference thresholds of operational requirements and flags are displayed in colour-coded mode for each test item pass/fail:

- Flag colour in *green*: the parameter is within the limits (PASS),
- in yellow: the parameter doesn't fulfil the minimum requirement but still within acceptable range in terms of data value for verification as in IDC review policy,
- in blue: poor,
- and in *red*: the parameter value is beyond the required range (FAIL).

Figure 16: Sample metrics – values and flags for current sample

(Left: HPGe noble gas; Centre: beta-gamma noble gas; Right: particulates)

8.2. ADDITIONAL PARAMETERS

The overall flag from SOH data standpoint is also integrated into *iNSPIRE*'s dashboard. SOH status reflects whether the SOH data quality is reviewed by the IDC Operation Section (OPS) using dedicated tools and procedures. Additional flags as shown in Figure 17 are also available on *iNSPIRE*'s dashboard are intended for the purposes of investigating special situations.

For noble gas:

- Air flow
- Whether Gas background data is available for the sample and used in data processing
- Live acquisition time for Gas background (*red if less than 4 hours*)
- Whether Detector background is available for the sample and used in data processing
- Sample volume derived from Air Flow. This "rough" sample volume might be higher than the effective sample volume as derived from stable Xenon volume *(effective air volume, in m3, is obtained by dividing stable xenon volume, in ml, by 0.087)*
- Radon counts in Region of Interest (ROI) 1 in the sample
- Energy resolution FWHM of the gamma detector at 81 keV

For particulates:

- Air flow
- Whether detector background spectrum is used in the correction of sample data processing
- Whether blank filter spectrum is used in the correction of sample data processing
- Be-7 concentration
- Pb-212 concentration

These additional data quality parameters are available in the central panel.

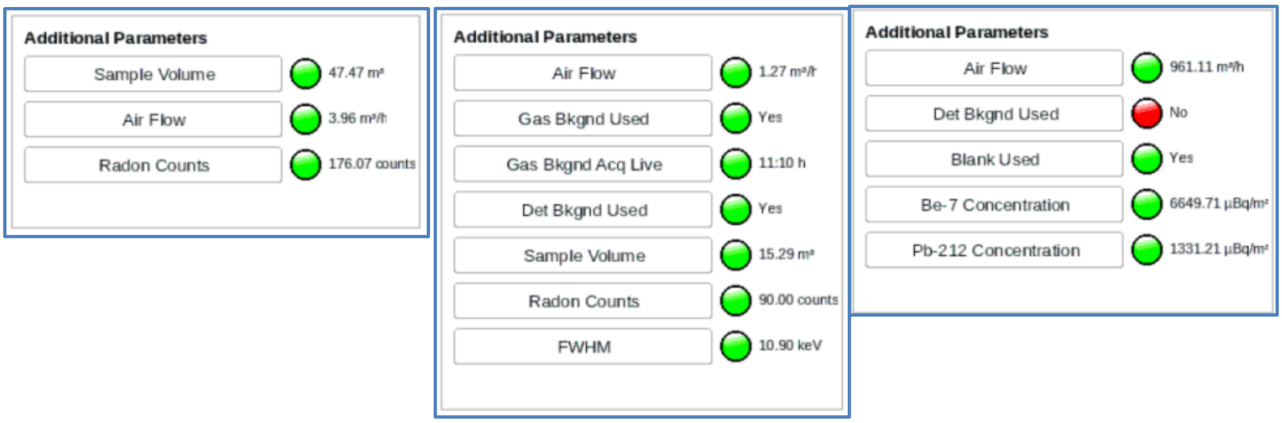


Figure 17: Additional sample and processing parameters (Left: HPGe noble gas; Centre: beta-gamma noble gas; Right: particulates)

8.3. HISTORY OF SAMPLE METRICS

By clicking on a sample metric (or additional parameters) button, a time series of the selected parameter will be displayed on the graph on the right hand as shown in Figure 18.

The default time frame is one week prior to the current sample, but this can be extended to one month, three months, one year or all available data, by selecting from the dropdown combo box in the panel. Samples can also be filtered based on status (released with category or all processed spectra). In the same way, the plots can be constrained to current detector or all detectors for the station. The vertical axis can be toggled to linear or logarithmic scale.

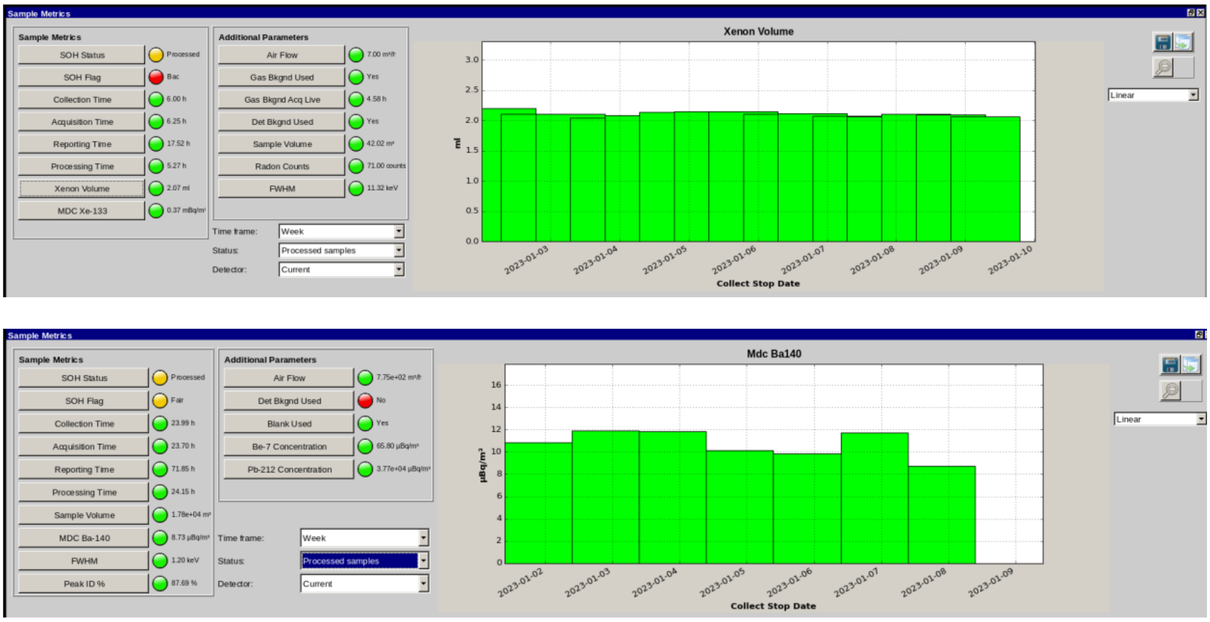


Figure 18: Sample metrics time series (Upper: noble gas; Lower: particulates)

9. Spectral displays

9.1. BETA-GAMMA NOBLE GAS

9.1.1. COINCIDENCE HISTOGRAM

Beta-gamma coincidence histogram 2D plot is represented by binning the counts into a colour mapping scheme. An example of this is shown in Figure 19.

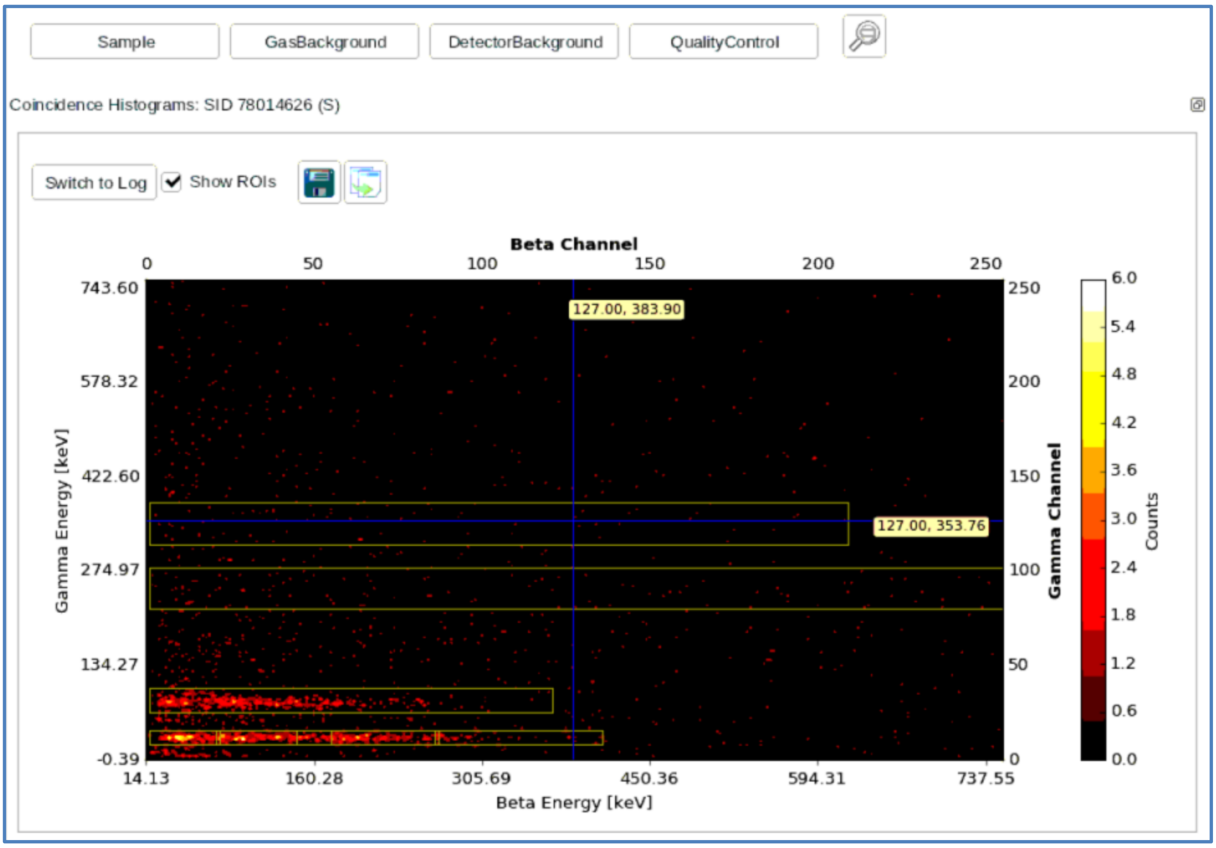


Figure 19: Beta-gamma coincidence histogram

- The upper buttons **Sample** (or **Spike**), **GasBackground, DetectorBackground** and **QualityControl** display related individual data components of the current dataset, as applicable.
- The check box **Show ROIs** allow displaying/hiding ROI limits.
- The button **Switch to Log/Linear**: switches coincidence histogram count mapping between linear and logarithmic scale.

Figure 20 and Figure 21 illustrate a spike spectrum in linear and Log mode respectively, that an analyst would see while processing these types of samples.

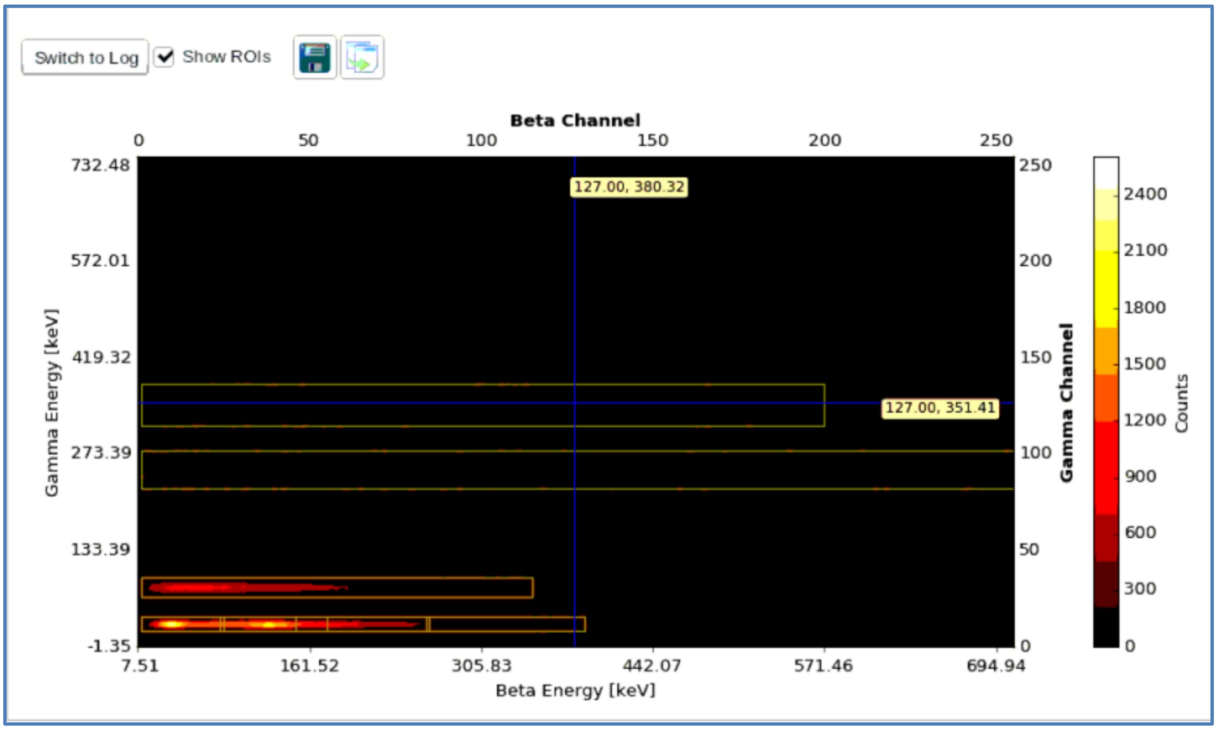


Figure 20: Beta-gamma histogram in linear scale

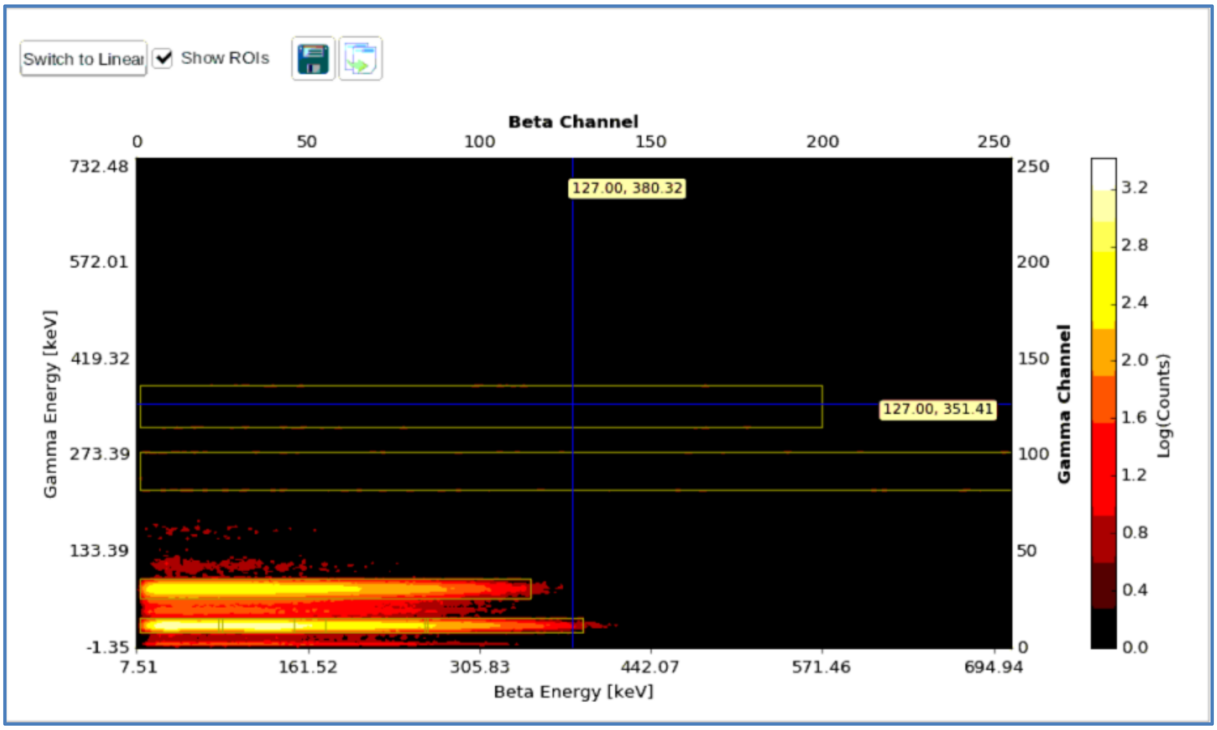


Figure 21: Beta-gamma histogram in logarithmic scale

9.1.2. BETA SPECTRA

Beta spectra refer to three types of spectra:

- **Single spectrum**: pure spectrum as acquired by the beta detector and recorded in PHD message under #b_Spectrum block.
- **Projected spectrum**: derived from the coincidence histogram by projecting over the whole gamma channel range.
- **Gated spectrum**: derived from the coincidence histogram by projecting over a specific interval of the gamma range.

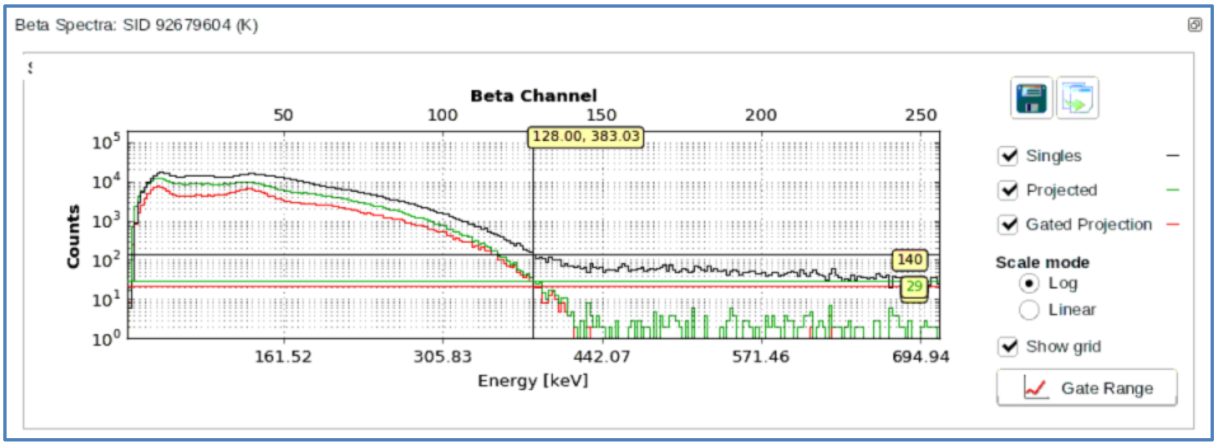
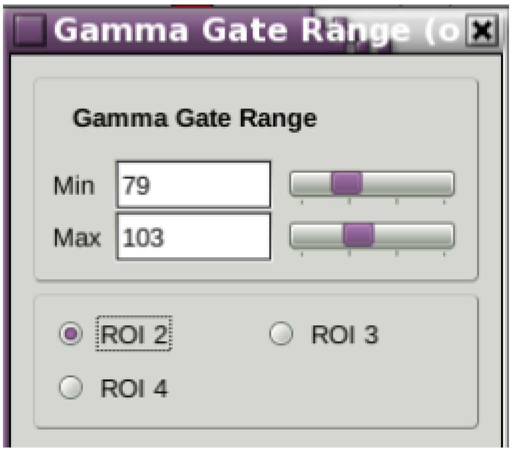


Figure 22: Beta spectra plots

The user can enable/disable any of the three spectra by checking/unchecking corresponding checkboxes. The vertical scale can be set to logarithmic or linear mode.

Settings for the gated spectrum can be viewed and edited by clicking on the **Gated Range** button.

- Predefined gating intervals include gamma limits of ROI2, ROI3 and ROI4.



- In addition, the window offers the option to use any user defined gating range, by typing in or moving the *Min/Max* sliders for defining the lower and upper limits, respectively.

9.1.3. Gamma spectra

Gamma spectra refer to three sorts of spectra:

- **Single spectrum**: pure spectrum as acquired by the gamma detector and recorded in PHD message under #g_Spectrum block.
- **Projected spectrum**: derived from the coincidence histogram by projecting over the whole beta channel range.
- **Gated spectrum**: derived from the coincidence histogram by projecting over a specific interval of the beta range.

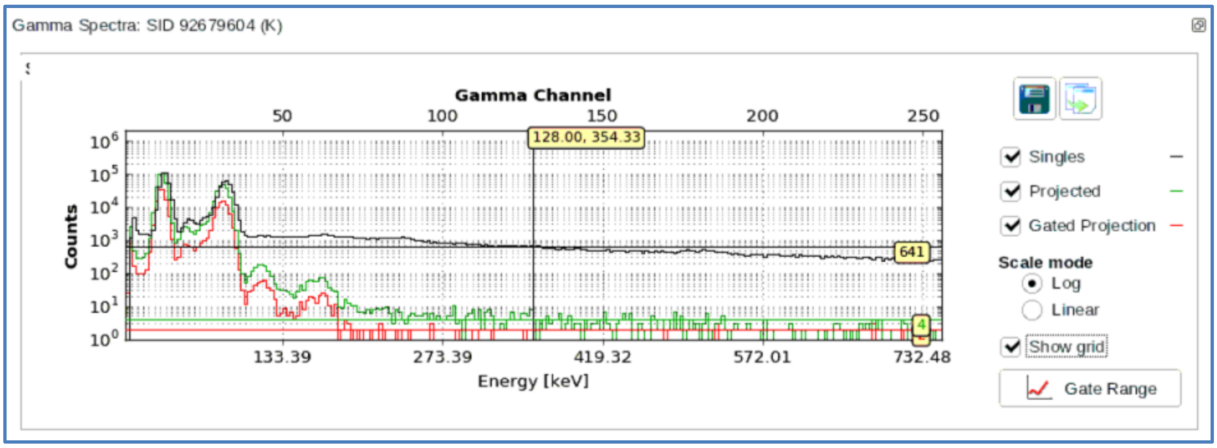
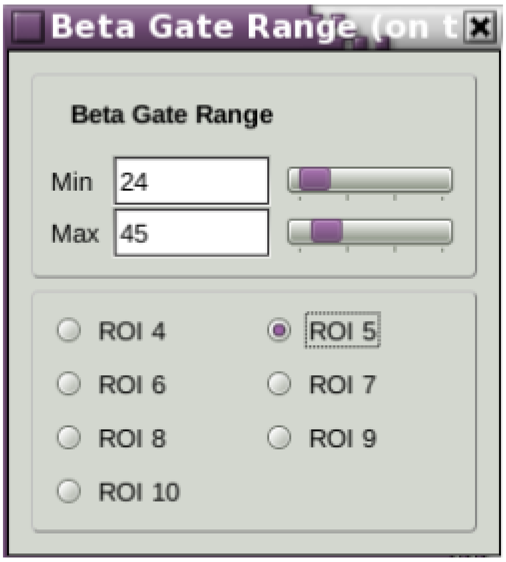


Figure 23: Gamma spectra plots

The user can enable/disable any of the three spectra by checking/unchecking corresponding checkboxes, in the upper right corner. The vertical scale can be set to logarithmic or linear mode.

Settings for the gated spectrum can be viewed and edited by clicking on the **Gated Range** button.

- Predefined gating intervals include beta limits of ROIs 4-10.



-
- In addition, the window offers the option to use any user defined gating range, by typing in or moving the *Min/Max* sliders for defining the lower and upper limits, respectively.

9.2. PARTICULATES

The main spectral display of *iNSPIRE* for particulates consists of the following items:

- spectrum original counts
- Single Channel Analyzer Curve (SCAC),
- baseline plot
- Critical Limit (LC) curve

The main chart consists of four series with the following default colour-coding convention:

- **yellow**: Original spectrum counts, where
  - *Peaks Region Of Interest (ROI) identified in automatic mode are shown in* **blue**.
  - *Uncommented peaks (no nuclide is associated, and no comment is provided) are shown in* **white**.
- **orange**: Spectrum baseline.
- **red**: Critical Limit Curve (LCC).
- **magenta**: Single Channel Analyzer Curve (SCAC).

Default scaling for horizontal and vertical axis is Automatic:

- Top horizontal axis in channel number mode, from first channel to Multi Channel Analyzer (MCA) size, and bottom horizontal axis in corresponding energy (keV).
- Vertical axis in logarithmic scale from 0 to max count over the spectrum range.
- The vertical axis can be set to Linear/Log mode from the corresponding radio buttons under the chart.
- By default, all chart series are in visible mode (counts, SCAC, baseline, LC). Each of SCAC, baseline and LC can be disabled from the three checkboxes below the chart.

Note that under the chart on the right side there are two groups of selectors to set the axes properties, first for the vertical axis (left) and second for the horizontal axis (right).

The spectrum display area provides a zoom in/out feature:

- Pressing the mouse left button and dragging will zoom into the area of drawn rectangle.
- Using the two pairs of magnifying glass buttons  below the chart, one for the vertical axis (left) and one for the horizontal axis (right), will zoom in/out on the selected axis.
- Clicking on the Autoscale checkbox will reset the vertical scale to automatic, from 0 to max count over the selected energy range.
- Clicking on the reset button , the scaling will zoom out to full spectra display mode.

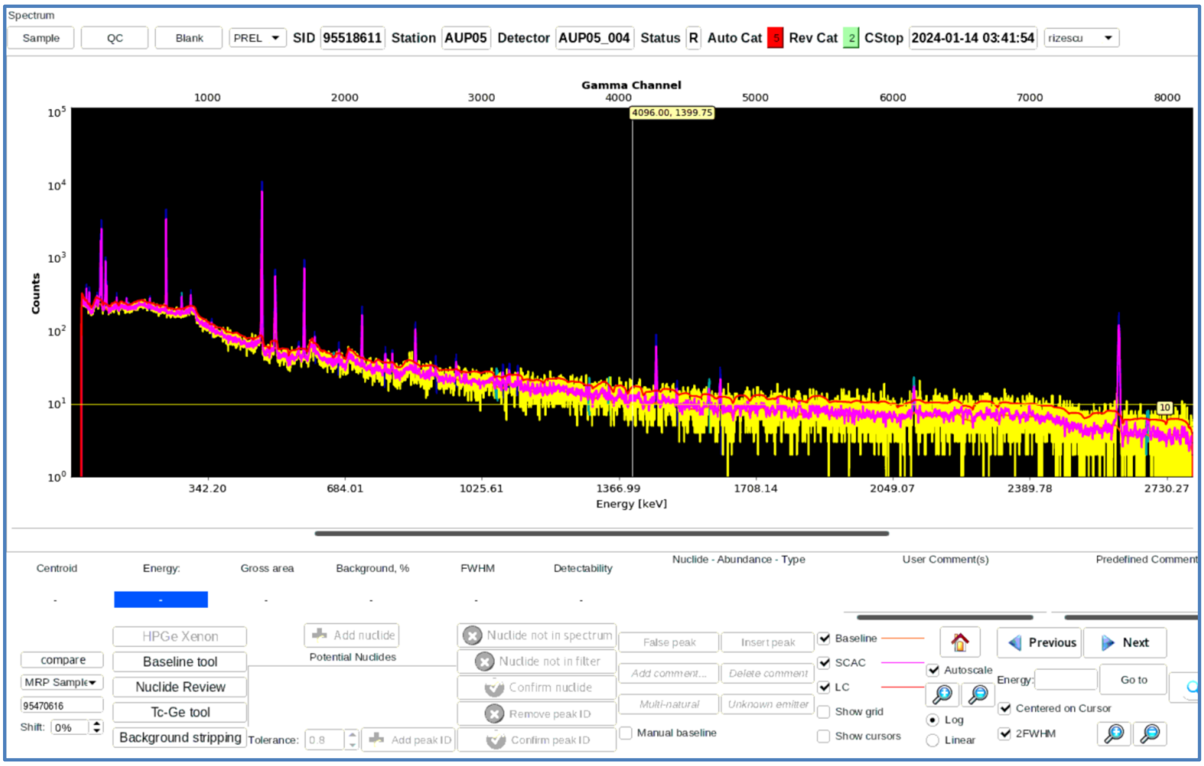


Figure 24: Particulates sample spectrum view

The upper buttons **Sample, QualityControl, Blank, DetectorBackground** and **PREL sample spectra** allow the user to display related individual data components.

Examples:

- *Quality control*

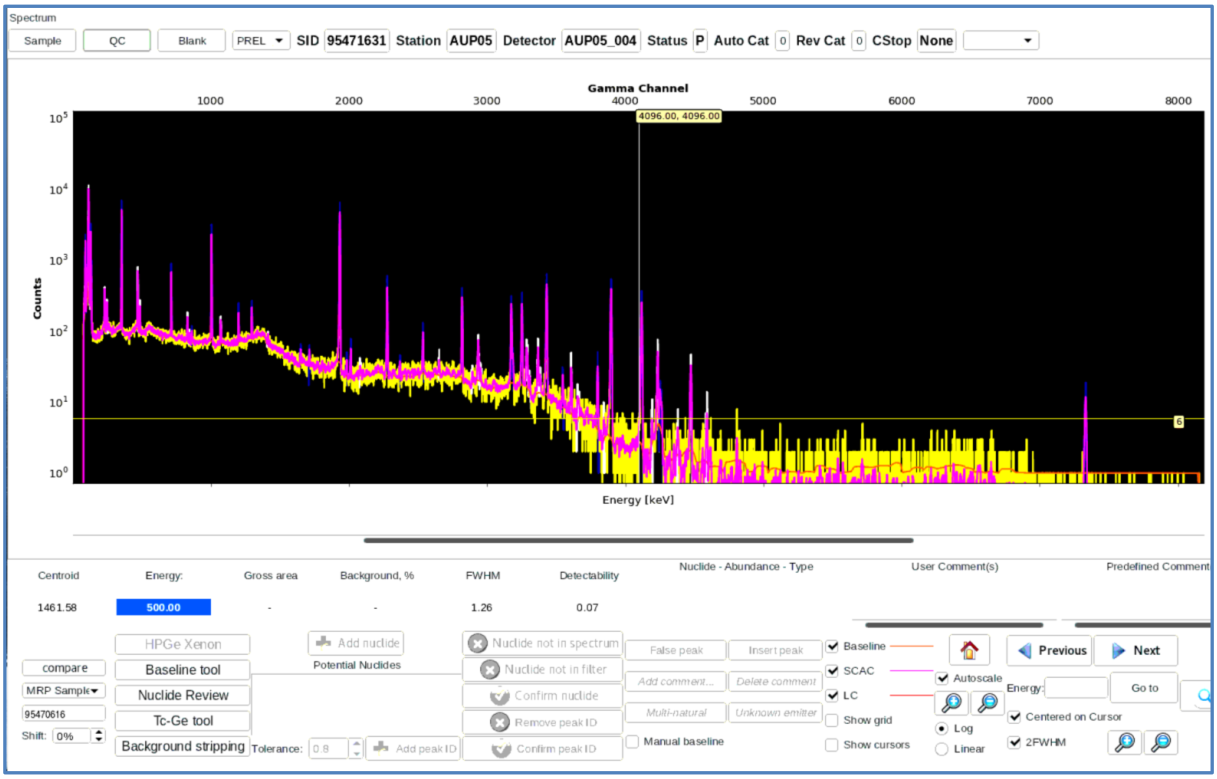


Figure 25: Particulates QC spectrum view

- Blank filter

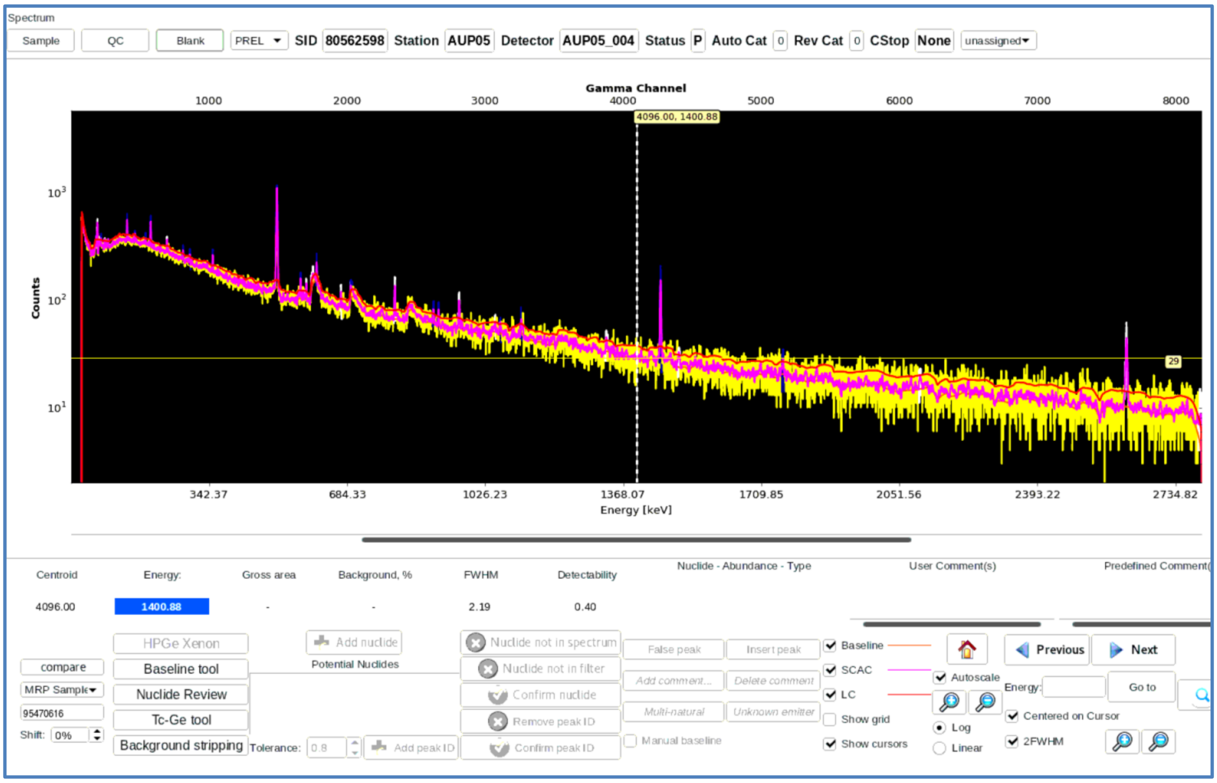


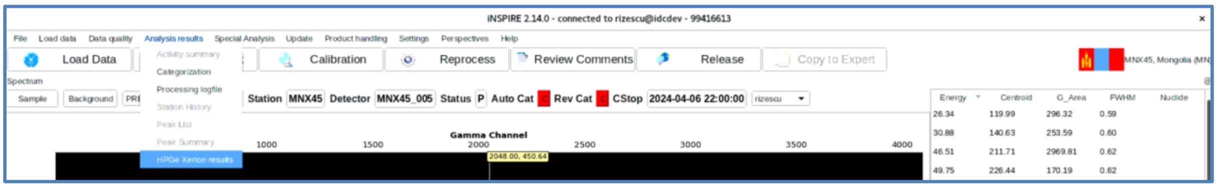
Figure 26: Particulates blank filter spectrum view

Note: The spectrum information panel as well as peak attributes automatically update by showing the parameters of the currently displayed data component.

The check boxes “Show grid” and “Show cursors” on the right hand allow the user to show/hide the chart grid and the cursors, respectively.

9.3. HPGE NOBLE GAS

Upon loading a HPGe based noble gas (SPALAX) sample spectrum, the Xenon window as shown in Figure 27 is activated from the **HPGe Xenon** button on the main window or from **HPGe Xenon results** menu item of **Analysis results** menu.



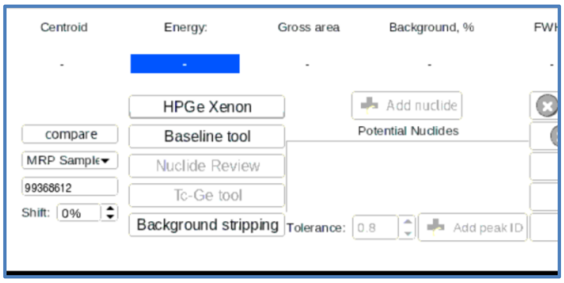


Figure 27: Two methods to activate the HPGe Xenon Tool

9.3.1. ANALYSIS RESULTS VIEW

The default Xenon window as shown in Figure 28 displays five plots:

- X-ray range of radioxenon isotopes
- Xe-133 gamma line (81 keV)
- Xe-131m gamma line (164 keV)
- Xe-133m gamma line (233 keV)
- Xe-135 gamma line (250 keV)

The plots use energy (keV) on the bottom and channel on the top horizontal axes with the counts displayed on the vertical axis.

Analysis results are displayed in the upper right panel for the four xenon isotopes based on two methods. The Analyst can switch between the two tabs for:

- Deconvolution method using the FULL spectrum (Method 11).
- Deconvolution method including the PREL spectra (Method 12).

Activity concentrations, associated uncertainties, and MDC (Minimum Detectable Concentration) are expressed in mBq/m3, decay-corrected to sampling time.

Note: MDC is only shown for Xe-133 and Xe-135. For Xe-131m and Xe-133m, MDI (Minimum Detectable Intensity) is shown, instead.

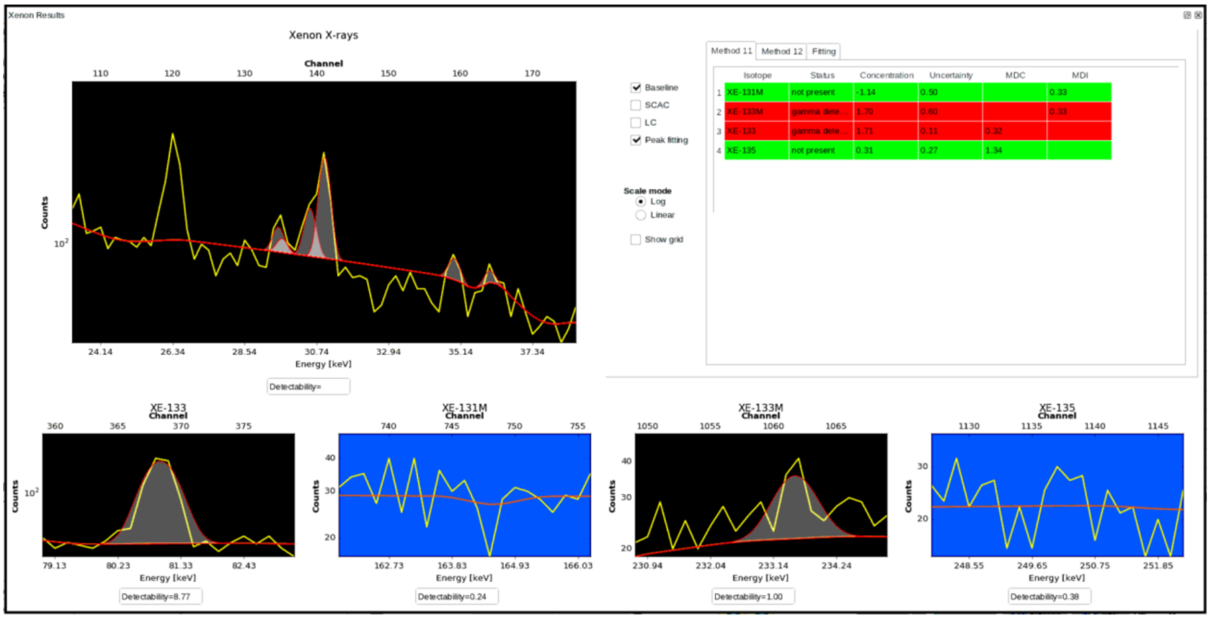


Figure 28: HPGe Xenon window - results

Colour mapping

- If a peak is detected, the plot background is in black, while a blue background is used if the peak is not detected.
- The background of each isotope row in the table results is coloured either in red (if the isotope is detected) or green, if not.

9.3.2. PEAK FITTING VIEW

The **Fitting** tab contains the list of xenon isotopes and related X-ray and gamma lines.

The following options are available for performing peak fitting:

- the line(s) to fit can be set from the checkboxes in front of each row
- FWHM can be either set to “Free” so that the value will be returned as output, or “Fixed” to use the current resolution calibration
- **Update fitting** button triggers a fresh peak fitting of gamma lines and X-rays deconvolution based on updated settings.

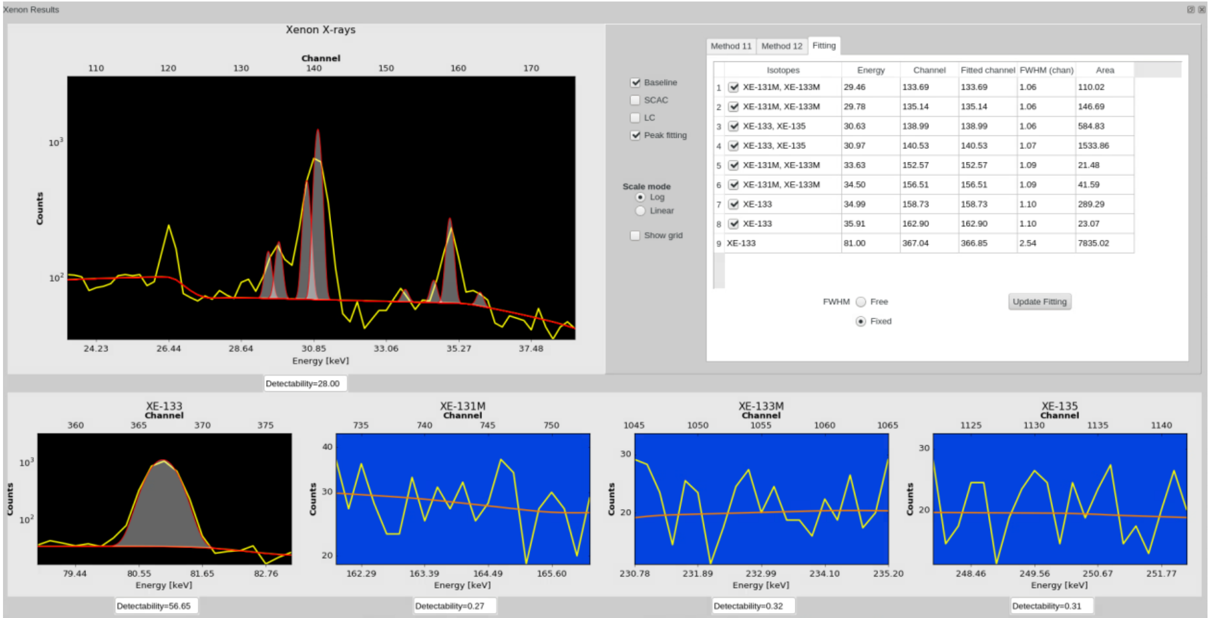
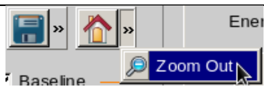


Figure 29: HPGe Xenon window - fitting

9.4. Plot controls

Appropriate controls allow the user to interact with all spectral plots as presented in the previous sub-sections. This applies to both particulates and noble gas.
The following table describes individual functions of associated widget icons.

Allows the user to save the plot into a file		*Brings the plot to the default (full scale) mode*
Allows the user to copy the plot to the clipboard		
Allows the user to save the plot into a file		*Brings the plot to the default (full scale) mode*
		Zooms the plot out by 100%.

Spectral plots of particulates and HPGe noble gas in all windows can be customized through the following controls on the window.

- The checkboxes **Baseline, SCAC, LC, Peak fitting, Show grid** and **Show cursors** allow the user to customize the plots by showing or hiding related elements.
- The radio buttons **Linear/Log** allows the user to toggle the vertical axis scale.

10. Data messages and processing log files

10.1. PHD MESSAGES

PHD message(s) pertaining to the currently loaded spectrum is(are) available from the menu item **PHD files** under the main menu **Load data** of the main window or by using the **View PHD** button in the **Load Sample ID** dialog for spectra that have not been loaded.

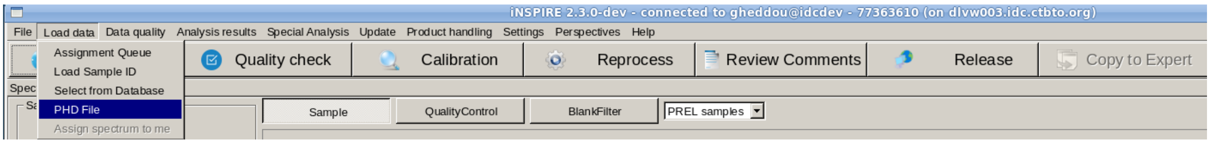
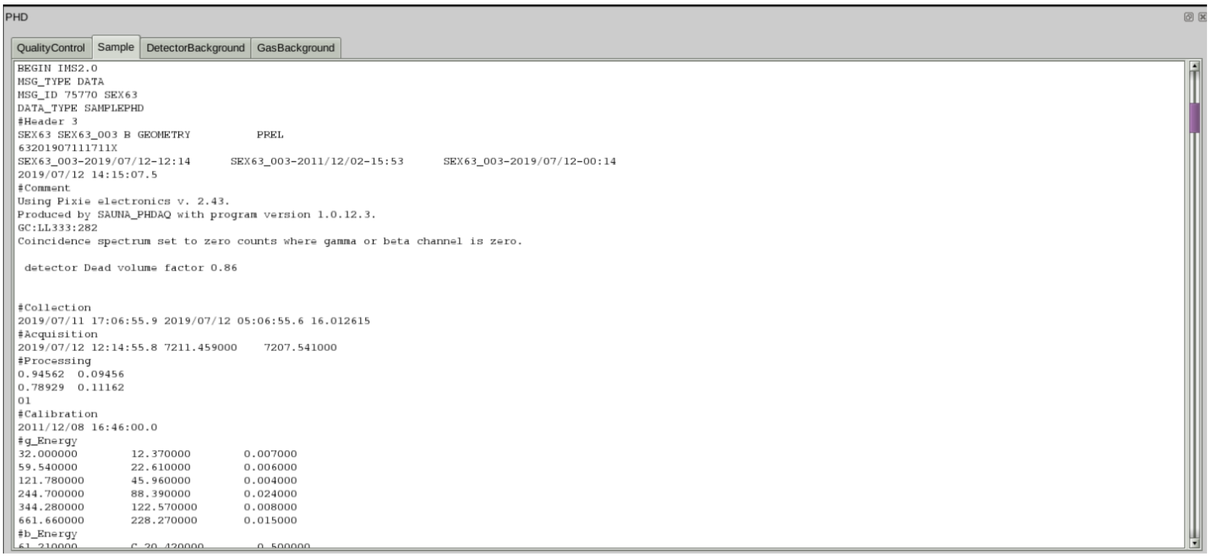


Figure 30 below illustrate an example of the view allow access to the raw PHD data components:

- Sample, gas background, detector background and QC for beta-gamma noble gas
- Sample, blank filter and QC for particulates



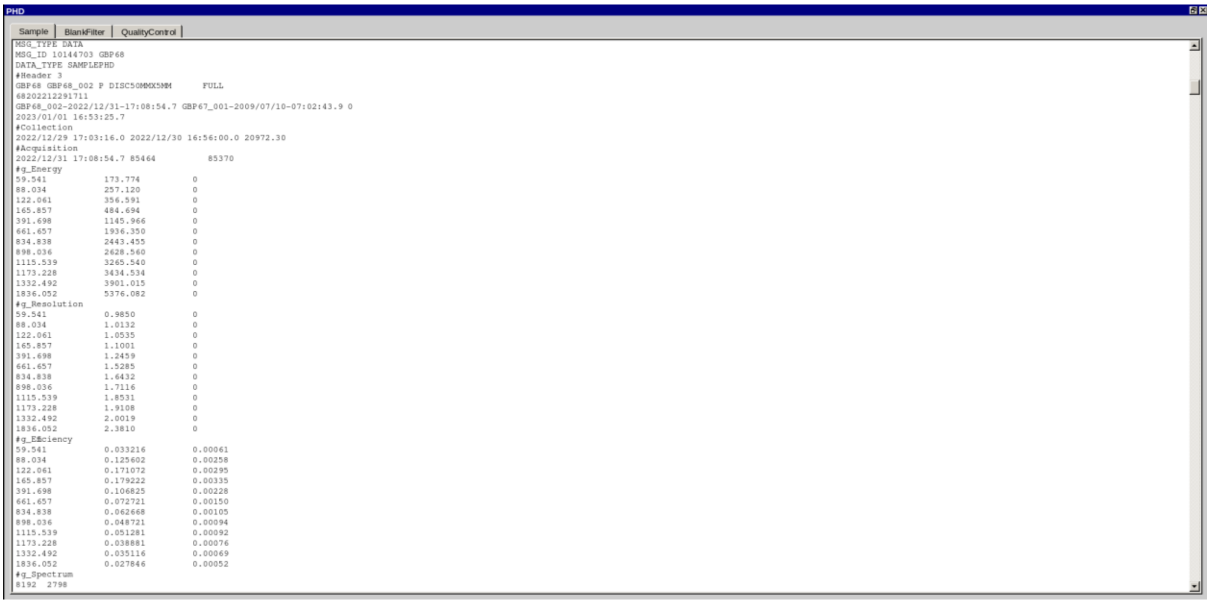


Figure 30: Viewing PHD messages (upper: noble gas; lower: particulates)

10.2. LOG FILES

Log files of both automatic and interactive processing pertaining to the currently loaded data components are available from the menu item **Processing logfile** under the main menu **Analysis results** of the main window.

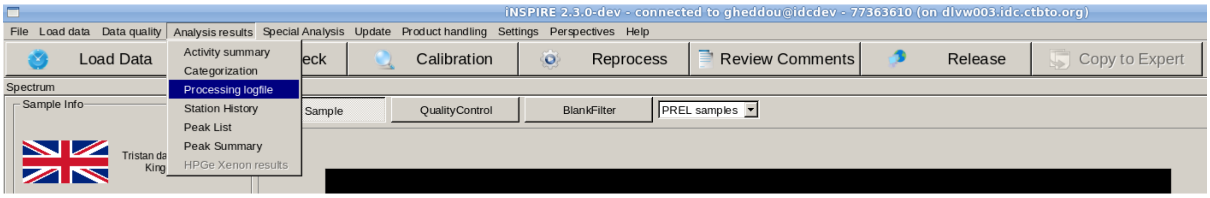


Figure 31 has an illustration of the view containing all log file components:

- Sample, gas background, detector background and QC for beta-gamma noble gas
- Sample, blank filter and QC for particulates

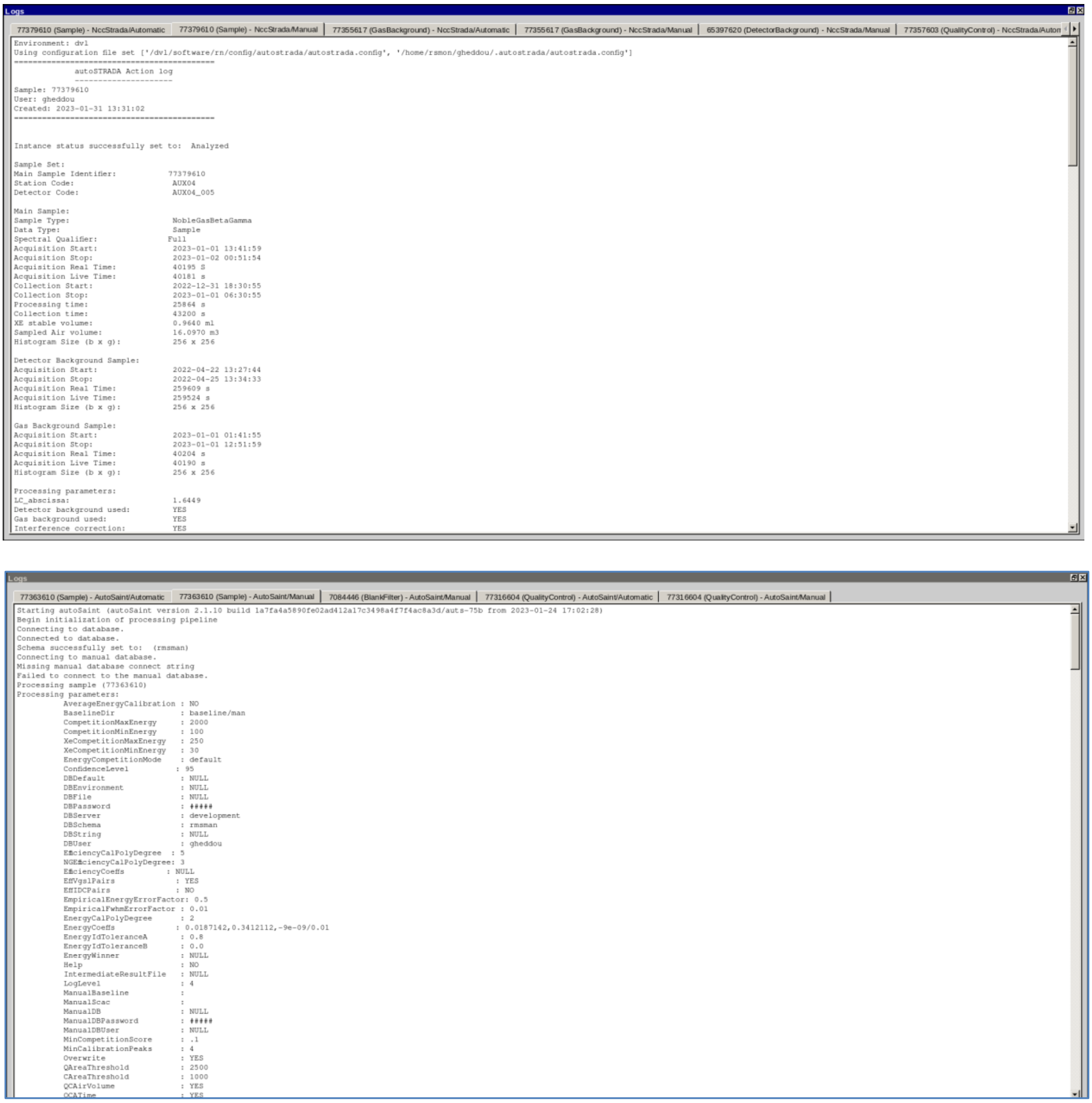


Figure 31: Viewing Logfiles (upper: noble gas; lower: particulates)

11. Sample analysis results

Both intermediate and ultimate analysis results are available to the Analyst on *iNSPIRE* GUI.

11.1. Beta-gamma noble gas

The high-level results include ROI counts, ROI concentration-based results and isotope concentration results.

11.2. Isotope concentrations

This view, shown in Figure 32, displays the ultimate analysis results of activity concentration and critical limit of the xenon isotopes Xe-131m, Xe-133, Xe-133m and Xe-135.

Isotope Concentrations | ROI Counts | ROI Concentrations

Ncc	Status	Concentration	Uncertainty	Lc
Xe-131m	Not present	1.54e+00	1.09e+00	1.73e+00
Xe-133m	Not present	3.24e-01	9.24e-01	1.51e+00
Xe-133	Detected	6.46e+01	6.67e+00	4.83e-01
Xe-135	Detected	2.16e+00	7.03e-01	6.89e-01

Figure 32: Isotope concentrations

Notes:

- The main tab **Isotope Concentrations** shows analysis results.
- The results include the following for each isotope:
  - Nuclide identification flag (Flag)
  - Activity concentration (Conc), in mBq/m3
  - Uncertainty (Uncert) on activity concentration, in mBq/m3
  - Critical Limit (LC), in mBq/m3
- The **Flag** is set to ***Detected*** if the isotope is detected (above LC) and to ***Not present*** if the isotope is not detected (below LC).
- Red background colour means that the isotope is detected.
- Green background colour means that the isotope is not detected.

11.2.1. ROI counts

This view, shown in Figure 33, displays analysis results at the ROI counts level.

Isotope Concentrations | ROI Counts | ROI Concentrations

Roi	Gross count	Temporary Count	Net count	Lc
1	1.90e+01	1.02e+01	1.02e+01	4.93e+00
2	4.60e+01	2.64e+01	2.64e+01	8.42e+00
3	1.09e+03	1.08e+03	1.05e+03	1.09e+01
4	1.43e+03	1.38e+03	1.35e+03	1.47e+01
5	4.69e+02	3.92e+01	3.61e+01	4.06e+01

Figure 33: ROI counts

Notes:

- The table contains:
    - ROI gross count: total counts
    - Temporary net count: after detector background and interference corrections
    - Net count: after memory effect correction
    - LC: Critical Limit, in terms of counts for the confidence level in the configuration
- A red background means that the Net count is above LC for the ROI.
- A green background means that the Net count is below LC for the ROI.

11.2.2. ROI CONCENTRATIONS

This view, shown in Figure 34, displays intermediate analysis results at the ROI concentration level, based on the Net Count Calculation (NCC) method.

Roi	Conc	Mdc	Lc	Ld
1	0.00e+00	0.00e+00	0.00e+00	0.00e+00
2	2.16e+00	1.60e+00	6.89e-01	1.60e+00
3	6.33e+01	1.47e+00	6.52e-01	1.47e+00
4	6.62e+01	1.57e+00	7.17e-01	1.57e+00
5	1.54e+00	3.57e+00	1.73e+00	3.57e+00

Figure 34: ROI concentrations

Notes :

- The table of the main tabulation **Isotope Concentrations** shows analysis results based on NCC method.
- The results include the following for each ROI:
    - Activity concentration (Conc), in mBq/m3
    - Minimum Detectable activity Concentration (Conc), in mBq/m3
    - Critical Limit (LC), in mBq/m3
    - Detection Limit (LC), in mBq/m3
- Red background colour means that the concentration is above LC.
- Green background colour means that concentration is below LC.
- ROI concentrations for ROI 1 (^{214}Pb) is not calculated, because the parent ^{222}Rn is not quantified

11.3. Particulate results

Both intermediate and ultimate analysis results are available to the Analyst on *iNSPIRE* GUI. This includes peak parameters, nuclide activity concentration as well as categorization results. The following sub-sections describe how to access the different levels of analysis results and the content of each level.

11.3.1. Peak summary

The spectrum peak summary is accessible from the **Peak summary** menu item of the **Analysis results** menu.

The results are brought up in an information dialog as shown in Figure 35.

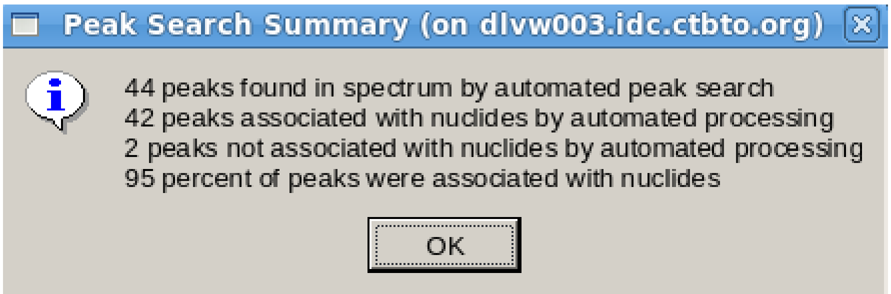
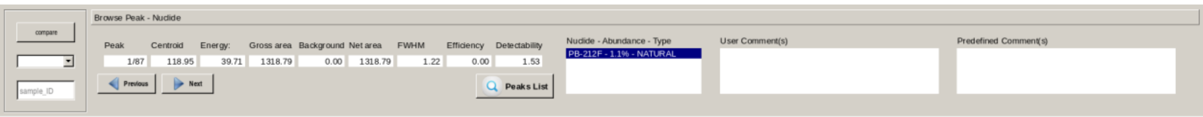


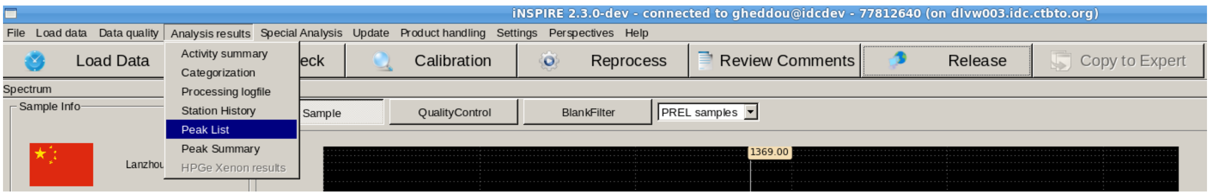
Figure 35: Peak search summary

11.3.2. Peaks list

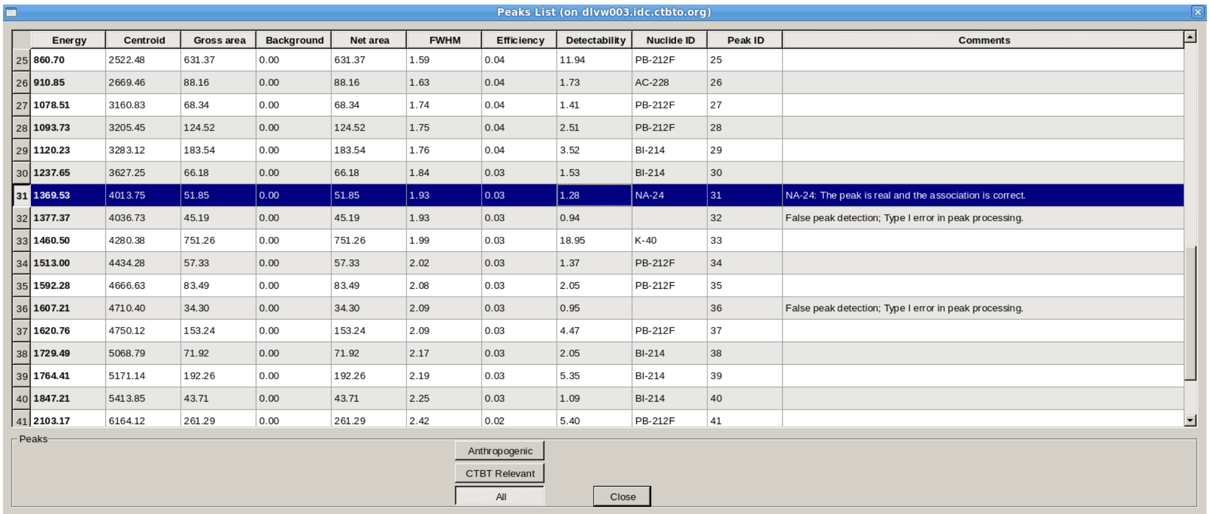
The list of detected peaks is accessible from the **Peaks list** button



or the menu item **Peak list** of the **Analysis results** menu.



The content consists of peak related attributes (energy, channel, FWHM, area, detectability, associated nuclide(s), comment(s), …) in the current spectrum.



	Energy	Centroid	Gross area	Background	Net area	FWHM	Efficiency	Detectability	Nuclide ID	Peak ID	Comments
25	860.70	2522.48	631.37	0.00	631.37	1.59	0.04	11.94	PB-212F	25	
26	910.85	2669.46	88.16	0.00	88.16	1.63	0.04	1.73	AC-228	26	
27	1078.51	3160.83	68.34	0.00	68.34	1.74	0.04	1.41	PB-212F	27	
28	1093.73	3205.45	124.52	0.00	124.52	1.75	0.04	2.51	PB-212F	28	
29	1120.23	3283.12	183.54	0.00	183.54	1.76	0.04	3.52	BI-214	29	
30	1237.65	3627.25	66.18	0.00	66.18	1.84	0.03	1.53	BI-214	30	
31	1369.53	4013.75	51.85	0.00	51.85	1.93	0.03	1.28	NA-24	31	NA-24: The peak is real and the association is correct.
32	1377.37	4036.73	45.19	0.00	45.19	1.93	0.03	0.94		32	False peak detection; Type I error in peak processing.
33	1460.50	4280.38	751.26	0.00	751.26	1.99	0.03	18.95	K-40	33	
34	1513.00	4434.28	57.33	0.00	57.33	2.02	0.03	1.37	PB-212F	34	
35	1592.28	4666.63	83.49	0.00	83.49	2.08	0.03	2.05	PB-212F	35	
36	1607.21	4710.40	34.30	0.00	34.30	2.09	0.03	0.95		36	False peak detection; Type I error in peak processing.
37	1620.76	4750.12	153.24	0.00	153.24	2.09	0.03	4.47	PB-212F	37	
38	1729.49	5068.79	71.92	0.00	71.92	2.17	0.03	2.05	BI-214	38	
39	1764.41	5171.14	192.26	0.00	192.26	2.19	0.03	5.35	BI-214	39	
40	1847.21	5413.85	43.71	0.00	43.71	2.25	0.03	1.09	BI-214	40	
41	2103.17	6164.12	261.29	0.00	261.29	2.42	0.02	5.40	PB-212F	41	

Figure 36: Peaks list

By default, the list contains all peaks present in the spectra.

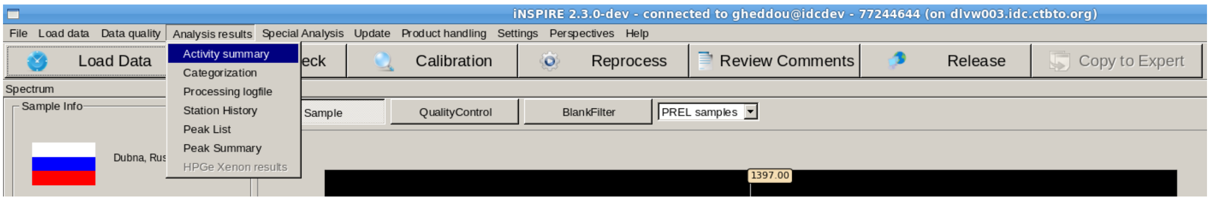
By pressing **CTBT relevant** button, the list will be constrained to only CTBT relevant radionuclide associated peaks.

By pressing **Anthropogenic** button, the list will be constrained to anthropogenic, but not-CTBT relevant peaks.

Pressing **All** button will expand the list to all peaks regardless of nuclide type.

11.3.3. ACTIVITY SUMMARY

Activity summary is a menu item under the menu **Analysis results**.



The *Activity summary* window contains the list of detected radionuclides in the current spectrum along with related attributes:

- *Name:* nuclide name
- *Type:* nuclide type
- *Conc:* activity concentration (µBq/m3)
- Uncert: uncertainty on activity concentration (%)
- *MDC:* Minimum Detectable Concentration (µBq/m3)

Activity Summary

Name	Type	Conc (µBq/m³)	Uncert (%)	MDC (µBq/m³)
AC-228	NATURAL	3.44e+00	99.48	2.31e+00
BE-7	NATURAL	7.84e+02	2.48	1.95e+01
BI-214	NATURAL	4.83e+00	46.52	5.47e+00
IR-190	ACTIVATION	3.92e+00	59.13	1.08e+00
PA-234M	NATURAL	9.81e+01	93.98	2.80e+02
PB-210	NATURAL	8.31e+01	80.25	2.25e+02
PB-212F	NATURAL	1.38e+04	2.30	8.08e+01
PB-214	NATURAL	9.19e+00	21.27	5.46e+00
SB-127	FISSION (P)	3.42e+02	32.17	7.29e+01

Figure 37: Particulates activity summary

11.3.4. Station history

The station history is accessible from the menu item **Station history** of the menu **Analysis results**. The window consists of three tabs:

- Peak parameters
- Nuclide parameters
- Ba-140 MDC vs. Pb-212f concentration

Peak parameters:

The dropdown **Energy** contains the list of peak energies in the current spectrum. By selecting a peak and a parameter of interest among the radio group (**Centroid channel, FWHM, Gross area, Net area, Count rate**), the plots will show corresponding time series and frequency distribution over the preceding week.

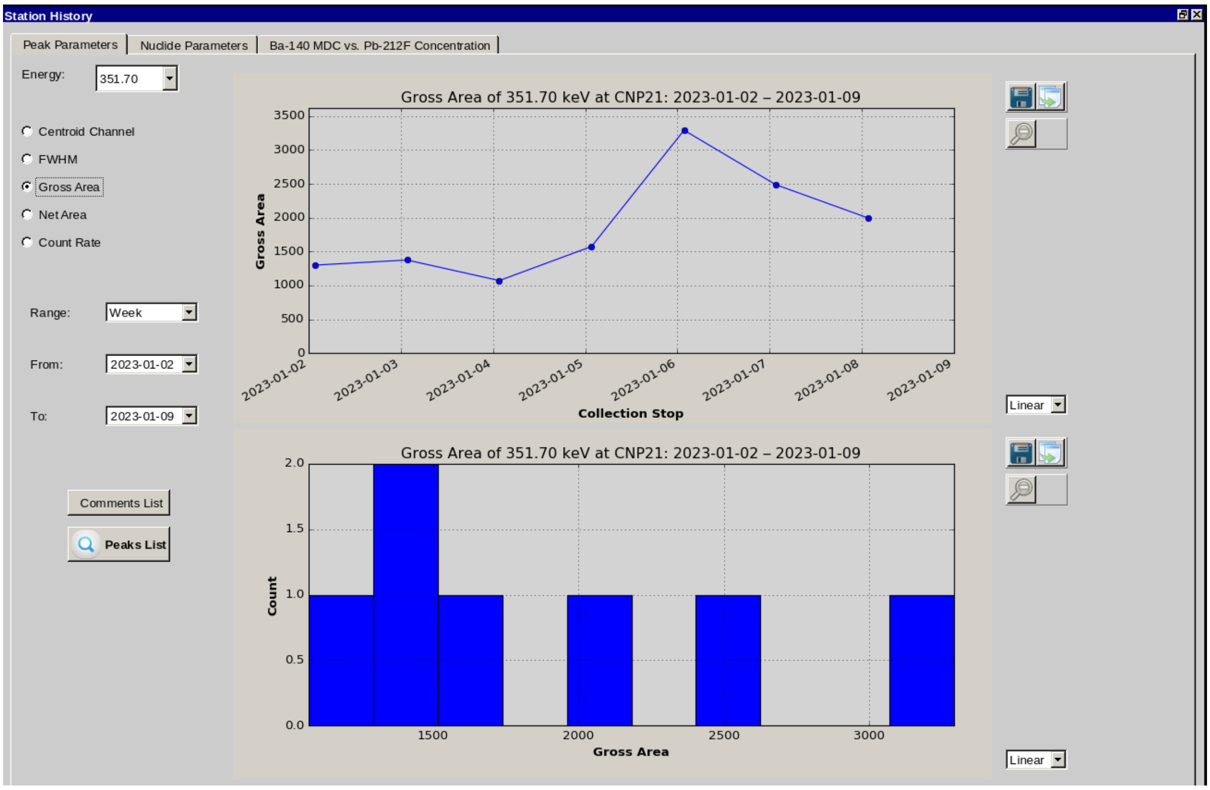


Figure 38: Station history - Peak parameters

The button **Comment list** will display the history of Analyst comments that have been added to peaks around current energy (within the tolerance window of 0.8 keV) in samples from the current station.

Nuclide parameters:

The dropdown **Nuclide** contains the list of nuclides that are detected in the current spectrum. By selecting a nuclide and a parameter of interest among the radio group (**Activity, Activity concentration, MDA, MDC**), the plots will show corresponding time series and frequency distribution over the preceding week.

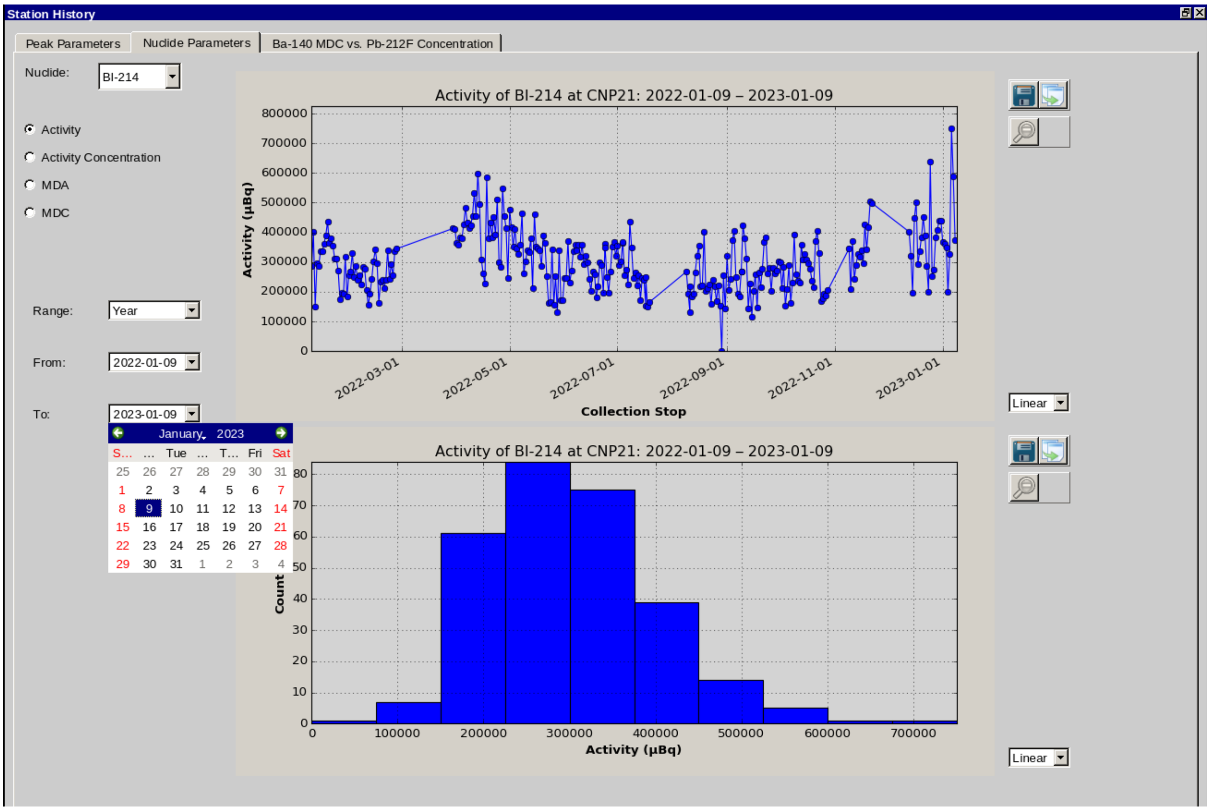


Figure 39: Station history - Nuclide parameters

Ba-140 MDC vs. Pb-212 activity concentration:

The plot shows Ba-140 MDC (µBq/m3) vs. Pb-212 activity concentration (µBq/m3) for the time frame of interest.

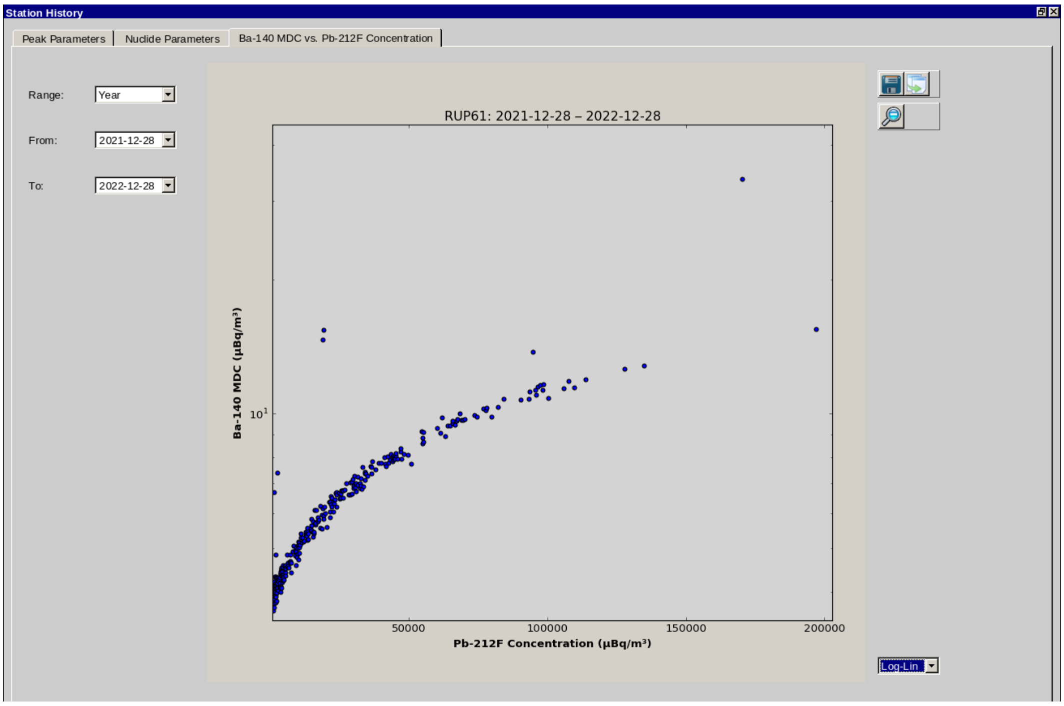
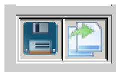


Figure 40: Station history – Ba-140 MDC vs. Pb-212 concentration

Plot controls

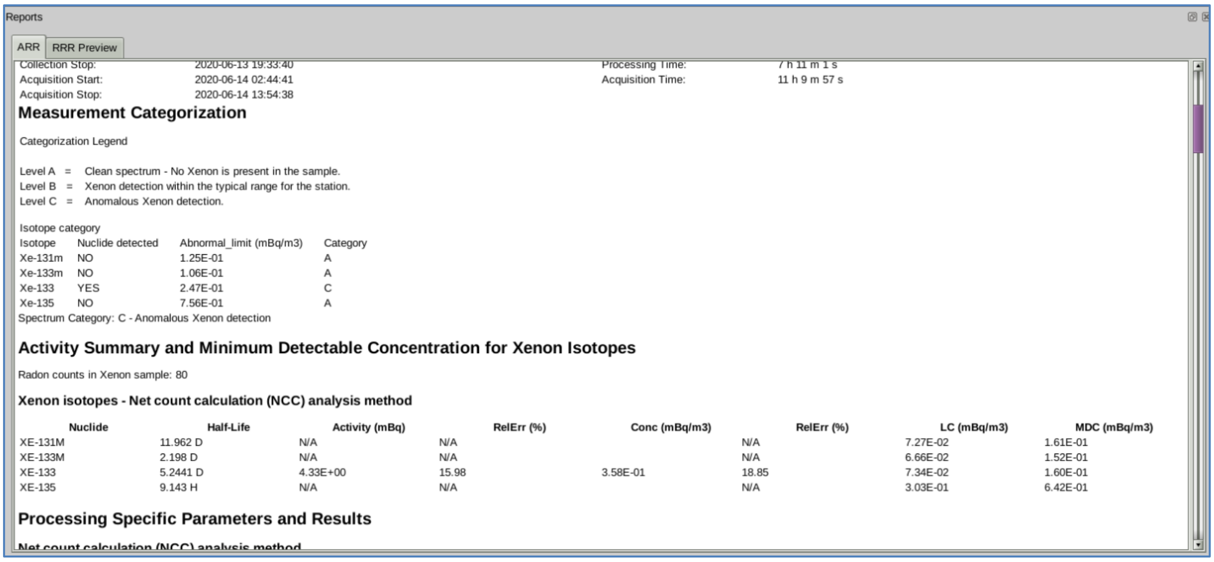
The three tabs of the *Station History* window can be customized to the user's needs through the following controls.

- The default time frame is set to past seven days (week) which can be customized one month, three months, one year or to any time frame which can be set through the two date pickers (from, to).
- The vertical axis of the plots can be set to linear or logarithmic.
- The plots can be zoomed in by click/drag to a rectangle and zoomed out with the button .
- The plots can be saved to a *.png* file or copied to clipboard with the buttons , respectively.

12. Automated and Reviewed Reports

Automated Radionuclide Report (ARR) is available upon loading a sample spectrum. This report contains the automatic processing-based results.

In addition, the Reviewed Radionuclide Report (RRR) can be loaded for a released sample spectra, or the RRR can be previewed for a sample before release. Reports window is accessible from the related buttons in the *Release* window or **Product handling** menu items.


Reports
ARR | RRR Preview

Collection Stop:	2020-06-13 19:33:40	Processing Time:	7 h 11 m 1 s
Acquisition Start:	2020-06-14 02:44:41	Acquisition Time:	11 h 9 m 57 s
Acquisition Stop:	2020-06-14 13:54:38		

Measurement Categorization

Categorization Legend

Level A = Clean spectrum - No Xenon is present in the sample.
Level B = Xenon detection within the typical range for the station.
Level C = Anomalous Xenon detection.

Isotope category

Isotope	Nuclide detected	Abnormal_limit (mBq/m3)	Category
Xe-131m	NO	1.25E-01	A
Xe-133m	NO	1.06E-01	A
Xe-133	YES	2.47E-01	C
Xe-135	NO	7.56E-01	A

Spectrum Category: C - Anomalous Xenon detection

Activity Summary and Minimum Detectable Concentration for Xenon Isotopes

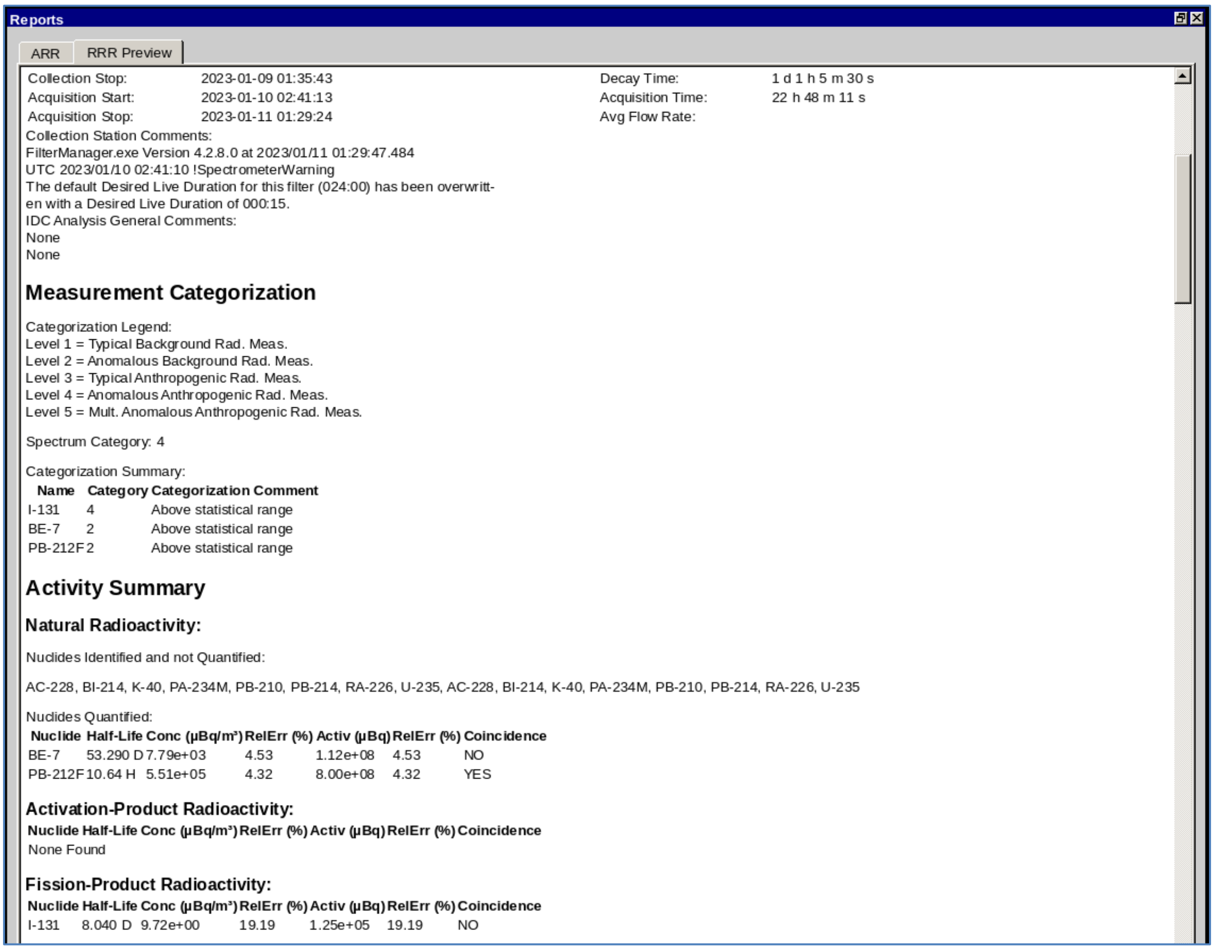
Radon counts in Xenon sample: 80

Xenon isotopes - Net count calculation (NCC) analysis method

Nuclide	Half-Life	Activity (mBq)	RelErr (%)	Conc (mBq/m3)	RelErr (%)	LC (mBq/m3)	MDC (mBq/m3)
XE-131M	11.962 D	N/A	N/A		N/A	7.27E-02	1.61E-01
XE-133M	2.198 D	N/A	N/A		N/A	6.66E-02	1.52E-01
XE-133	5.2441 D	4.33E+00	15.98	3.58E-01	18.85	7.34E-02	1.60E-01
XE-135	9.143 H	N/A	N/A		N/A	3.03E-01	6.42E-01

Processing Specific Parameters and Results

Net count calculation (NCC) analysis method


Reports
ARR | RRR Preview

Collection Stop:	2023-01-09 01:35:43	Decay Time:	1 d 1 h 5 m 30 s
Acquisition Start:	2023-01-10 02:41:13	Acquisition Time:	22 h 48 m 11 s
Acquisition Stop:	2023-01-11 01:29:24	Avg Flow Rate:	

Collection Station Comments:
FilterManager.exe Version 4.2.8.0 at 2023/01/11 01:29:47.484
UTC 2023/01/10 02:41:10 !SpectrometerWarning
The default Desired Live Duration for this filter (024:00) has been overwritt-
en with a Desired Live Duration of 000:15.
IDC Analysis General Comments:
None
None

Measurement Categorization

Categorization Legend:
Level 1 = Typical Background Rad. Meas.
Level 2 = Anomalous Background Rad. Meas.
Level 3 = Typical Anthropogenic Rad. Meas.
Level 4 = Anomalous Anthropogenic Rad. Meas.
Level 5 = Mult. Anomalous Anthropogenic Rad. Meas.

Spectrum Category: 4

Categorization Summary:

Name	Category	Categorization Comment
I-131	4	Above statistical range
BE-7	2	Above statistical range
PB-212F	2	Above statistical range

Activity Summary

Natural Radioactivity:

Nuclides Identified and not Quantified:

AC-228, BI-214, K-40, PA-234M, PB-210, PB-214, RA-226, U-235, AC-228, BI-214, K-40, PA-234M, PB-210, PB-214, RA-226, U-235

Nuclides Quantified:

Nuclide	Half-Life	Conc (µBq/m³)	RelErr (%)	Activ (µBq)	RelErr (%)	Coincidence
BE-7	53.290 D	7.79e+03	4.53	1.12e+08	4.53	NO
PB-212F	10.64 H	5.51e+05	4.32	8.00e+08	4.32	YES

Activation-Product Radioactivity:

Nuclide	Half-Life	Conc (µBq/m³)	RelErr (%)	Activ (µBq)	RelErr (%)	Coincidence
None Found						

Fission-Product Radioactivity:

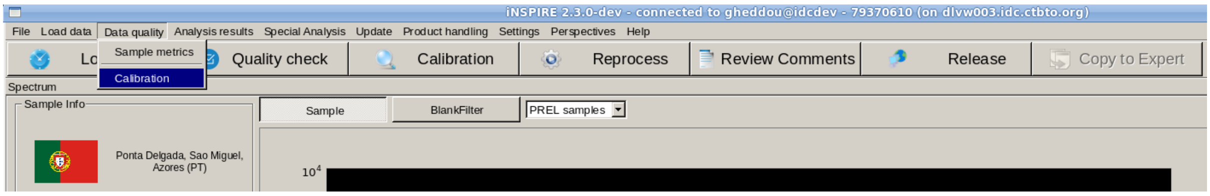
Nuclide	Half-Life	Conc (µBq/m³)	RelErr (%)	Activ (µBq)	RelErr (%)	Coincidence
I-131	8.040 D	9.72e+00	19.19	1.25e+05	19.19	NO

Figure 41: ARR and RRR (Upper: noble gas; Lower: particulates)

13. Calibration utility

iNSPIRE offers a Calibration utility for checking and, in case of need, updating resolution and/or energy calibrations.

The calibration window can be activated either from **Calibration** button on the main window toolbar of from **Calibration** menu item of **Data quality** menu.



13.1. BETA-GAMMA NOBLE GAS CALIBRATIONS

The window contains two main tabs for checking/reprocessing and updating energy calibrations. Each tab has two sub-tabs for gamma and beta calibrations.

13.1.1. CALIBRATION CHECK / REPROCESS

Both gamma and beta tabs under calibration *Check/Reprocess* display three plots:

- The plot in the left side shows the plot of the calibration currently used in the analysis.
- The plot in the middle shows test calibration plot, based on selected calibration option from the dropdown on the right side. This allows Analysts to "test" the consistency of alternative calibrations before actual reprocessing.
  Available options include:
  - *Sample*: calibration derived from the Energy pairs in the PHD message.
  - *Custom*: most recent calibration that was provided manually by analysts.
  - *QC*: automatic calibration based on most recent QC spectrum.
  - Alternatively, Analysts can manually type-in/tweak the coefficients in edit fields.
- The plot on the right-side shows a calibration shift analysis (used vs. selected calibration).
- A button **Reprocess** for reprocessing with currently selected gamma and/or beta calibrations.

Gamma energy check

The gamma plots (both *Used* and *Selected* calibrations) contain annotations of x-rays and gamma energy lines where corresponding QC peaks are expected to appear.

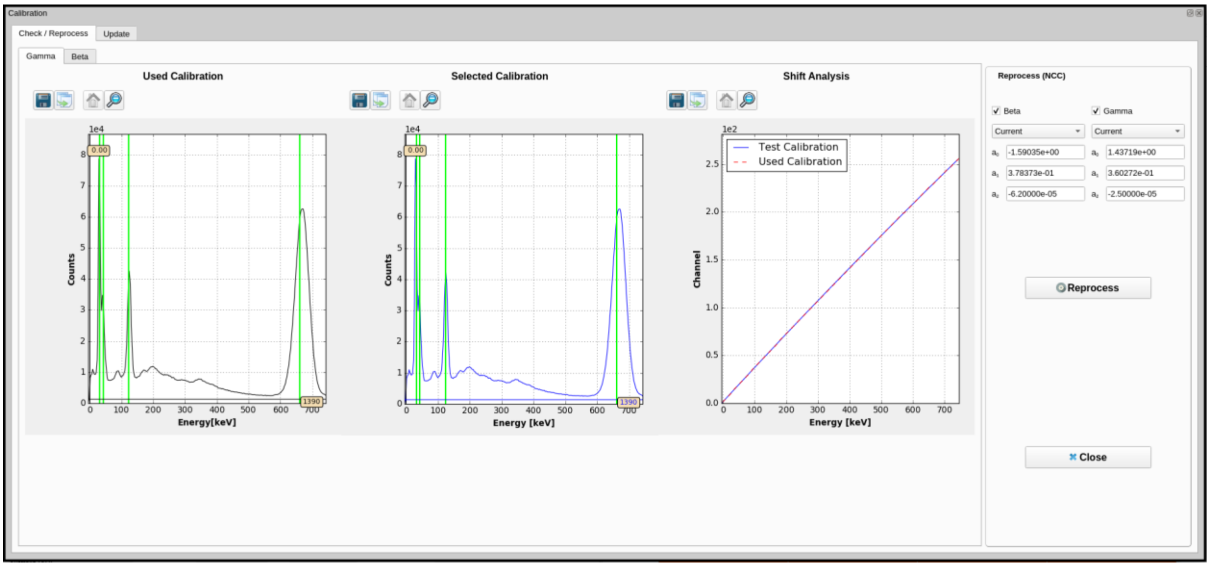


Figure 42: Gamma energy calibration window

Beta energy check

The beta-gamma coincidence plots (both *Used* and *Selected* calibrations) contain annotation reference line $E_\gamma = 662 - E_\beta$ where corresponding QC maximum coincidence counts of Cs-137 Compton scattering are expected to appear.

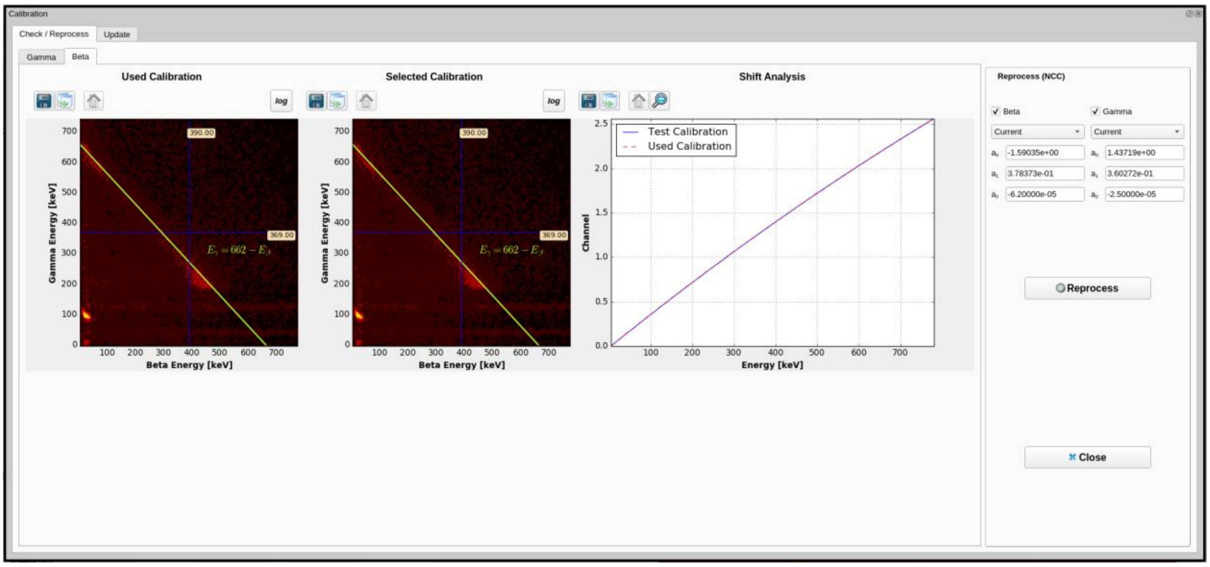


Figure 43: Beta energy calibration window

13.1.2. Calibration Update

On the calibration update windows, the user can interactively refine the calibration based on daily QC spectra.

Gamma energy update

This screen allows to update the gamma energy calibration based on peaks from the QC source spectrum.

- The plot on the left side shows the QC spectrum projected on the gamma axis.
- The table shows the nuclides of the QC source and their peak energies. Energy lines where the checkbox in the Used column are marked will be used in the energy recalibration.
- The labels below the table of energies show the current energy fitting parameters. By hitting the **Fit** button, the energy calibration is re-calculated based on the enabled energy lines. If **Linear** is selected, a linear fit will be performed. Otherwise, a cubic (polynomial degree 3) fit function will be used.

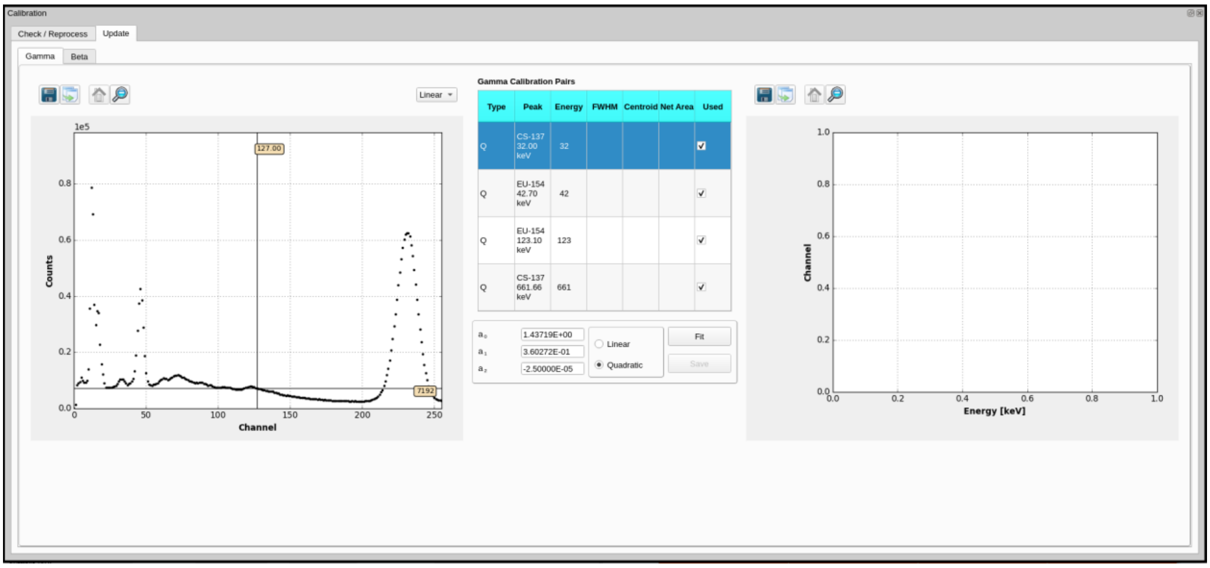


Figure 44: Gamma Energy Calibration Update window – action

After hitting the **Fit** button, the coefficients are updated, and the Channel *vs*. Energy calibration is displayed on the right plot.

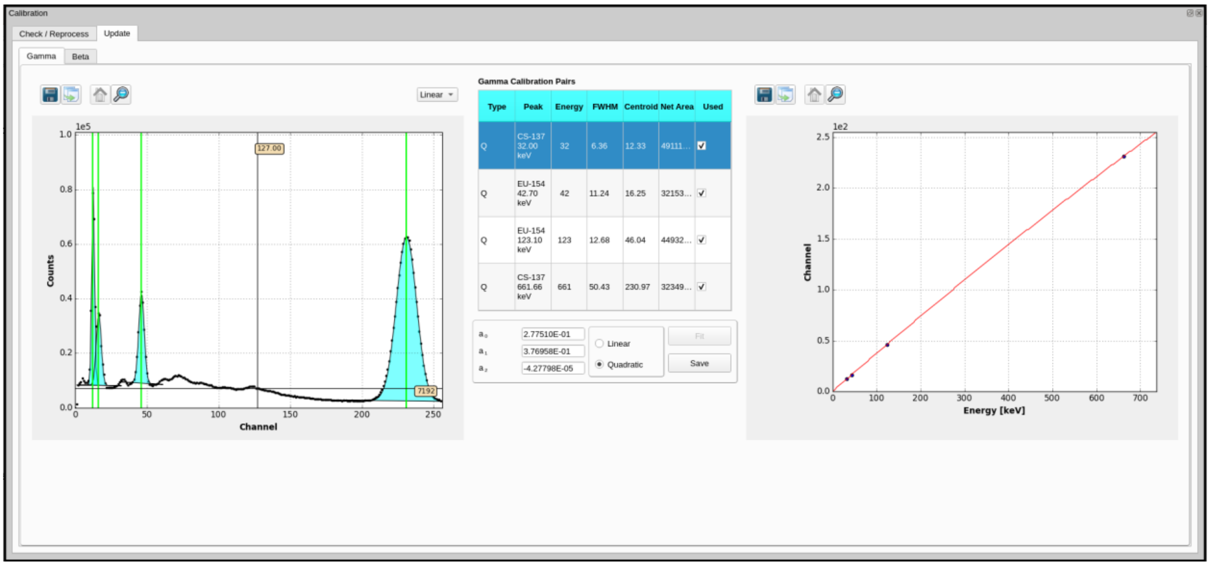


Figure 45: Gamma energy calibration update window - result

The **Save** button allows the Analyst to save the new gamma energy calibration coefficients in the database for later use.

Beta energy update

This screen allows to update the beta energy calibration based on selecting/deselecting energy slices from the QC source spectrum.

- The plot on the left side shows the QC spectrum together with gamma energy slices.
- The plot to the right of the QC spectrum displays the counts within the selected gamma energy slice projected on the beta-axis.
- The selection of the gamma energy slice is done by selecting the corresponding line in the "Beta calibration pairs" table.
- The number of slices and the energy range (lowest to highest slice energy) can be set in the energy slices box
- The **Count Filter** box allows to limit the data used for fitting to counts above and below the count thresholds set in Minimum Count and Maximum Count, i.e., energy bins with counts less or more than the set values will be disregarded in the fitting.
- The combo box below the chart panel on the right shows the current energy fitting parameters. By hitting the **Fit** button, the energy calibration is re-calculated based on

the selected settings. If **Linear** option is selected, a linear fit is performed. Otherwise, a quadratic (polynomial degree 2) function is used.

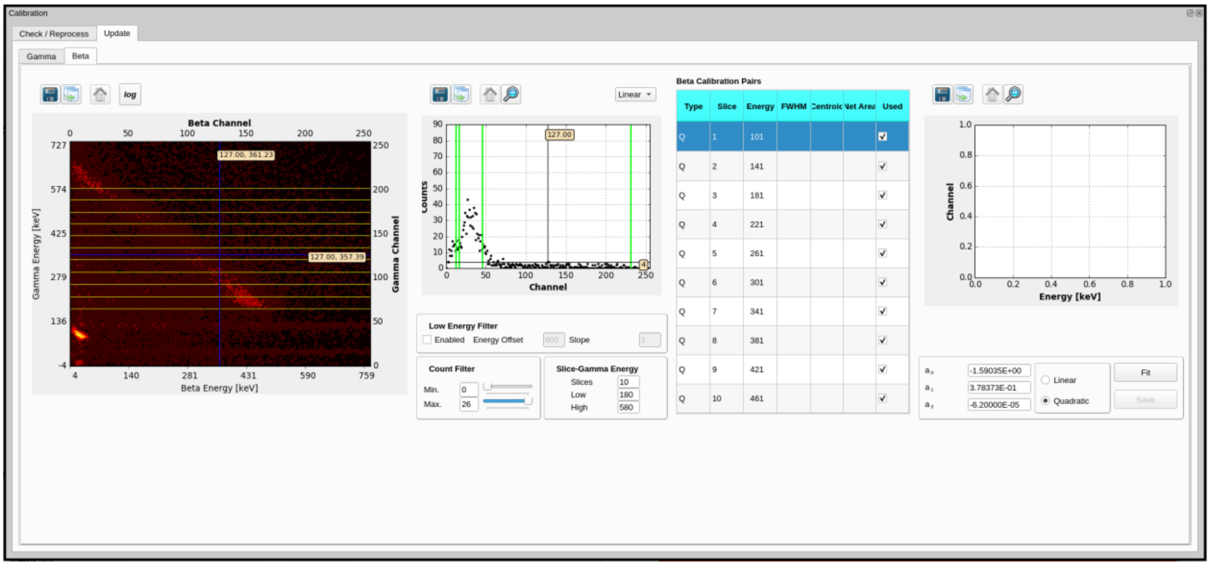


Figure 46: Beta Energy Calibration Update window - action

After clicking on the **Fit** button, the coefficients are updated, and the Channel-Energy calibration is displayed on the right plot.

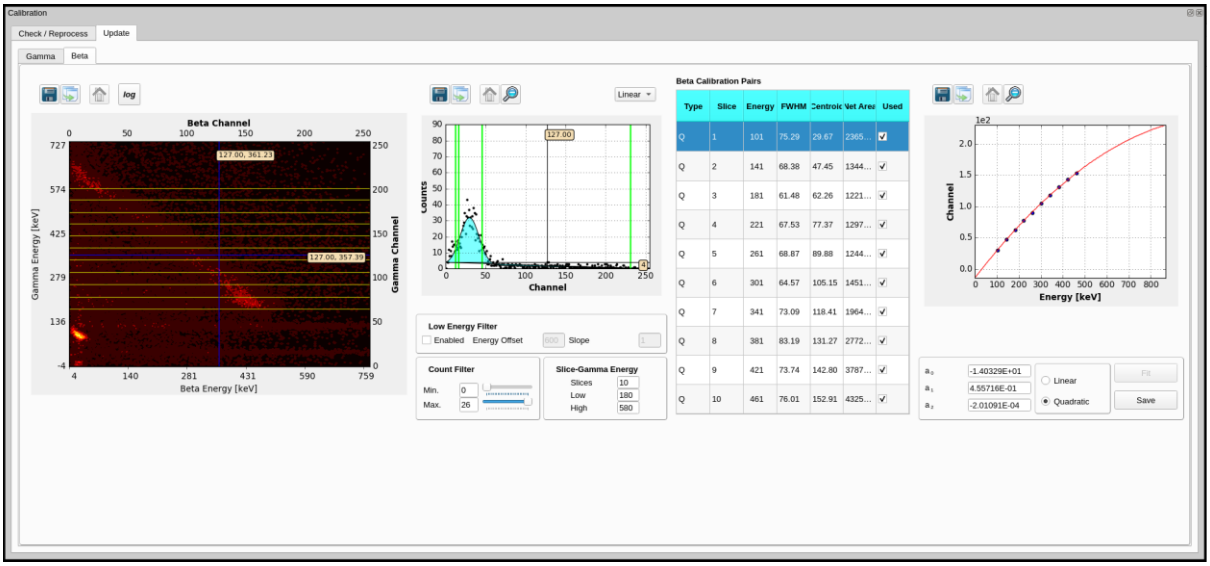


Figure 47: Beta energy calibration update window - result

The button **Save** allows the Analyst to save the new beta energy calibration coefficients in the database for later use (interactive reprocessing from the tab *Check/Reprocess*, as described in section above).

13.2. Particulates and HPGe noble gas calibrations

The calibration window consists of four nested views:

- Energy check
- Resolution check
- Energy and resolution update
- Efficiency

13.2.1. *Energy Check*

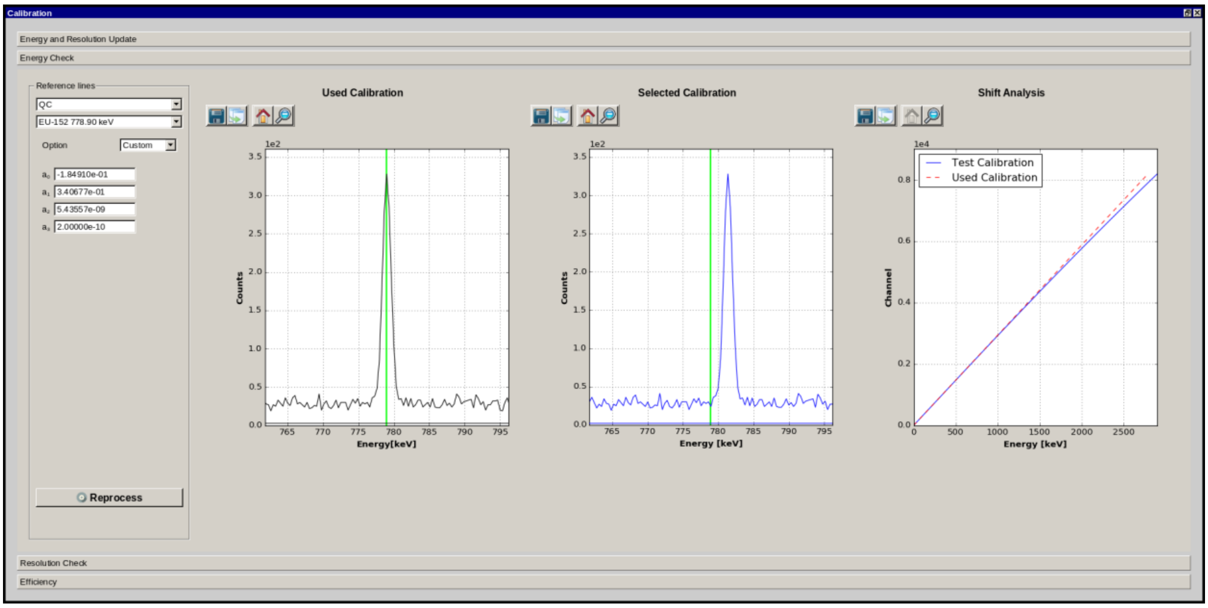


Figure 48: HPGe energy calibration check

The view consists of the following elements which allow Analysts to test the quality of the proposed and current energy calibration and to explore alternative options <u>before actual reprocessing.</u>

- The dropdowns under **Reference lines** lists main sample and QC peak energies to select for checking energy calibrations.
- The plot in the left side shows a zoom on current peak based on the calibration currently used in the analysis.
- The plot in the middle shows a zoom on current peak based on selected calibration.
- The dropdown **Option** include INPUT, MRPA, MRPM, MRPQC, INITIAL (as described in the section “Options for energy and resolution calibrations”).

Alternatively, analysts can manually type-in/tweak the coefficients in edit fields.

The plots "*Used*" and "S*elected*" contain vertical line annotations lines where corresponding QC peaks are expected to appear.

- The plot on the right side shows shift analysis results (used vs. selected calibration).
- **Reprocess** button will reprocess the data with updated energy calibration, as appropriate.

13.2.2. RESOLUTION CHECK

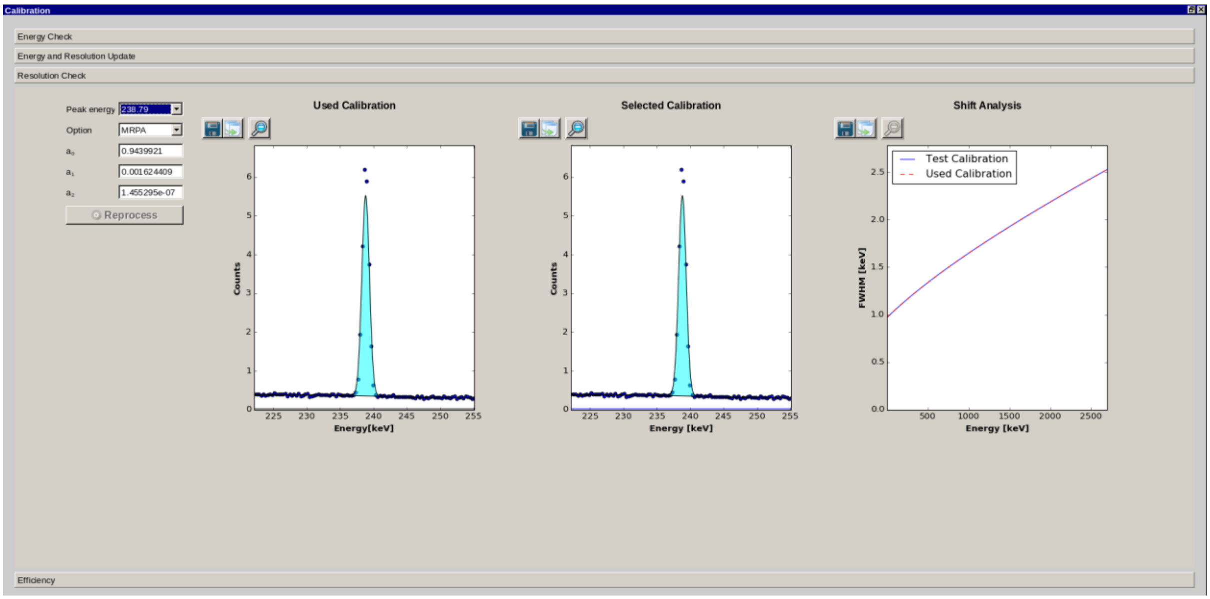


Figure 49: HPGe resolution calibration check

The view consists of the following elements which allow Analysts to test the quality of the proposed and current resolution calibration and to explore alternative options before actual reprocessing.

- The dropdown **Reference lines** allows an analyst to select a desired reference line for validating the resolution calibration.
- The plot in the left side shows a zoom on current peak plus a fitted area (light blue) based on the calibration currently used in the analysis.
- The plot in the middle shows a zoom on current peak plus a fitted area (light blue) based on selected calibration.
- The dropdown **Option** include INPUT, MRPA, MRPM, MRPQC, INITIAL (as described in the section "Options for energy and resolution calibrations").

  Alternatively, analysts can manually type-in/tweak the coefficients in edit fields.
- The plot on the right side shows the calibration shift analysis results (used vs. selected calibration).
- **Reprocess** button will reprocess the data with updated resolution calibration, as appropriate.

13.2.3. ENERGY AND RESOLUTION UPDATE

This screen allows to update energy and resolution calibrations based on peaks from the QC source spectrum.

- The plot on the left side of shows the QC spectrum.

- The table shows the nuclides of the QC source and their peak energies. Energy lines where the checkbox in column "Used" is marked will be used for updating energy and resolution calibrations.

- The labels below the table of energies show the current energy fitting parameters. By hitting the **Fit** button, the energy and resolution calibrations will be re-calculated based on enabled energy lines.
- If **Linear** is selected, a linear fit will be performed for energy vs. channel and for resolution (FWHM) vs. energy.
- Otherwise, a cubic (polynomial degree 3) fit function will be used for energy vs. channel and a quadratic (polynomial degree 2) for resolution vs. Energy.

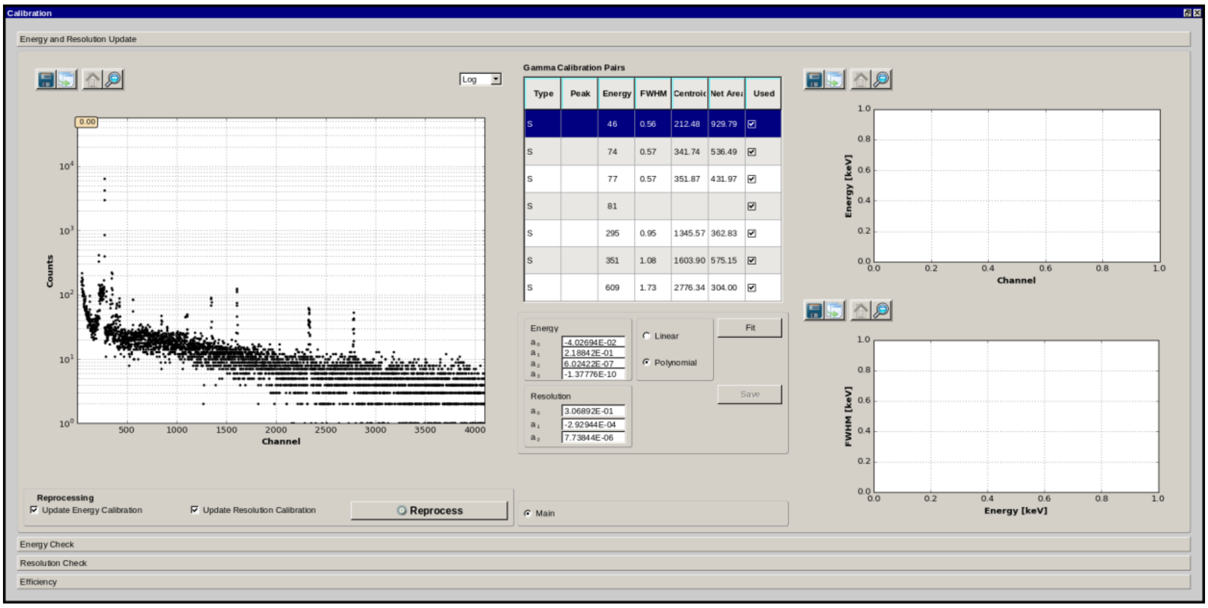


Figure 50: HPGe energy and resolution calibrations update – action

After hitting the **Fit** button, the results will be displayed:

- energy *vs.* channel calibration coefficients and plot
- resolution *vs.* energy calibration coefficients and plot

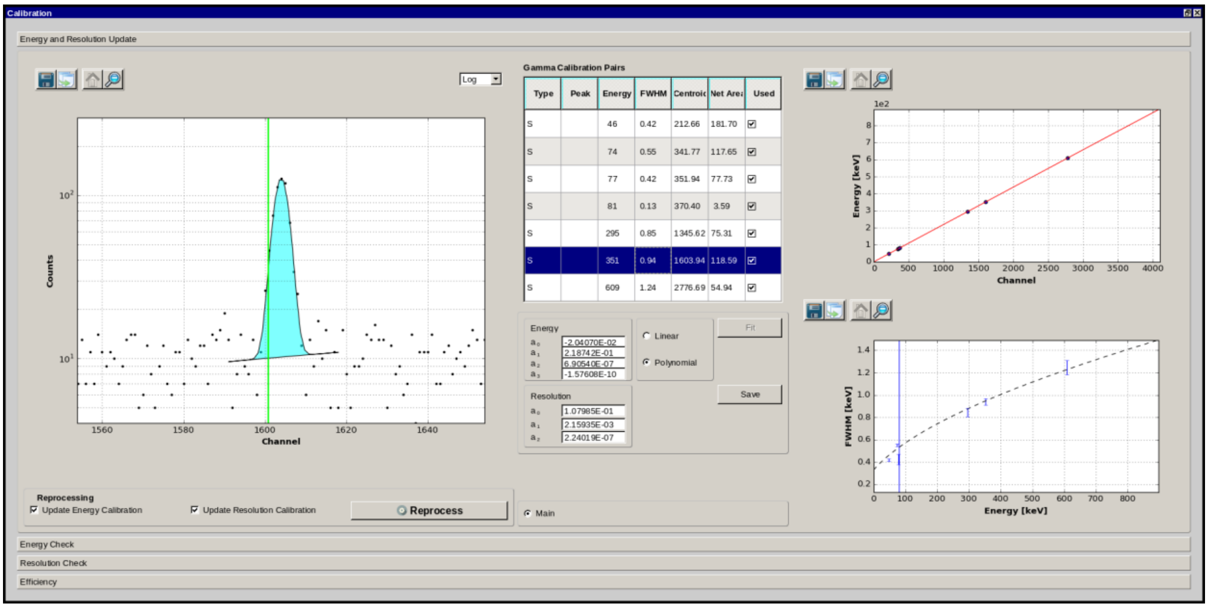


Figure 51: HPGe energy and resolution calibrations update - result

The **Save** button allows the Analyst to save the new energy and beta calibration coefficients in the database for later use.

The **Reprocess** button will reprocess the data with updated energy and/or resolution calibrations, as appropriate.

`

13.2.4. EFFICIENCY

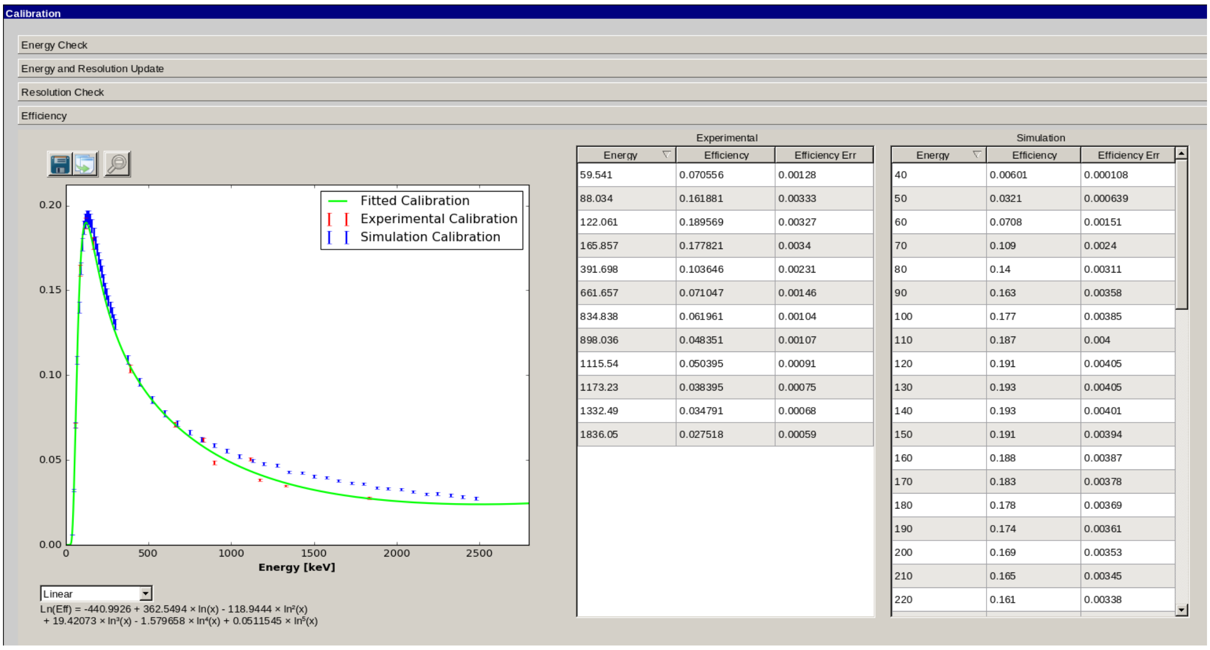


Figure 52: HPGe efficiency

The view shows efficiency calibrations (in numerical and graphical mode) that are available for the current data:

- Experimental calibration (energy, efficiency, uncertainty)
- Fitted curve of experimental efficiency vs. energy using a polynomial in log-log scale (default degree: 5 for particulates and 3 for HPGe noble gas)
- Fitting coefficients of experimental calibration
- Monte Carlo based calibration (energy, efficiency, uncertainty), if available

Both axes can be set to linear or logarithmic.

14. Particulate review functionalities

After spectrum loading and checking of state-of-health and quality-control flags as described in related sections above, the main task of analysts is to go through the automatic processing results to ensure that all peaks have been correctly identified.

Suitability of processing parameters also needs to be validated and, if necessary, the spectrum has to be reprocessed interactively with adjusted parameters.

Peak identification algorithms are designed to ensure a conservative behaviour in automatic mode when CTBT-relevant nuclides are involved as possible associations. The final peak identification is left to analyst judgment. Therefore, a special attention should be paid to CTBT relevant fission or activation products in peak association.

In addition, correct nuclide(s) and /or explanatory comments need to be provided to peaks left without nuclide identification after the automatic processing.

The following sections provide a contextual description of the main interactive functionalities as involved in the review process. These include:

1) Adjusting the spectrum baseline as necessary
2) Interactive reprocessing of data via *iNSPIRE* GUI
3) Checking of peak search results from the automatic mode
4) Nuclide review facility for updating automatic processing results
5) Technetium-Germanium (Tc-Ge) discrimination tool
6) Background stripping tool
7) Comparing to spectra of relevance

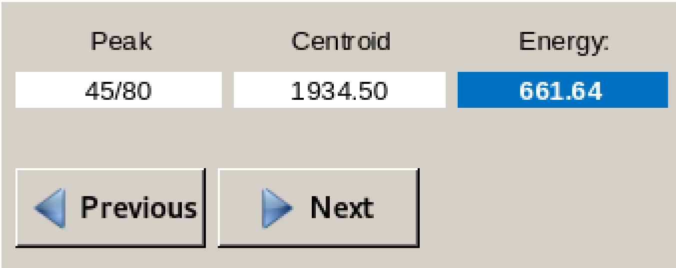
14.1. PEAK BROWSING

Before starting the interactive review, the display reflects automatic processing results. The content will then get updated upon each relevant action during the interactive review.

There are five ways for browsing the peaks in presence:

- "Peaks list" window (see related section above)

- **Previous** and **Next** buttons under "Browse Peak-Nuclide" panel



- **Previous** and **Next** buttons with red icons under "Anthropogenic peaks"
- **Previous** and **Next** buttons with blue icons under "Uncommented peaks" and
- **Previous** and **Next** buttons with blue icons under "False peaks".

Notes:

- The "Left" label in the "Anthropogenic peaks" group-box shows the number of peaks that are still not confirmed
- The "Left" label in the "Uncommented peaks" group-box shows the number of peaks that are still without nuclide association and without comment
- The "Left" label in the "False peaks" group-box shows the number of false peaks
- The number of "Left" peaks gets automatically updated across the interactive review process.

Upon browsing to a peak, the spectrum plot area will zoom-in to current range. The peak information fields will also update accordingly.

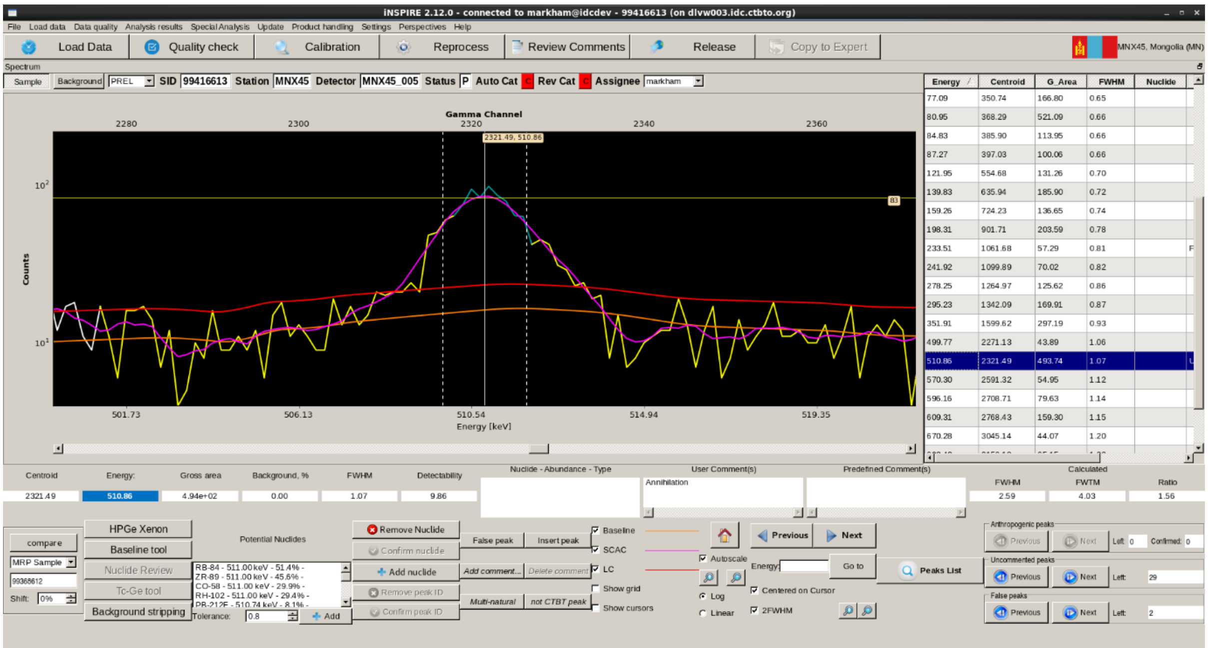


Figure 53: Particulates peak browsing

14.2. PEAK/NUCLIDE REVIEW

The review panel on the bottom of the main window has both peak- and nuclide-oriented functionality

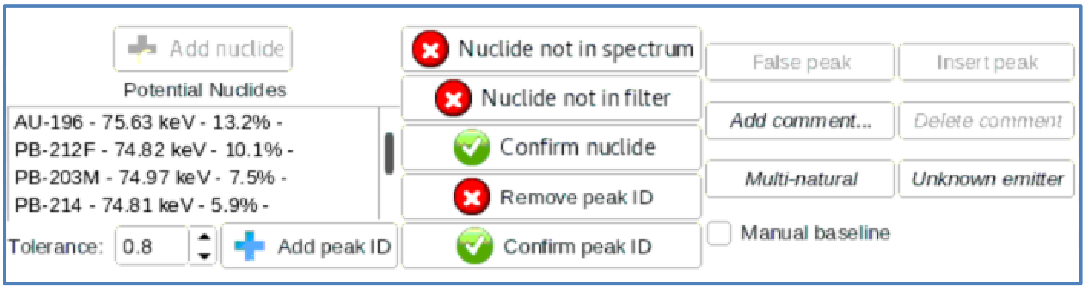


Figure 54: Particulates peak/nuclide review

14.2.1. *PEAK ORIENTED FUNCTIONALITY*

The review panel contains the following peak-oriented buttons:

- **Remove peak ID**: *will remove currently selected nuclide from current peak*
- **Confirm peak ID**: *will confirm currently selected nuclide at current peak*
- **Add peak ID**: *will add the currently selected nuclide to current peak*
- **False peak**: *will add false peak comment to current peak*
- **Add comment**: *will open a dialog for adding a user defined comment to current peak*
- **Multi-natural**: *will add multi-natural predefined comment to current peak*
- **Insert peak**: *will insert new peak*

- **Delete comment**: *will remove currently selected comment from current peak*
- **Unknown emitter**: *will add not-CTBT predefined comment to current peak*

The following sub-sections illustrate the steps for using different peak review buttons.

Remove peak ID

- Browse to the peak of interest and select the nuclide to remove

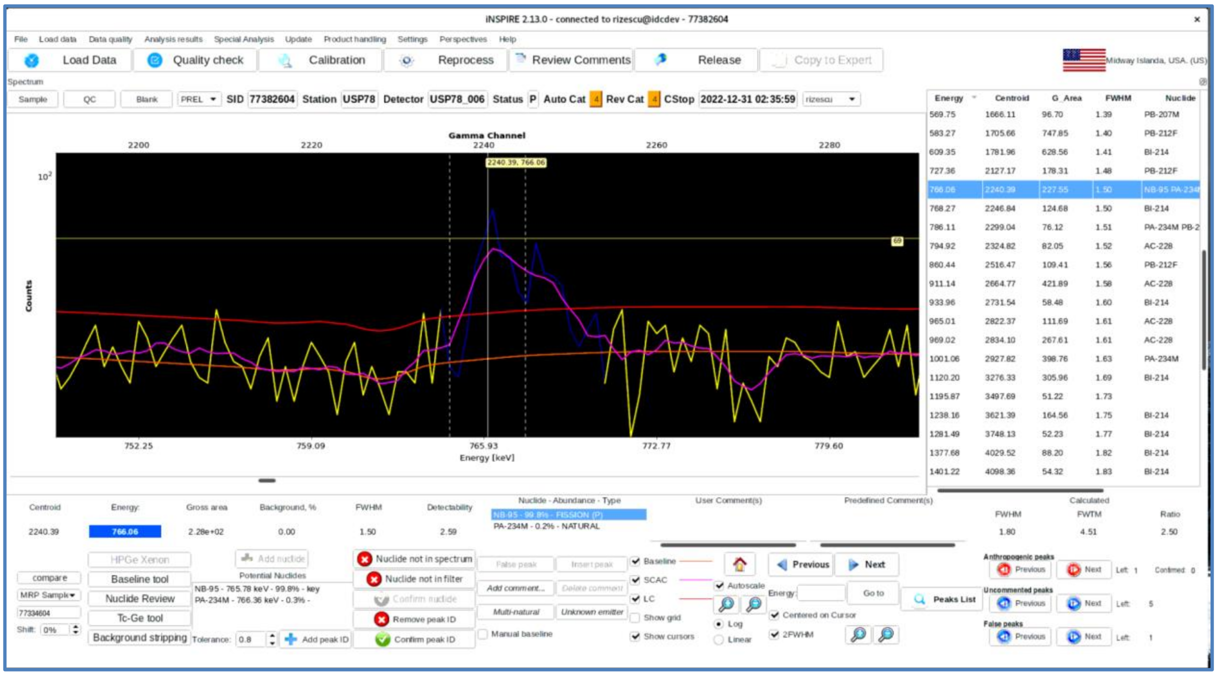
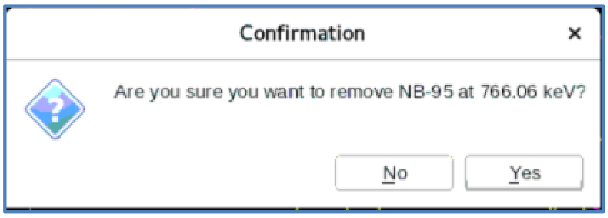


Figure 55: Removing peak ID – action

- Click on **Remove peak ID** button. A confirmation dialog will be brought up.



- After confirmation the nuclide will be removed from the peak, and it will not be included in the *Activity Summary* and the Reviewed Radionuclide Report (RRR).

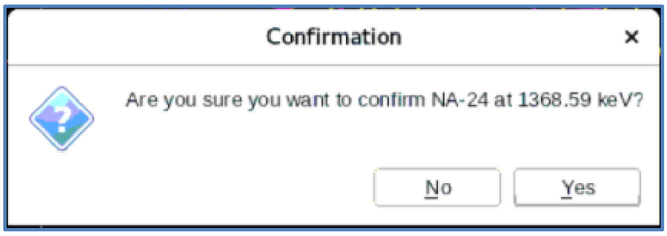
Figure 56: Removing peak ID - results

Confirm peak ID

- Browse to the peak of interest and select the nuclide to confirm

Figure 57: Confirming peak ID – action

- Click on **Confirm peak ID** button. A confirmation dialog will be brought up:



- After validation, the nuclide will be confirmed for the current peak, and a nuclide confirmation comment will be added to the peak.

Figure 58: Confirming peak ID – result

Add peak ID

- Browse to the peak of interest

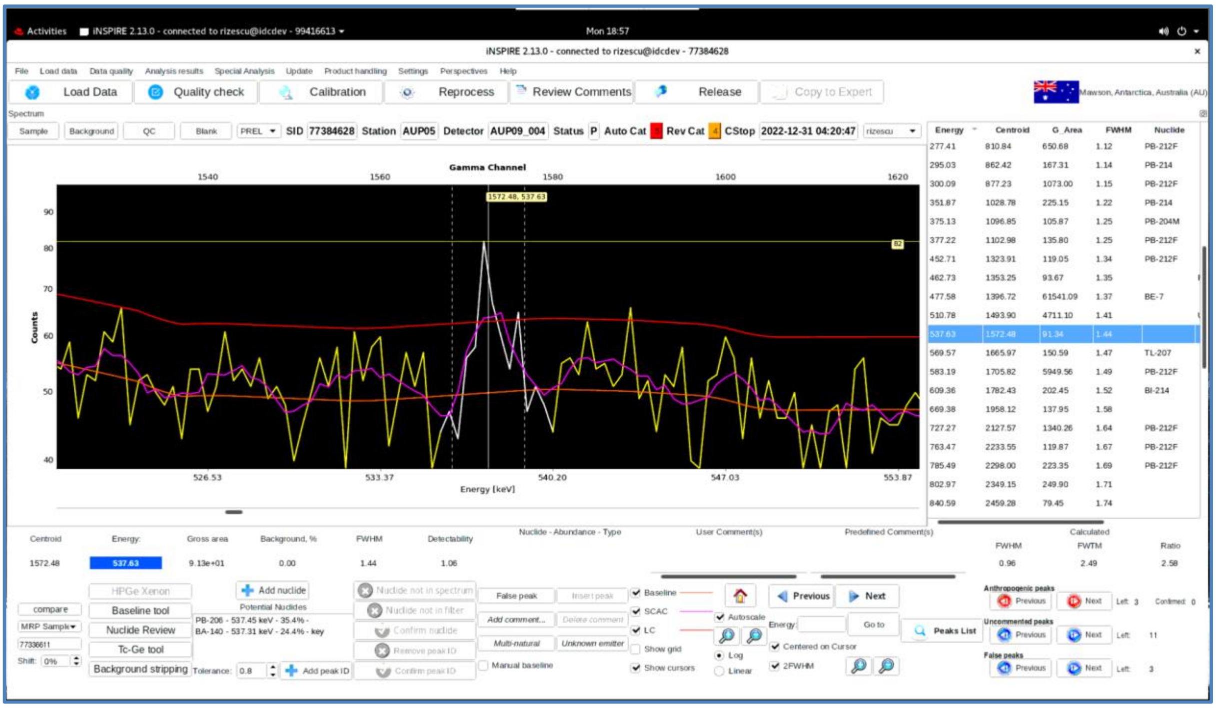
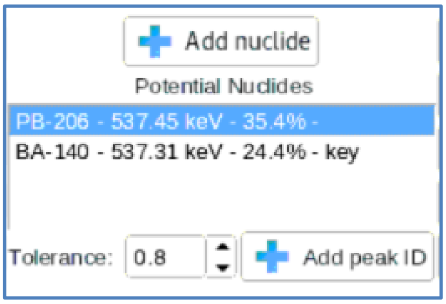


Figure 59: Adding peak ID – action

- Select the nuclide and peak energy from the "Potential Nuclides" list and click on **Add peak ID** button 

.



- The nuclide will be added for the current peak only, and a nuclide adding comment will be added to the peak.

Figure 60: Adding peak ID – results

False peak

- Browse to the peak of interest

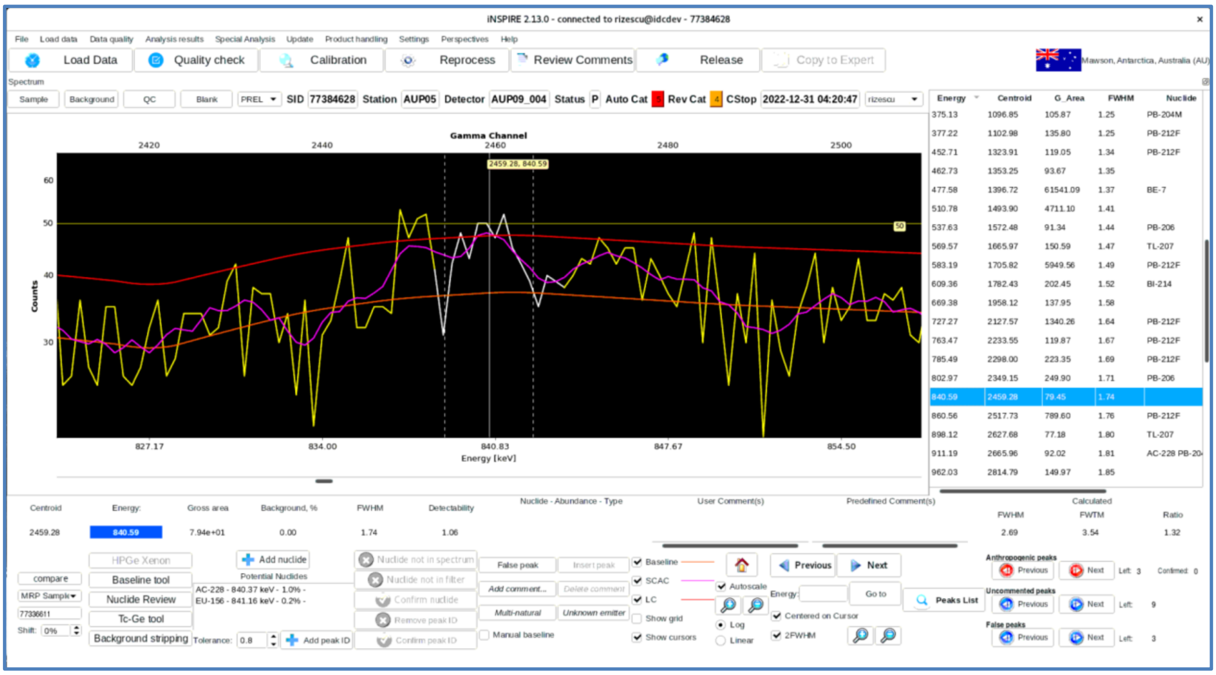
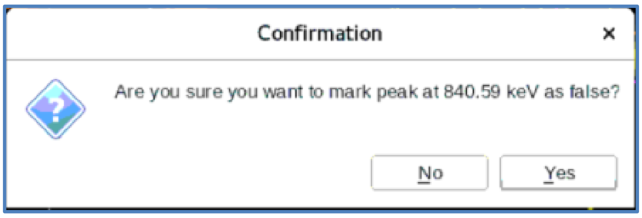


Figure 61: False peak – action

- Click on **False peak** button. A confirmation dialog will be brought up.



- After validation, false peak comment will be added to the peak.

Figure 62: False peak – result

Add comment

- Browse to the peak on interest

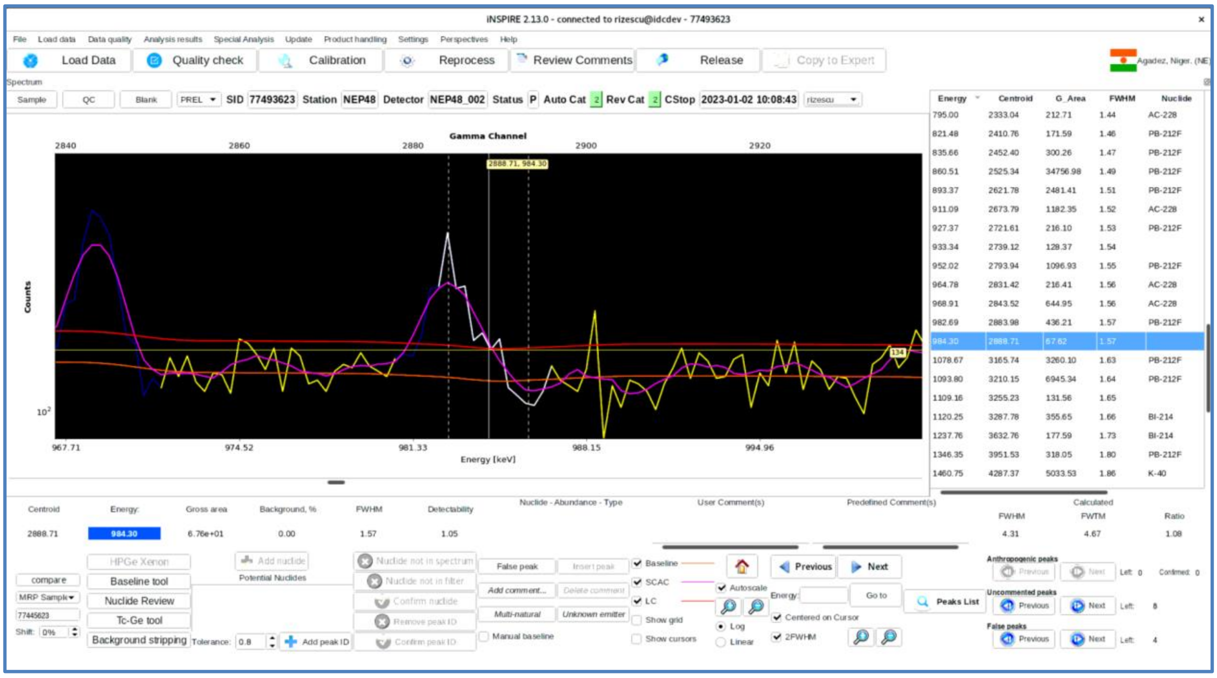
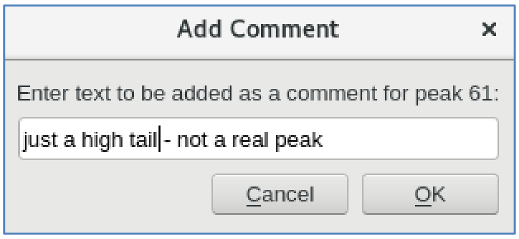


Figure 63: Adding comment – action

- Click on **Add comment** button. A window with Edit field will be brought up.



- After typing a comment and validation, the comment will be added to the peak

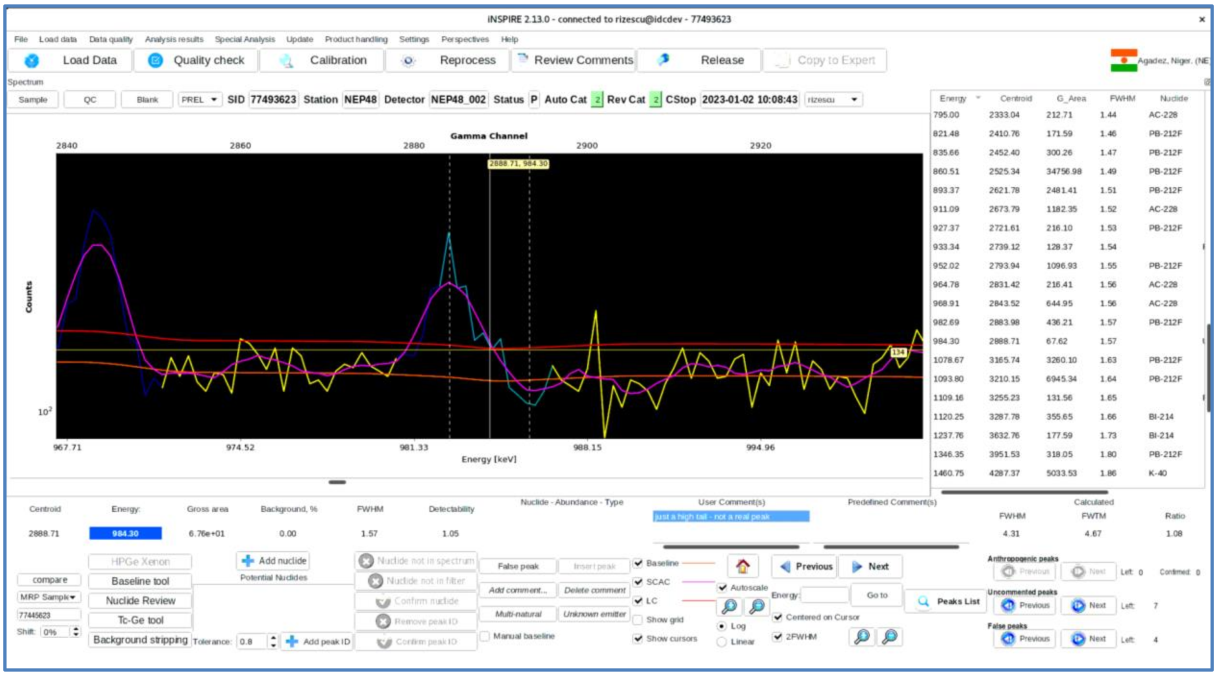


Figure 64: Adding comment – result

Multi-natural

- Browse to the peak of interest

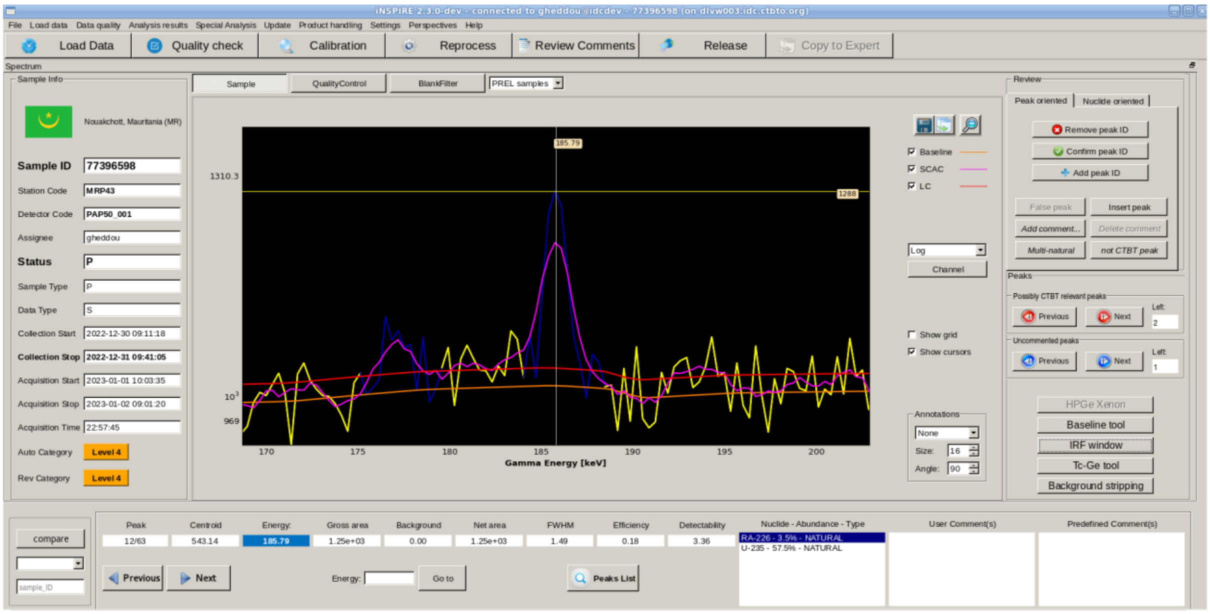
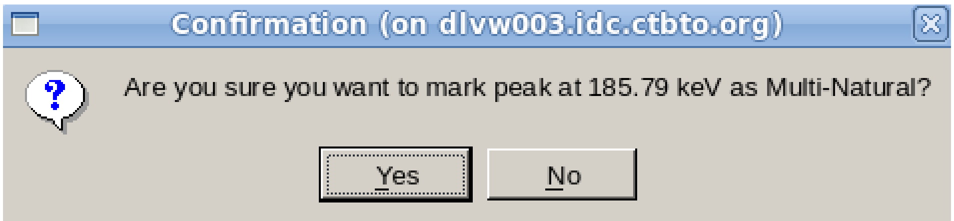


Figure 65: Multi-natural – action

- Click on **Multi-natural** button. A confirmation dialog will be brought up.



- After validation, a multi-natural comment will be added to the peak

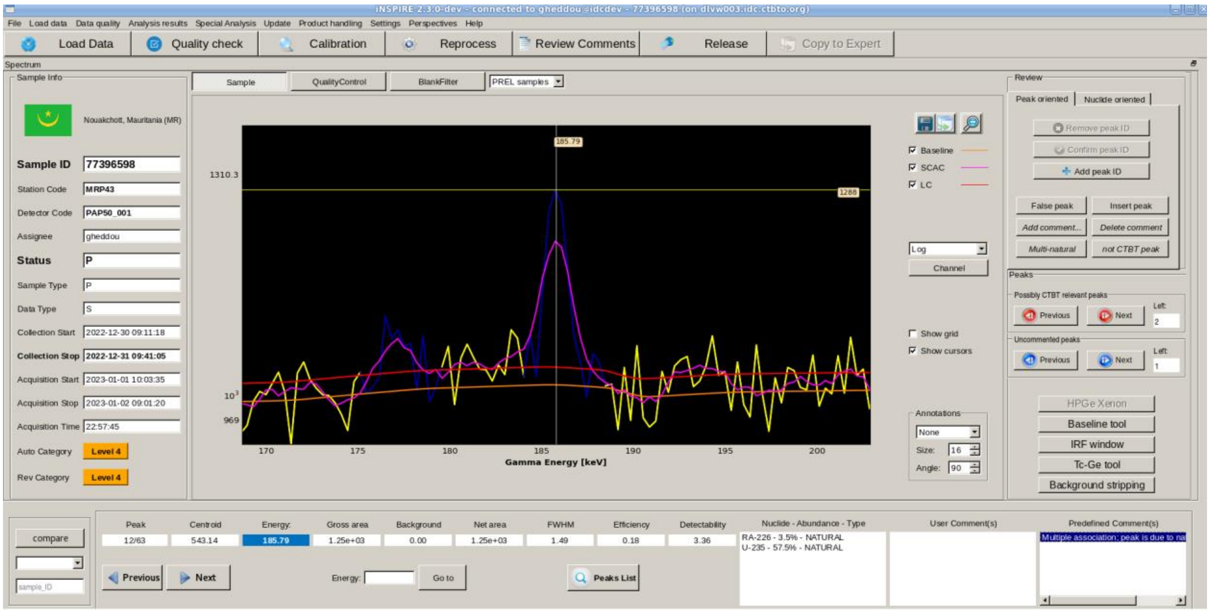


Figure 66: Multi-natural – result

Insert peak

Activating **Insert peak** button offers a feature for inserting new peaks as appropriate.

The main steps are:

- Select from *Peaks list* or use the zoom-in feature to the spectrum area of interest. This will display the spectrum region in focus.
- Choose the point in the spectra with detectability>=1 where the peak was not automatically identified, to become a centroid of a new peak.
- Define the cursors by pressing the middle mouse button. This will enable **Insert peak** button.

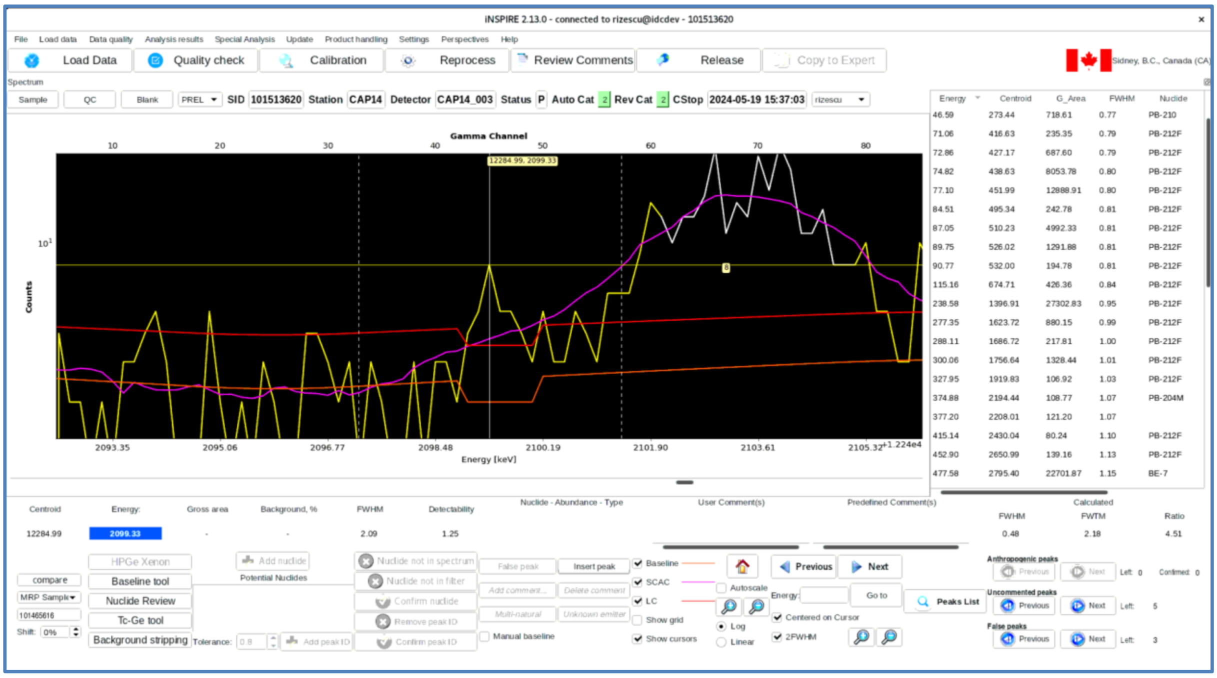
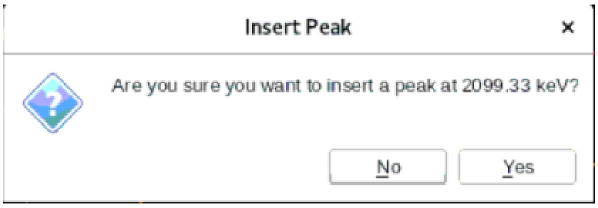


Figure 67: Insert peak – action

- Press **Insert peak(s)** button. A confirmation message will be brought up.



- Upon confirmation, the new peak(s) will be inserted with a user comment.
- These will be available (towards the end of the *Peaks list*) for further analysis steps (nuclide association, comment, …) in interactive mode.

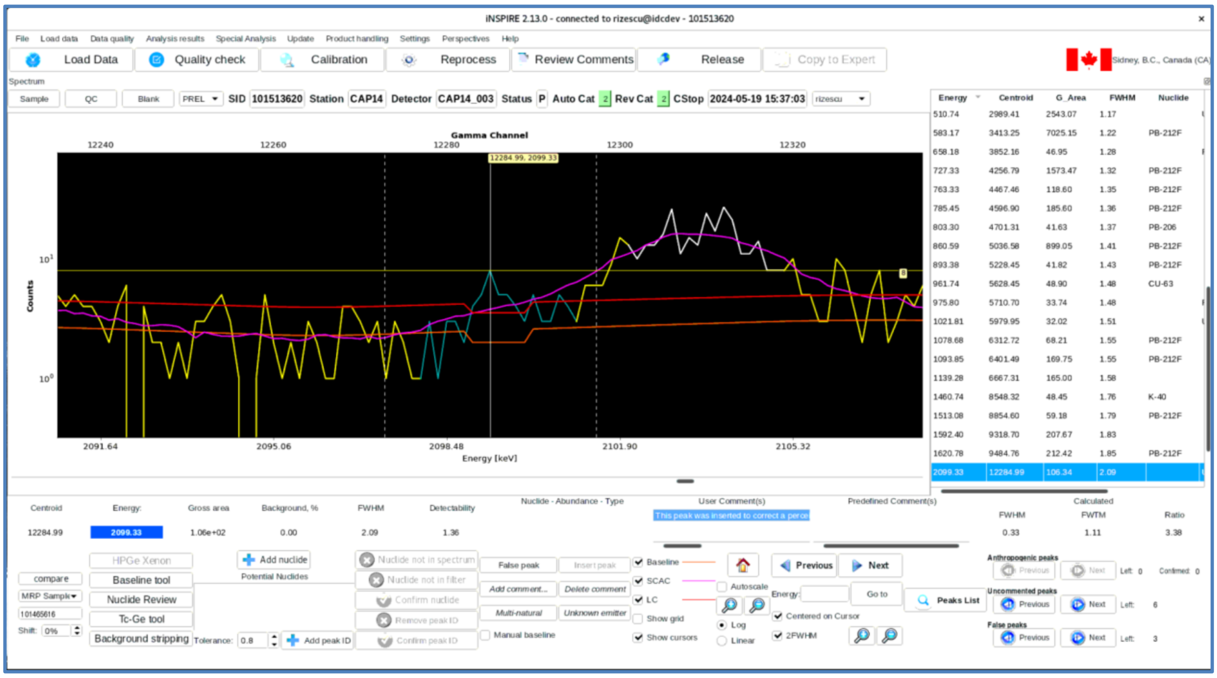


Figure 68: Insert peak – result

Delete comment

- Browse to the peak of interest and select the comment to delete

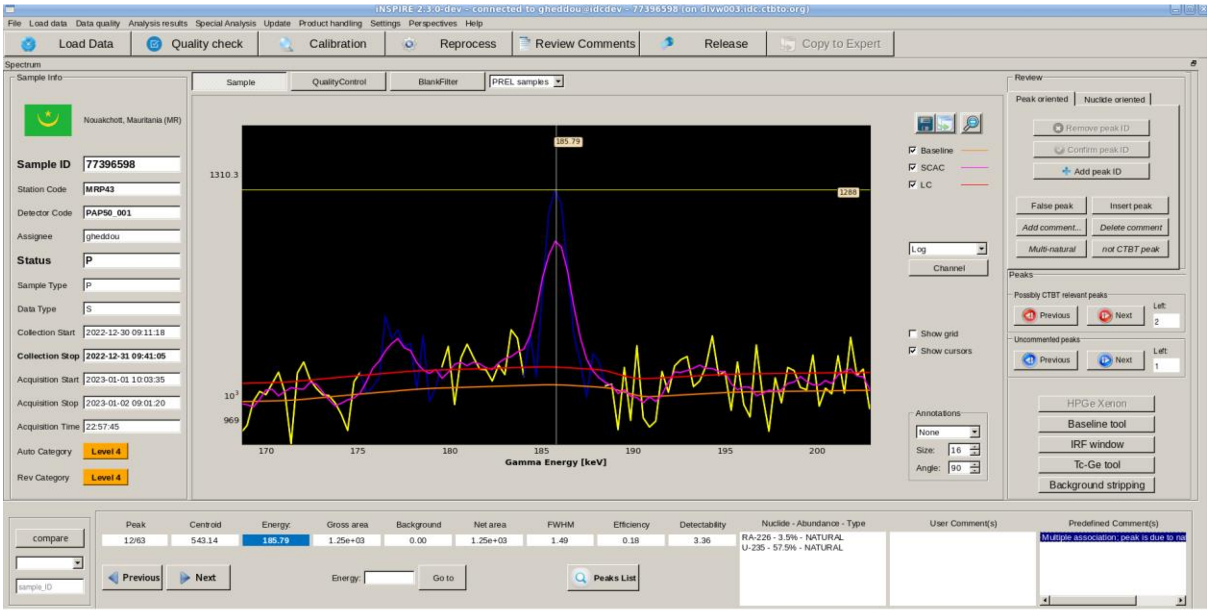
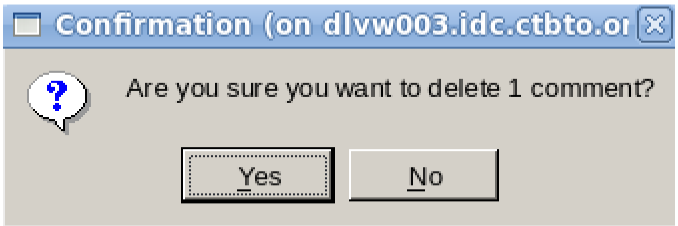


Figure 69: Delete comment – action

- Click on **Delete comment** button. A confirmation dialog will be brought up.



- After validation, the comment will be deleted from the peak.

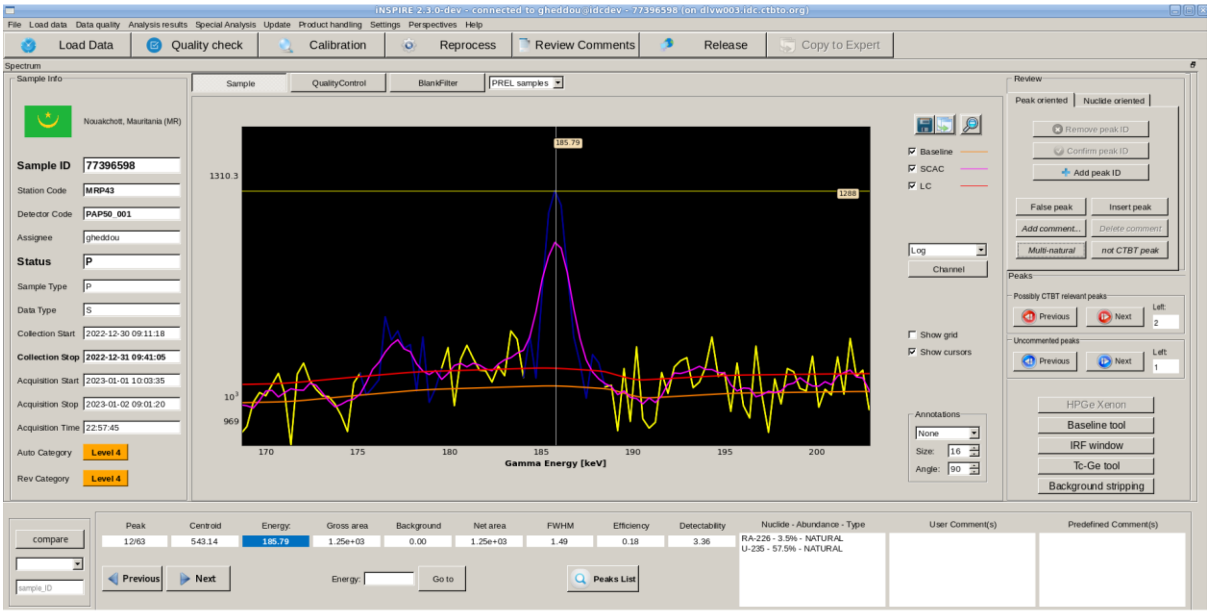


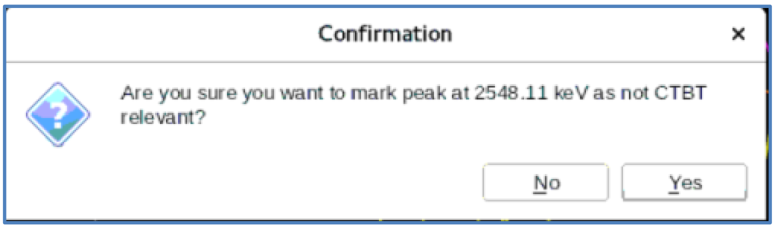
Figure 70: Delete comment – result

Unknown emitter

- Browse to the peak of interest

Figure 71: Unknown emitter – action

- Click on **Unknown emitter** button. A confirmation dialog will be brought up.



- After validation, a not-CTBT relevant comment added to the peak.

Figure 72: Unknown emitter – result

14.2.2. *Nuclide oriented functionality*

The review panel contains the following nuclide-oriented buttons:

- **Remove Nuclide** options will remove currently selected nuclide from all peaks:
  - **Nuclide not in spectrum**: *will remove the selected nuclide from the Activity Summary with a predefined comment because in the analyst's judgement it is not present in spectrum; some nuclides may be removed because their activity calculations are not meaningful. The nuclide identification is removed from all associated peaks.*
  - **Nuclide not in filter**: *will remove from the Activity Summary the selected nuclide that is present in the spectrum but not in the filter. In the analyst's judgement the appearance of the nuclide was from detector contamination or station background. The nuclide is removed from Activity Summary for all associated peaks, but it is still present in the Peak Search Results. A predefined comment is added.*
- **Confirm nuclide**: *will confirm currently selected nuclide at all its peaks*

- **Add nuclide**: *will open a list of possible nuclides for currently selected peak and allow selection of one or more energy lines for the chosen nuclide*

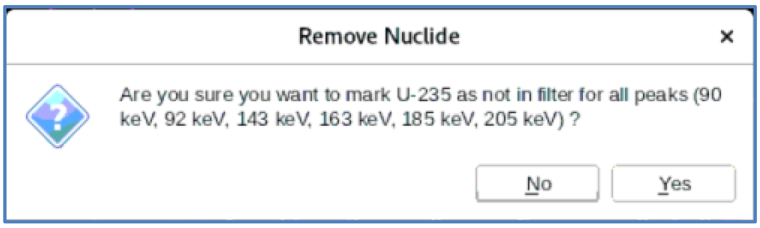
The following sub-sections illustrate the steps for using different nuclide review buttons.

Nuclide not in spectrum

- Browse to a peak where the nuclide to remove is associated and select the nuclide

Figure 73: Removing Nuclide not in spectrum – action

- Click on the **Nuclide not in spectrum** button. A confirmation dialog will be brought up.



- After validation, the nuclide will be removed, and a nuclide removal comment to indicate that in the analyst's judgement it is not present in the spectrum will be added to the current peak and any other peak associated with the selected nuclide. The nuclide is excluded from the *Activity Summary* but is included in the *Peak Search Notes* in the Reviewed Radionuclide Report (RRR).

Figure 74: Removing Nuclide not in spectrum – results

Nuclide not in filter

- Browse to a peak where the nuclide to remove is associated and select the nuclide

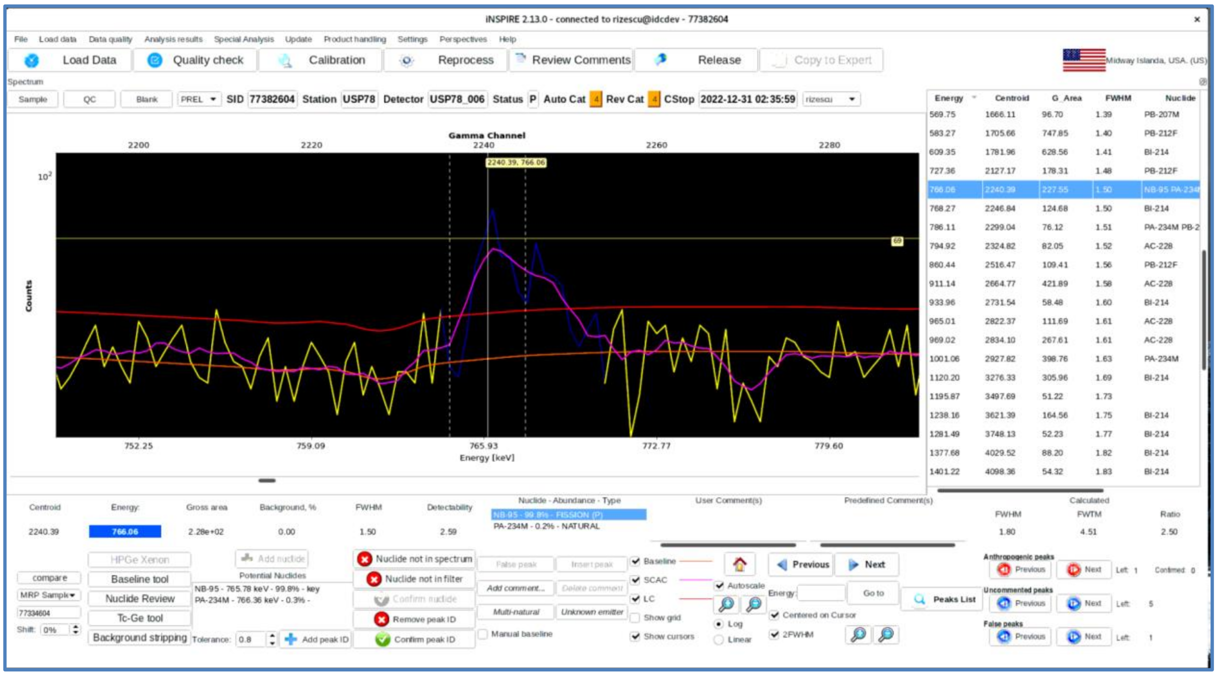
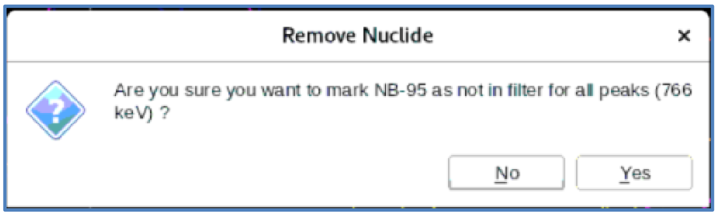


Figure 75: Nuclide not in filter – action

- Click on **Nuclide not in filter** button. A confirmation dialog is displayed.



- After validating, a predefined comment is added to all the nuclide peaks (listed in the confirmation window) to indicate that the nuclide is present in the spectrum but not in the filter, as it can come from detector contamination or station background. The nuclide is removed from the *Activity Summary* but still present in the *Peak Search Results* (with note).

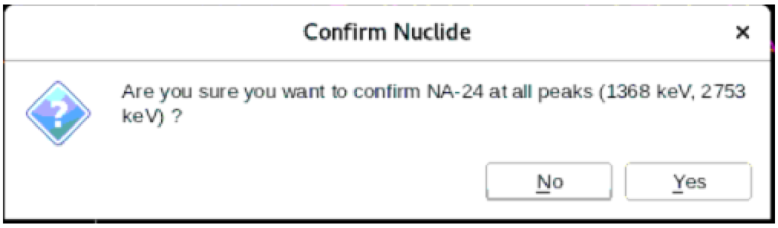
Figure 76: Removing Nuclide not in filter – results

Confirm nuclide

- Browse to a peak where the nuclide to confirm is associated and select the nuclide

Figure 67: Confirming nuclide – action

- Click on **Confirm nuclide** button. A confirmation dialog will be brought up, listing all the nuclide peaks:



- After validation, the nuclide will be confirmed, and a nuclide confirmation comment will be added to the current peak and any other peak associated with the selected nuclide.

Figure 68: Confirming nuclide – results

Add nuclide

- Browse to uncommented peak without nuclide

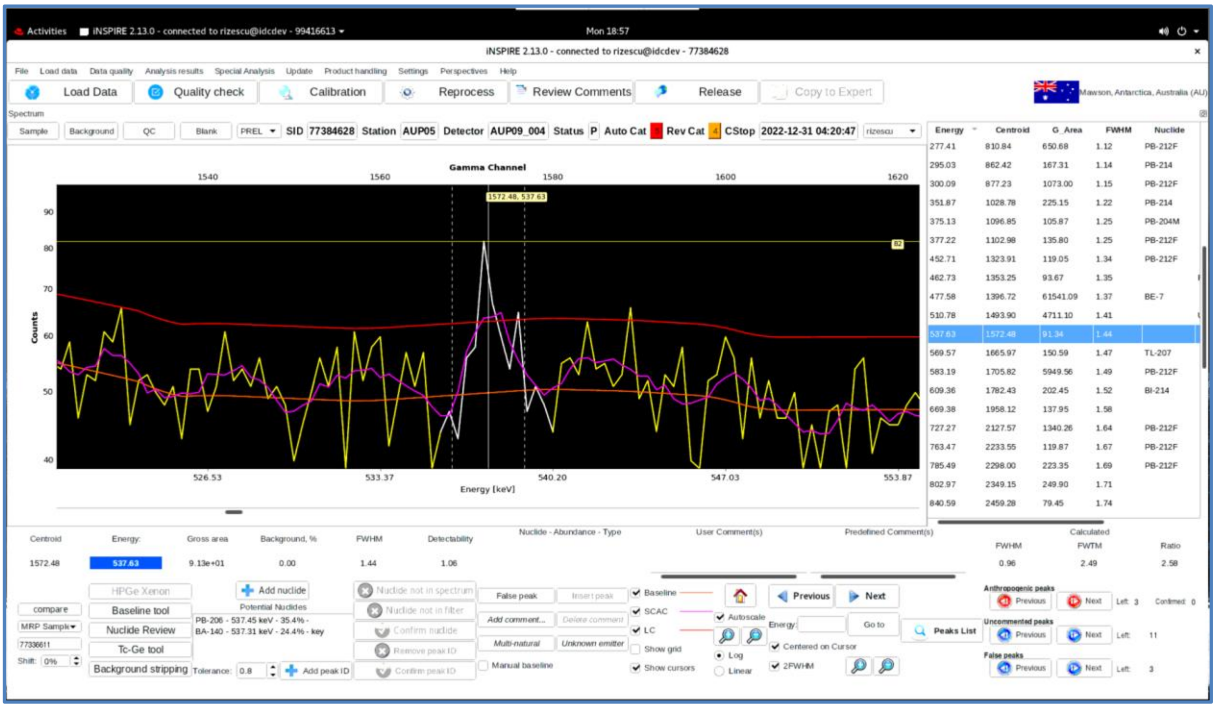
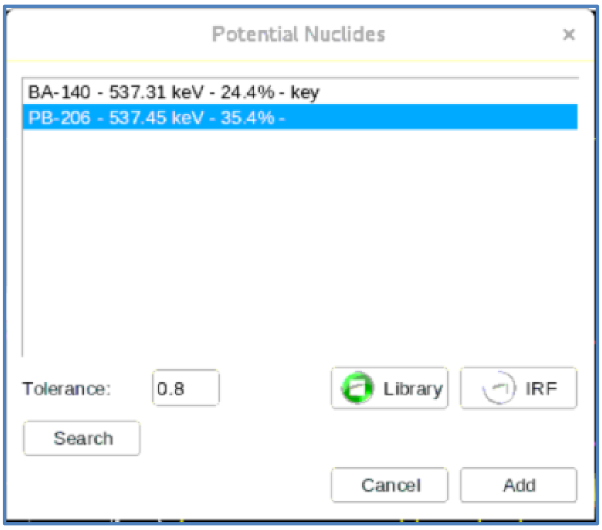
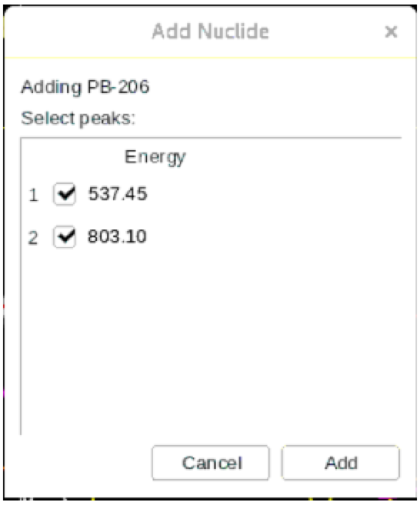


Figure 79: Adding nuclide – action

- Click on **Add nuclide** button 

. A window with potential nuclides will be brought up.
- Select the nuclide and click on **Add** button. A window with potential nuclide peaks is presented next; select the nuclide peaks and click on **Add** button.



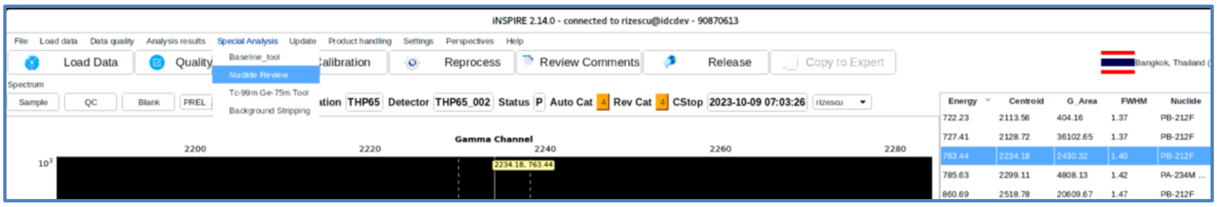


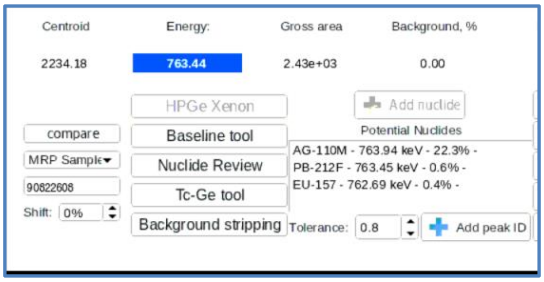
- After validation, the nuclide will be added with a comment, to current peak and all other uncommented peaks with a gamma energy within the tolerance window (default 0.8 keV) to an emission line from the nuclide in focus.

Figure 80: Adding nuclide – results

14.3. NUCLIDE REVIEW FACILITY

The Nuclide Review facility can be activated from the **Nuclide Review** button of the main screen or by selecting menu item **Nuclide Review** under the menu **Special Analysis**.





14.3.1. FUNCTIONALITY

The Nuclide Review facility is a decision support system which assists the analyst while exploring peak identification options. Relevant information is displayed in a graphical mode for other gamma lines of all possible nuclide associations that have peaks within the tolerance identification window (0.8 keV) around the energy in question.

Available possibilities are compiled in graphical mode so that the analyst can consult interactively each option.

Nuclear data of interest are made available on the same window with the possibility to extend the search to other nuclides in the Nuclide Library by just changing the energy tolerance setting.

In addition to the selected peak, other detectable lines are plotted in their expected sizes in the panes below to allow an analyst to assess whether the selected nuclide is a good candidate for the peak. Combining all elements of such a user-friendly dashboard environment allows the analyst to make more reliable identifications.

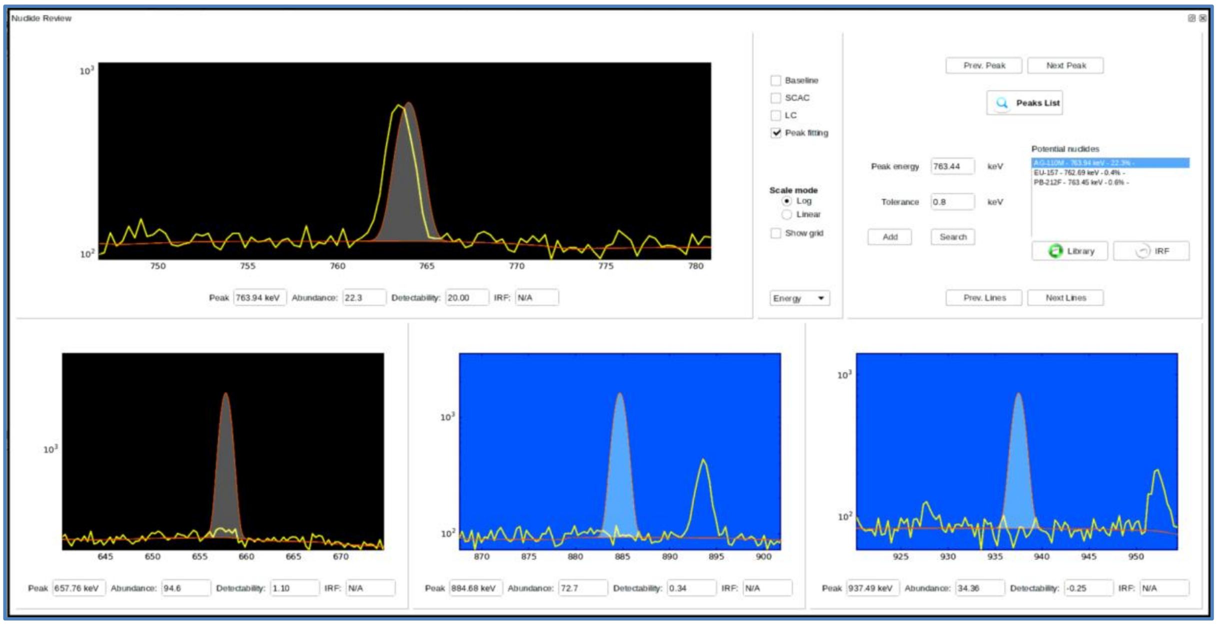


Figure 69: Nuclide review facility

14.3.2. DESCRIPTION

The Nuclide review window consists of the following items:

- The plot in the upper-left corner displays a zoom in around the current peak of interest.
- The "Potential nuclides" list box to the right contains possible nuclide candidates for peak association. These have energy lines within the tolerance window (default is 0.8 keV). The source of possible nuclides is the nuclide library when the **Library** button is active, and Isotope Response Function library when the **IRF** button is active. The line energy of each nuclide along with related abundance are also provided.
- The plots in the lower panels correspond to other emission energy lines (if any) for the selected nuclide. If more than three lines are available, the Analyst can scroll left and right for additional energy plots by using the buttons "Previous lines" and "Next lines", respectively
- Each plot footer shows contextual information for the selected nuclide and energy line:
  - **Abundance** (emission probability), in %,
  - Peak **detectability** in the spectrum,
  - Isotope Response Function (**IRF**), if available.

Note:

- *The buttons **Previous peak** and **Next peak** on the top right allow to Analyst to browse to other peaks. This is also available with **Peaks list** button.*

14.3.3. FEATURES

- Each plot displays original spectrum counts in a zoomed-in mode around energies of interest.

- In each plot, a shaded (grey) Gaussian peak is fitted to the spectral structure, with the peak centroid being at the energy associated to the selected nuclide, where the peak would be expected.

- In lower plots, shaded (grey) areas represent theoretical peaks, based on the size of the peak under investigation (upper left plot) and considering the abundance ratio, detector efficiency ratio, and coincidence correction factor(s) if applicable.

- The plot background is colour-mapped *vs.* detectability to allow immediate recognition of real peaks from insignificant SCAC structures:
    - black background means the peak is real (*SCAC above LC: detectability ≥1*),
    - blue background indicates there is no significant peak in the spectrum (*SCAC below LC: detectability<1*) around the energy in question.
    - *This colour-coding convention applies to both the peak under investigation and other peaks of the selected nuclide.*

- The peak location tolerance window can be set interactively to a different value in the Edit field next to Tolerance, as appropriate. Then, by clicking the **Search** button, a new query is run, and the list of possible nuclides is updated on the display.

- If the Analyst decides that a new nuclide candidate is valid to associate with the peak, clicking on the **Add** button will add the currently selected nuclide to the current peak.

14.3.4. ILLUSTRATION

The screenshots in Figure 70, Figure 71 and Figure 72 illustrate an example on how the *Nuclide Review Window* can be used to check nuclide identification for a peak around 658.17 keV.

The window shows all three nuclides with possible association to the peak:

- Ag-110m, with a gamma line at 657.76 keV, from Library
- Pb-212F, with a gamma line at 658.16 keV, from IRF
- Bi-214, with a gamma line at 658.51 keV, from IRF

Although, all three nuclides have energy lines within the tolerance peak search window, the following considerations will allow an analyst to provide the correct identity to the peak:

- A candidate nuclide is to be discarded if observed peak areas at energies of other lines are not in consistent ratios with respect to the selected peak.
- The right nuclide association will be the one that has all its other lines in consistent peak ratios to the selected peak.

The analyst will ultimately decide the correct peak identity by applying these key rules to every peak.

(a) Assuming AG-110M

By selecting **AG-110M** in the list box, the window displays related information as shown in Figure 70.

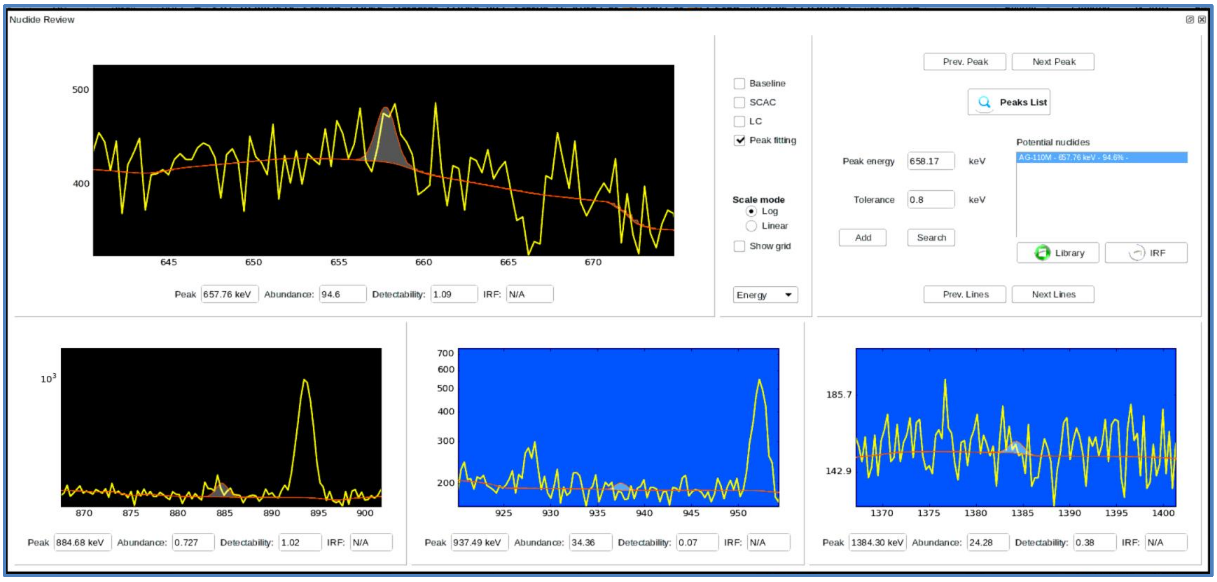


Figure 70: Nuclide review window with Ag-110m selected.

Two of the three lower plots for other peaks of Ag-110m (937.49 and 1384.30 keV in the screenshot) have blue background which means that these peaks are NOT present in the spectrum.

The first lower plot for other peaks of Ag-110m (884.68 keV in the screenshot) has black background which means that this peak is present in the spectrum. Considering that the abundance of 884.69 keV is 72.7% which is comparable to the abundance of 94.6% for the 658.17 keV, we would expect a peak with an area in roughly the same proportion as the efficiency differences are minor. These results show that although there is a peak detected around 884.69 keV, the spectral features do not fit the candidate nuclide. Therefore, Ag-110m is unlikely to be the correct peak identification.

(b) Assuming BI-214

By clicking **IRF** and selecting **BI-214** in the list box, the window displays related information as in Figure 71.

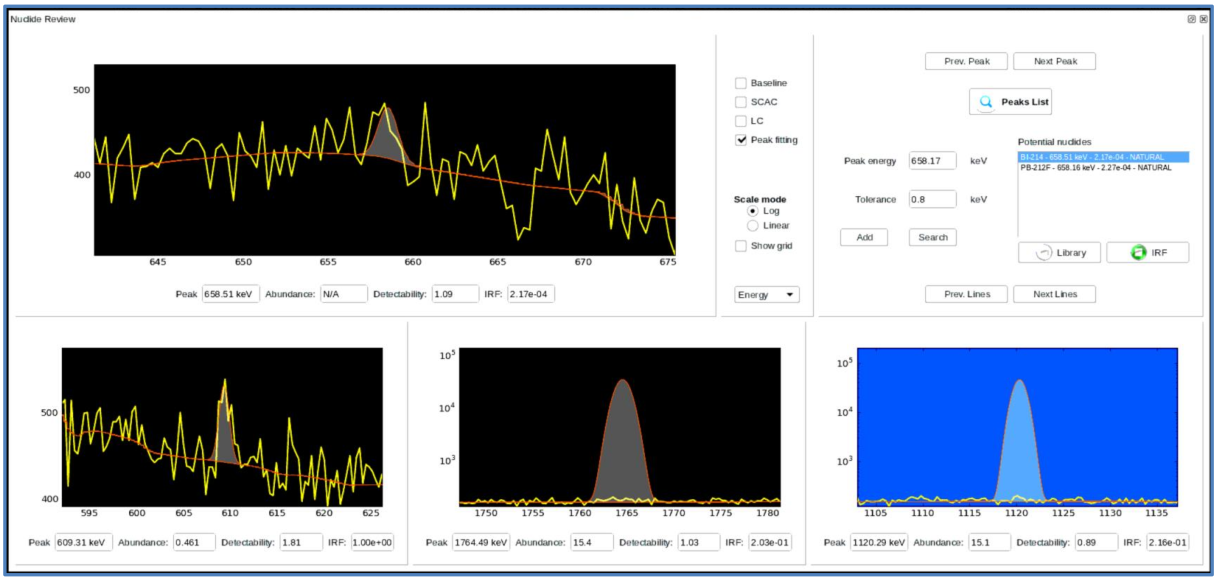


Figure 71: Nuclide review window with Bi-214 selected.

Two of the three lower plots for other peaks of Bi-214 (609.31 and 1764.49 keV in the screenshot) have a black background, meaning these peaks are present in the spectrum. For the first peak (609.31 keV) the expected area (grey) fits the actual peak. However, for the second peak (1764.49 keV) there is a very large discrepancy, of several orders of magnitude, between expected area (grey) and the actual peak in the spectrum.

In addition, the third peak of Bi-214 (1120.29 keV in the screenshot), with abundancy 15.1% is comparable to the abundance of 15.4% for 1764.49 keV (even considering the relative differences in detector efficiency - a factor of 2 in favour of 1120.29 keV), has a blue background, meaning this peak was not observed in the spectrum. Therefore, Bi-214 is also unlikely to be the correct peak identification.

(c) Assuming PB-212F

By clicking **IRF** and selecting **PB-212F** in the list box, the window displays related information as in Figure 72.

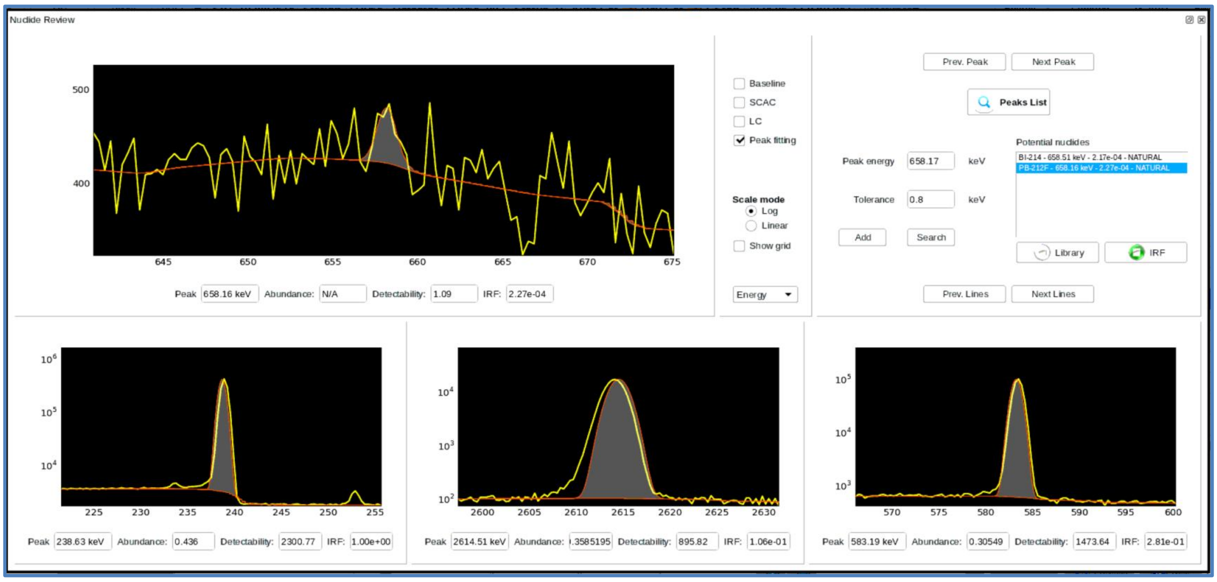


Figure 72: Nuclide review window with Pb-212F selected.

The lower plots for all other peaks of PB-212F *(238.63, 2614.51 and 583.19 keV in the screenshot)* have black background which means that these peaks are also present in the spectrum. Furthermore, expected areas (in grey) are in excellent consistency with actual peaks in the spectrum for other lines of PB-212F. The combination of these elements provides enough confidence for deciding that the peak in focus belongs to PB-212F (which corroborates the automatic association in the current example).

14.4. Technetium-Germanium (Tc-Ge) Tool

One of the most common issues when dealing with IMS spectra is related to the discrimination between:

- Tc-99m, one of the 83 CTBT-relevant nuclides, with a gamma energy at 140.51 keV and a half-life of 6 h.
- and Ge-75m, produced by interaction of neutrons from cosmic radiation with the Germanium crystal of the detector itself, with a gamma peak at 139.68 keV.

Another aspect of the issue is to distinguish whether Tc-99m is present alone in the sample or it is supported by its parent Mo-99 with a gamma energy at 140.51 keV and effective half-life 66 h.

14.4.1. Theoretical considerations

In theory, such cases can be handled based on peak position around 140 keV and peak area at 739.5 keV. However, the usefulness of these elements requires the following conditions:

- Energy discrimination between Ge-75m and Tc-99m only applies if the peaks are large enough which allow centroid determination with low uncertainty.

- The primary line of Mo-99 at 739.5 keV is only useful if the nuclide is present at relatively high concentration (expected ratio 140 keV:739 keV is in the range 4 to 13 for detector types used in the IMS radionuclide stations).

In practice, analysts have also to deal with spectral data where observed peaks are close to the detection limit. In such situations both above discrimination elements are compromised:

- Uncertainties in peak shape cause uncertainties in centroid position larger than the required 0.81 keV (difference between Ge-75m and Tc-99m).
- Expected Mo-99 peak area at 739.5 keV is much below the detection limit.

Accounting for these inherent difficulties, *iNSPIRE* is equipped with a Technetium-Germanium analysis tool (Tc-Ge) which is based on four practical decision elements.

(a) Ge-75m in the detector background

Background and blank spectra provide peak area of Ge-75m with relatively low uncertainty.

Daily variation of cosmic neutron flux is around 10% due to fluctuations in atmospheric pressure.

(b) Ge-71m in the sample spectrum

The presence of 198.39 keV peak due to de-excitation of Ge-71m is expected with comparable peak area than Ge-75m at ~140 keV. The reason is that the product *abundance x production cross-sections x gamma emission probability x detection efficiency* is almost the same for these Ge isotopes.

In other words, for any Ge-75m peak at ~140 keV, there should be an accompanying peak due to Ge-71m of similar size at 198.39 keV.

(c) Time development of peak detectability

Peak detectability around 140 keV during the normal 24 h spectrum acquisition time will vary following differentiated patterns depending on whether the peak is produced by Ge-75m, Tc-99m alone or supported Tc-99m:

- If the peak results from Ge-75m, the peak area is expected to grow quasi-linearly with the acquisition time, due to the too short half-life of Ge-75m and which is produced continuously with a constant rate.
- If the peak is produced by unsupported Tc-99m, peak detectability is expected to increase only slowly because Tc-99m will be decaying significantly due to its 6 h half-life.
- Supported Tc-99m, on the other hand, will decay only slightly because of the 66 h half-life of the Mo-99 parent. This will be reflected by a faster increase of 140 keV peak detectability.

14.4.2. OPERATING PRINCIPLES

The Tc-Ge window is activated from the **Tc-Ge Tool** button on the main screen or by selecting the menu item **Tc-99m Ge-75m Tool** under the menu **Special Analysis** as shown in Figure 73.

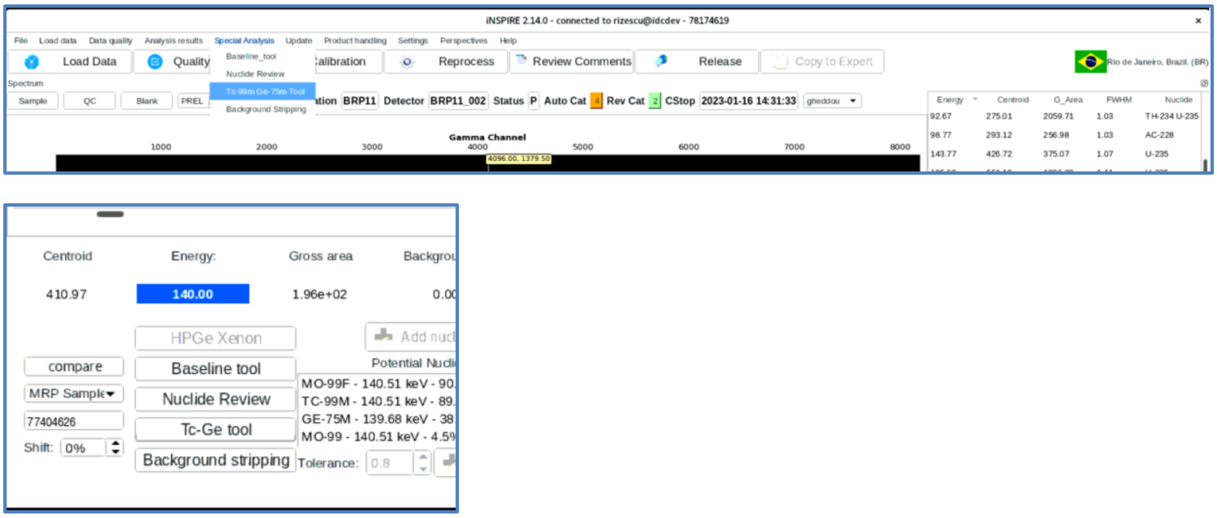


Figure 73: Two methods to activate the Tc-Ge tool

The Tc-Ge translates the above discrimination concepts into quantifiable decision support elements which allow a reliable association of a peak around 140 keV, even close to the detection limit.

(a) Energy discrimination

- The plot in the upper left corner displays original spectrum counts in a zoomed window around 140 keV.
- Two vertical lines are plotted at respective energies of Ge-75m (in green) and Tc-99m (in red) where peak centroids would be expected.

(b) Background subtraction

The first point to consider is whether the peak at ~140 keV is above the background Ge-75m level. The Tc-Ge assesses the spectra by adjusting the signal peak through a reduction in the size by 90% of the background level (to conservatively allow for the 10% variation in neutron flux). The SCAC/LC method is then applied to the residual for determining if a peak is present. If no residual peak is present, the peak is deemed to be due to normal background Ge-75m. This is shown by the upper and lower left plots in the display screen (Figure 75) which contain:

- the existing spectral peak in SCAC form (top left)
- and the residual structure after background subtraction (bottom left) along with the size of the peak remaining in percentage (i.e. the closer to 100%, the more residual signal present due to Tc-99m).

(c) Peak ratio 140:198 keV:

The spectral structure at 198 keV (gamma line of Ge-71m) is displayed in the upper right screen to enable the analyst to judge the degree of similarity. The ratio of peak areas, 140keV:198keV is also indicated:

- The presence of a peak at 198 keV with a ratio around 1 compared to 140 keV means the peak around 140 keV is due to Ge-75m.

- The absence of a peak at 198 keV or a ratio considerably greater than 1 with respect to 140 keV indicates the possible presence of Tc-99m.

(d) Preliminary spectra

The Tc-Ge calculates expected detectability at 2-hour intervals during the acquisition time, corresponding to preliminary spectra. These are plotted in the lower-right plot.

The diagram shows three coloured areas:

- A **grey** band within orange line boundaries (Tc-99m band): *expected detectability for unsupported Tc-99m,*
- A **grey** band within dark blue line boundaries (**Mo-99** band): *expected detectability for supported Tc-99m,*
- A **blue** semi plane to indicate the **Detectability<1** domain

Observed peak detectability around 140 keV in the PREL spectra of the sample under analysis are also co-plotted on the same so-called detectability diagram.

Notes:

- *The Tc and Mo bands are curved, showing the effect of decay during acquisition on expected peak size. This expected curvature would obviously be affected by the presence of Pb-212 in the sample filter because it also decays simultaneously during the spectrum acquisition, albeit with a longer half-life, and so affects the apparent change in count-rate.*
- *Band boundaries correspond to two extreme scenarios:*
  (a) Assuming that there is no Pb-212 in the spectrum region (constant background under the 140 keV peak);
  (b) Assuming that the background is entirely due to Pb-212.

14.4.3. Illustration cases

The following examples illustrate how the Tc-Ge window is used for peak identification in two contrasted sample spectra in terms of 140 keV peak association.

Spectrum A: *The peak around 140 keV is due to unsupported Tc-99m*

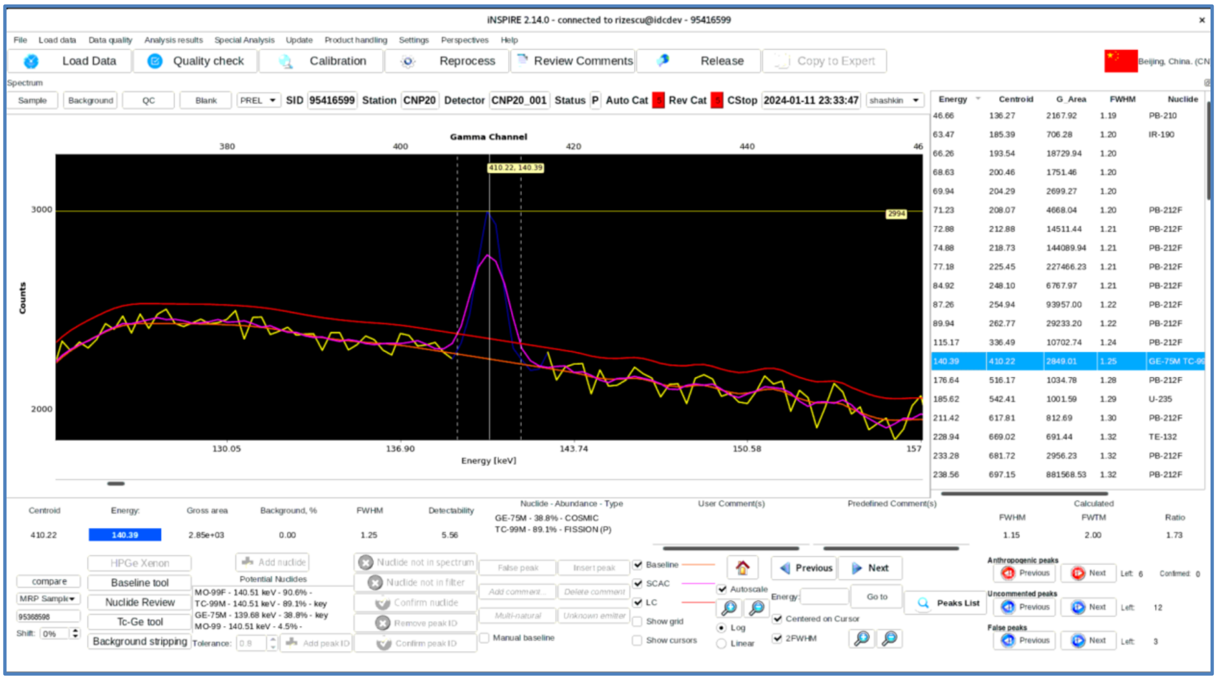


Figure 74: Sample spectrum with Tc-99m

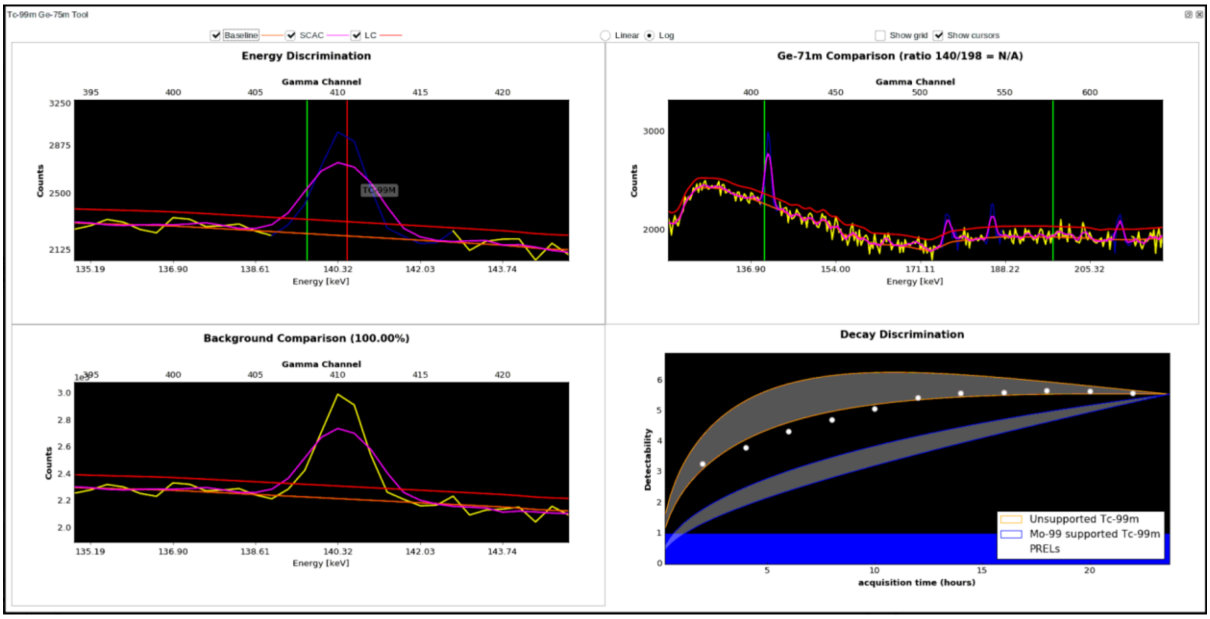


Figure 75: Tc-Ge window with unsupported Tc-99m

Interpretation elements:

(a) The upper-left plot shows a peak of significant size, and the centroid is on the side of Tc-99m energy.

(b) The net SCAC obtained after background subtraction, is still above LC, as indicated by the black background colour of the lower-left plot.

(c) The 198 keV Ge-71m peak, as shown in the upper-right plot, is absent.

(d) On the detectability diagram plot, the 11 PREL data points spectra fit rather well within the Tc-band (boundaries in orange).

<u>The combination of these findings is interpreted as clear evidence that the 140 keV peak is due to unsupported Tc-99m.</u>

Note: *If Tc-99m is supported, instead, the same logic as above applies. The only difference is that detectabilities of the PREL spectra would fall within the blue band of Mo-99.*

Spectrum B: ***A peak around 140 keV is due to Ge-75m***

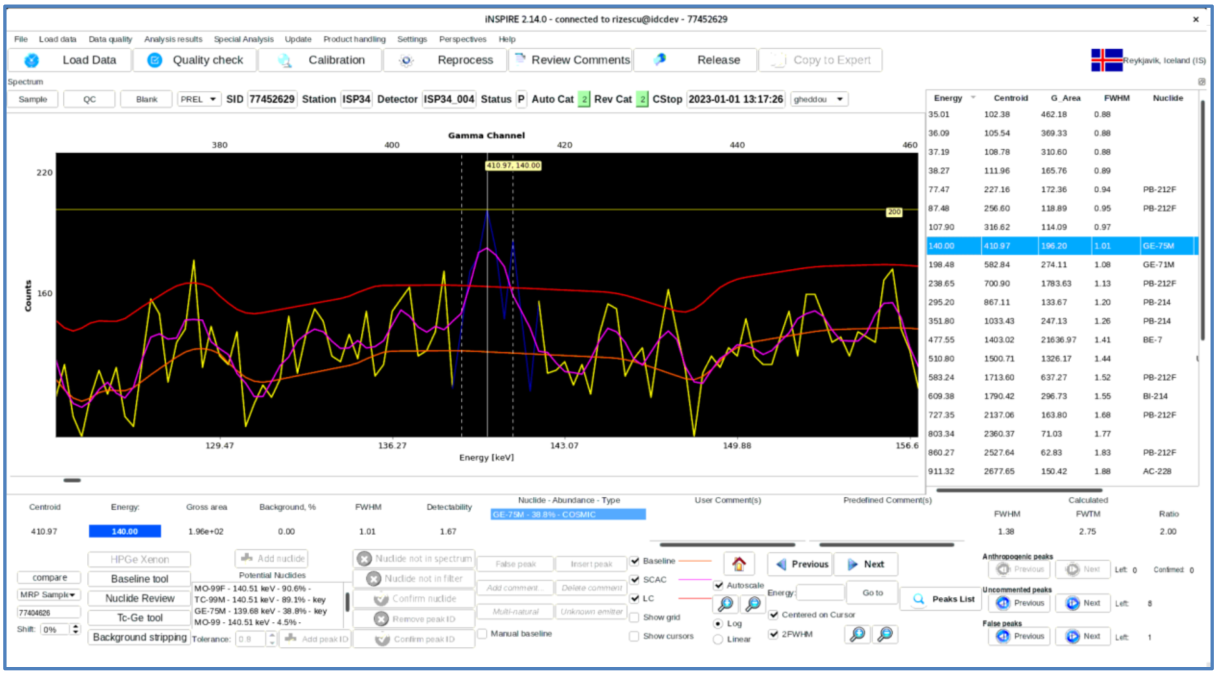


Figure 76: Sample spectrum with Ge-75m

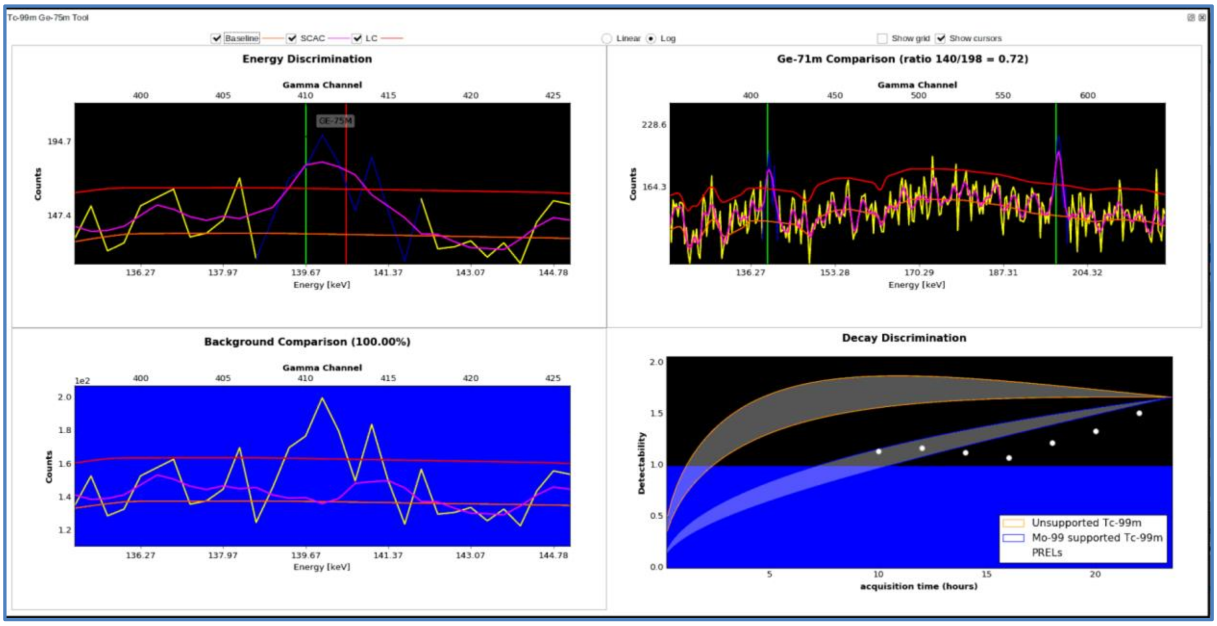


Figure 77: Tc-Ge window with Ge-75m

Interpretation elements:

The absence of Tc-99m is indicated by the following:

(a) The peak centroid energy is rather close to Ge-75m line (139.68 keV).

(b) The Ge-75m and Ge-71m plot (upper right) shows peaks of similar size, as indicated by a peak-area ratio of 0.72.

(c) The net resulting SCAC after background stripping is below LC, as highlighted by the blue background colour of the lower left plot (a reduction factor is 1 means that the peak in the sample is completely subtracted). In other words, this clearly indicates that the peak is due only to Ge-75m from the background.

(d) Observed detectability values in the PRELs, as displayed in the lower-right plot, rather show a scattered pattern and don't fit with any of the Tc or Mo bands.

<u>The combination of these findings is interpreted as clear evidence that the 140 keV peak is due only to Ge-75m.</u>

14.5. BASELINE TOOL

The spectrum baseline is computed by the automatic processing software using appropriate algorithm which is designed to best fit the specificities of low-level radioactivity in air filter samples. The algorithm is based on a smoothing filter in a combination with "Lawn-Mower" cutting. The algorithm parameters (energy sub-intervals along with associated number of iterations, …) are configurable for each detector and data type. In case specific parameters are not available in the database, the software reverts to default settings as a fallback option.

A fundamental purpose of the automatic algorithm is to minimize the need for subjective analysis. As a general guidance, the baseline should not be modified in interactive mode, unless there is a clear inconsistency in the pattern. In such a case, the baseline can be adjusted, over the channel range(s) in question.
The "Baseline tool" utility can be activated either from the **Baseline tool** button on the main window of *iNSPIRE* or from the **Baseline** menu item of the **Special analysis** menu.

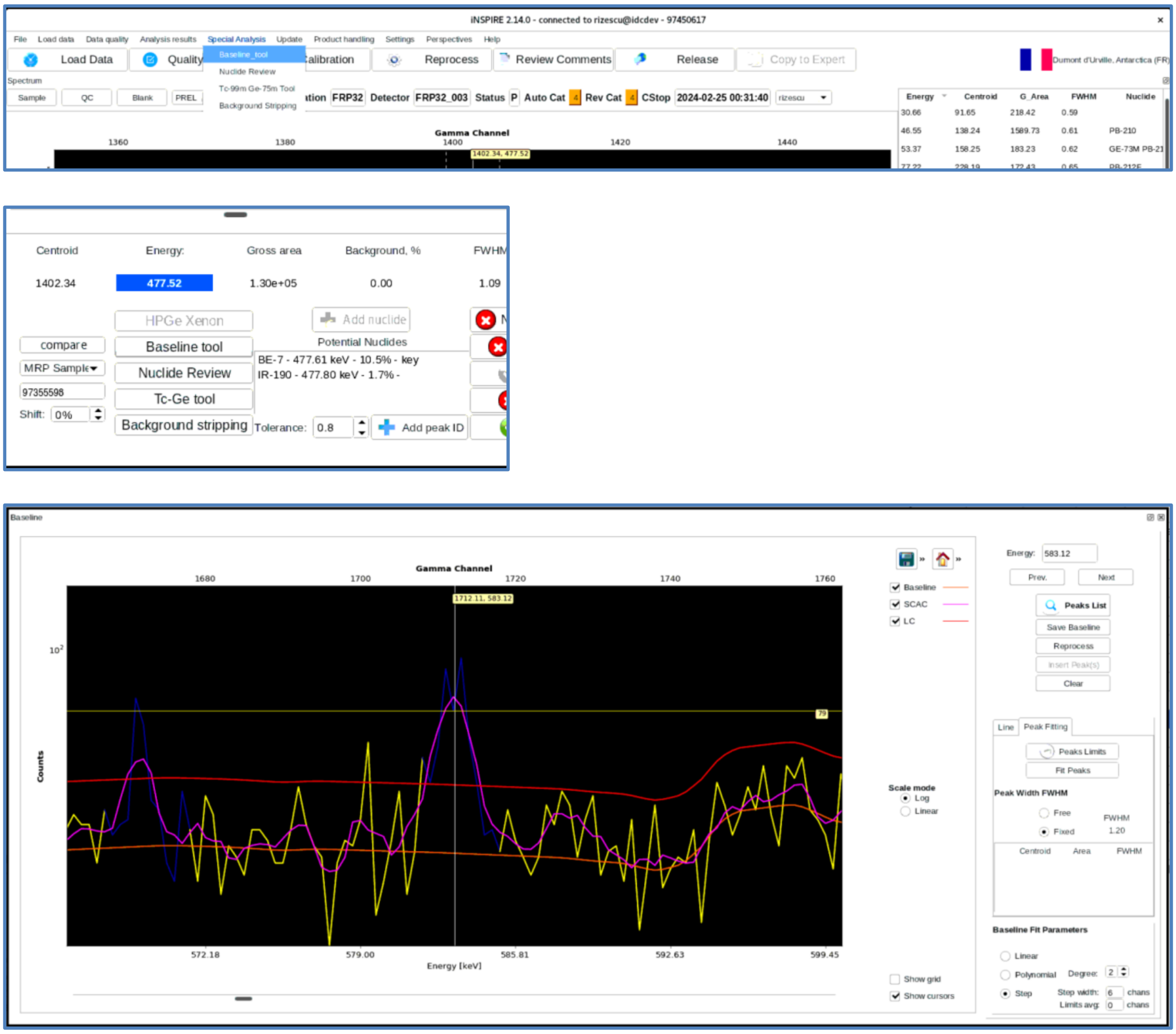


Figure 78: Manual baseline window

14.5.1 LINE

a) Activate the **Line Limits** button on the left panel.

b) Right-click one or more times to set new baseline points.

c) Press **Save Baseline** to save the new baseline.

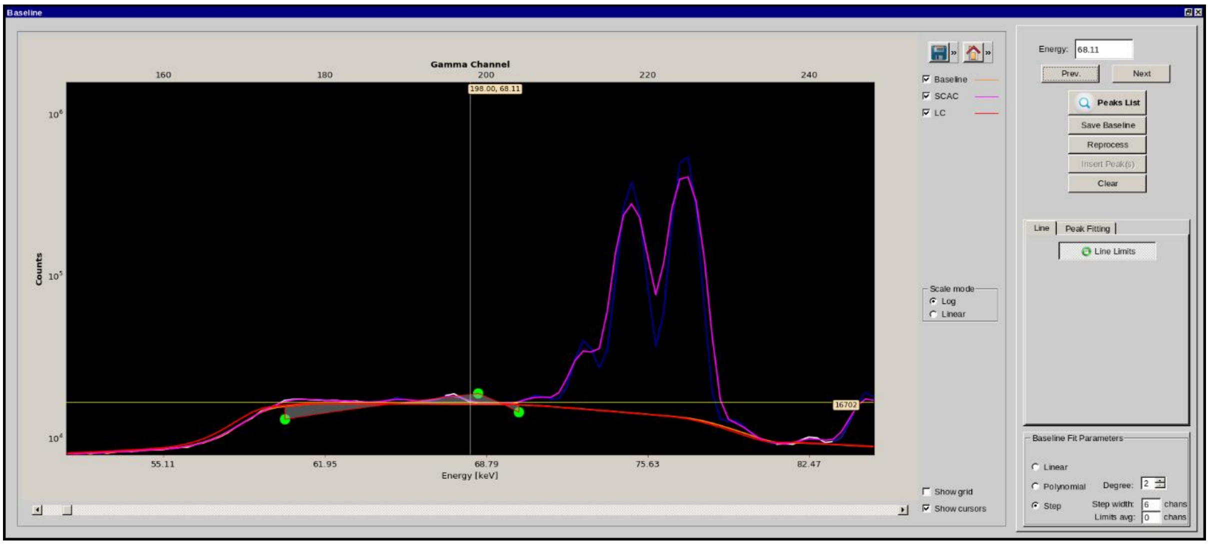


Figure 79: Adjusting baseline

14.5.2 PEAK FITTING

The following steps describe the procedure.

a) Activate the **Peaks Limits** button on the right panel
b) Move the mouse cursor to the middle of the range where the baseline is to be adjusted and right-click. A first green line will be placed at the selected channel.
c) If another peak is to be included in the fitting, move the mouse cursor to corresponding energy/channel and right-click. Another second green line will be placed at the selected channel.
d) Repeat step c) if more peaks (maximum: 5) are to be considered.

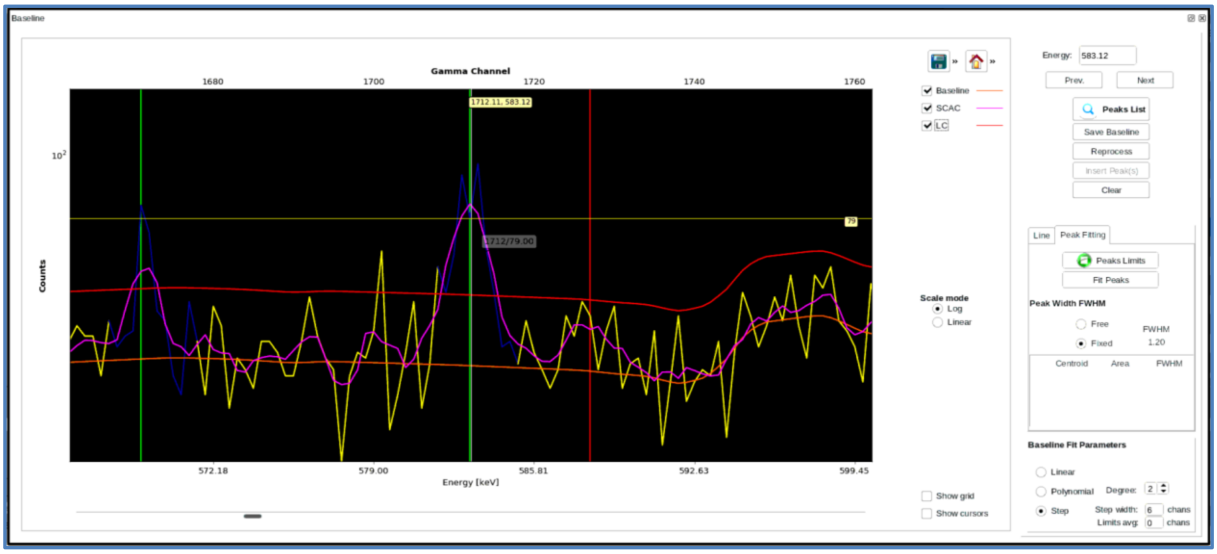


Figure 80: Peak fitting – action

e) Choose one of the two items **Free** or **Fixed** of the radio group **Peak width FWHM**

f) Choose the baseline fit model as **Linear**, **Polynomial** with selectable Degree, or **Step** with selectable Width and Limits from the radio group **Baseline Fit Parameters**

g) Press **Fit Peaks** button

h) One or more fitted areas will be shown on the plot on top of an adjusted baseline. Resulting parameters (Area, Centroid, FWHM) for the fitted peak(s) will also be displayed on the right panel.

i) Press **Save Baseline** to save the new baseline.

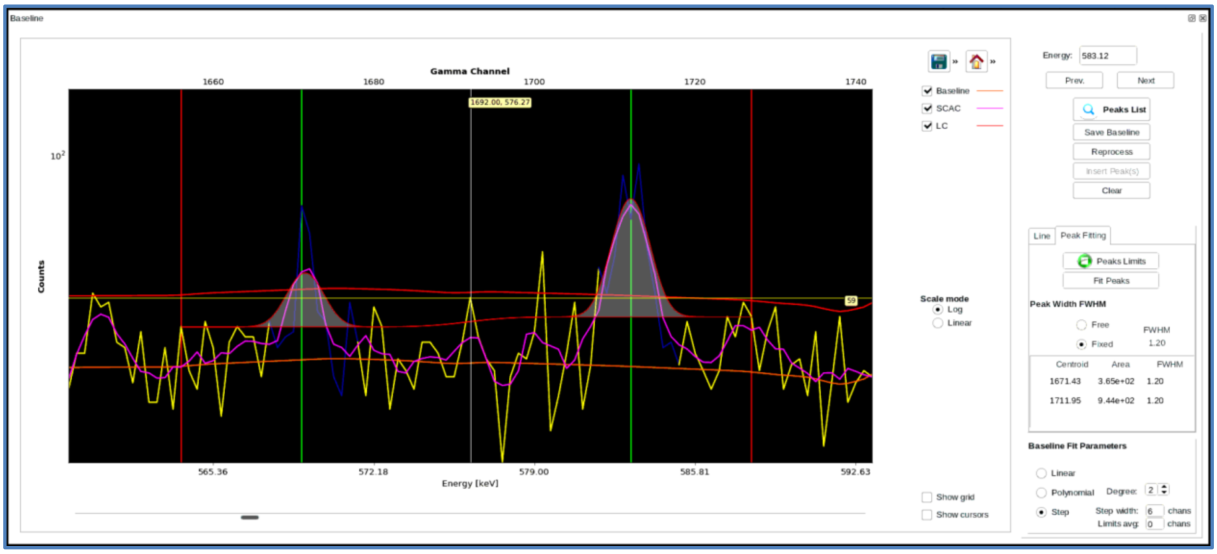


Figure 81: Peak fitting – result

14.5.3 BASELINE TOOL OPTIONS

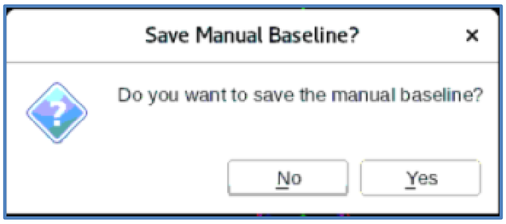
The following options are available from the baseline tool window

a) Peaks Navigation

Pressing the **Peaks List** button will open a window with the list of all detected peaks that can be used to select the active peak to display. Navigating between consecutive peaks in the spectrum can be done by pressing the **Prev** and **Next** buttons.

b) Saving the baseline

Pressing the **Save Baseline** button will pop-up a confirmation dialog prompting you whether you want to proceed with the change.



- Confirming with "Yes" will trigger the software to store the so adjusted baseline.
- Clicking on "No" will disregard the updated baseline and revert to earlier pattern.

c) **Reprocessing**

For an updated baseline to take effect in the analysis results, the spectrum will need to be reprocessed interactively, by hitting the **Reprocess** button in the baseline window or at a subsequent stage from the main window.

d) Insert peak

If the fitting results in a new meaningful peak, this can be inserted into the database. Further analysis of the new peak can be performed using the peak review buttons on the main window.

e) Clear

Click on the **Clear** button to deactivate the "Peak limits" cursors.

Notes:

- *The procedure above can be repeated at several channel ranges as appropriate.*

14.6. Spectra comparison

Compare option is available on the low left corner of the main window (Figure 82).

Comparing to Most Recent Prior (MRP) spectra provides additional information to check for new observed peaks of sudden changes in the spectrum baseline.

Comparing a sample spectrum with a blank filter or a detector background spectrum provides useful input to the review process. This helps in checking for peaks that may be explained by contributions from either the surrounding environment or the filter material itself.

In addition, comparing a FULL spectrum with its preliminary spectra is a helpful feature when deciding on identities for short-lived nuclides.

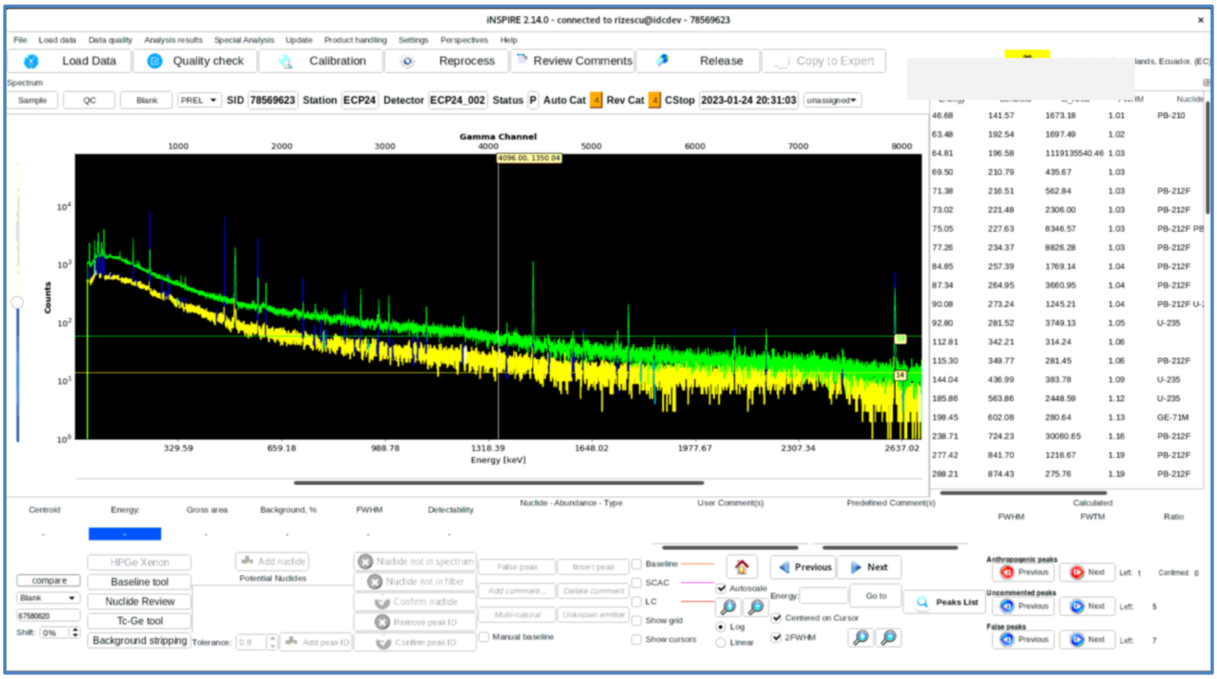


Figure 82: main display in comparison mode

iNSPIRE offers three options for choosing the spectrum to compare with:

(a) One of the available PRELiminary spectra for the same sample.
(b) The blank filter or a detector background spectrum associated with the sample.
(c) Most Recent Prior spectra from the same station.
(d) Any spectrum in the file system (not necessarily from the same station). In this case, a valid spectrum identification number (sample_id) can be typed in the Edit field.

Available spectra related to (a) and (c), can be selected from the drop-down combo box under **Blank/MRP Sample/PRELs**.

After spectrum selection, the button **Compare** is enabled. Clicking on it will load the second spectrum of interest, in **green** colour. Clicking again on the **Compare** button will hide the comparison spectrum.

15. Interactive reprocessing

iNSPIRE provides the possibility to reprocess of one or more components of the currently loaded dataset. This functionality is available via the ***Reprocessing*** window, which allows the user to set various processing parameters and reprocess the spectra.

The “Reprocess” utility can be activated either from the **Reprocess** tab on the main window of *iNSPIRE* or from the **Reprocess** menu item of the **Update** menu.

Note: *This assumes that the spectrum is assigned to the current user which provides him/her all required write/update permissions on database analysis tables.*

15.1. Beta-Gamma noble gas

As in the Figure 83, the window offers the following reprocessing options:

- Possibility to select the analysis method for reprocessing.
  Note that currently two analysis methods are available: Net Count Calculation (NCC) and Beta-Gamma Matrix (BGM).
- Possibility to change the energy calibration used for reprocessing.
  If this option is used, then a new type **C(Custom)** calibration directive is created in the database before starting the reprocessing run and the analysis tool will load the new directive for processing. As possible starting points for the new calibration directive the existing calibration candidates can be selected via a combo box for β and γ.
- Possibility to select the data components which the analysis tool shall reprocess.
  The main spectrum (usually sample or spike) will always be processed, but QC spectrum, gas background and detector background are optional.
- Different command line parameters can be configured for the reprocessing run.
  The resulting command line(s) are displayed and updated according to the user choices.

When the **Reprocess** button is pressed, *iNSPIRE* will first create a new calibration directive if necessary and then the automatic processing software application will be invoked by executing the appropriate command(s). After successful reprocessing, the spectra will be reloaded with refreshed results.

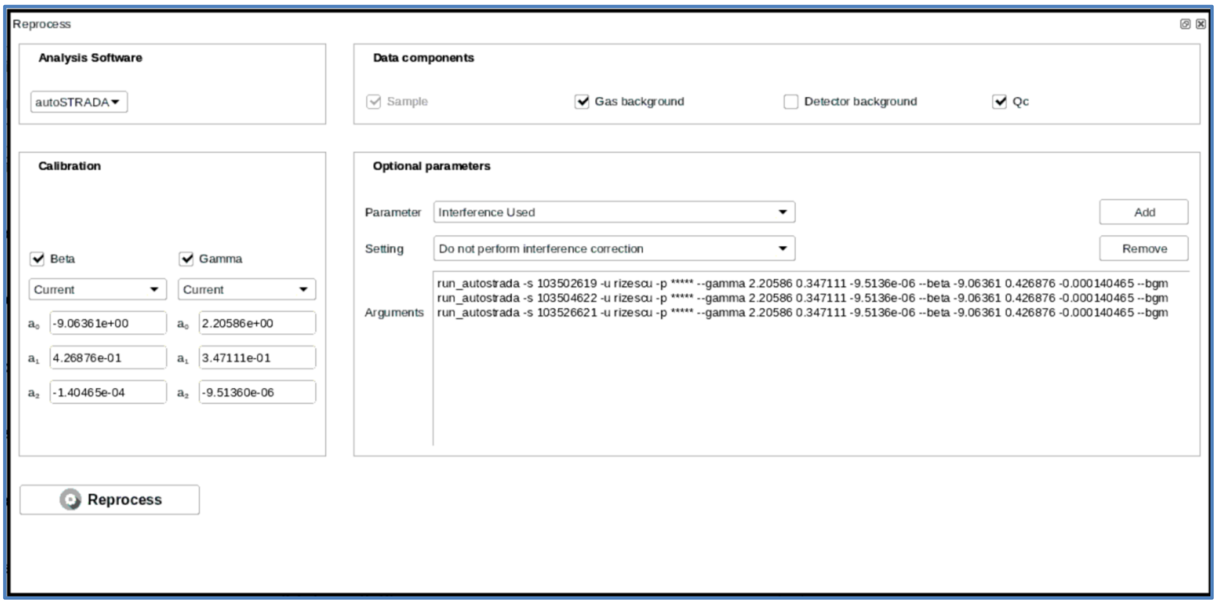


Figure 83: Beta-gamma noble gas reprocessing window

15.2. PARTICULATES AND HPGE NOBLE GAS

As in the Figure 84, the window offers the following reprocessing options.

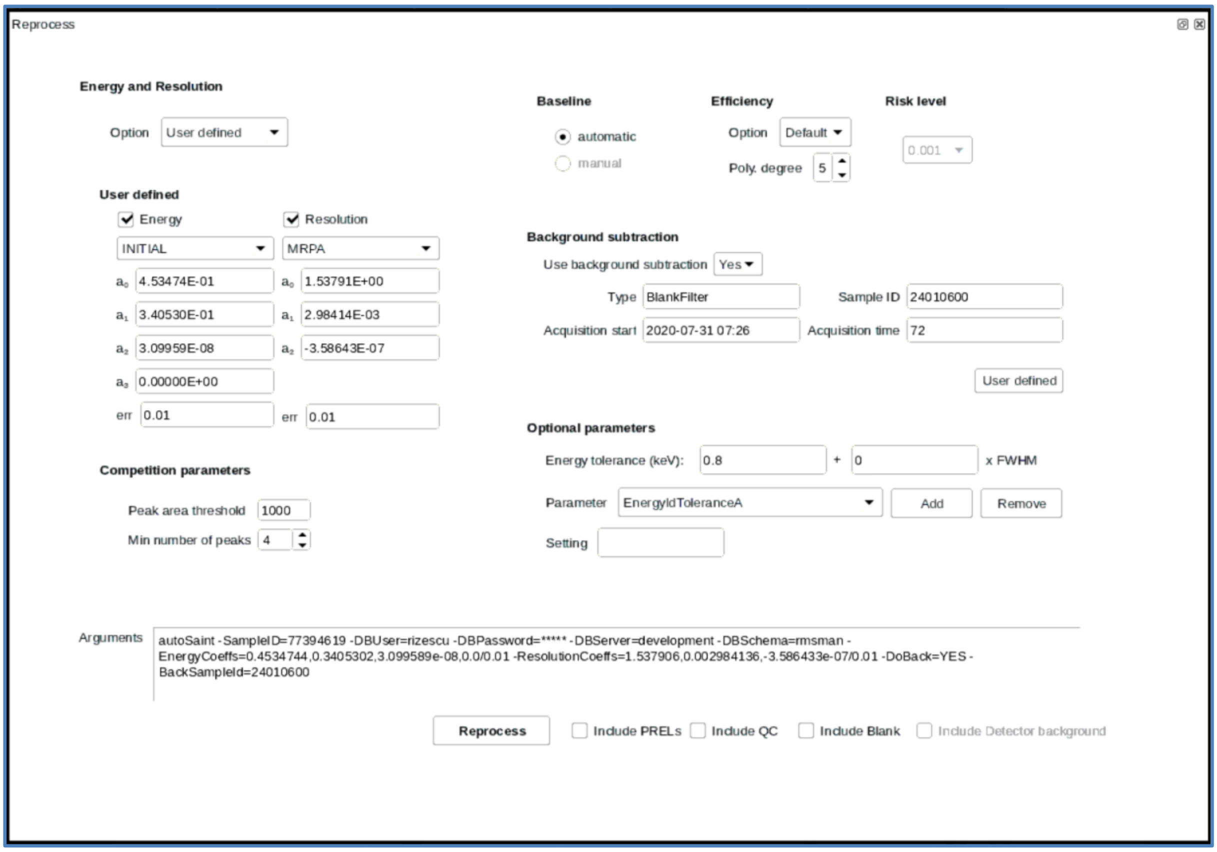


Figure 84: Particulates and HPGe noble gas reprocessing window

15.2.1. OPTIONS FOR ENERGY AND RESOLUTION CALIBRATIONS:

The analyst can choose among two options:

(a) Force calibration coefficients of choice for energy and/or resolution by selecting "User defined" item from the dropdown menu in the upper left panel.

- Depending on which of energy and resolution the Analyst wants to update, respective checkbox(es) **Energy** and/or **Resolution** need(s) to be checked/unchecked accordingly.
- For both of **Energy** and **Resolution**, the Analyst can either select one of the already available calibrations from the drop-down combo box. The coefficients are shown in edit mode so that they can also be tweaked manually by typing-in in respective fields, which will change the item caption to "Custom". Note that a dummy entry (0.01) is also needed in Err field(s).

- The following terminology is used for Energy and Resolution calibration options:
  - **INPUT**: *based on calibration pairs in the PHD message.*
  - **MRP QC**: *calibration from the Most Recent Prior Quality Control spectrum.*
  - **MRP A**: *calibration from the Most Recent Prior Automatically processed spectrum.*
  - **MRP M**: *calibration from the Most Recent Prior Manually reprocessed spectrum.*
  - **INITIAL**: *based on reference peaks in the current spectrum.*
  - **Custom**: *calibration coefficients provided by the User (in the command line).*

(b) Run the competition algorithm by selecting the **Run competition** item from the dropdown menu in the upper left panel.
The following related parameters can then be set:

- Reference peak area threshold counts (only peaks with peak area above the defined threshold will be considered for updated calibration based on the current spectrum itself).
- Minimum number of peaks that should satisfy the condition on area threshold for generating updated calibration based on the current spectrum itself.

15.2.2. OPTIONS FOR EFFICIENCY CALIBRATIONS:

In automatic processing configuration, the automatic processing software uses Monte Carlo based efficiencies when available, as a default option. As a fallback option, station efficiency calibration pairs will be used. In interactive mode, the analyst has the possibility to select the desired option.

15.2.3. OPTIONS FOR BACKGROUND SUBTRACTION:

In automatic processing mode, the software uses the most recent prior among valid blank and detector background spectra: status **V**; acquisition time above a configurable threshold (default 70 hours).

iNSPIRE reprocessing window offers additional possibilities for:

- Disabling/enabling background subtraction for the current spectrum.
- Choosing any user-defined blank or detector background spectrum for sample spectrum reprocessing in interactive mode.
  By clicking on **User defined** button, a child window is brought up for querying available spectra.

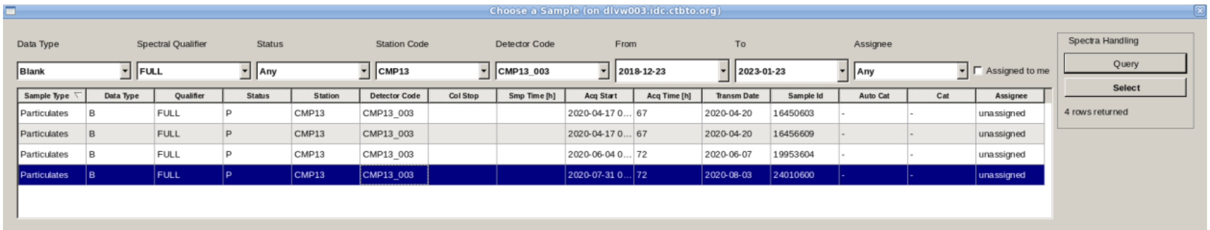


Figure 85: Particulates background/blank selection

- Once the filters are set, clicking on **Query** button will return available spectra. The final step is to select the spectrum of choice and validate with **Select** button.

15.2.4. MANUAL BASELINE

If **Manual baseline** is checked, the processing will use the updated baseline. Otherwise, the previously stored baseline will be used.

15.2.5. TOLERANCE WINDOW FOR PEAK IDENTIFICATION:

The automatic processing software supports a nuclide location window as a linear function of energy resolution (FWHM): *Tolerance = a + b*FWHM*. This allows a better compensation for lower resolutions in the high energy region.

The default peak association is based on a static tolerance window of 0.8 keV.

iNSPIRE reprocessing window offers the possibility to change both the offset and the slope of the so-called tolerance window.

15.2.6. OTHER PARAMETERS:

In addition to the high-level parameters described above, *iNSPIRE* allows wider possibilities for changing the setting of any processing parameter of interest.

This can be done by simply selecting the parameter name from the dropdown next to **Parameter**, providing the value in **Setting** field and hitting **Add** button. The new settings will then be used upon reprocessing.

15.2.7. RISK LEVEL SETTING:

The automatic processing software uses the SCAC/baseline/LC algorithm for deciding on presence of peaks and related significance at any energy of the spectrum range. The decision criterion is based on the relative position of SCAC with respect to LC.

It is enough to have only one channel above the LC for a peak to be recognized as present. This risk system is channel based and the sensitivity of peak-search is set by the height of the LC above the baseline.

Wherever the SCAC curve touches or crosses the LC curve, the structure is deemed to be a real peak (at the pre-selected level of risk defined by the height of the LC curve above baseline).

Assuming a well-known baseline, the nominal risk is defined as the risk of making an incorrect judgment that a channel represents part of a real peak when, in fact, it does not (i.e., a Type 1 error). The higher the risk setting, the greater the number of expected false peak detections.

The default risk level used in LC calculation is set to an optimized value for IMS sample spectra in IDC Operations. The risk level can be changed interactively, as appropriate, but it is not recommended in routine analysis mode.

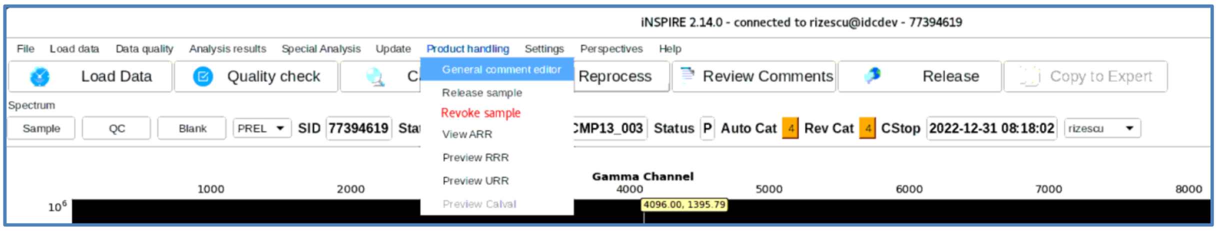
If the spectrum is reprocessed with a new value for the risk level, this new value will be used in LC calculation. Consequently, this will produce different results of peak search algorithms.

15.2.8. Reprocess

By pressing the **Reprocess** button, the automatic processing software will be invoked with updated arguments on the command line.

16. General comments editor

The General Comments Editor can be accessed either via the main window toolbar from the tab **Review Comments** or from the **General comment editor** menu item of the **Product handling** menu. It can be used to add, view, modify or delete general comment(s) for the currently loaded sample.



The term "general" in this context means that the comments apply to the whole sample as opposed to isotope specific comments.

The analyst can also add new comments. For convenience the GUI offers several lists of predefined comments applying to samples with specific properties. But the analyst is free to modify the comments and/or write his/her own general comment.

16.1. Predefined comments

As in Figure 86, predefined comments are grouped in six sub-classes and can be selected from corresponding dropdown menus, as applicable:

- *Timestamp Metrics*
- *Volume and MDC Comments*
- *Background*
- *QC and Calibrations*
- *Release Comments*
- *Recent Comments*
- *SOH Comments*

Note that depending on the sample type the list of available predefined comments is updated in contextual mode.

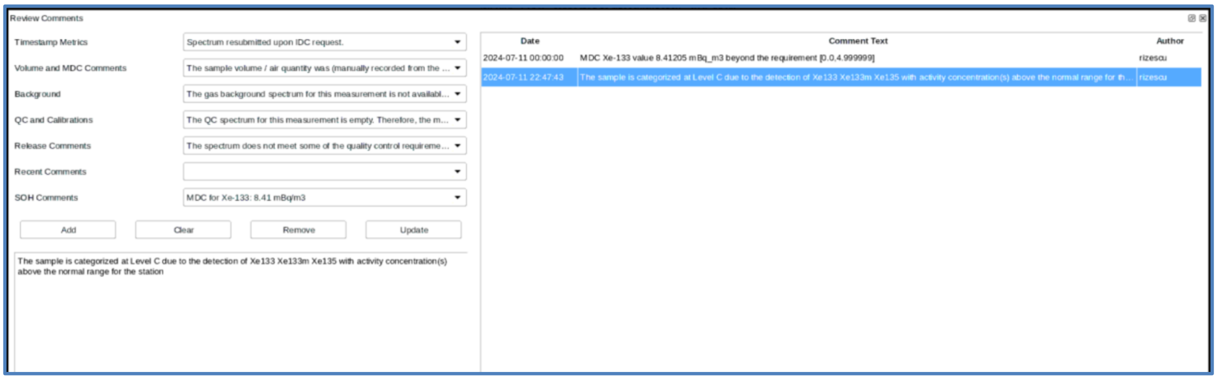


Figure 86: General comment editor

16.2. Active comments

- The right-hand grid displays already added general comments for the currently selected spectrum. The list includes the timestamp when the comment was added and the comment author.
- Note that, if the sample is categorized at level B or C, the system automatically generates a related comment specifying the isotope(s) in presence.
- The system will also automatically generate a comment, if any of the sample metrices is outside prescribed limits.

16.3. Most recent comments

A dropdown combo box is available which allows Analysts to reuse most recent comments for each station. The list includes distinct comments that have been added to released sample spectra (as in RRR) during the last 30 days.

16.4. Automatic comment(s) for failing sample metric(s)

The new version of *iNSPIRE* automatically adds general comment(s) if any sample metric is outside the IDC review policy requirements for release with categorization.

16.5. Adding and Editing comments

The edit text window in the bottom left side allows Analysts to type in free-text comments or to build on top of predefined (from the upper left dropdowns) or pre-existing (from the upper right list) comment text, using the following action buttons:

- **Add**: inserts the current comment in the edit box.
- **Clear**: clears the text in the box.
- **Remove**: removes the currently selected comment.
- **Update**: update the currently selected comment with the text in the edit box.

Note that these actions are only enabled if the spectrum is (still) under status P. For released spectra, the buttons status turns to disabled.

17. Release functionality

The sample release is accessed either via the main window toolbar from the tab **Release** or from the **Release sample** menu item of the **Product handling** menu.

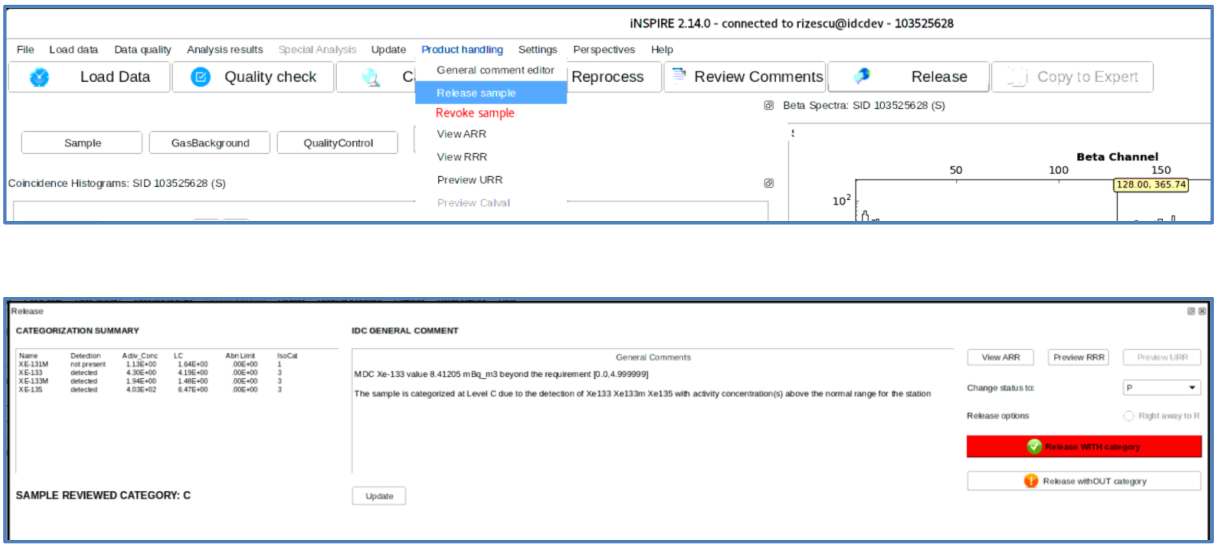


Figure 87: Spectrum release window before release

Category information:

- **Categorization summary** for each isotope (detected or not; Activity concentration, LC; Abnormal Limit; Isotope category).
- **Sample reviewed category (A, B, C);**
- A read-only list of **general comments** that were applied to the sample (the general comments can only be modified in the General Comments Editor – see previous section).

Viewing ARR, (pre)viewing RRR:

- **View ARR**: available for all FULL sample spectra, before and after release.
- **Preview RRR**: creates and displays a preview of RRR for FULL sample spectra before release.
- **View RRR**: available for all FULL sample spectra, after release.

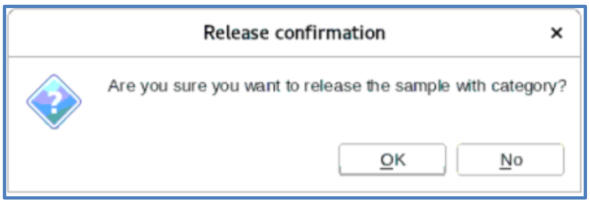
17.1. Release options

Three release options are available for sample spectra:

- **Release with category.** RRR will be created.
- **Release without category.** RRR will be created, and the category will be set to *null* in the database so that the results for the sample will not be considered for ulterior update of abnormal thresholds by the categorization program.

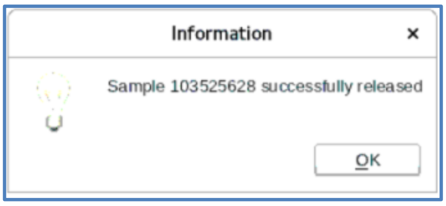
The option for releasing **Right away to R** allows the sample spectrum to be released by skipping the **Q** (quality check) waiting time. Note that this option is currently enabled in the NDC-in-a-Box configuration and disabled in the IDC environment.

When the user clicks on **Release with category** button, the following confirmation message is prompted to the user.



When the user clicks on **Release without category** button, the following confirmation message is prompted to the user.

Upon release confirmation (with or without category), an information message is brought up.



After sample release the *Release* window changes as follows:

- The Change status combo box is disabled and displays the new status of the sample **Q** (quality check)
- Both **Release** buttons (with or without category) are disabled
- The **View RRR** button (replacing **Preview RRR**) becomes available

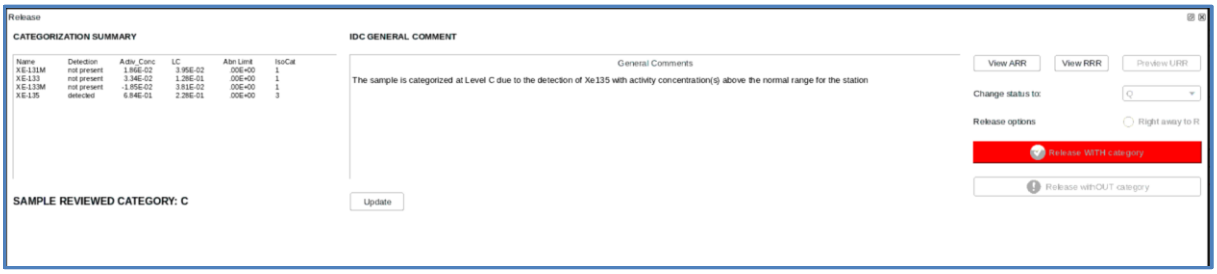


Figure 88: Spectrum release window after release

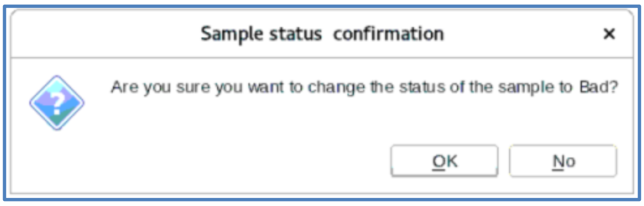
17.2. CHANGING SPECTRUM STATUS

The release window offers to Analysts the option to change the status for a sample spectrum to **Bad** or **Duplicate** as appropriate, according to the instructions in the IDC review policy.

Other spectral data (Detector Background, QC and calibration) can be marked as **V** (**Viewed**) as appropriate, which indicates that these are of good quality.

This can be performed by selecting the appropriate status from dropdown list next to the caption *Change status to* with contextual items.

When a new status is selected from the combo box next to **Change status to**, the following confirmation message (B is selected in the current case) is prompted to the user.



Upon confirmation, the status will change to the selected setting.

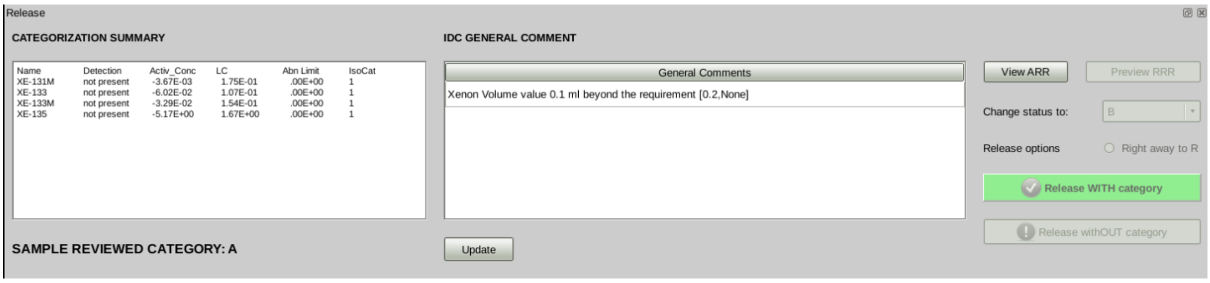


Figure 89: Changing spectrum status

The system does not allow further change of the sample status, nor allow the user to reprocess or add comments. The spectrum can still be loaded/ viewed in read only mode.

17.3. CHECKING FOR SEQUENTIAL RELEASE

If there is (are) preceding sample(s) in status P from the current station, the system will bring up a confirmation message. This provides a decision support system to the analyst for ensuring that sample spectra are released in sequential order, and that the categorization parameters are set consistently. Note that this check only applies to release with category.

Example from the IDC development environment (for illustration purposes):

17.4. CHECKING FOR UNCOMMENTED PEAKS

On **Release** tab instantiation for particulates sample, the **Release with category** button will be enabled only if both of the following conditions are fulfilled:

- all peaks are either identified or/and have comments
- CTBT relevant nuclides if present are all confirmed

Note that this check does not apply to "Release without category" (a particulates sample can be released without category even if the spectrum still has uncommented peaks and/or unconfirmed CTBT relevant nuclides).

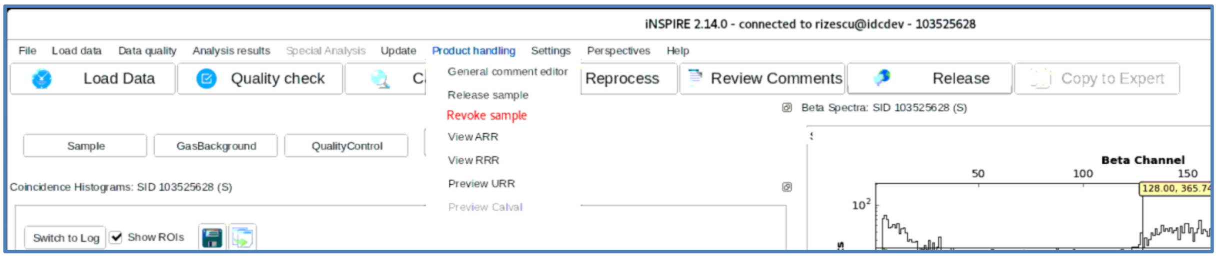
17.5. LABORATORY SAMPLE SPECTRA

iNSPIRE handles sample spectra from IMS Radionuclide Laboratories in a special manner, taking account their special status with respect to the IDC review policy:

- There is no check for a valid ARR on loading
- Categorize/NGCategorize will not be run on loading/reprocessing
- It is not possible to release (with/without category)
- Preview RRR is not available
- Sample status can only be set to **V**, **D**, or **B**

18. Revoking a temporary release

The revoke functionality allowing revoking a temporary release (only relevant in the IDC environment) is accessible via the menu item **Revoke sample** of the main menu **Product handling**.



The following steps allow Analysts to revoke released sample(s) <u>that are still under status **Q**</u>:

Step 1: check or set the relevant filters as appropriate

(a) Select data type S, spectral qualifier FULL, <u>**status Q**</u>.

(b) Set the time frame to include sample(s) collection stop to be revoked.

(c) Tick the check box *assigned to me*, as appropriate.

(d) Press the **Query** button.

The system displays corresponding sample spectra under status Q.

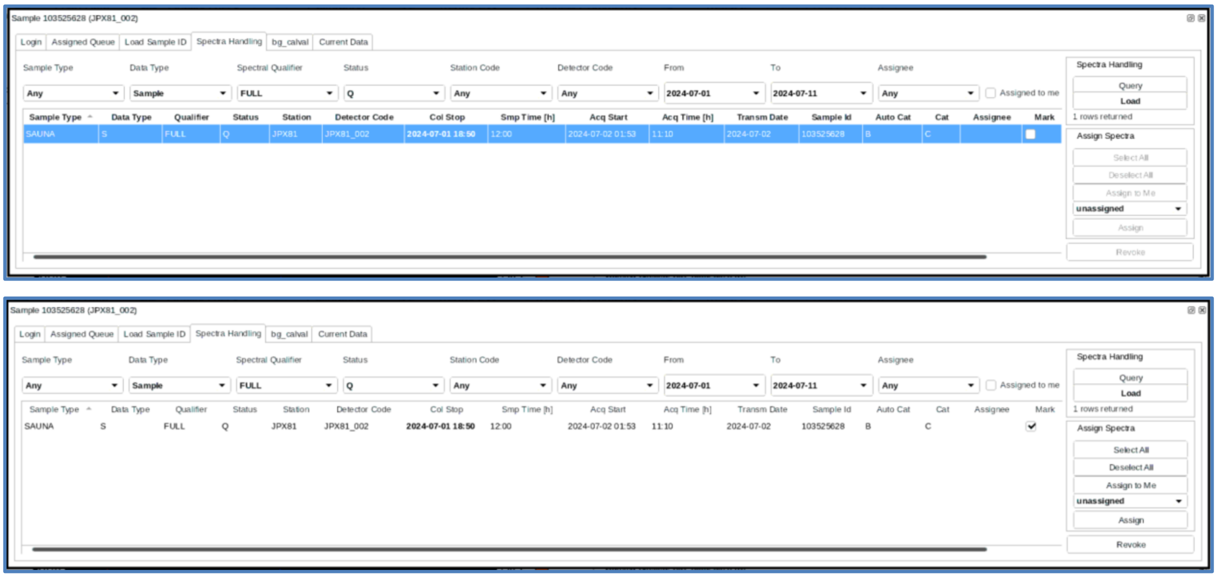
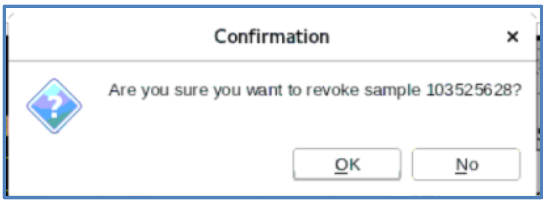


Figure 90: Revoking a temporary release (Step 1 – top, Step 2 – bottom)

Step 2: select spectra and revoke

(e) In the returned list of sample spectra under status **Q**, mark the sample(s) to revoke, by ticking the check box in the last column of the grid. The options to **Assign** and **Revoke** spectra become enabled.

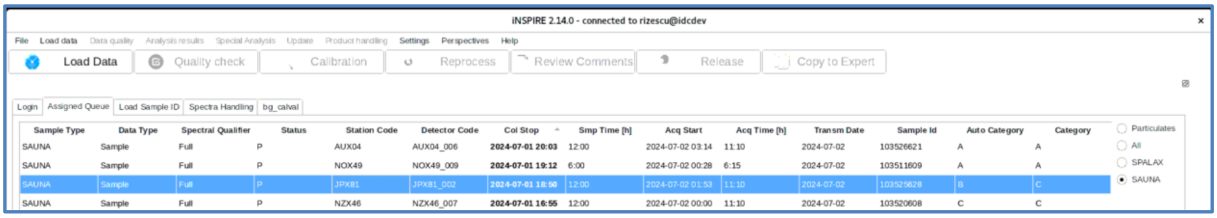
(f) Press the button **Revoke**.



Upon confirmation, the revoke stored procedure will be executed, which triggers the following changes to occur:

- Sample status will be updated from **Q** back to **P**.
- The products **RRR** (and **SSREB** in case of level 4 or 5 for particulates, and level C for noble gas) will be removed from the temporary location of the file system.
- Temporary entries in related database table will be deleted.

Revoked sample spectrum/ spectra will then be available <u>in Analyst assignment queue</u>.



19. Appendix I: List of CTBT relevant nuclides for particulate samples

The table below lists the 83 CTBT radionuclides (42 fission products and 41 activation products).

ACTIVATION PRODUCTS		FISSION PRODUCTS	
Nuclide	**Half-life**	**Nuclide**	**Half-life**
AG-106M	8.460 D	**AG-111**	7.450 D
AG-108M	127.000 Y	**BA-140**	12.752 D
AG-110M	249.760 D	**CD-115**	2.228 D
AS-74	17.770 D	**CD-115M**	44.600 D
AS-76	1.097 D	**CE-141**	32.501 D
AU-196	6.183 D	**CE-143**	1.377 D
AU-196M	9.700 H	**CE-144**	284.894 D
AU-198	2.694 D	**CS-136**	13.160 D
BA-133	10.520 Y	**CS-137**	30.100 Y
CO-57	271.800 D	**EU-155**	4.680 Y
CO-58	70.820 D	**EU-156**	15.190 D
CO-60	5.271 Y	**EU-157**	15.180 H
CR-51	27.702 D	**I-130**	12.360 H
CS-132	6.479 D	**I-131**	8.040 D
CS-134	2.062 Y	**I-133**	20.800 H
EU-152	13.542 Y	**I-135**	6.570 H
EU-152M	9.274 H	**LA-140**	1.678 D
FE-59	44.496 D	**MO-99**	2.748 D
GA-72	14.100 H	**NB-95**	34.970 D
IR-190	11.780 D	**ND-147**	10.980 D
IR-192	73.831 D	**PD-112**	21.030 H
K-42	12.360 H	**PM-149**	2.212 D
MN-54	312.120 D	**PM-151**	1.183 D
NA-24	14.959 H	**RH-105**	1.473 D
NP-239	2.357 D	**RU-103**	39.260 D
PB-203	2.161 D	**RU-106**	1.023 Y
RB-84	32.770 D	**SB-125**	2.730 Y
RB-86	18.631 D	**SB-126**	12.400 D
RH-102	207.000 D	**SB-127**	3.850 D
SB-120	5.760 D	**SB-128**	9.010 H
SB-122	2.700 D	**SM-153**	1.928 D
SB-124	60.200 D	**SM-156**	9.400 H
SC-46	83.810 D	**SN-125**	9.640 D
SC-47	3.345 D	**SR-91**	9.630 H
TM-168	93.100 D	**TC-99M**	6.010 H
U-237	6.750 D	**TE-129M**	33.600 D
W-187	23.720 H	**TE-131M**	1.250 D
Y-88	106.650 D	**TE-132**	3.204 D
ZN-65	243.900 D	**Y-91**	58.510 D
ZN-69M	13.760 H	**Y-93**	10.100 H
ZR-89	3.267 D	**ZR-95**	64.020 D
		ZR-97	16.900 H

20. Appendix II: List of CTBT relevant radioxenon isotopes

The table below lists the 4 CTBT radioxenon isotopes (fission products).

Isotope	Half-life
Xe-131m	11.962 D
Xe-133	5.2441 D
Xe-133m	2.198 D
Xe-135	9.143 H

21. Appendix III: Algorithms for particulate radionuclides categorization

Former algorithms *(from 2000 to April 2015)*

Two methods were used: EWMA and RDC methods.

(a) EWMA: the Exponentially Weighted Moving Average method is applicable mainly to Pb-212 and Be-7 which are usually observed every day.

(b) RDC: the Recent Distribution Comparison method is applicable to all nuclides, particularly the anthropogenic ones which are not as frequently seen as natural nuclides.

For a nuclide to be a candidate for categorization by the RDC method it must have been detected at the station 3 times in the preceding month, and 10 times in station history.

If these conditions are satisfied, the mean and standard deviation of the last 10 occurrences are calculated and the normal concentration range defined mean±3SD for natural nuclides and 0-(mean+3SD) for anthropogenic nuclides.

Current algorithm *(since April 2015)*

The new algorithm is based on the station history distribution of the radionuclide in focus, over the past 365 days.

The upper threshold is determined as the Median + 3*(Q3-Q1); where Q1 and Q3 are the first and third quartiles, respectively.

The same algorithm is used for the key natural radionuclides (Pb-212 and Be-7) as well as CTBT relevant radionuclides.

- Pb-212 and Be-7 are categorized at Level 2 if the activity concentration is above the abnormal threshold, otherwise at Level 1
- CTBT radionuclides are categorized at Level 4 if the activity concentration is above the abnormal threshold, otherwise at Level 3

If anthropogenic (but not CTBT relevant) radionuclide is detected, it gets categorized at level 2 (regardless of its history at the station).

22. Appendix IV: Sample categorization scheme for particulates

Particulate samples are categorized on the basis of a 5 level scheme as illustrated in the diagram below.

The five categorization levels are defined as follows:

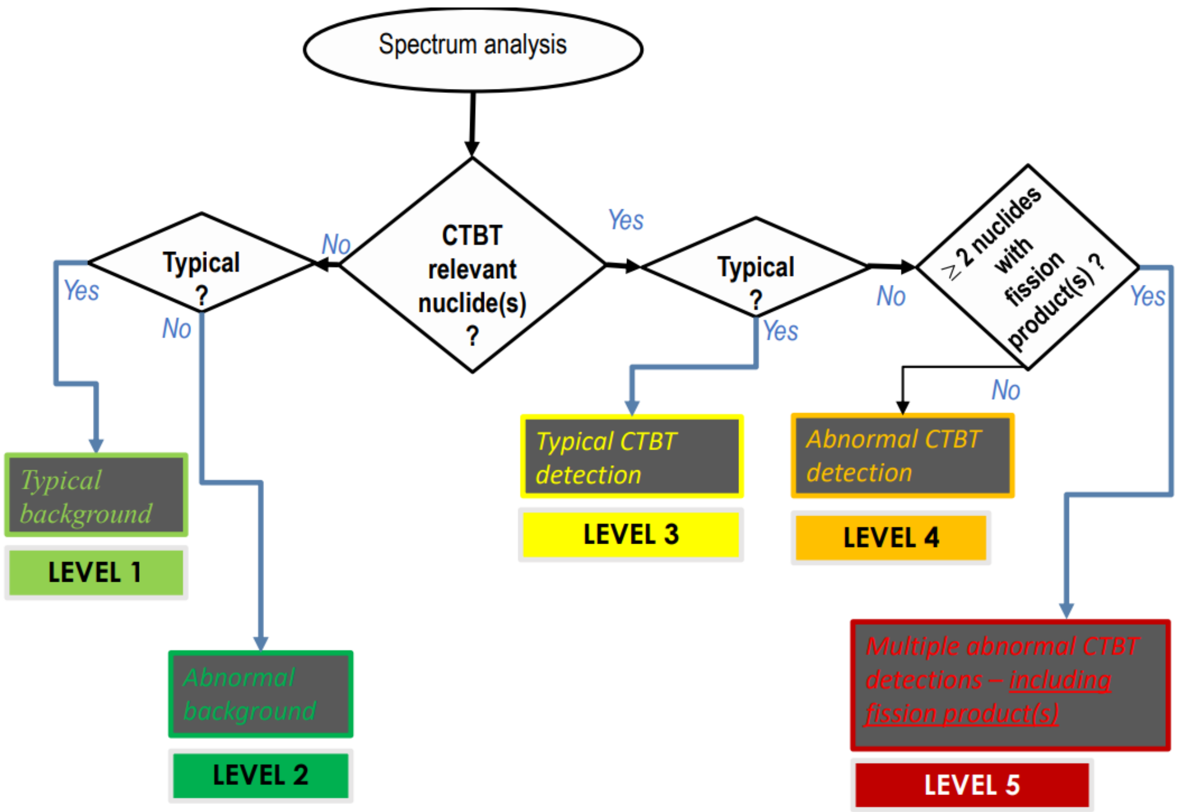
Level 1 *(normal background)*: The spectrum contains evidence of only natural radionuclides at atmospheric concentrations which are within the normal range for the station.

Level 2 *(anomalous background):* The spectrum contains evidence of either natural radionuclides at atmospheric concentrations outside the normal range, or the non-relevant anthropogenic radionuclides (or both these conditions).

Level 3 *(normal anthropogenic conditions):* The spectrum contains evidence of a relevant anthropogenic radionuclide which is regularly detected at the station, at an atmospheric concentration which is within the normal range for the station.

Level 4 *(anomalous anthropogenic conditions):* The spectrum contains evidence of one relevant anthropogenic radionuclide which is either not regularly seen at the station or is regularly seen but is above the normal concentration range.

Level 5 *(multiple anthropogenic conditions):* The spectrum contains evidence of more than one relevant anthropogenic radionuclide, under anomalous conditions as at level 4, with at least one being a fission product.



23. Appendix V: Algorithm for noble gas isotopes categorization

The algorithm is based on the station history distribution of the four CTBT relevant radioxenon isotopes (Xe-131m, Xe-133, Xe-133m and Xe-135), over the past 365 days.

The upper threshold is determined as the Median + 3*(Q3-Q1); where Q1 and Q3 are the first and third quartiles, respectively.

A detected isotope is categorized at Level C if the activity concentration is above the abnormal threshold, otherwise at Level B.

24. Appendix VI: Sample categorization scheme for noble gas

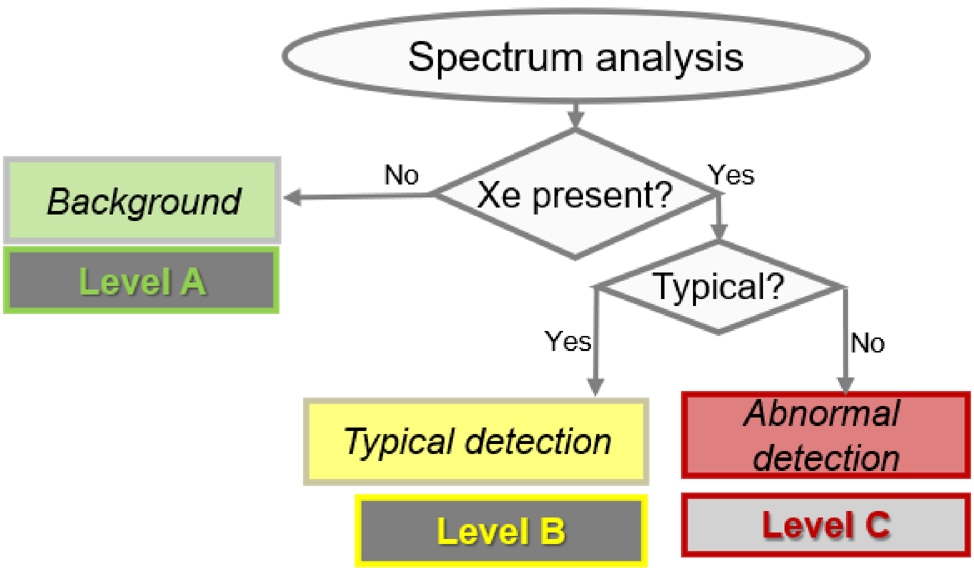
Noble gas samples are categorized on the basis of a 3 level scheme as illustrated in the diagram below.

The three categorization levels are defined as follows:

Level A *(no xenon detection background)*: The spectrum doesn't contain any evidence of radioxenon isotopes.

Level B *(normal anthropogenic conditions):* The spectrum contains evidence of relevant radioxenon isotope(s) which is (are) regularly detected at the station, at an atmospheric concentration which is within the normal range for the station.

Level C *(anomalous anthropogenic conditions):* The spectrum contains evidence of relevant radioxenon isotope(s) which is (are) either not regularly seen at the station, or is (are) regularly seen but is (are) above the normal concentration range.



CTBTO PREPARATORY COMMISSION | preparatory commission for the comprehensive nuclear-test-ban treaty organization

Manual	# IDC Database Schema – ODB

12 January 2021	IDC-ENG-MAN-102	Distr.: INTERNAL USE ONLY

Summary

This document describes the Database Schema for Seismic, Hydroacoustic, Infrasound monitoring technologies (referred as S/H/I hereinafter) along with the Database Schema for Radionuclide (referred as RN hereinafter) in use as of January 12, 2021 at the International Data Centre (IDC) in Vienna, Austria. This document specifically outlines the structure and content of database ODB.

Disclaimer

The IDC database is undergoing active improvements and changes. The database schema provided here has been generated semi-automatically and reflects the information that was available on January 12, 2021. Subject matter experts are continuing to provide feedback and updates into the IDC database and where necessary, updates are being made. This document will be updated as required.

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1. ABOUT THIS DOCUMENT

1.1. Purpose

This document describes the database schema in use as of 12 January 2021. This document presents the relationships between tables, table descriptions, and definitions of the table columns. This document does not describe the specific location and general use of these tables at the IDC or how to manipulate them to obtain information.

1.2. Scope

This document describes the S/H/I and RN schema used in the IDC databases. The schema includes relationships between tables, table descriptions, and definitions of the table columns.

This document does not describe the specific location and general use of these tables at the IDC or how to manipulate them to obtain information. In most cases it provides a recommendation for the format of each column in external file representations of the tables, however, utilities are available for exporting the table content in a variety of formats and users are free to select the most appropriate for their requirements.

This document can be generated towards several databases of the IDC, this one specifically outlines the structure and content of database ODB.

1.3. Audience

This document is intended for software engineers, scientists, processing engineers, and anyone who needs to interact with the S/H/I and RN databases at the IDC.

1.4. Related Information

This document supersedes all other documents describing the IDC S/H/I and RN Database Schema dated prior to 12 January 2021. Legacy versions of this document were labelled under the code IDC-5.1.1.

The following documents provide information and instructions for retrieving data from the IDC databases:

- Database Tutorial [IDC-5.1.2]
- Configuration of PIDC Databases [IDC-5.1.3.Rev1]

See References on page 789 for a listing of all the sources of information consulted in preparing this document.

1.5. Using this Document

This document is part of the core system documentation of the IDC. It is intended to serve as a User Guide. It provides information relevant to understanding IDC processing complementing the IDC Processing of Seismic, Hydroacoustic, and Infrasonic Data [IDC-OPS-MAN-001.Rev1] and IDC Processing of Radionuclide Data [IDC-OPS-MAN-050.Rev3] documents.

This document is organized as follows:

- **S/H/I Entity Relationship**

  This chapter provides an overview of the main S/H/I tables and describes the relationships between these tables.

- **S/H/I Objects Descriptions**

  This chapter describes each table in the S/H/I database schema (in alphabetical order). It includes information about the category to which the table belongs, the columns included in the table, Oracle storage types for each column, keys (primary, alternate, and foreign), and column brief descriptions.

  It also provides detailed descriptions of the columns of the S/H/I database schema including the tables in which the columns may be found, a full description of the column, Oracle storage type and external format, NA value, unit, and acceptable range of values.

- **Radionuclide Entity Relationships**

  This chapter provides an overview of the radionuclide database tables through an organizational description of the tables. This chapter describes the relationships between the radionuclide database tables.

- **Radionuclide Objects Descriptions**

  This chapter describes each table in the radionuclide database schema (in alphabetical order). It includes information about the columns included in the table, Oracle storage types for each column, and keys (primary, alternate, and foreign).

  It provides detailed descriptions of the columns of the radionuclide database schema including the tables in which the columns may be found, a full description of the column, Oracle storage type and external format, NA value, units, and acceptable range of values.

- **References**

  This section lists the sources cited in this document.

- **Glossary**

  This section defines the terms, abbreviations, and acronyms used in this document.

1.6. Conventions

This document uses a variety of conventions, which are described in the following tables. Table 1 shows the conventions for entity-relationship diagrams. Table 2 lists typographical conventions. Table 3 explains certain technical terms that are not part of the standard Glossary, which is located at the end of this document.

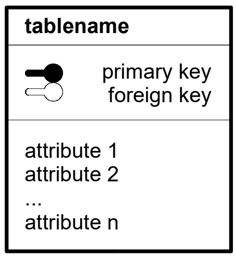
Description	**Symbol**
One A maps to one B	
One A maps to zero or one B	
One A maps to many Bs	
One A maps to zero or many Bs	
Database table	

Table 1: Entity-relationships symbols

The table name is always shown at the top of the table. Keys are shown below the table name. The primary key of a table is indicated with a filled symbol. Optional foreign keys shown by white symbol. Keys consisting of multiple columns are shown with a key symbol next to the first column of the key and the remaining columns are listed beneath with no symbols. All column names are shown below the key section in the diagrams.

Element[1]	**Font**	**Example**
• database table	UPPERCASE	DATAREADY DATAREADY.status
• database columns	lowercase	status
• processes, software units and libraries • user-defined arguments and variables used in parameter (par) files and program command lines • titles of documents	*italics*	*parsesubs* *delete-remarks object*
• computer code and output • filenames, directories and web sites • text that should be typed in *exactly* as shown • SQL code	`consolas`	`>(list 'a 'b 'c)` `ars.scm` `edit-filter-dialog`

Table 2: Typographical conventions

[1] Formatting may differ when the element is used as a section heading or it is hyperlinked.

Term	Description
field	database column
Keys: Foreign	primary key in a different table
Keys: Primary	set of database columns that uniquely define a row in a database table (unique key)

Table 3: Technical terms

Relationships between tables are usually indicated by naming the column or columns through which two tables are related. Table 4 explains the syntax used. In many cases the column names that must be compared in the two tables are not identical, or a column value in one table must be compared to more than one column value in another table. The delimiters in the syntax are the dash (-) and the slash (/). A dash (-) separates groups of column names from the two tables, and slashes (/) separate the columns that comprise the composite key. Other symbols, such as equal (=), vertical bar (|), ampersand (&), and brackets, specify how the columns are compared. Expressions within brackets in relationships between tables are evaluated first. The order of operations is: =, |, and &.

Syntax	Definition
col	This is the simplest case where the column names (col) of the keys in the tables at each end of the relationship are the same. Both keys consist of a single column.
col1/col2	A slash (/) is used when a key is comprised of multiple columns. Here, the keys in both tables are the same and consist of two columns, col1 and col2.
col1-col2	A dash (-) is used when the column names of the keys in the two tables are not the same. Col1 is the name of the key column in one table. Col2 is the name of the key column in the other table. Each key consists of a single column. Only one dash may be used, and the dash separates the keys of the two tables. A dash can be combined with slash (/) to show that the keys consist of multiple columns and that one or more of the columns have different names in the two tables as in col1/col2-col3/col4 (both parts of the key are different in the two tables), or col1/col2-col1/col3 (only the second part of the key is different in the two tables).
col1-col2/col3=value	An equals sign (=) is used when a component of a key must be set to a particular value. Here col1 is the name of the key column in one table. Col2 and col3 are the names of the key columns in the other table, and col3 must be set to the shown value. See the arid-tagid/tagname=arid relationship between ARRIVAL and WFTAG and orid-tagid/tagname=orid relationship between ORIGIN and WFTAG.
col1-col2 | col3	A vertical line (|) is used to show that the key in a table could be one of a set of columns. This is different from a key that consists of multiple columns. Here col1 corresponds to either col2 or col3. See the magid-mbid|msid|mlid relationship between NETMAG and ORIGIN.

Syntax	Definition
col1-col2 & col3	An ampersand (&) is used to show that a key in one table must have a value between the values of two keys in another table. Here the value of col1 must be between the values of col2 and col3. See the sta/chan/ time-sta/chan/time&endtime relationship between WFDISC and SENSOR.
col1-col2 & col3	An ampersand (&) is used to show that a key in one table must have a value between the values of two keys in another table. Here the value of col1 must be between the values of col2 and col3. See the sta/chan/ time-sta/chan/time&endtime relationship between WFDISC and SENSOR.
(col1)-(col2)	Brackets () are used to show that the keys within them have different formats and a conversion must be made to make the comparison. Here col1 corresponds to col2, but col1 and col2 have different storage formats (usually an epoch time versus a date). See the sta/chan/(time)-sta/chan/(ondate&offdate) relationship between SITECHAN and SITEAUX.

Table 4: Syntax Used to Indicate Database Table Relationships

The relationship shown in Figure 1, with TABLE1 columns on the left and TABLE2 columns on the right, demonstrates the possible relationships between the columns of two different tables. The syntax of Table 4 is used to interpret the relationships between the columns of TABLE1 and TABLE2 in Figure 1. col8 in TABLE2 has no matching column in TABLE1 and must be equal to value in this relationship. All other columns have one or more corresponding columns in the other table. Following the syntax, col1 in TABLE1 must have the same value as col1 in TABLE2, col2 in TABLE1 must have a value between col4 and col5 in TABLE2, and col3 in TABLE1 must match either col6 or col7 in TABLE2 for the one-to-many relationship indicated by the entity-relationship symbol (Table 1) to be true.

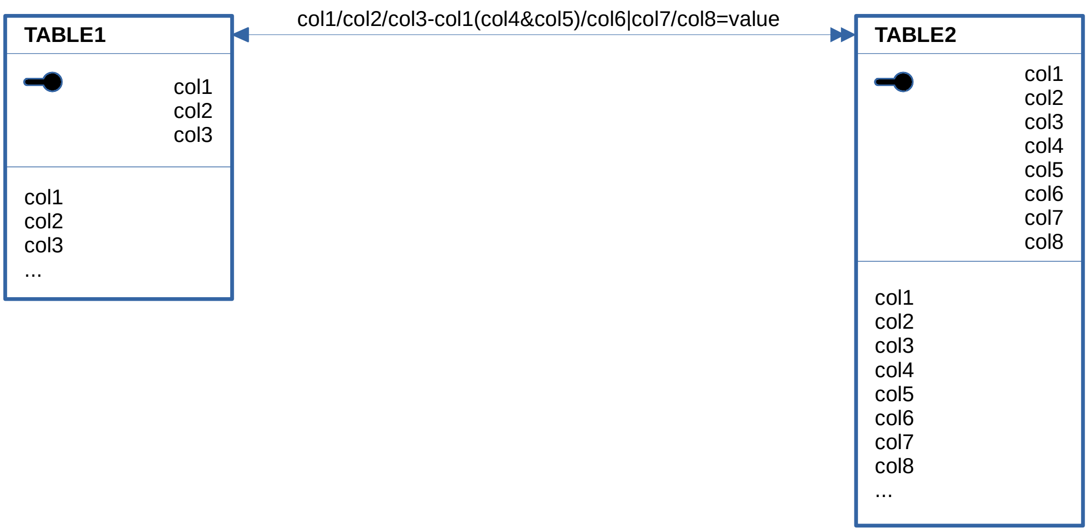


Figure 1: Sample entity relationship

1.7. Dates and Times

The time column used throughout the S/H/I schema is stored as epochal time, the number of seconds since January 1, 1970. Epochal time conventionally has a precision of one second, but, in the context of the IDC Database Schema, this is extended to a precision of one millisecond. Often time is matched by the more readable field, jdate. This “Julian date” represents a day in the form yyyyddd; for example, 1981231 where 1981 is the year (yyyy) and 231 is the day of year (ddd); this is not to be confused with the more conventional use of Julian dates in Astronomy, for example.

1.8. Oracle Data Types

The IDC database uses five of the available Oracle data types:

- **char**

  This fixed data format is only used for a very limited number of character-based columns in the S/H/I schema.

- **varchar2(n)**

  Almost all character data in the database are defined to be varchar2(n) where n is the maximum number of characters in the string. varchar2 does not store trailing blanks.

- **number(n)**

  All integer fields in the database are defined to be number(n) where n is the maximum number of digits allowed in the field. Number may also be used without specifying the maximum number of digits.

- **float(n)**

  Oracle supports the float(n) data type where n is the maximum number of binary digits. Float allows the approximation of single and double precision floats commonly used in scientific programming. The decimal point may be specified anywhere from the first to the last digit (or not at all). Most real numbers in the database are single precision float(24), except for fields such as time, endtime, and other time fields that are double precision float(53).

- **date**

  The only columns in the database that are declared to be the Oracle date data type are the lddate, moddate, last_mig_date, offdate, ondate, and initialdate columns, which store the day and time a record was inserted into the database or last modified.

2. S/H/I ENTITY RELATIONSHIPS

2.1. Overview

This chapter contains entity-relationship diagrams (ERDs) that show the relationships between database tables for the IDC S/H/I database schema following conventions described in section 1.6.

2.2. Table Categories

The database tables of the schema are grouped into natural categories. The first category contains the fundamental tables used with S/H/I data. These tables are used by many applications and are frequently updated. The fundamental tables contain a smaller set called the core tables. The core tables, which have remained essentially unchanged for many years, have been widely adopted by other seismological organizations, and therefore their definitions are virtually immutable. The relationships between the fundamental tables are shown in Figures 2 through 7.

Figures 8, 9 and 10 show the relationships between tables in the second category, referential tables for S/H/I data. These tables are read by many applications, but seldom if ever are the contents altered – they are considered to be “static”. Most of the data in these tables pertain to International Monitoring System (IMS) stations and seismic networks.

Relationships between tables used by only a few application programs are shown in additional figures. These are further grouped according to the software configuration items of the software architecture. Figures 11 and 12 have tables associated with automatic processing; Figures 13 and 14 have tables associated with interactive processing; and Figure 15 has tables associated with management of distributed processes. Figures 18 through 20 are related to the data services software; Figures 21 and 22 are used by system monitoring software; Figure 23 shows tables that facilitate use of the database.

2.3. Fundamental Tables

The fundamental tables have been part of seismic processing at the IDC from its inception. They hold data characterizing time-series signals as well as the collections of signals that are associated with a particular origin or event.

Figure 2 summarizes the fundamental tables. In this figure, only the table names and keys are shown. Those tables that are part of the core set are labeled 3.0 core and 3.1 core, indicating previous versions of the CSS schema (see Anderson 1990, Swanger 1991, Swanger 1993). Figure 3 shows the tables that have data related to signal arrivals and the association of arrivals to origins and events. Additional data about signal arrivals are recorded in the tables shown in Figure 4, and Figure 6 shows tables holding data about source size.

Tables holding data used for event characterization are shown in Figure 7. Finally, Figure 8 shows the relationships of tables that have information about the time-series data, which are themselves saved in conventional files.

2.3.1. Summary of Tables and Keys

Fundamental tables related to stored time series, detected signals, and relationships between signals and events are shown in Figure 2. This summary provides the table names, keys, and relationships, but each table is presented in its entirety in a subsequent figure.

Data from the IMS stations (WFDISC) are processed for detections (DETECTION) from which arrivals and signal characteristics are extracted (AMPLITUDE, ARRIVAL, STASSOC). The signals are used to infer event locations (ASSOC, EVENT, NETMAG, ORIGERR, ORIGIN, PARRIVAL, STAMAG).

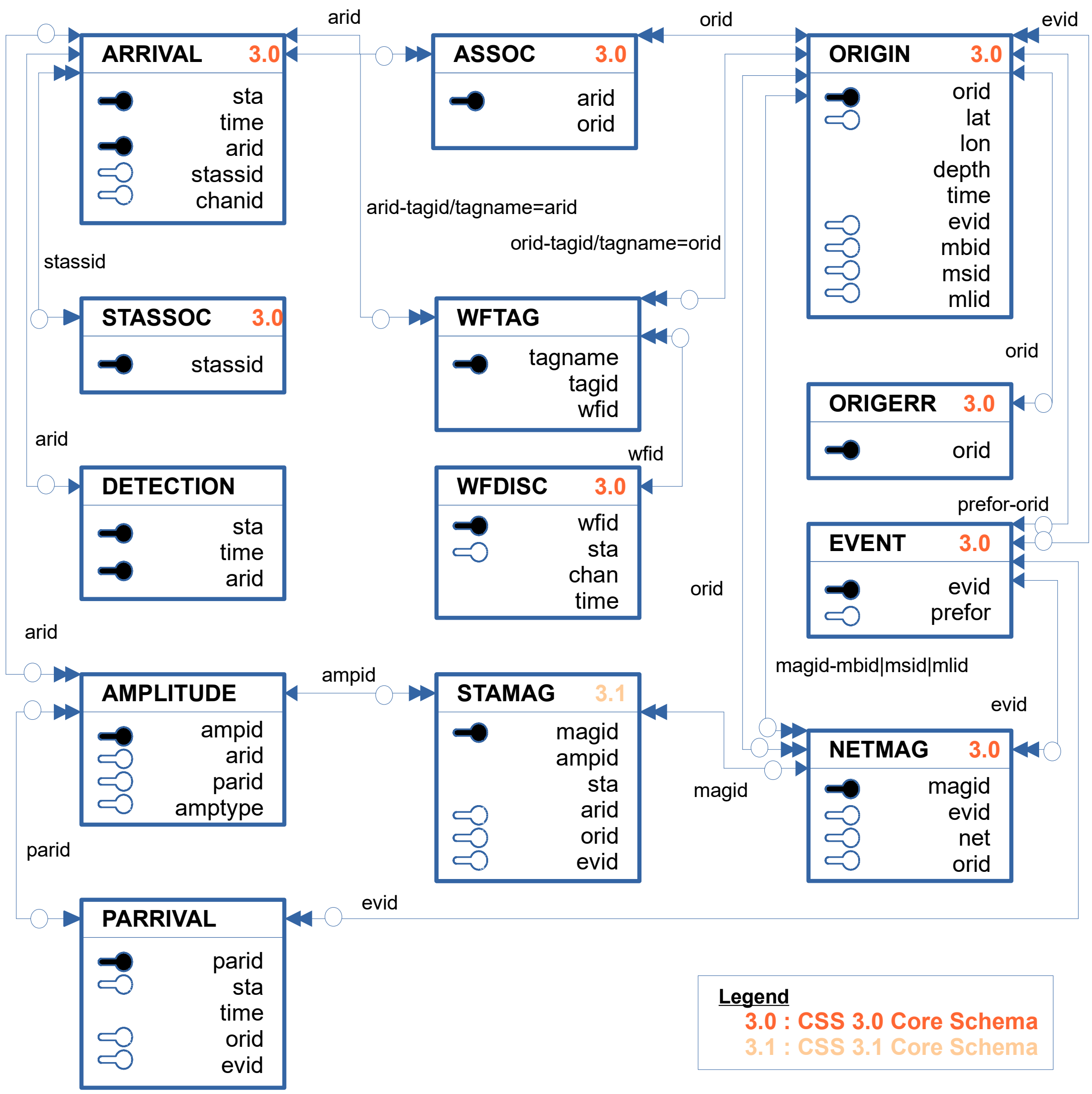


Figure 2: Overview of the fundamental SHI tables

2.3.2. Events

Figure 2 shows tables involved in forming origin hypotheses and events. Each table is part of the core set. Tables with information about event arrivals, location, origin time, and error are included. During automated processing, groups of arrivals from several stations are associated with presumed events. The initial origin estimate for an individual station is contained in the STASSOC table, which is related to the ARRIVAL table through stassid. Specific arrivals listed in the ARRIVAL table are associated with origins in the ORIGIN table through the ASSOC table. An event may have several different origins, each of which is a different estimate. The preferred origin is indicated in the EVENT table.

2.3.3. Measurements

The tables shown in Figure 3, 4, and 5 contain additional data about seismic and hydroacoustic signals and the magnitudes, locations, and characteristics of events. Most tables in this category lie outside the core set and are used by a smaller number of applications. Figure 4 shows tables that have detailed data about arrivals. Figure 5 shows tables related to the location, origin time, and size of an event.

The event characterization tables in Figure 6 include SPVAR, COMPLEXITY, SPLP, THIRDMOM, TIMEFREQ, and CEPPKS. The SPVAR table contains arrival-based information and is related to the ARRIVAL table through arid. The other tables contain origin-based measurements and are related to ORIGIN through orid.

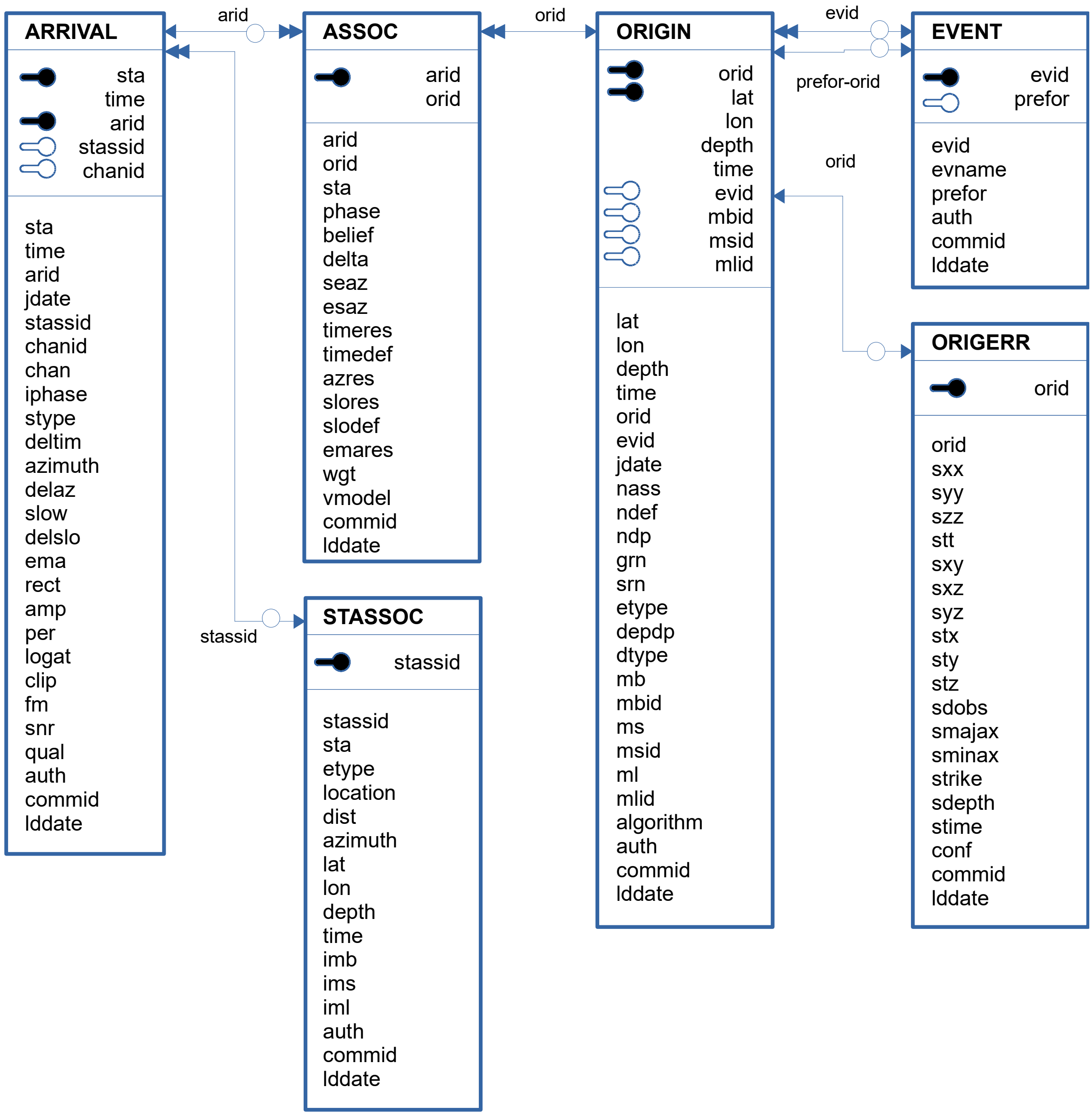


Figure 3: Event table relationships

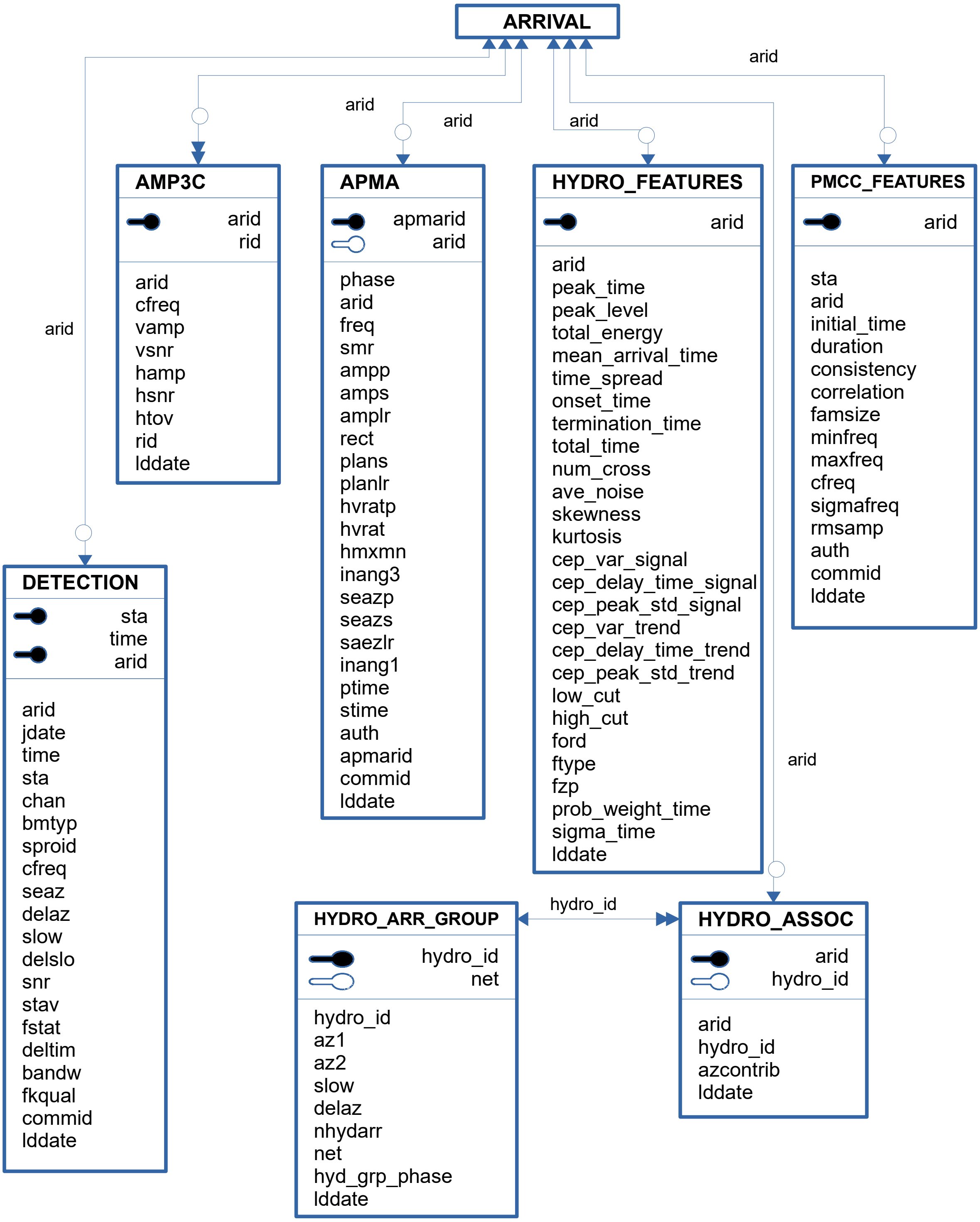


Figure 4: Detail tables related to the ARRIVAL table

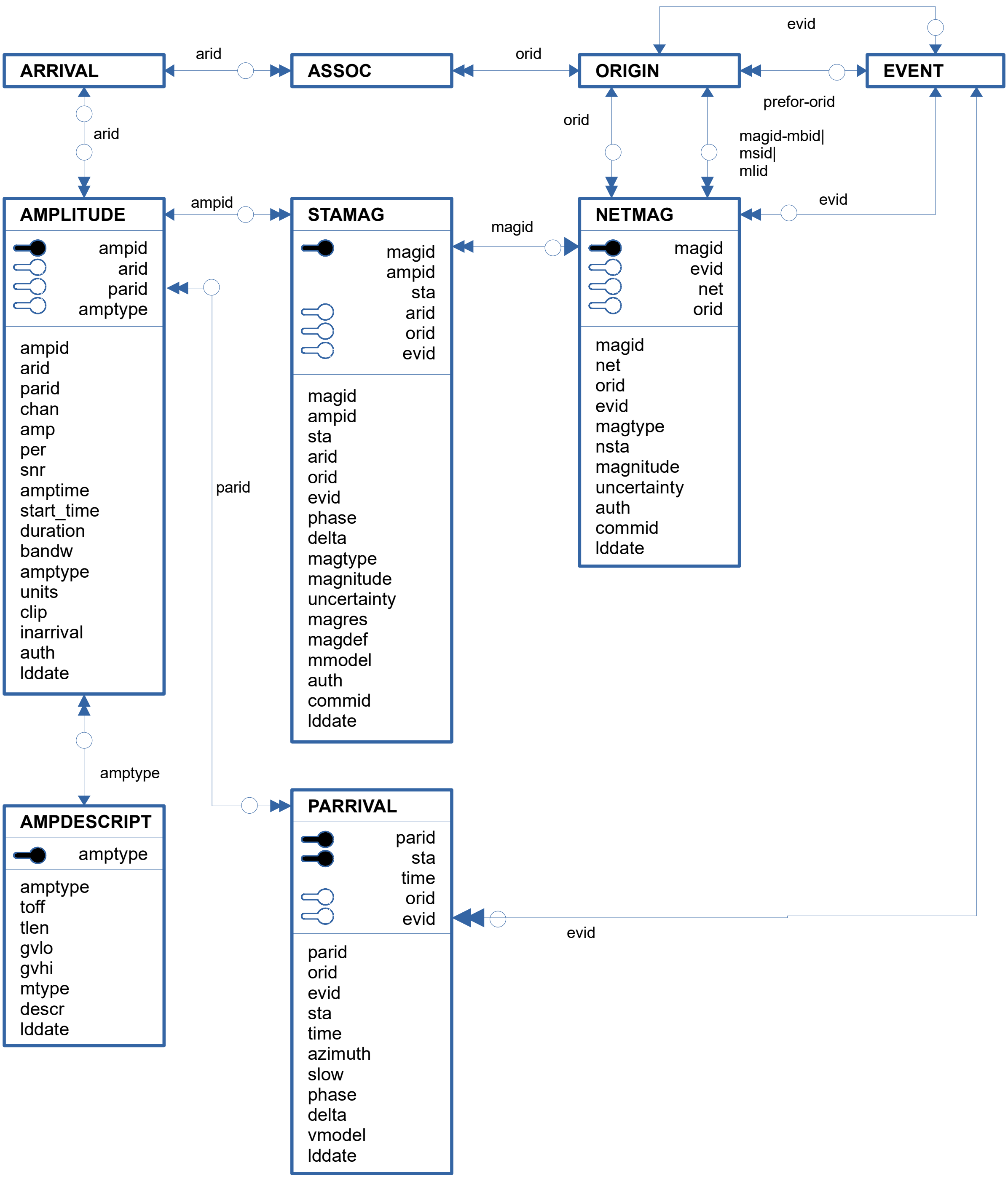


Figure 5: Measurement table relationships

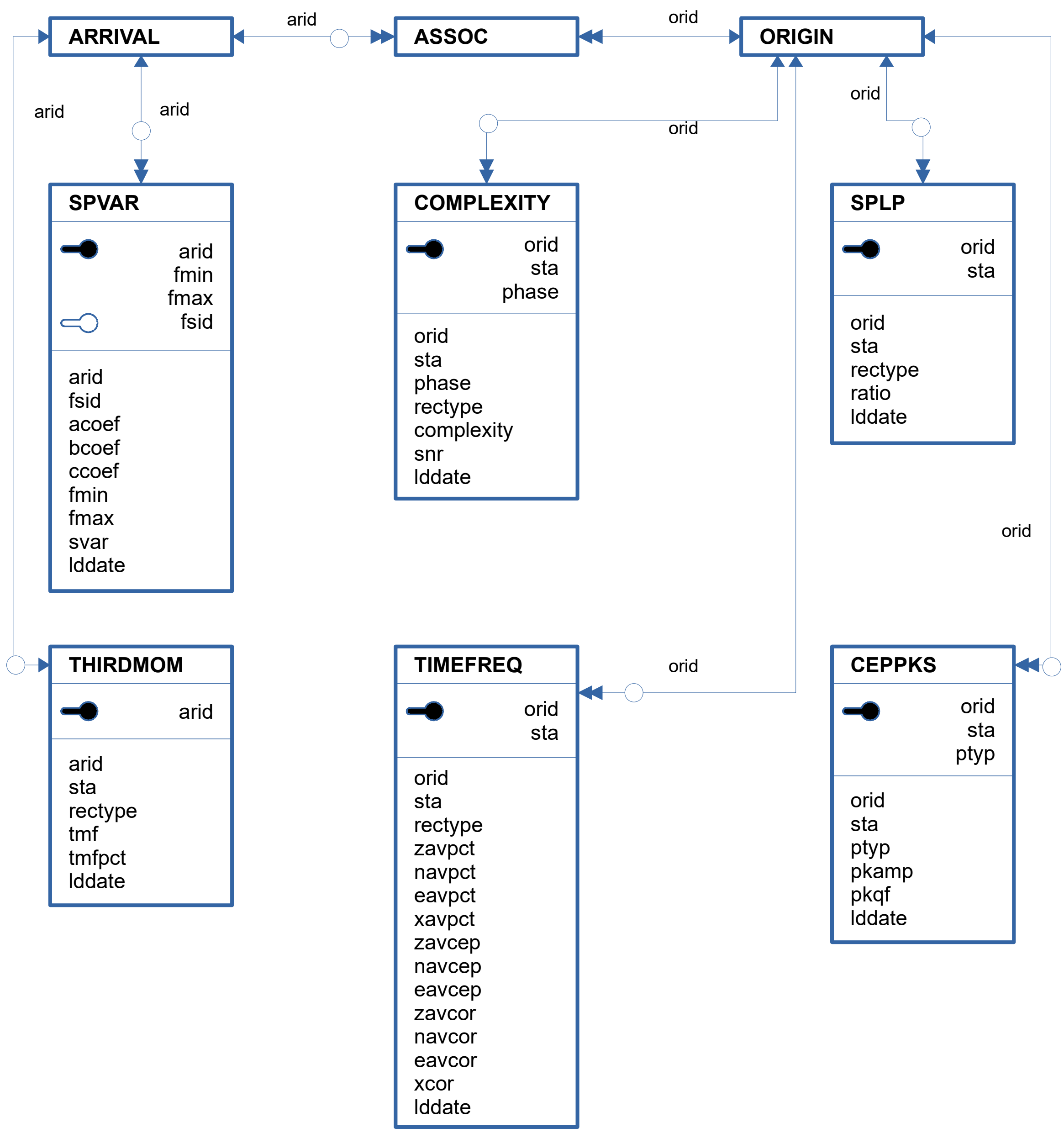


Figure 6: Event characterization table relationships

2.3.4. Waveforms

The waveform tables include WFDISC and WFTAG (see Figure 7). The WFDISC table is related to most other tables through the WFTAG table. However, sta, chan, and time are more frequently used to link the ARRIVAL and WFDISC tables directly.

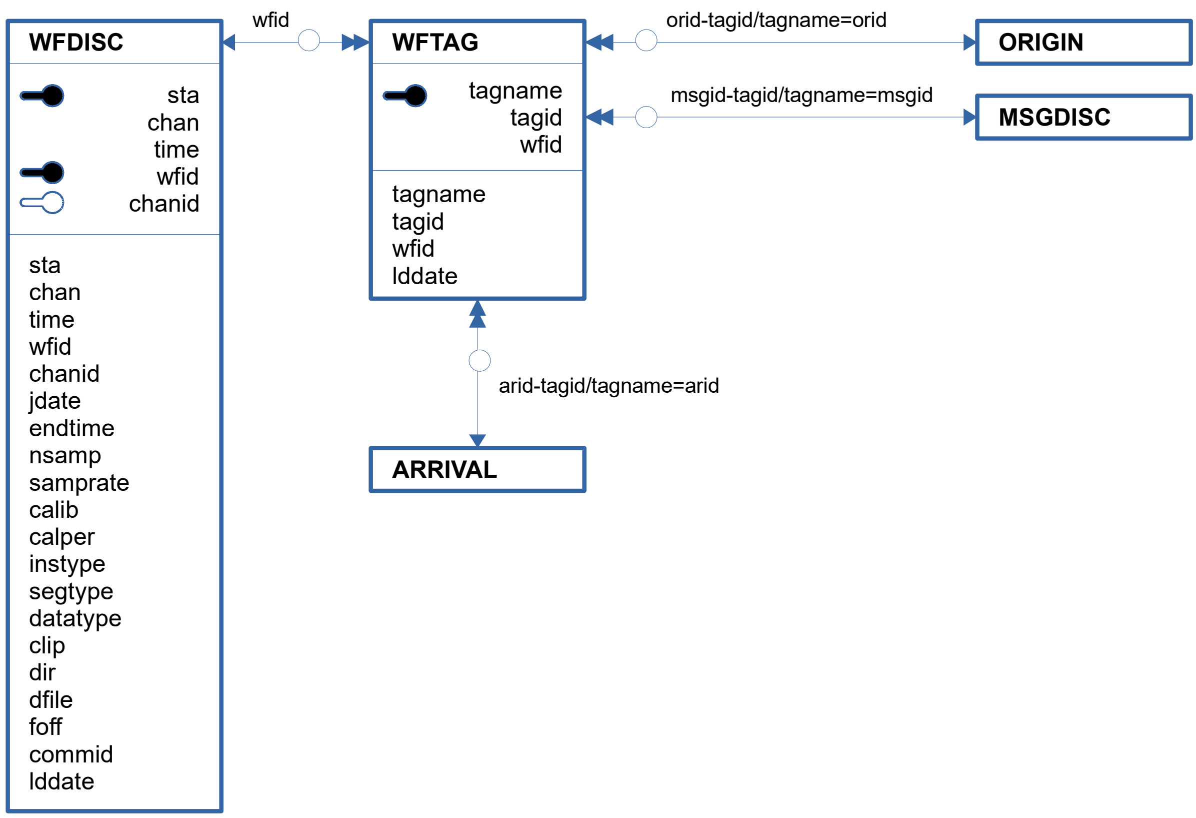


Figure 7: Waveform table relationships

2.4. Reference Tables

The reference tables are relatively static and primarily contain look-up information. Figure 8 is an overview of the tables in this category. As with Figure 2, no column names are provided, and tables in the core set are noted. Tables shown by name only are core tables that were previously shown in Figure 2.

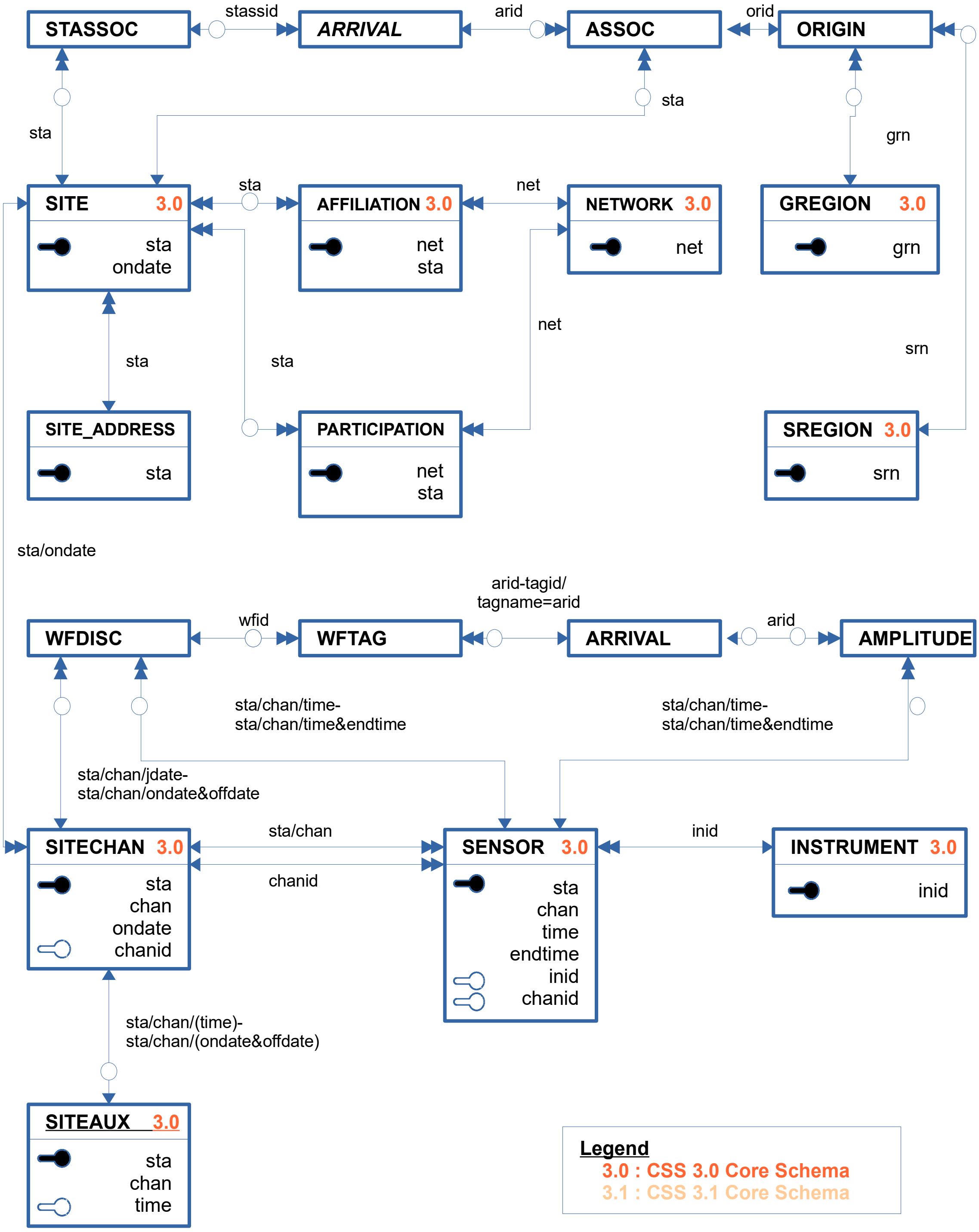


Figure 8: Referential core table relationships

2.4.1. Network

Figure 9 shows tables related to networks, which are collections of stations across wide geographic areas. Network tables include information on the names of the networks, the stations included in them, the participation of the stations in the network, and geographic and seismic region information.

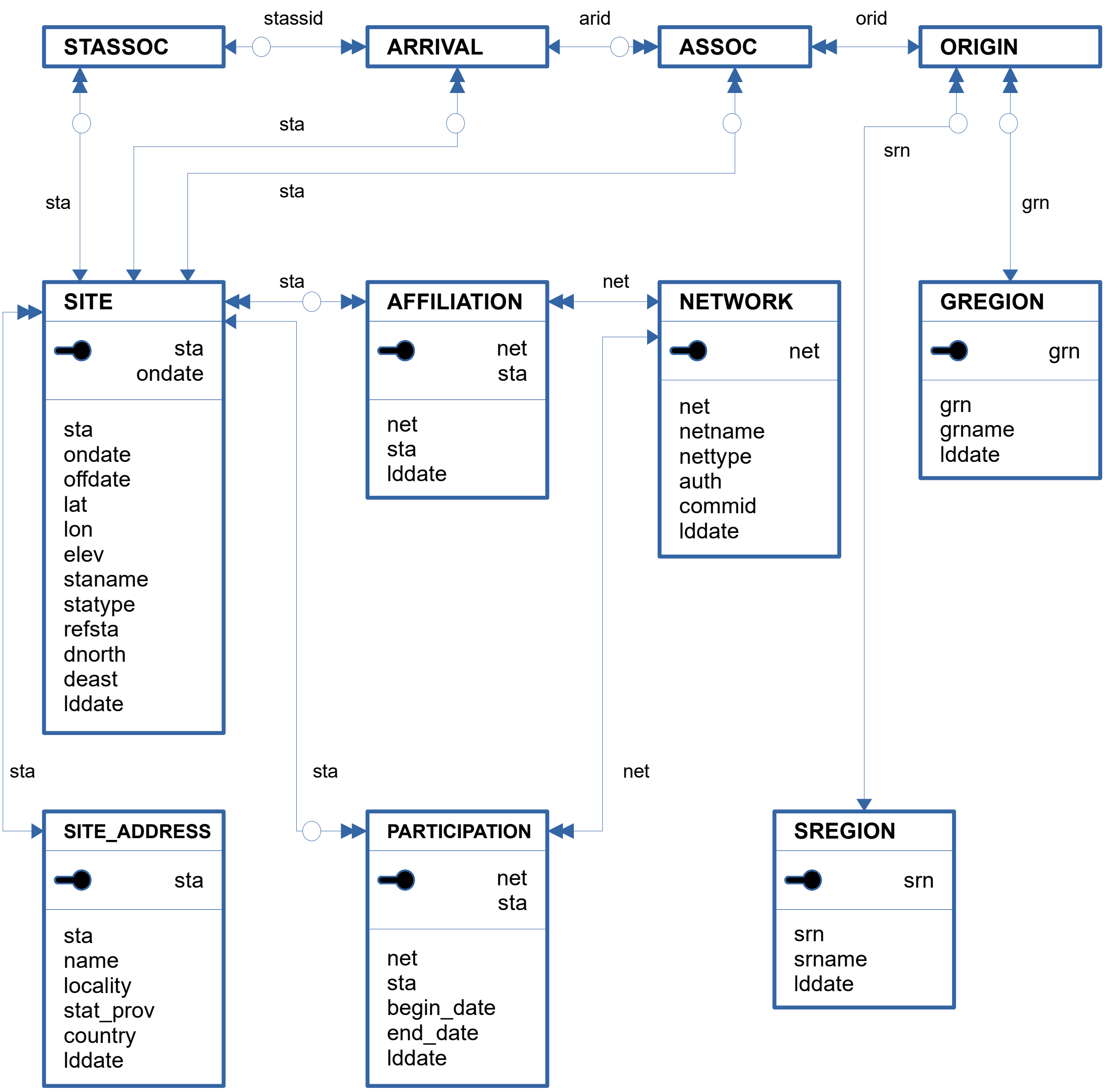


Figure 9: Network table relationships

2.4.2. Channel

Figure 10 shows tables that contain specific information about the data channels of the IMS stations. Instrument response information is identified in the INSTRUMENT table. The

SENSOR table is linked to it through inid and from there to WFDISC and AMPLITUDE through sta/chan/time. General data characteristics for any data channel are in SITEAUX.

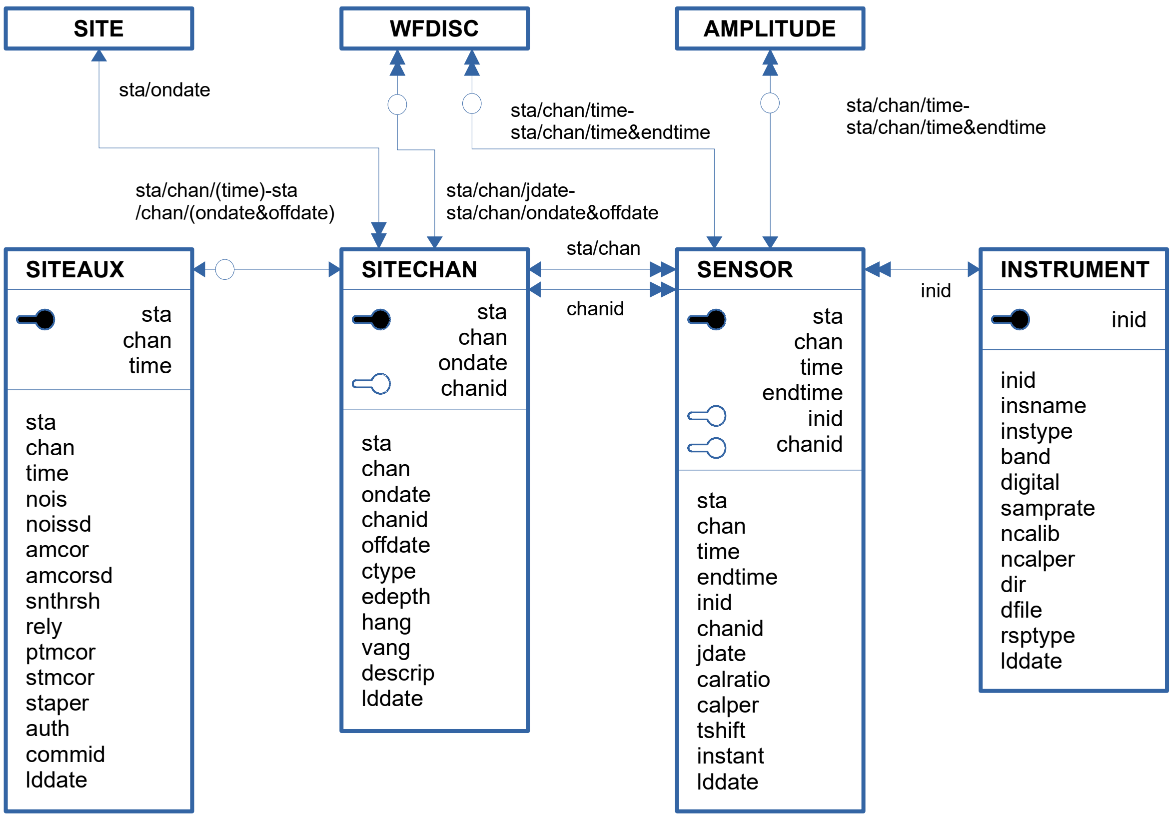


Figure 10: Channel table relationships

2.5. S/H/I Application Software Tables

The tables shown in this section are used by fewer applications than those previously described. The tables are organized by computer software configuration items (CSCIs).

2.5.1. Automatic Processing

The EVENT_CONTROL table is used by the event location and magnitude programs to preserve the values of key parameters that analysts set while reviewing the bulletin (see Figure 11), and it is also used in post-analysis processing. The SEISGRID and SEISINDEX hold historical seismicity data. The tables are also used by event quality control software.

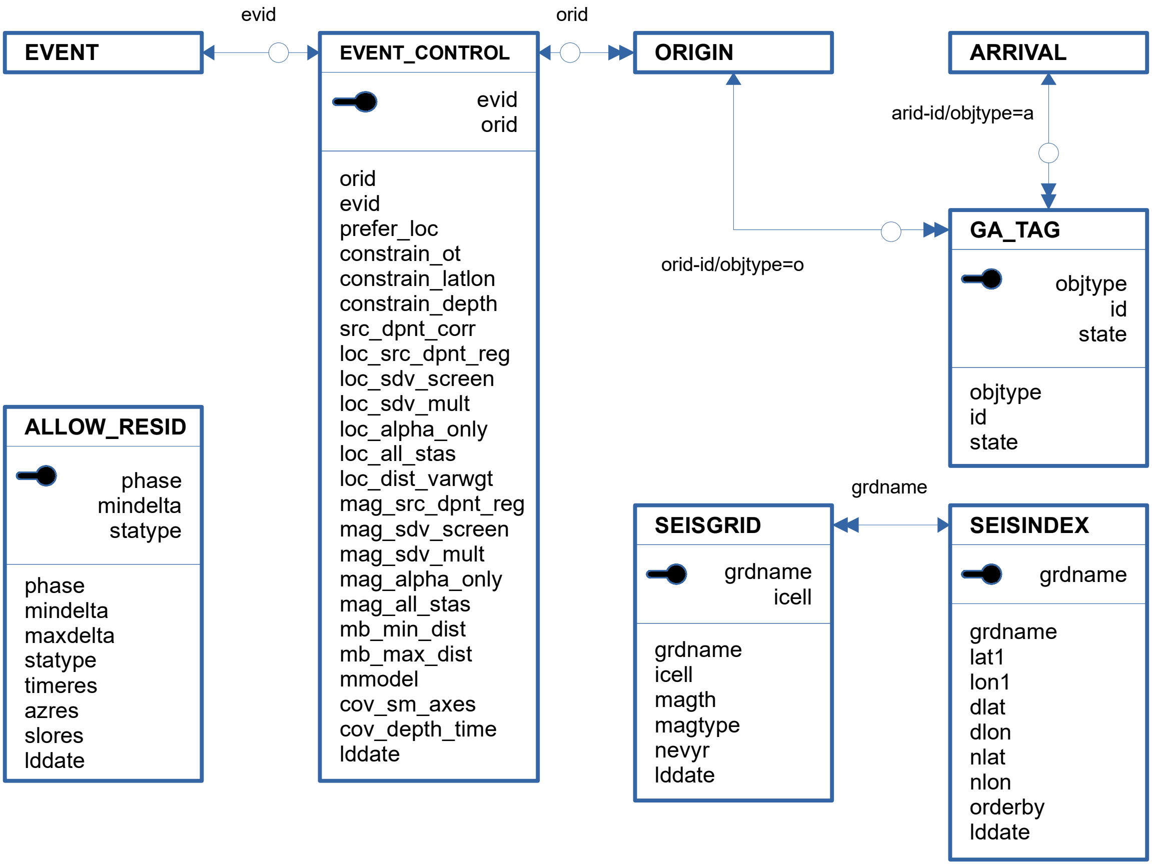


Figure 11: Relationships of tables used in automatic processing

Event Screening Subsystem uses the tables shown in Figure 12.

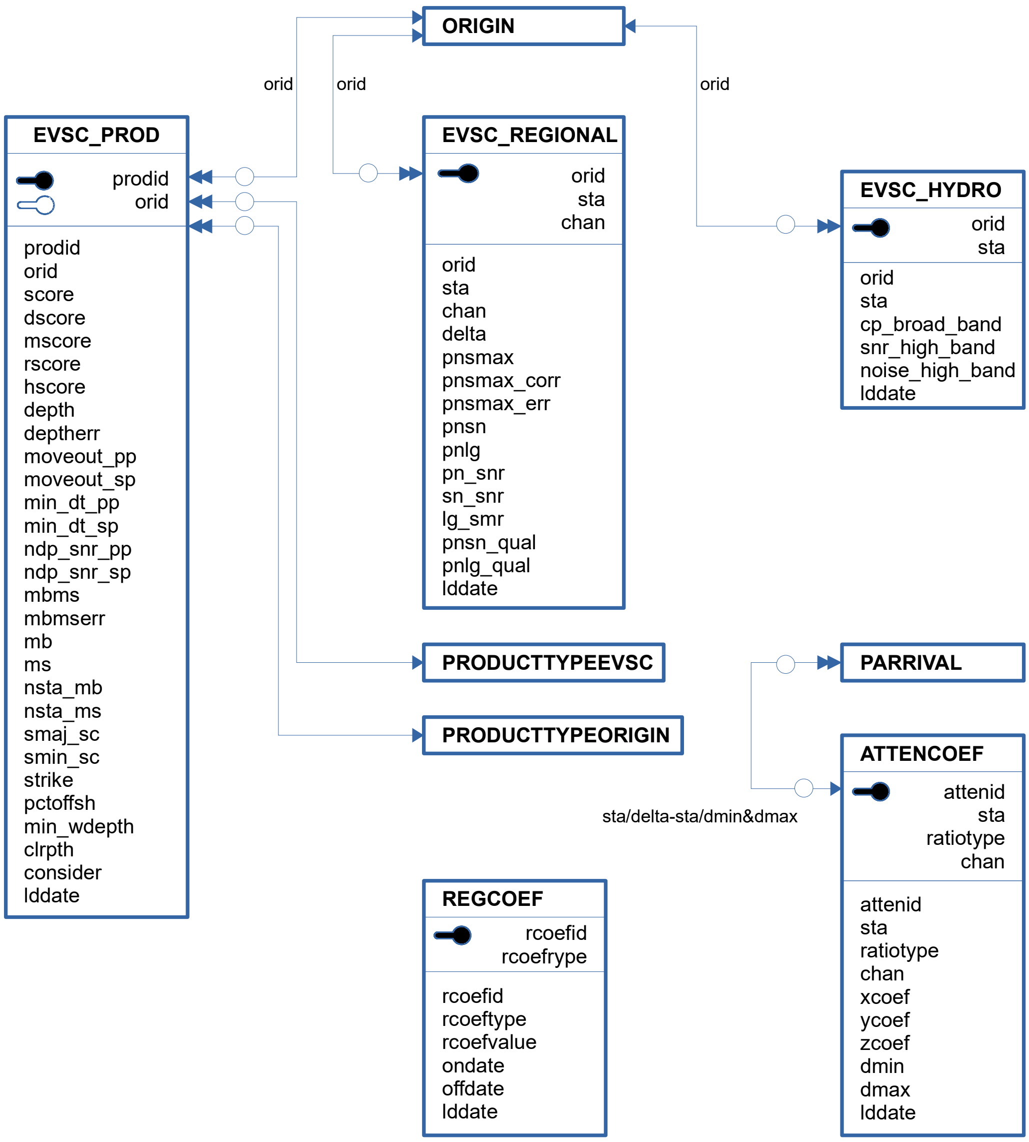


Figure 12: Event screening table relationships

2.5.2. *Interactive Processing*

The tables in this group support the work of S/H/I data analysts, but they are not linked to any of the core tables. Figure 13 shows tables involved in scheduling the work of analysts and recording progress. Figure 14 shows tables for the *Map* application. The tables have information about the base maps, as well as overlays and colours. Interactive analysis frequently includes calculation of frequency spectra and frequency-wave number spectra.

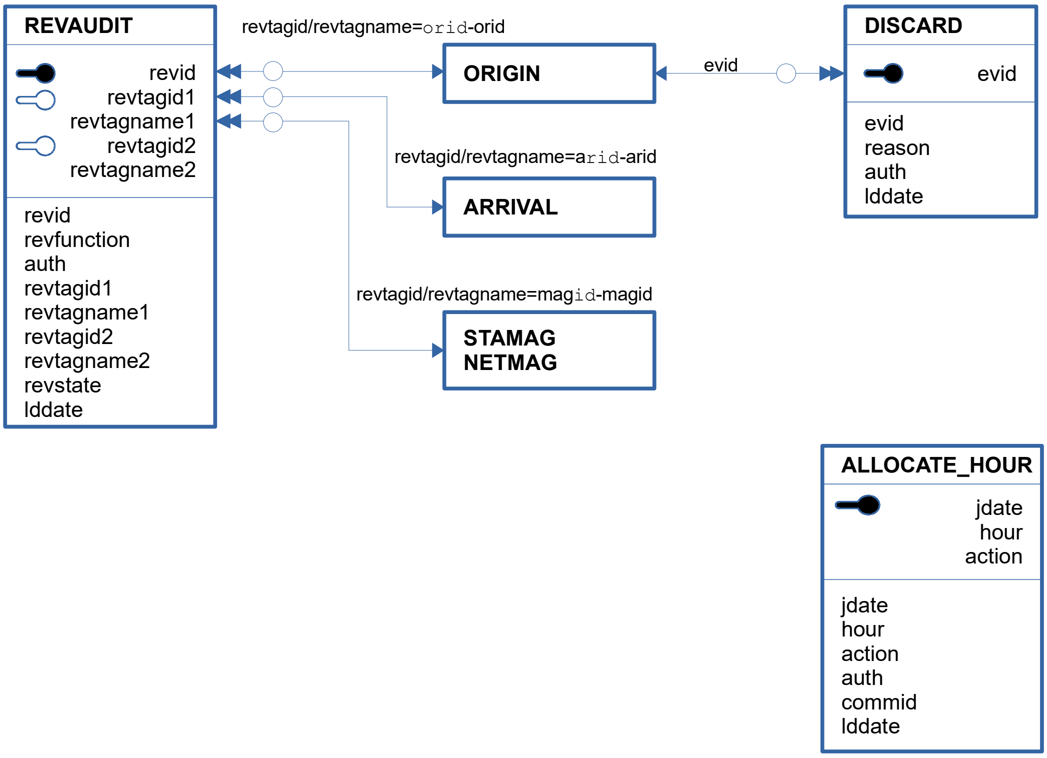


Figure 13: Tables involved in Analyst Review of Time-series Data

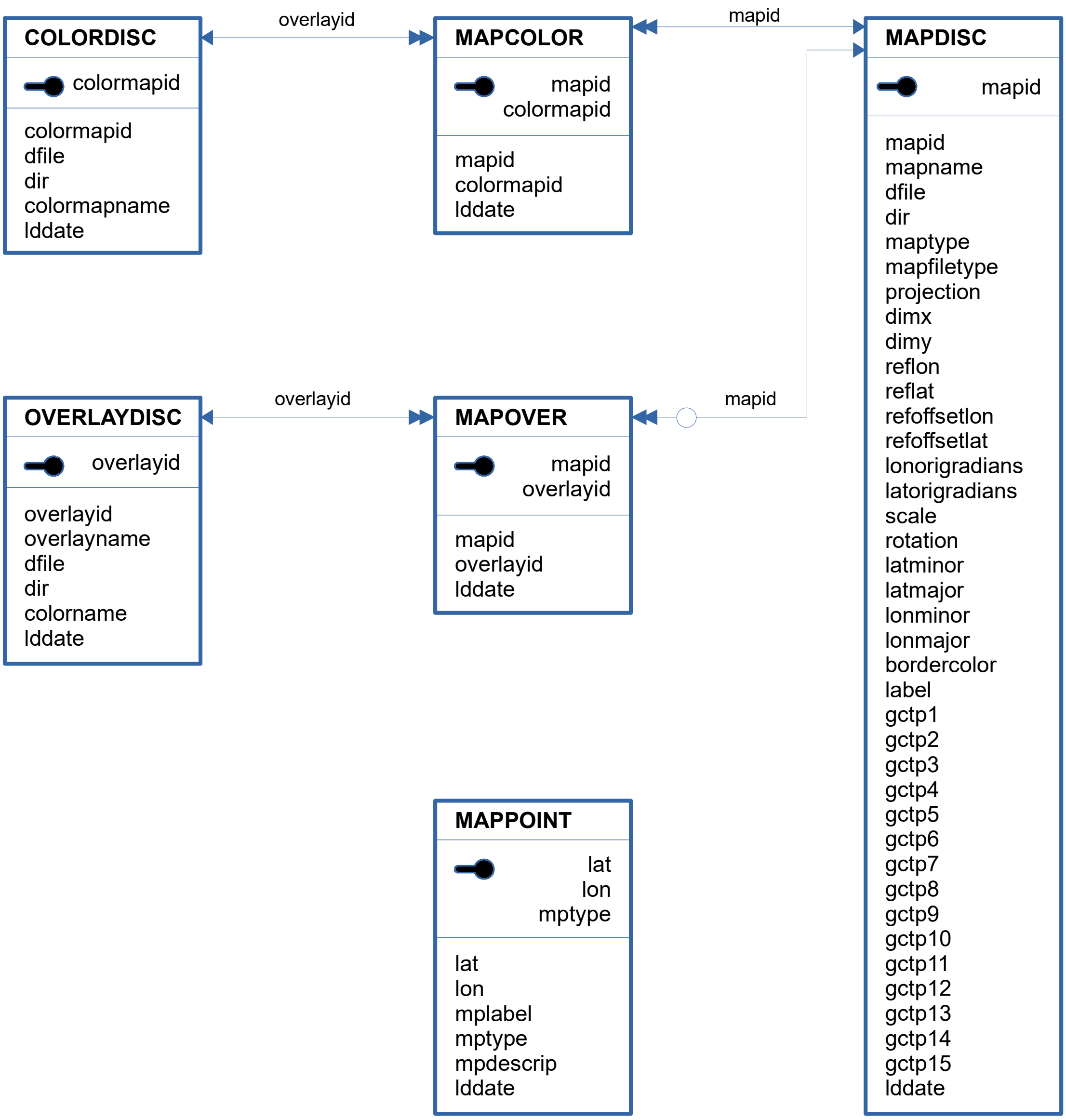


Figure 14: Map table relationships

2.5.3. *Distributed Processing*

The Distributed Processing ("DACS") CSCI has software that manages jobs and orchestrates the workflow [IDC-SPC-ENG-401.Rev0]. The INTERVAL and TIMESTAMP tables (shown in Figure 15) are used by this software as well as by some of the data services applications.

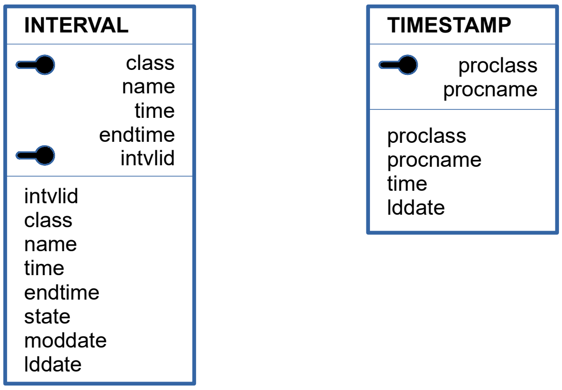


Figure 15: Tables used by distributed processing applications

2.5.4. *Data Services*

The Data Services CSCI has software to receive and forward time-series data received in Continuous Data (CD) Protocol (see CD Tools User Guide, IDC-ENG-SPC-100.Rev.1, IDC-ENG-SPC-101.Rev.3). CD Tools is a software system that contains a number of components (or tools), which can interact with continuous seismoacoustic data from IMS stations (or from any entity forwarding data in CD-1.0 or CD-1.1 format). Tools are available for receiving, storing, parsing, sending, archiving, and reporting.

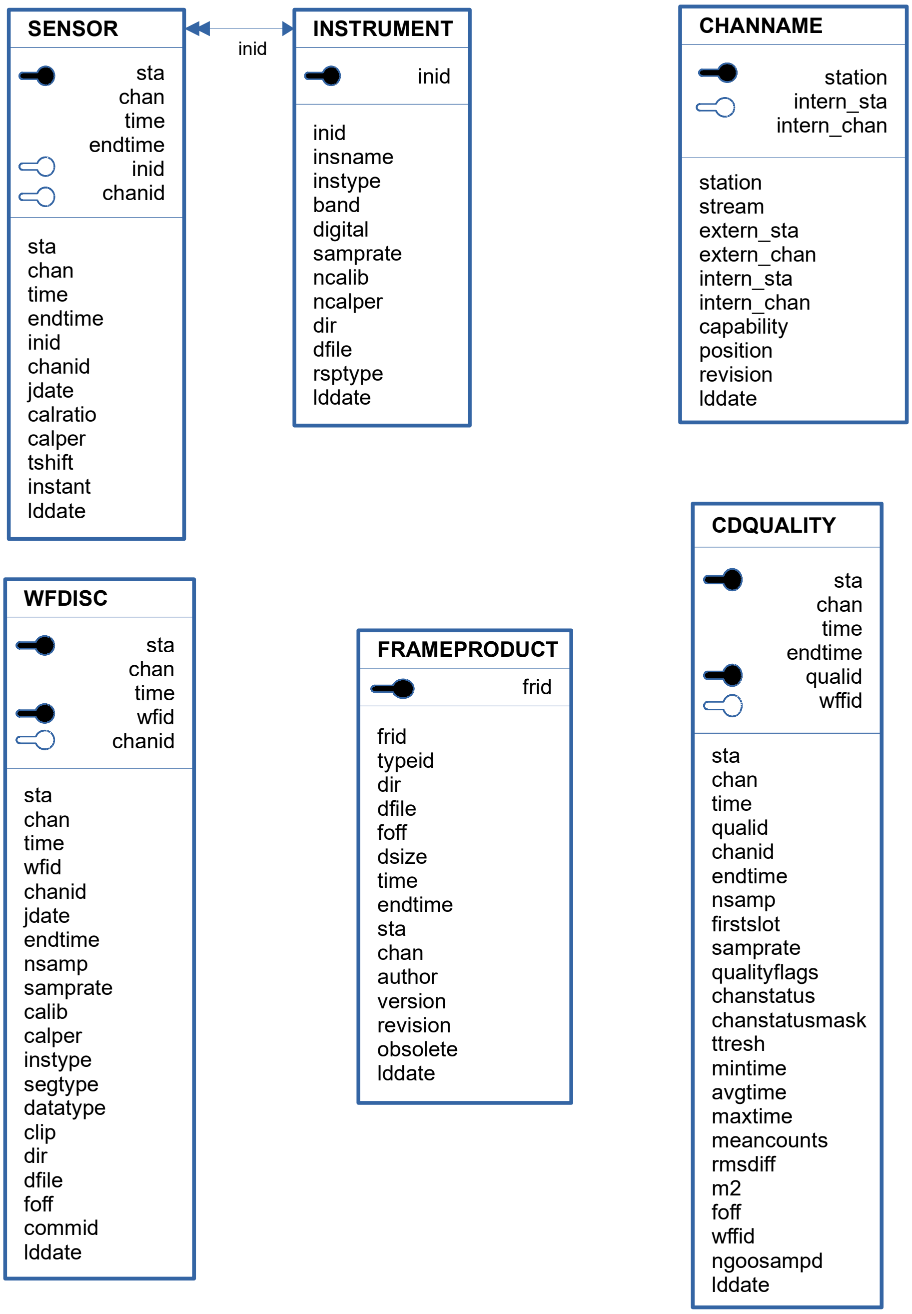


Figure 16: Continuous Data Subsystem table relationships

Figure 17 shows relationships between tables of the Message Subsystem. These tables are used by the Verification Data Messaging System (*VDMS*) and applications requesting seismic data from stations in the auxiliary network.

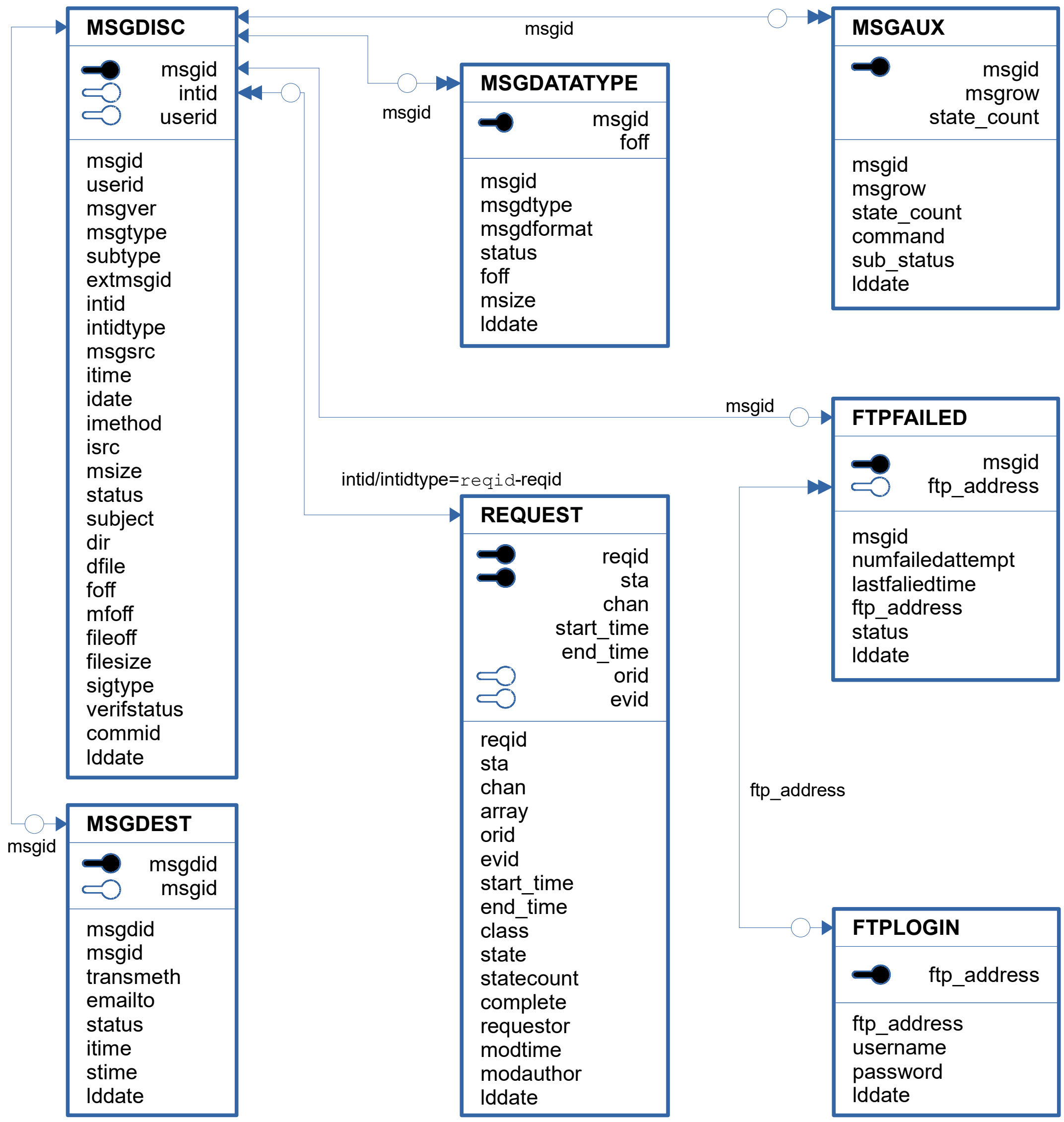


Figure 17: Message Subsystem table relationships

Figure 18 shows tables used by the Subscription Subsystem, which notes when products are ready, maintains subscriptions, and tracks subscription processing.

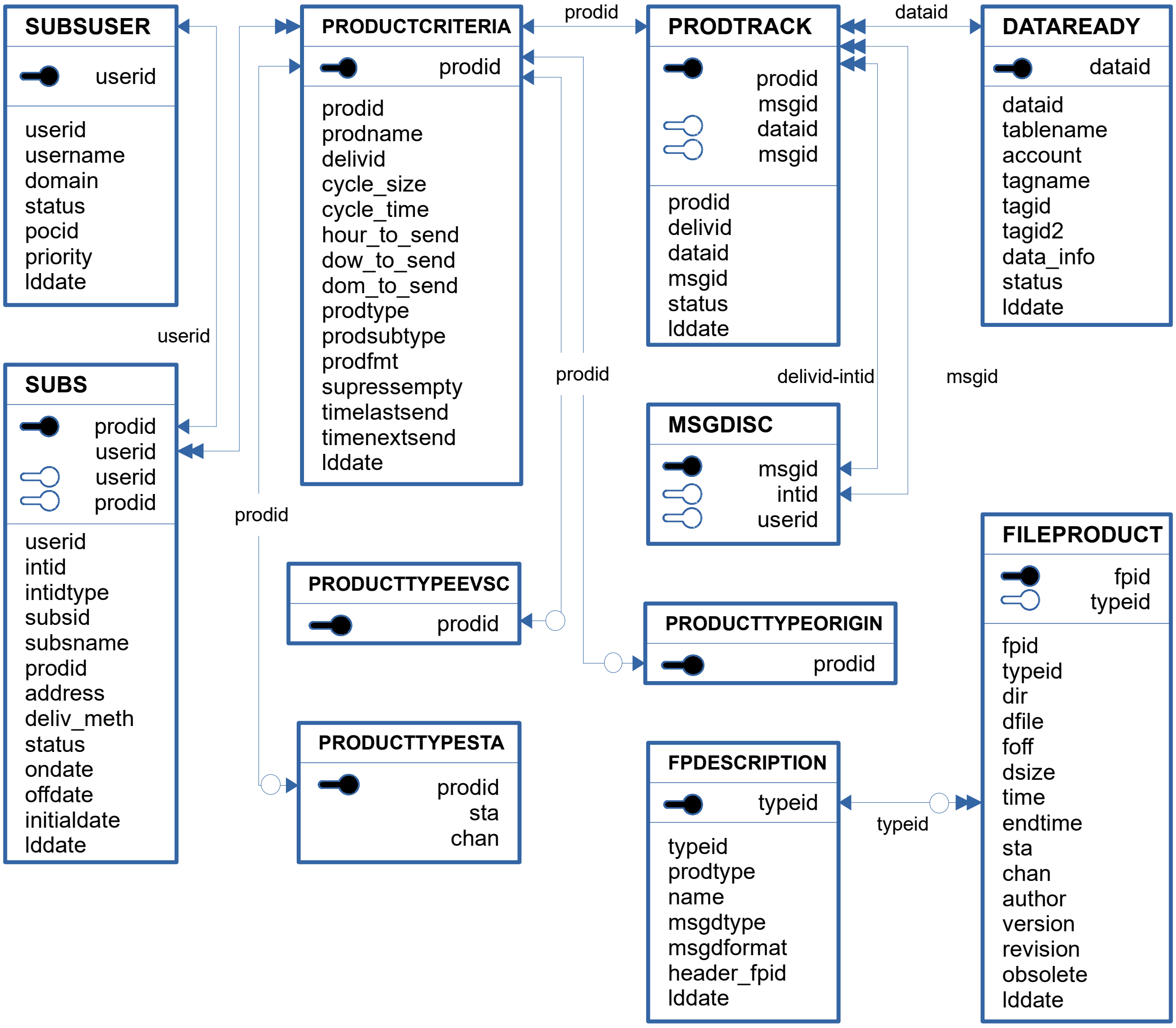


Figure 18: Subscription Subsystem table relationships

The DATAUSER table supports both the Message and Subscription Subsystems.

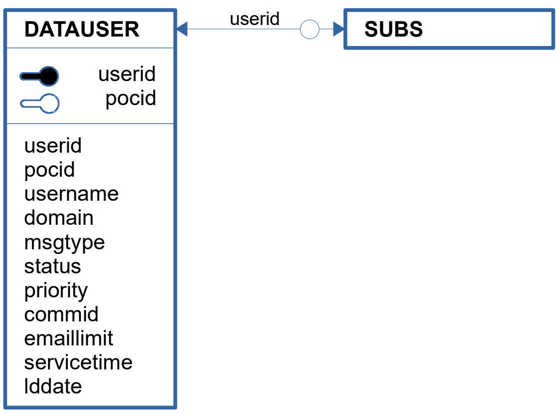


Figure 19: Message and Subscription Subsystem support tables

The tables of the data archiving subsystem contain information used by the software subsystems that migrate database tables between databases and that migrate time-series data to the mass-storage device (see Figure 20).

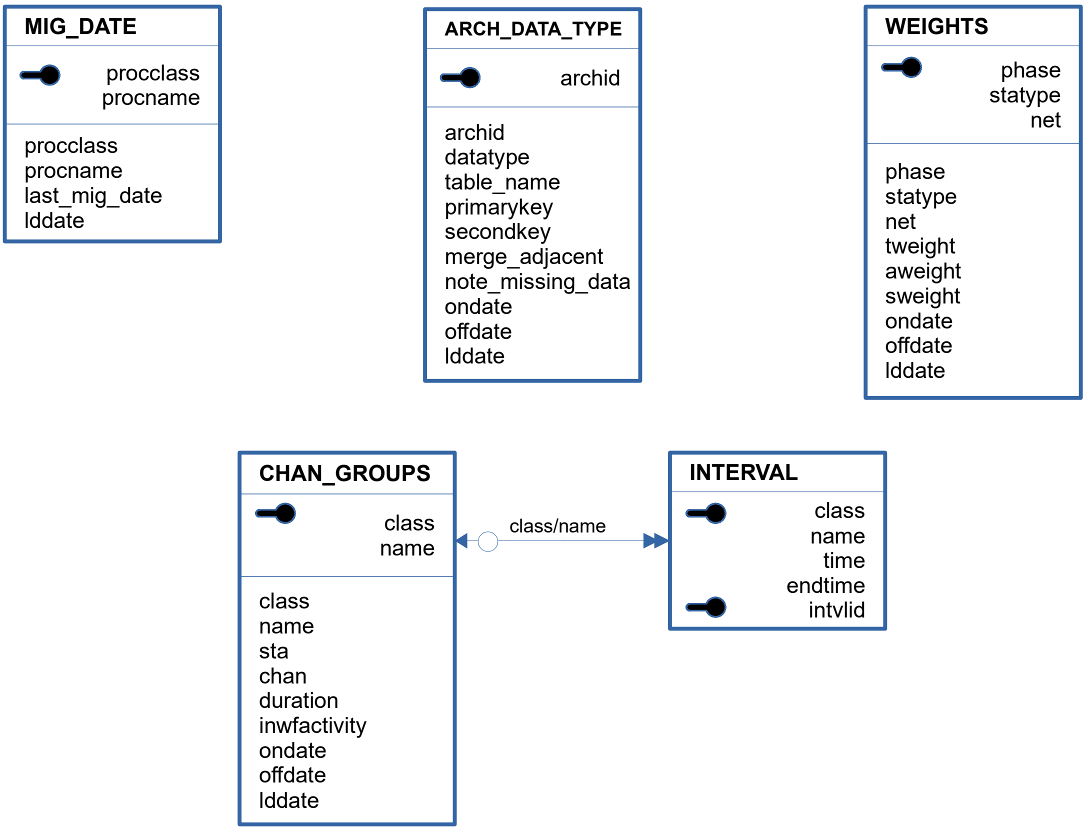


Figure 20: Data archiving subsystem tables

2.5.5. System and Performance Monitoring

The tables of the System Monitoring CSCI track the state of the hardware and software as well as the quality of the scientific results. *Xlogger* is used to record problems discovered in the system. The SITEPOLL table is a list of auxiliary seismic stations and channels that are regularly "polled" to determine their availability. System and performance monitoring applications tables are displayed in Figure 21.

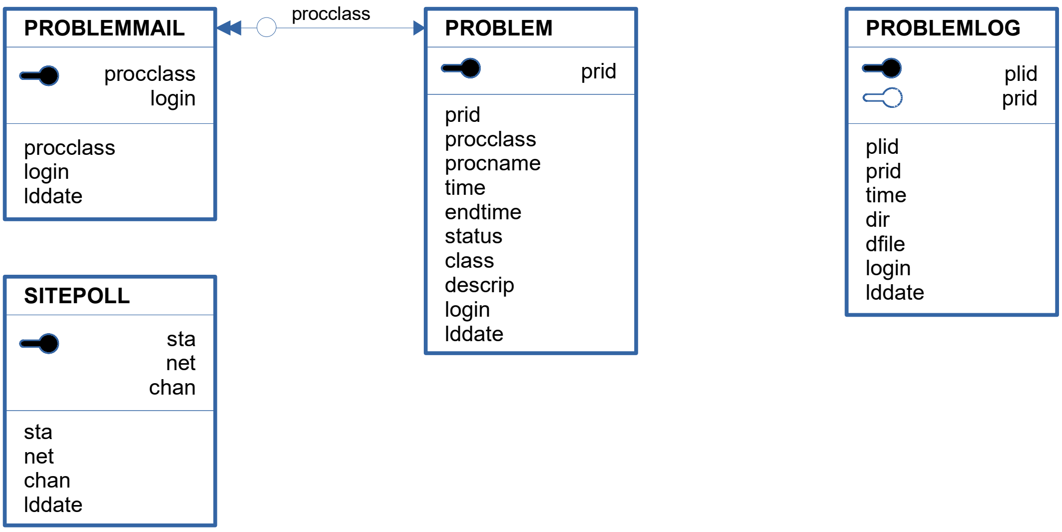


Figure 21: Tables used by System Monitoring Applications

Figure 22 displays tables that hold data pertinent to monitoring scientific performance. The BULL_COMP table (used by the *BullComp* application) compares event origins first estimated by automatic analysis against analyst-reviewed origins. In the figure, the ORIGIN table on the left exists in the database account for automatic processing, and the ORIGIN table on the right exists in the account for interactive processing. The tables at the bottom of the figure are used by other evaluation applications.

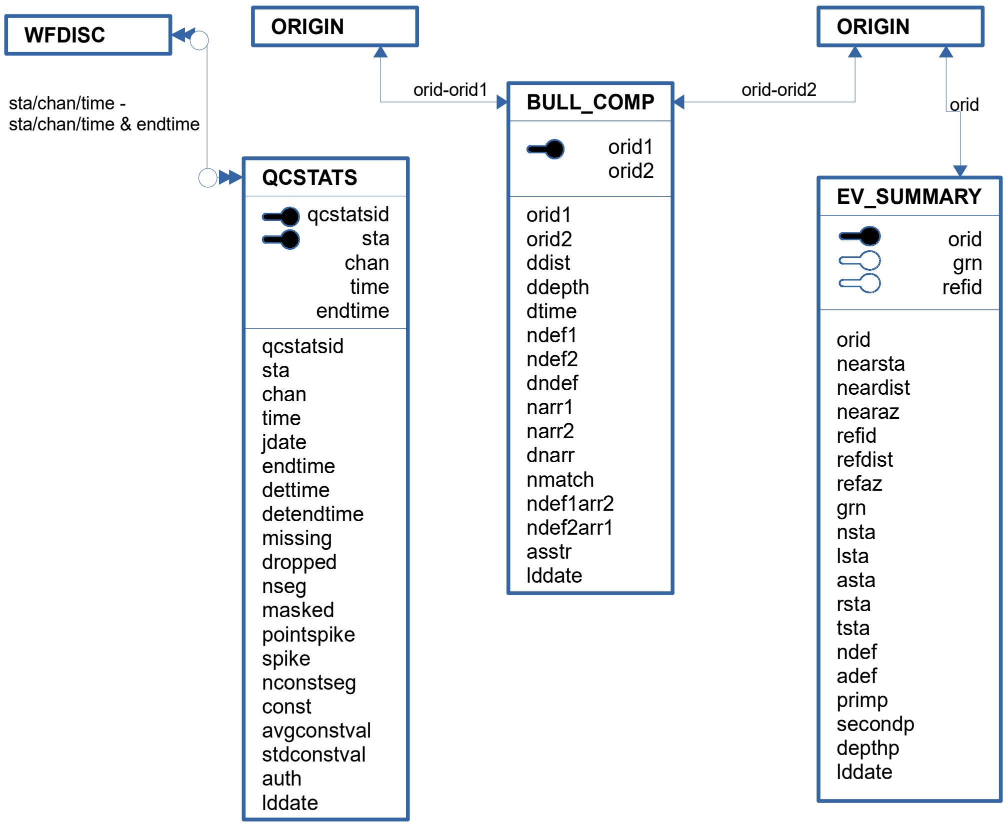


Figure 22: Tables used for Performance Monitoring

2.5.6. Database Support

Several tables facilitate use of the database (see Figure 23). The LASTID table is used by all applications that require unique values for surrogate keys. NA_VALUE specifies "not-available" values for many columns of the schema.

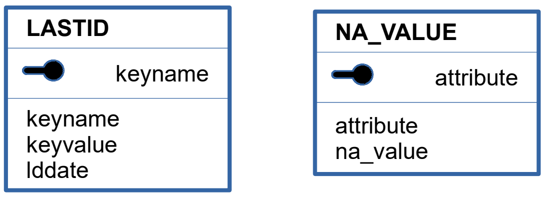


Figure 23: Tables used to support schema

3. S/H/I OBJECTS DESCRIPTION

3.1. S/H/I Table Descriptions

3.1.1. AFFILIATION

Owner(s)	STATIC
Category	Core, Reference
Description	The AFFILIATION table groups stations into networks.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	net	*varchar2(8)*	Network identification string	N
PI	sta	*varchar2(6)*	Station code	N
	lddate	*date*	Load date	Y

Primary key	PK_AFFILIATION(net, sta)
Indexes	AFFNETXX(net), AFFSTAX(sta, net), PK_AFFILIATION(net, sta)

3.1.2. AFFILIATION_EXCL

Owner(s)	STATIC
Description	Obsolete.

Pk/Fk/I	Column	Storage type	Description	Nullable
	net	*varchar2(8)*	Network identification string	N
	sta	*varchar2(6)*	Station code	N
	lddate	*date*	Load date	Y

3.1.3. AFFILIATION_LP (VIEW)

Owner(s)	STATIC
Category	Reference
Description	The AFFILIATION_LP view groups stations into networks. It is used for station-specific configuration for surface wave processing.

Pk/Fk/I	Column	Storage type	Description	Nullable
	net	*varchar2(8)*	Network identification string	Y
	sta	*varchar2(6)*	Station code	Y
	lddate	*date*	Load date	Y

SQL Body	`SELECT NET, STA, LDDATE FROM STATIC.AFFILIATION WHERE NET NOT IN (SELECT NET FROM STATIC.AFFILIATION_SUB WHERE OFFDATE=-1) UNION SELECT NET, STA, LDDATE FROM STATIC.AFFILIATION_SUB WHERE OFFDATE=-1`

3.1.4. AFFILIATION_SUB

Owner(s)	STATIC
Category	Reference
Description	The AFFILIATION_SUB table groups stations into networks. It is used for station-specific configuration for surface wave processing.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	net	*varchar2(8)*	Network identification string	N
PI	sta	*varchar2(6)*	Station code	N
	lddate	*date*	Load date	Y
	ondate	*number(8,0)*	First julian date this row is valid	N
PI	offdate	*number(8,0)*	Last Julian date this row is valid	N

Primary key	PK_AFFILIATION_SUB(offdate, net, sta)

3.1.5. ALLOCATE_HOUR

Owner(s)	REB
Category	Interactive Processing
Description	The ALLOCATE_HOUR table is used by the analyst_log application to manage analyst schedules and to initiate the process of REB bulletin production.

Pk/Fk/I	Column	Storage type	Description	Nullable
I	jdate	*number(8,0)*	Julian date for this data	N
I	hour	*number(2,0)*	Starting hour of analysis	N
I	action	*varchar2(16)*	Analyst task	N
	auth	*varchar2(16)*	Name of the Analyst processing the time block	Y
	commid	*number(10,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

Indexes	ALLOCATE_HOURX(jdate, hour, action)

3.1.6. ALLOCATE_HOUR

Owner(s)	LEB
Category	Interactive Processing

Description	The ALLOCATE_HOUR table is used by the analyst_log application to manage analyst schedules and to initiate the process of REB bulletin production.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	jdate	*number(8,0)*	Julian date for this data	N
PI	hour	*number(2,0)*	Starting hour of analysis	N
PI	action	*varchar2(16)*	Analyst task	N
	auth	*varchar2(16)*	Name of the Analyst processing the time block	Y
	commid	*number(10,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

Primary key	PK_ALLOCATE_HOUR(jdate, hour, action)
Indexes	PK_ALLOCATE_HOUR(jdate, hour, action)

3.1.7. ALLOW_RESID

Owner(s)	LEB
Category	Automatic Processing
Description	The ALLOW_RESID table contains the allowable maximums for the absolute values of residuals for time, azimuth, and slowness. The allowed residuals are a function of phase type and station type (single station or array), and for each of these, the allowed residuals may vary for different distance ranges. A negative value for the residual indicates an arrival field that is not permitted to be defining for that phase, statype, and distance range.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	phase	*varchar2(8)*	Phase type	N
PI	mindelta	*float(24)*	Minimum station to event distance	N
	maxdelta	*float(24)*	Maximum station to event distance	Y
PI	statype	*varchar2(4)*	Station type: single station, array	N
	timeres	*float(24)*	Time residual	Y
	azres	*float(24)*	Azimuth residual	Y
	slores	*float(24)*	Slowness residual (s/deg)	Y
	lddate	*date*	Load date	Y

Primary key	PK_ALLOW_RESID(phase, mindelta, statype)
Indexes	ALLOWPHASEX(phase, statype), PK_ALLOW_RESID(phase, mindelta, statype)

3.1.8. AMP3C

Owner(s)	REB, LEB
Category	Fundamental

Description	The AMP3C table contains amplitude measurements made on three-component data for a specific detection.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	arid	*number(10,0)*	Arrival identifier	N
	cfreq	*float(24)*	Central frequency (Hz)	Y
	vamp	*float(24)*	Vertical amplitude	Y
	vsnr	*float(24)*	Vertical signal-to-noise ratio	Y
	hamp	*float(24)*	Horizontal amplitude	Y
	hsnr	*float(24)*	Horizontal signal-to-noise ratio	Y
	htov	*float(24)*	Horizontal to vertical amplitude ratio	Y
PI	rid	*varchar2(8)*	Recipe identifier	N
	lddate	*date*	Load date	Y

Primary key	PK_AMP3C(arid, rid)
Indexes	AMP3CARIDX(arid), PK_AMP3C(arid, rid)

3.1.9. AMP3C

Owner(s)	IDCX
Category	Fundamental
Description	The AMP3C table contains amplitude measurements made on three-component data for a specific detection.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	arid	*number(10,0)*	Arrival identifier	N
	cfreq	*float(24)*	Central frequency (Hz)	Y
	vamp	*float(24)*	Vertical amplitude	Y
	vsnr	*float(24)*	Vertical signal-to-noise ratio	Y
	hamp	*float(24)*	Horizontal amplitude	Y
	hsnr	*float(24)*	Horizontal signal-to-noise ratio	Y
	htov	*float(24)*	Horizontal to vertical amplitude ratio	Y
PI	rid	*varchar2(8)*	Recipe identifier	N
I	lddate	*date*	Load date	Y

Primary key	PK_AMP3C(arid, rid)
Indexes	AMP3CARIDX(arid), PK_AMP3C(arid, rid), AMP3C_LDDATEX(lddate)

3.1.10. AMPDESCRIPT

Owner(s)	IDCX

Category	Fundamental
Description	The AMPDESCRIPT table contains a description of how each type of amplitude measurement in amplitude table was made.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	amptype	*varchar2(8)*	Amplitude measure descriptor	N
	toff	*float(24)*	Offset from theoretical or observed arrival time	Y
	tlen	*float(24)*	Duration of measurement window	Y
	gvlo	*float(24)*	Low group velocity for measurement window (km/sec)	Y
	gvhi	*float(24)*	High group velocity for measurement window (km/sec)	Y
	mtype	*varchar2(8)*	Measurement type	Y
	descr	*varchar2(255)*	Description	Y
	lddate	*date*	Load date	Y

Primary key	PK_AMPDESCRIPT(amptype)
Indexes	PK_AMPDESCRIPT(amptype)

3.1.11. AMPLITUDE

Owner(s)	LEB
Category	Fundamental
Description	The AMPLITUDE table contains arrival-based and origin-based amplitude measurements. The amplitude measurement is described in AMPDESCRIPT.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	ampid	*number(10,0)*	Amplitude identifier	N
I	arid	*number(10,0)*	Arrival identifier	Y
I	parid	*number(10,0)*	Predicted arrival identifier	Y
	chan	*varchar2(8)*	Channel name	Y
P	amp	*float(24)*	Amplitude	Y
	per	*float(24)*	Period (s)	Y
	snr	*float(24)*	Signal-to-noise ratio	Y
	amptime	*float(53)*	Time of amplitude measure	Y
	start_time	*float(53)*	Start time of measurement window	Y
	duration	*float(24)*	Duration of measurement window	Y
	bandw	*float(24)*	Difference between the high and low frequency bands used (Hz).	Y
	amptype	*varchar2(8)*	Amplitude measure descriptor	Y

	units	*varchar2(15)*	Units	Y
	clip	*varchar2(1)*	Flag indicating whether or not the data are clipped	Y
	inarrival	*varchar2(1)*	"y" or "n" flag indicating if amp is the same in the ARRIVAL table	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
I	lddate	*date*	Load date	Y

Primary key	PK_AMPLITUDE(ampid)
Indexes	AMPPARIDX(parid), AMPLITUDE_LDDATEX(lddate), PK_AMPLITUDE(ampid), AMPARIDX(arid), AMP_PARID_ARID_X(parid, arid)

3.1.12. AMPLITUDE

Owner(s)	REB
Category	Fundamental
Description	The AMPLITUDE table contains arrival-based and origin-based amplitude measurements. The amplitude measurement is described in AMPDESCRIPT.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	ampid	*number(10,0)*	Amplitude identifier	N
I	arid	*number(10,0)*	Arrival identifier	Y
I	parid	*number(10,0)*	Predicted arrival identifier	Y
	chan	*varchar2(8)*	Channel name	Y
P	amp	*float(24)*	Amplitude	Y
	per	*float(24)*	Period (s)	Y
	snr	*float(24)*	Signal-to-noise ratio	Y
	amptime	*float(53)*	Time of amplitude measure	Y
	start_time	*float(53)*	Start time of measurement window	Y
	duration	*float(24)*	Duration of measurement window	Y
	bandw	*float(24)*	Difference between the high and low frequency bands used (Hz).	Y
	amptype	*varchar2(8)*	Amplitude measure descriptor	Y
	units	*varchar2(15)*	Units	Y
	clip	*varchar2(1)*	Flag indicating whether or not the data are clipped	Y
	inarrival	*varchar2(1)*	"y" or "n" flag indicating if amp is the same in the ARRIVAL table	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
I	lddate	*date*	Load date	Y

Primary key	PK_AMPLITUDE(ampid)
Indexes	AMPPARIDX(parid), AMPLITUDE_LDDATEX(lddate), PK_AMPLITUDE(ampid), AMPARIDX(arid)

3.1.13. AMPLITUDE

Owner(s)	IDCX
Category	Fundamental
Description	The AMPLITUDE table contains arrival-based and origin-based amplitude measurements. The amplitude measurement is described in AMPDESCRIPT.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	ampid	*number(10,0)*	Amplitude identifier	N
I	arid	*number(10,0)*	Arrival identifier	Y
I	parid	*number(10,0)*	Predicted arrival identifier	Y
	chan	*varchar2(8)*	Channel name	Y
P	amp	*float(24)*	Amplitude	Y
	per	*float(24)*	Period (s)	Y
	snr	*float(24)*	Signal-to-noise ratio	Y
	amptime	*float(53)*	Time of amplitude measure	Y
	start_time	*float(53)*	Start time of measurement window	Y
	duration	*float(24)*	Duration of measurement window	Y
	bandw	*float(24)*	Difference between the high and low frequency bands used (Hz).	Y
	amptype	*varchar2(8)*	Amplitude measure descriptor	Y
	units	*varchar2(15)*	Units	Y
	clip	*varchar2(1)*	Flag indicating whether or not the data are clipped	Y
	inarrival	*varchar2(1)*	"y" or "n" flag indicating if amp is the same in the ARRIVAL table	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
I	lddate	*date*	Load date	Y

Primary key	PK_AMPLITUDE(ampid)
Indexes	AMPPARIDX(parid), PK_AMPLITUDE(ampid), AMPLDDATEX(lddate), AMPARIDX(arid)

3.1.14. APMA

Owner(s)	REB
Category	Fundamental

Description	The APMA table contains results of particle motion analysis for a specific detection.

Pk/Fk/I	Column	Storage type	Description	Nullable
	phase	*varchar2(8)*	Phase type	Y
PI	arid	*number(10,0)*	Arrival identifier	N
	freq	*float(24)*	Frequency	Y
	snr	*float(24)*	Signal-to-noise ratio	Y
	ampp	*float(24)*	P-phase amplitude	Y
	amps	*float(24)*	S-phase amplitude	Y
	amplr	*float(24)*	Rayleigh-phase amplitude	Y
	rect	*float(24)*	Rectilinearity	Y
	plans	*float(24)*	S-phase planarity	Y
	planlr	*float(24)*	Rayleigh-phase planarity	Y
	hvratp	*float(24)*	P-phase horizontal-to-vertical ratio	Y
	hvrat	*float(24)*	S-phase horizontal-to-vertical ratio	Y
	hmxmn	*float(24)*	Maximum-to-minimum horizontal ratio	Y
	inang3	*float(24)*	Short-axis incidence angle	Y
	seazp	*float(24)*	P-phase observed azimuth	Y
	seazs	*float(24)*	S-phase observed azimuth	Y
	seazlr	*float(24)*	Rayleigh-phase observed azimuth	Y
	inang1	*float(24)*	Long-axis incidence angle	Y
	ptime	*float(53)*	P-phase extraction time	Y
	stime	*float(53)*	S-phase extraction time	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
	apmarid	*number(10,0)*	Apma recipe identifier	Y
	commid	*number(10,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

Primary key	PK_APMA(arid)
Indexes	PK_APMA(arid)

3.1.15. APMA

Owner(s)	IDCX, LEB
Category	Fundamental
Description	The APMA table contains results of particle motion analysis for a specific detection.

Pk/Fk/I	Column	Storage type	Description	Nullable
	phase	*varchar2(8)*	Phase type	Y

PI	arid	*number(10,0)*	Arrival identifier	N
	freq	*float(24)*	Frequency	Y
	snr	*float(24)*	Signal-to-noise ratio	Y
	ampp	*float(24)*	P-phase amplitude	Y
	amps	*float(24)*	S-phase amplitude	Y
	amplr	*float(24)*	Rayleigh-phase amplitude	Y
	rect	*float(24)*	Rectilinearity	Y
	plans	*float(24)*	S-phase planarity	Y
	planlr	*float(24)*	Rayleigh-phase planarity	Y
	hvratp	*float(24)*	P-phase horizontal-to-vertical ratio	Y
	hvrat	*float(24)*	S-phase horizontal-to-vertical ratio	Y
	hmxmn	*float(24)*	Maximum-to-minimum horizontal ratio	Y
	inang3	*float(24)*	Short-axis incidence angle	Y
	seazp	*float(24)*	P-phase observed azimuth	Y
	seazs	*float(24)*	S-phase observed azimuth	Y
	seazlr	*float(24)*	Rayleigh-phase observed azimuth	Y
	inang1	*float(24)*	Long-axis incidence angle	Y
	ptime	*float(53)*	P-phase extraction time	Y
	stime	*float(53)*	S-phase extraction time	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
	apmarid	*number(10,0)*	Amplitude measure descriptor	Y
	commid	*number(10,0)*	Comment identifier	Y
I	lddate	*date*	Load date	Y

Primary key	PK_APMA(arid)
Indexes	APMA_LDDATEX(lddate), PK_APMA(arid)

3.1.16. ARCH_DATA_TYPE

Owner(s)	IDCX
Category	Core, Fundamental
Description	The ARCH_DATA_TYPE table contains information used by the archiving software.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	archid	*number(10,0)*	Archive row identifier	N
	datatype	*varchar2(24)*	Data type (or class of data) being archived (e.g. PRIARC, MSG, SQUAL)	Y
	table_name	*varchar2(32)*	Name of the table encapsulating the data type to be archived	Y

	primarykey	*varchar2(24)*	Not used	Y
	secondkey	*varchar2(24)*	Not used	Y
	merge_adjacent	*varchar2(2)*	Y indicates Archive should merge adjacent rows	Y
	note_missing_data	*varchar2(2)*	Indicates that this data type is for late arriving data	Y
	ondate	*number(8,0)*	First julian date this row is valid	Y
	offdate	*number(8,0)*	Last Julian date this row is valid	Y
	lddate	*date*	Load date	Y

Primary key	PK_ARCH_DATA_TYPE(archid)
Indexes	PK_ARCH_DATA_TYPE(archid)

3.1.17. ARRIVAL

Owner(s)	REB
Category	Core, Fundamental
Description	The ARRIVAL table contains summary information about arrivals.

Pk/Fk/I	Column	Storage type	Description	Nullable
	sta	*varchar2(6)*	Station code	N
I	time	*float(53)*	Epoch time of the arrival	N
PI	arid	*number(10,0)*	Arrival identifier	N
	jdate	*number(8,0)*	Julian date for this data	Y
I	stassid	*number(10,0)*	Station association (stassoc) identifier.	Y
	chanid	*number(8,0)*	Channel recording identifier	Y
	chan	*varchar2(8)*	Channel name	Y
	iphase	*varchar2(8)*	Reported phase	Y
	stype	*varchar2(1)*	Signal type	Y
	deltim	*float(24)*	Time uncertainty	Y
	azimuth	*float(24)*	Observed azimuth	Y
	delaz	*float(24)*	Azimuth uncertainty	Y
	slow	*float(24)*	Observed slowness for a detected arrival (s/deg)	Y
	delslo	*float(24)*	Slowness uncertainty (s/deg)	Y
	ema	*float(24)*	Emergence angle	Y
	rect	*float(24)*	Rectilinearity	Y
	amp	*float(24)*	Amplitude	Y
	per	*float(24)*	Period	Y
	logat	*float(24)*	Log(amp/per)	Y

	clip	*varchar2(1)*	Flag indicating whether or not the data are clipped	Y
	fm	*varchar2(2)*	First motion	Y
	snr	*float(24)*	Signal-to-noise ratio	Y
	qual	*varchar2(1)*	Signal onset quality	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
I	commid	*number(10,0)*	Comment identifier	Y
I	lddate	*date*	Load date	Y

Primary key	PK_ARRIVAL(arid)
Indexes	ARRIVAL_ARID_COMMID_X(arid, commid), ARTIMEX(time), ARSTASSX(stassid), PK_ARRIVAL(arid), ARRIVAL_LDDATEX(lddate)

3.1.18. ARRIVAL

Owner(s)	LEB
Category	Core, Fundamental
Description	The ARRIVAL table contains summary information about arrivals.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
	sta	*varchar2(6)*	Station code	N
I	time	*float(53)*	Epoch time of the arrival	N
PI	arid	*number(10,0)*	Arrival identifier	N
	jdate	*number(8,0)*	Julian date for this data	Y
I	stassid	*number(10,0)*	Station association (stassoc) identifier.	Y
	chanid	*number(8,0)*	Channel recording identifier	Y
	chan	*varchar2(8)*	Channel name	Y
	iphase	*varchar2(8)*	Reported phase	Y
	stype	*varchar2(1)*	Signal type	Y
	deltim	*float(24)*	Time uncertainty	Y
	azimuth	*float(24)*	Observed azimuth	Y
	delaz	*float(24)*	Azimuth uncertainty	Y
	slow	*float(24)*	Observed slowness for a detected arrival (s/deg)	Y
	delslo	*float(24)*	Slowness uncertainty (s/deg)	Y
	ema	*float(24)*	Emergence angle	Y
	rect	*float(24)*	Rectilinearity	Y
	amp	*float(24)*	Amplitude	Y
	per	*float(24)*	Period	Y

	logat	*float(24)*	Log(amp/per)	Y
	clip	*varchar2(1)*	Flag indicating whether or not the data are clipped	Y
	fm	*varchar2(2)*	First motion	Y
	snr	*float(24)*	Signal-to-noise ratio	Y
	qual	*varchar2(1)*	Signal onset quality	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
	commid	*number(10,0)*	Comment identifier	Y
I	lddate	*date*	Load date	Y

Primary key	PK_ARRIVAL(arid)
Indexes	ARTIMEX(time), ARSTASSX(stassid), ARRIVAL_LDDATEX(lddate), PK_ARRIVAL(arid)

3.1.19. ARRIVAL

Owner(s)	IDCX
Category	Core, Fundamental
Description	The ARRIVAL table contains summary information about arrivals.

Pk/Fk/I	Column	Storage type	Description	Nullable
I	sta	*varchar2(6)*	Station code	N
I	time	*float(53)*	Epoch time of the arrival	N
PI	arid	*number(10,0)*	Arrival identifier	N
	jdate	*number(8,0)*	Julian date for this data	Y
I	stassid	*number(10,0)*	Station association (stassoc) identifier.	Y
	chanid	*number(8,0)*	Channel recording identifier	Y
	chan	*varchar2(8)*	Channel name	Y
	iphase	*varchar2(8)*	Reported phase	Y
	stype	*varchar2(1)*	Signal type	Y
	deltim	*float(24)*	Time uncertainty	Y
	azimuth	*float(24)*	Observed azimuth	Y
	delaz	*float(24)*	Azimuth uncertainty	Y
	slow	*float(24)*	Observed slowness for a detected arrival (s/deg)	Y
	delslo	*float(24)*	Slowness uncertainty (s/deg)	Y
	ema	*float(24)*	Emergence angle	Y
	rect	*float(24)*	Rectilinearity	Y
	amp	*float(24)*	Amplitude	Y

	per	*float(24)*	Period	Y
	logat	*float(24)*	Log(amp/per)	Y
	clip	*varchar2(1)*	Flag indicating whether or not the data are clipped	Y
	fm	*varchar2(2)*	First motion	Y
	snr	*float(24)*	Signal-to-noise ratio	Y
	qual	*varchar2(1)*	Signal onset quality	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
	commid	*number(10,0)*	Comment identifier	Y
I	lddate	*date*	Load date	Y

Primary key	PK_ARRIVAL(arid)
Indexes	ARSTTIMEX(sta, time), ARTIMEX(time), ARSTASSX(stassid), PK_ARRIVAL(arid), ARRIVAL_LDDATEX(lddate)

3.1.20. ASSOC

Owner(s)	REB, LEB
Category	Core, Fundamental
Description	The ASSOC table contains information that connects arrivals (entries in the arrival table) to a particular origin.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	arid	*number(10,0)*	Arrival identifier	N
PI	orid	*number(10,0)*	Origin identifier	N
	sta	*varchar2(6)*	Station code	Y
	phase	*varchar2(8)*	Phase type	Y
	belief	*float(24)*	Phase confidence	Y
	delta	*float(24)*	Source-receiver distance in degrees	Y
	seaz	*float(24)*	Station-to-event azimuth	Y
	esaz	*float(24)*	Event-to-station azimuth	Y
	timeres	*float(24)*	Time residual	Y
	timedef	*varchar2(1)*	Time = defining (d), non defining (n)	Y
	azres	*float(24)*	Azimuth residual	Y
	azdef	*varchar2(1)*	Azimuth = defining (d), non defining (n)	Y
	slores	*float(24)*	Slowness residual (s/km)	Y
	slodef	*varchar2(1)*	Flag indicating whether slowness is defining (d) or non defining (n).	Y
	emares	*float(24)*	Incidence angle residual	Y
	wgt	*float(24)*	Location weight	Y

	vmodel	*varchar2(15)*	Velocity model	Y
	commid	*number(10,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

Primary key	PK_ASSOC(arid, orid)
Indexes	ASSARIDX(arid), ASSOCX(orid, arid)

3.1.21. ASSOC

Owner(s)	SEL2, SEL3, SEL1
Category	Core, Fundamental
Description	The ASSOC table contains information that connects arrivals (entries in the arrival table) to a particular origin.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	arid	*number(10,0)*	Arrival identifier	N
PI	orid	*number(10,0)*	Origin identifier	N
	sta	*varchar2(6)*	Station code	Y
	phase	*varchar2(8)*	Phase type	Y
	belief	*float(24)*	Phase confidence	Y
	delta	*float(24)*	Source-receiver distance in degrees	Y
	seaz	*float(24)*	Station-to-event azimuth	Y
	esaz	*float(24)*	Event-to-station azimuth	Y
	timeres	*float(24)*	Time residual	Y
	timedef	*varchar2(1)*	Time = defining (d), non defining (n)	Y
	azres	*float(24)*	Azimuth residual	Y
	azdef	*varchar2(1)*	Azimuth = defining (d), non defining (n)	Y
	slores	*float(24)*	Slowness residual (s/km)	Y
	slodef	*varchar2(1)*	Flag indicating whether slowness is defining (d) or non defining (n).	Y
	emares	*float(24)*	Incidence angle residual	Y
	wgt	*float(24)*	Location weight	Y
	vmodel	*varchar2(15)*	Velocity model	Y
	commid	*number(10,0)*	Comment identifier	Y
I	lddate	*date*	Load date	Y

Primary key	PK_ASSOC(arid, orid)
Indexes	ASSARIDX(arid), ASSOC_LDDATEX(lddate), ASSOCX(orid, arid)

3.1.22. ASSOC

Owner(s)	IDCX
Category	Core, Fundamental
Description	The ASSOC table contains information that connects arrivals (entries in the arrival table) to a particular origin.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	arid	*number(10,0)*	Arrival identifier	N
PI	orid	*number(10,0)*	Origin identifier	N
	sta	*varchar2(6)*	Station code	Y
	phase	*varchar2(8)*	Phase type	Y
	belief	*float(24)*	Phase confidence	Y
	delta	*float(24)*	Source-receiver distance in degrees	Y
	seaz	*float(24)*	Station-to-event azimuth	Y
	esaz	*float(24)*	Event-to-station azimuth	Y
	timeres	*float(24)*	Time residual	Y
	timedef	*varchar2(1)*	Time = defining (d), non defining (n)	Y
	azres	*float(24)*	Azimuth residual	Y
	azdef	*varchar2(1)*	Azimuth = defining (d), non defining (n)	Y
	slores	*float(24)*	Slowness residual (s/km)	Y
	slodef	*varchar2(1)*	Flag indicating whether slowness is defining (d) or non defining (n).	Y
	emares	*float(24)*	Incidence angle residual	Y
	wgt	*float(24)*	Location weight	Y
	vmodel	*varchar2(15)*	Velocity model	Y
	commid	*number(10,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

Primary key	PK_ASSOC(arid, orid)
Indexes	ASSARIDX(arid), ASSOCX(orid, arid)

3.1.23. ASSOC_TEMP_GA

Owner(s)	SEL2, SEL3
Category	Core, Fundamental
Description	The ASSOC_TEMP_GA table is used by the Global Association (GA) application to store temporary associations.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
I	arid	*number(10,0)*	Arrival identifier	N

I	orid	*number(10,0)*	Origin identifier	N
	sta	*varchar2(6)*	Station code	Y
	phase	*varchar2(8)*	Phase type	Y
	belief	*float(24)*	Phase confidence	Y
	delta	*float(24)*	Source-receiver distance in degrees	Y
	seaz	*float(24)*	Station-to-event azimuth	Y
	esaz	*float(24)*	Event-to-station azimuth	Y
	timeres	*float(24)*	Time residual	Y
	timedef	*varchar2(1)*	Time = defining (d), non defining (n)	Y
	azres	*float(24)*	Azimuth residual	Y
	azdef	*varchar2(1)*	Azimuth = defining (d), non defining (n)	Y
	slores	*float(24)*	Slowness residual (s/km)	Y
	slodef	*varchar2(1)*	Flag indicating whether slowness is defining (d) or non defining (n).	Y
	emares	*float(24)*	Incidence angle residual	Y
	wgt	*float(24)*	Location weight	Y
	vmodel	*varchar2(15)*	Velocity model	Y
	commid	*number(10,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

Indexes	ATGORIDX(orid), ASSOC_TEMP_GAX(arid, orid)

3.1.24. ATTENCOEF

Owner(s)	STATIC
Category	Fundamental
Description	The ATTENCOEF table contains station-specific attenuation corrections for regional Event Characterization analysis.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	attenid	*varchar2(20)*	Attenuation coefficient set identifier	N
PI	sta	*varchar2(6)*	Station code	N
PI	ratiotype	*varchar2(6)*	Amplitude ratio identifier	N
PI	chan	*varchar2(8)*	Channel name	N
	xcoef	*float(24)*	Constant coefficient	Y
	ycoef	*float(24)*	Geometrical spreading coefficient	Y
	zcoef	*float(24)*	Attenuation coefficient	Y
	dmin	*float(24)*	Minimum distance of applicability	Y
	dmax	*float(24)*	Maximum distance of applicability	Y
	lddate	*date*	Load date	Y

Primary key	SYS_C0028354(attenid, sta, ratiotype, chan)
Indexes	PK_ATTENCOEF(attenid, sta, ratiotype, chan)

3.1.25. BEAMAUX (VIEW)

Owner(s)	STATIC
Category	Interactive Analysis
Description	The BEAMAUX view joins the sensor, instrument and forbeamaux tables. It is used by the SHI processing application, GSEBull.

Pk/Fk/I	Column	Storage type	Description	Nullable
	sta	*varchar2(6)*	Station code	N
	chan	*varchar2(8)*	Channel name	N
	ncalib	*float(24)*	Nominal calibration (nanometers/digital count)	Y
	ncalper	*float(24)*	Nominal calibration period (seconds)	Y
	time	*float(53)*	Epoch time of start of beam	N
	endtime	*float(53)*	Epoch time of end of beam	N

SQL Body

```
SELECT f.sta,
       f.chan,
       i.ncalib,
       i.ncalper,
       s.time,
       s.endtime
FROM instrument i, sensor s, forbeamaux f
WHERE i.inid=s.inid and s.sta=f.sta and s.chan=f.chan
```

3.1.26. BREGION_DEF

Owner(s)	STATIC
Category	Core, Reference
Description	The BREGION_DEF table holds the latitude and longitude boundaries for each region as well as a region name and region identification number. This table is used by Scanner Tool 2.0.

Pk/Fk/I	Column	Storage type	Description	Nullable
	bregname	*varchar2(32)*	Region name	N
	bregid	*number(8,0)*	Region identification number	N
	lat_lo	*number(8,3)*	Minimum latitude of the region	Y
	lat_hi	*number(8,3)*	Maximum latitude of the region	Y
	lon_lo	*number(8,3)*	Minimum longitude of the region	Y
	lon_hi	*number(8,3)*	Maximum longitude of the region	Y

	lddate	*date*	Load date	Y

3.1.27. BREGION_TAB

Owner(s)	STATIC
Category	Core, Reference
Description	The BREGION_TAB table contains the stations and arrival parameter window attributes and is linked to BREGION_DEF by the bregname and bregid columns. This table is used by Scanner Tool 2.0.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
	bregname	*varchar2(32)*	Region name	N
	bregid	*number(8,0)*	Region identification number	N
	sta	*varchar2(6)*	Station code	N
	azi_lo	*number(8,3)*	Minimum azimuth	Y
	azi_hi	*number(8,3)*	Maximum azimuth	Y
	slo_lo	*number(8,3)*	Minimal slowness	Y
	slo_hi	*number(8,3)*	Maximal slowness	Y
	snr_lo	*number(8,3)*	Minimal snr	Y
	snr_hi	*number(8,3)*	Maximal snr	Y
	per_lo	*number(8,3)*	Minimum period	Y
	per_hi	*number(8,3)*	Maximum period	Y
	amp_lo	*number(8,3)*	Minimum amplitude	Y
	amp_hi	*number(8,3)*	Maximum amplitude	Y
	lddate	*date*	Load date	Y

3.1.28. CEPPKS

Owner(s)	REB
Category	Fundamental
Description	The CEPPKS table contains results of cepstral analysis and includes the amplitude and frequency of cepstral peaks that are consistent among multiple phases associated with the same event.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	orid	*number(10,0)*	Origin identifier	N
PI	sta	*varchar2(6)*	Station code	N
	ptyp	*varchar2(6)*	Consistent peak type code	Y
	pkamp	*float(24)*	Consistent peak amplitude	Y
PI	pkqf	*float(24)*	Consistent peak quefrency	N

I	lddate	*date*	Load date	Y

Primary key	PK_CEPPKS(orid, sta, pkqf)
Indexes	CEPPKS_LDDATEX(lddate), PK_CEPPKS(orid, sta, pkqf)

3.1.29. CHANNAME

Owner(s)	STATIC
Category	Data Services
Description	The CHANNAME table provides mapping between channel and station names.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
	station	*varchar2(6)*	Station name	N
PI	stream	*varchar2(6)*	Stream name	N
PI	extern_sta	*varchar2(6)*	External station name	N
PI	extern_chan	*varchar2(8)*	External channel name	N
	intern_sta	*varchar2(6)*	Internal station name	N
	intern_chan	*varchar2(8)*	Internal channel name	N
	capability	*number(4,0)*	Capability	Y
	position	*number(4,0)*	Position	Y
PI	revision	*number(4,0)*	Revision number	N
	lddate	*date*	Load date	Y

Primary key	PK_CHANNAME(stream, extern_sta, extern_chan, revision)
Indexes	PK_CHANNAME(stream, extern_sta, extern_chan, revision)

3.1.30. CHAN_GROUPS

Owner(s)	STATIC
Category	Core, Reference
Description	The CHAN_GROUPS table is used for configuration of station data archiving.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	class	*varchar2(16)*	Type of channel group	N
PI	name	*varchar2(20)*	Station name	N
PI	sta	*varchar2(6)*	Station code	N
PI	chan	*varchar2(8)*	Channel name	N
	duration	*number(8,0)*	Not used	Y
	inwfactivity	*number(1,0)*	Not used	Y
PI	ondate	*number(8,0)*	First julian date this row is valid	N
PI	offdate	*number(8,0)*	Last Julian date this row is valid	N

	lddate	*date*	Load date	Y

Primary key	PK_CHAN_GROUPS(class, name, sta, chan, ondate, offdate)
Indexes	PK_CHAN_GROUPS(class, name, sta, chan, ondate, offdate)

3.1.31. CHAN_GROUPS_AUXWF

Owner(s)	STATIC
Category	Core, Reference
Description	Obsolete. Extract from chan_groups table made in 2012. Not used since.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
	class	*varchar2(16)*	Type of channel group	Y
	name	*varchar2(20)*	Station name	Y
	sta	*varchar2(6)*	Station code	Y
	chan	*varchar2(8)*	Channel name	Y
	duration	*number(8,0)*	Not used	Y
	inwfactivity	*number(1,0)*	Not used	Y
	ondate	*number(8,0)*	First julian date this row is valid	Y
	offdate	*number(8,0)*	Last Julian date this row is valid	Y
	lddate	*date*	Load date	Y

3.1.32. COLORDISC

Owner(s)	MAP
Category	Interactive Processing
Description	The COLORDISK table links a unique colormapid to a colormap name and disk file.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	colormapid	*number(8,0)*	Colormap identifier	N
	dfile	*varchar2(32)*	Data file name	N
	dir	*varchar2(64)*	Absolute path to the data file	N
	colormapname	*varchar2(64)*	Colormap name	Y
	lddate	*date*	Load date	Y

Primary key	COLORDISC_PK(colormapid)
Indexes	COLORDISC_PK(colormapid)

3.1.33. COMPLEXITY

Owner(s)	REB

Category	Fundamental
Description	The COMPLEXITY table contains the complexity event characterization parameter estimated by the Detection and Feature Extraction (DFX) application.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	orid	*number(10,0)*	Origin identifier	N
PI	sta	*varchar2(6)*	Station code	N
PI	phase	*varchar2(6)*	Phase type	N
	rectype	*varchar2(8)*	Recipe type	Y
	complexity	*float(24)*	Complexity measure	Y
	snr	*float(24)*	Signal-to-noise ratio	Y
I	lddate	*date*	Load date	Y

Primary key	PK_COMPLEXITY(orid, sta, phase)
Indexes	COMPLEXITY_LDDATEX(lddate), COMPLORIDX(orid), PK_COMPLEXITY(orid, sta, phase)

3.1.34. DATAREADY

Owner(s)	IDCX
Category	Data Services
Description	The DATAREADY table indicates which data are ready to be processed by the Subscription Subsystem. Entries to the table are made by applications running in the operational systems that process the data. For applications under the control of the Distributed Application Control System (DACS), such as Station Processing by DFX (Detection and Feature Extraction) and StaPro, this is achieved via a stop-hook call from the tuxshell process controlling the transaction.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	dataid	*number(10,0)*	Data ready identifier	N
	tablename	*varchar2(24)*	Name of table containing data to be distributed by the Subscription system.	Y
	account	*varchar2(24)*	Account name	N
	tagname	*varchar2(12)*	Name of reference field (for example, orid)	Y
I	tagid	*number(10,0)*	Numeric value of the identifier specified by the tagname column	Y
	tagid2	*number(10,0)*	Secondary tag value	Y
	data_info	*varchar2(24)*	Miscellaneous data information	Y
	status	*varchar2(8)*	Status of this row.	Y
I	lddate	*date*	Load date	Y

Primary key	DATAREADY_PK(dataid)
Indexes	PK_DATAREADY(dataid), DRTAGIDX(tagid), DATAREADY_LDDATEX(lddate)
Triggers	DATAREADY_TO_PRODTRACK

3.1.35. DATAUSER

Owner(s)	IDCX
Category	Data Services
Description	The DATAUSER table tracks authorized users of the Message and Subscription Subsystems. Each user is identified by a (unique) username and domain, which must match all email headers. The priority column specifies the class of user, and servicetime is the last time a request from the user was processed. Priority and servicetime are considered when selecting the order in which requests will be processed. The status can either be active or inactive.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	userid	*number(8,0)*	User identifier	N
	pocid	*number(8,0)*	Point of contact identifier	Y
	username	*varchar2(24)*	user name component of email address	N
	domain	*varchar2(48)*	Domain name from the incoming subscription message	N
	msgtype	*varchar2(16)*	Message type	N
	status	*varchar2(24)*	Status of this user	N
	priority	*number(2,0)*	User priority	N
	commid	*number(10,0)*	Comment identifier	Y
	emaillimit	*number(8,0)*	Maximum size of message (in bytes) that will be delivered via email	Y
	servicetime	*float(53)*	Last time a request from that user was serviced	Y
	lddate	*date*	Load date	Y

Primary key	SYS_C0028353(userid)
Indexes	PK_DATAUSER(userid)

3.1.36. DEFINE_PHASE_RESIDUAL

Owner(s)	STATIC
Category	Interactive Analysis
Description	Definitions of allowable phase residuals for use in Interactive SHI analysis

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
	phase	*varchar2(8)*	Phase type	N

	statype	*varchar2(4)*	Station type (array (ar) or three-component (3c))	N
	mindelta	*float(24)*	Minimum allowable distance (degrees)	N
	maxdelta	*float(24)*	Maximum allowable distance (degrees)	N
	mindepth	*float(24)*	Minimum allowable depth (km)	N
	maxdepth	*float(24)*	Maximum allowable depth (km)	N
	timres	*float(24)*	Time residual (seconds)	N
	slores	*float(24)*	Slowness residual (s/km)	N
	azres	*float(24)*	Allowable azimuth residual	N
	lddate	*date*	Load date	N

3.1.37. DERVDISC

Owner(s)	IDCX
Category	Automatic Processing
Description	The DERVDISC table contains pointers to detection pixel information derived from PMCC infrasound processing.

Pk/Fk/I	Column	Storage type	Description	Nullable
I	sta	*varchar2(6)*	Station code	N
	chan	*varchar2(8)*	Channel name	N
I	time	*float(53)*	Start time of the data interval (epochal)	N
	tlen	*float(24)*	Duration of the data interval in seconds.	Y
	net	*varchar2(8)*	Network identification string	Y
PI	dervid	*number(10,0)*	Derived data unique identifier	N
	recid	*number(10,0)*	Unique record identifier	Y
	method	*varchar2(17)*	Method or Application associated to the dervdisc entry.	Y
	datatype	*varchar2(2)*	Data type (bi: binary as:ASCII)	Y
	dervtype	*varchar2(4)*	Nature of the derived data (pix:PMCC detection pixels, fam: PMCC detection family)	Y
	jdate	*number(8,0)*	Julian date for this data	Y
	dir	*varchar2(64)*	Absolute path to the data file	Y
	dfile	*varchar2(32)*	Name of the data file.	Y
	foff	*number(10,0)*	Byte offset of data segment within file	Y
	commid	*number(10,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

Primary key	DERVDISC_PK(dervid)
Indexes	DERVDISC_PK(dervid), DERV_STAX(sta, time)

3.1.38. DETECTION

Owner(s)	IDCX, REB, LEB
Category	Fundamental
Description	The DETECTION table contains summary information about SHI detections.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	arid	*number(10,0)*	Arrival identifier	N
	jdate	*number(8,0)*	Julian date for this data	Y
I	time	*float(53)*	Epoch time	Y
	sta	*varchar2(6)*	Station code	Y
	chan	*varchar2(8)*	Channel name	Y
	bmtyp	*varchar2(4)*	Beam type	Y
	sproid	*number(10,0)*	Signal processor identifier	Y
	cfreq	*float(24)*	Central frequency (Hz)	Y
	seaz	*float(24)*	Observed azimuth	Y
	delaz	*float(24)*	Azimuth uncertainty	Y
	slow	*float(24)*	Slowness (s/km)	Y
	delslo	*float(24)*	Slowness uncertainty (s/km)	Y
	snr	*float(24)*	Signal-to-noise ratio	Y
	stav	*float(24)*	Short-term average	Y
	fstat	*float(24)*	F-statistic	Y
	deltim	*float(24)*	Time uncertainty	Y
	bandw	*float(24)*	Difference between the high and low frequency bands used (Hz).	Y
	fkqual	*number(4,0)*	F-k quality	Y
	commid	*number(10,0)*	Comment identifier	Y
I	lddate	*date*	Load date	Y

Primary key	PK_DETECTION(arid)
Indexes	PK_DETECTION(arid), DETTIMEX(time), DETLDDATEX(lddate)

3.1.39. DISCARD

Owner(s)	LEB
Category	Interactive Processing
Description	The DISCARD table contains the reason why an analyst discarded an event that was hypothesized by the automated system.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	evid	*number(10,0)*	Event identifier	N

PI	reason	*varchar2(30)*	Reason event was discarded	N
	auth	*varchar2(15)*	Name of the Analyst discarding the event	Y
PI	lddate	*date*	Load date	N

Primary key	PK_DISCARD(evid, reason, lddate)
Indexes	DISCARD_LDDATEX(lddate), DISCARDEVIDX(evid), PK_DISCARD(evid, reason, lddate)

3.1.40. DISCARD

Owner(s)	REB
Category	Interactive Processing
Description	The DISCARD table contains the reason why an analyst discarded an event that was hypothesized by the automated system.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	evid	*number(10,0)*	Event identifier	N
PI	reason	*varchar2(30)*	Reason event was discarded	N
	auth	*varchar2(15)*	Name of the Analyst discarding the event	Y
PI	lddate	*date*	Load date	N

Primary key	PK_DISCARD(evid, reason, lddate)
Indexes	DISCARDEVIDX(evid), PK_DISCARD(evid, reason, lddate)

3.1.41. DLMAN

Owner(s)	IDCX
Category	Data Services
Description	Not used at the IDC.

Pk/Fk/I	Column	Storage type	Description	Nullable
I	dlid	*number(10,0)*	diskloop manager identifier	N
	machine	*varchar2(32)*	machine name	N
	running	*varchar2(1)*	DLMan running = y/n	Y
	connmanport	*number(6,0)*	ConnMan port	Y
	controlport	*number(6,0)*	DataControl port	Y
	archiveport	*number(6,0)*	Archiver port	Y
	forwardport	*number(6,0)*	Forwarder port	Y
	commid	*number(10,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

Indexes	DLMANX(dlid)

3.1.42. DSEISGRID

Owner(s)	STATIC
Category	Automatic Processing
Description	The DSEISGRID table contains a natural seismicity grid, which includes the average number of events per year with magnitude greater than the threshold in this table for each latitude-longitude grid point (the grid points are defined in the seisindex table). The DSEISGRID table is used by the AEQ application to help identify anomalous events.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	grdname	*varchar2(6)*	Grid name	N
PI	icell	*number(8,0)*	Grid cell index	N
	magth	*float(24)*	Magnitude threshold	Y
	magtype	*varchar2(6)*	Magnitude type, for example mb, Ms, ML	Y
	nevyr	*float(24)*	Average number of events/year	Y
	lddate	*date*	Load date	Y

Primary key	PK_DSEISGRID(grdname, icell)
Indexes	PK_DSEISGRID(grdname, icell)

3.1.43. DSEISINDEX

Owner(s)	STATIC
Category	Automatic Processing
Description	The DESEISINDEX table contains the geographic grids of natural seismicity data in the seisgrid table. The DESEISINDEX table contains the geographic grids of seismicity data in the DSEISGRID table. The DESEISINDEX table is used by the AEQ application to help identify anomalous events.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	grdname	*varchar2(6)*	Grid name	N
	lat1	*float(24)*	Initial latitude	Y
	lon1	*float(24)*	Initial longitude	Y
	dlat	*float(24)*	Latitude increment	Y
	dlon	*float(24)*	Longitude increment	Y
	nlat	*number(8,0)*	Number of latitudes	Y
	nlon	*number(8,0)*	Number of longitudes	Y
	orderby	*varchar2(6)*	Order by either latitude or longitude	Y
	lddate	*date*	Load date	Y

Primary key	PK_DSEISINDEX(grdname)
Indexes	PK_DSEISINDEX(grdname)

3.1.44. EVCHAR_PROD

Owner(s)	IDCX
Description	Obsolete. Never used.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	prodid	*number(10,0)*	Obsolete.	N
PI	orid	*number(10,0)*	Obsolete.	N
	ec_icat	*varchar2(8)*	Obsolete.	Y
	ec_score	*float(24)*	Obsolete.	Y
	ec_dscore	*float(24)*	Obsolete.	Y
	ec_mscore	*float(24)*	Obsolete.	Y
	ec_pscore	*float(24)*	Obsolete.	Y
	ec_hscore	*float(24)*	Obsolete.	Y
	ec_iscore	*float(24)*	Obsolete.	Y
	ec_lscore	*float(24)*	Obsolete.	Y
	ec_deptherr	*float(24)*	Obsolete.	Y
	ec_msmb	*float(24)*	Obsolete.	Y
	ec_msmberr	*float(24)*	Obsolete.	Y
	ec_smajax	*float(24)*	Obsolete.	Y
	ec_sminax	*float(24)*	Obsolete.	Y
	ec_strike	*float(24)*	Obsolete.	Y
	ec_consider	*number(8,0)*	Obsolete.	Y
	ec_ievcat	*varchar2(8)*	Obsolete.	Y
	ec_nsta_ms	*number(8,0)*	Obsolete.	Y
	ec_nsta_mb	*number(8,0)*	Obsolete.	Y
	ec_pctoffsh	*float(24)*	Obsolete.	Y
	ec_irej	*varchar2(8)*	Obsolete.	Y
	ec_stamin	*varchar2(6)*	Obsolete.	Y
	ec_pvaluemin	*float(24)*	Obsolete.	Y
I	lddate	*date*	Load date	Y

Primary key	PK_EVCHAR_PROD(prodid, orid)
Indexes	PK_EVCHAR_PROD(prodid, orid), EVCHAR_PROD_LDDATEX(lddate)

3.1.45. EVENT

Owner(s)	SEL2, SEL3, SEL1
Category	Core, Fundamental
Description	The EVENT table contains a list of events. Multiple origins may be defined for any

	one event.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	evid	*number(10,0)*	Event identifier	N
	evname	*varchar2(15)*	Event name	Y
	prefor	*number(10,0)*	Preferred origin	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
	commid	*number(10,0)*	Comment identifier	Y
I	lddate	*date*	Load date	Y

Primary key	PK_EVENT(evid)
Indexes	EVENT_LDDATEX(lddate), PK_EVENT(evid)

3.1.46. EVENT

Owner(s)	REB, LEB
Category	Core, Fundamental
Description	The EVENT table contains a list of events. Multiple origins may be defined for any one event.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	evid	*number(10,0)*	Event identifier	N
	evname	*varchar2(15)*	Event name	Y
	prefor	*number(10,0)*	Preferred origin	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
	commid	*number(10,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

Primary key	PK_EVENT(evid)
Indexes	PK_EVENT(evid)

3.1.47. EVENT_CONTROL

Owner(s)	REB
Category	Automatic Processing
Description	The EVENT_CONTROL and IN_EVENT_CONTROL tables contain event location and magnitude control parameters. This information acts as an archive of the specific user-defined controls that were used to determine the location and magnitude of a given orid. The table also includes two measurement columns (cov_sm_axes and cov_depth_time) that allow the coverage ellipse to be determined from the confidence ellipse axes.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	orid	*number(10,0)*	Origin identifier	N
	evid	*number(10,0)*	Event identifier	Y
	prefer_loc	*varchar2(1)*	Preferred location identifier (S, F, R)	Y
	constrain_ot	*number(1,0)*	Flag to constrain origin time	Y
	constrain_latlon	*number(1,0)*	Flag to constrain latitude/longitude	Y
	constrain_depth	*number(1,0)*	Flag to constrain depth	Y
	src_dpnt_corr	*number(2,0)*	Source-dependent correction code	Y
	loc_src_dpnt_reg	*varchar2(15)*	Region name of source-dependent location correction	Y
	loc_sdv_screen	*number(1,0)*	Flag to ignore large data residuals in location	Y
	loc_sdv_mult	*float(24)*	Location large residual multiplier factor	Y
	loc_alpha_only	*number(1,0)*	Flag to use only primary stations in location	Y
	loc_all_stas	*number(1,0)*	Flag to use only stations with src_dpnt_corr	Y
	loc_dist_varwgt	*number(1,0)*	Flag to use distance variance weighting	Y
	mag_src_dpnt_reg	*varchar2(15)*	Region name of source-dependent magnitude correction	Y
	mag_sdv_screen	*number(1,0)*	Flag to ignore large magnitude data residuals	Y
	mag_sdv_mult	*float(24)*	Magnitude large residual multiplier factor	Y
	mag_alpha_only	*number(1,0)*	Flag to limit station net used in magnitude	Y
	mag_all_stas	*number(1,0)*	Flag to use only primary stations in magnitude	Y
	mb_min_dist	*float(24)*	Minimum distance (degrees) for mb	Y
	mb_max_dist	*float(24)*	Maximum distance (degrees) for mb	Y
	mmodel	*varchar2(15)*	Network magnitude model	Y
	cov_sm_axes	*float(24)*	Coverage ellipse semi-axes conversion factor	Y
	cov_depth_time	*float(24)*	Coverage ellipse depth/time conversion factor	Y
	lddate	*date*	Load date	Y

Primary key	PK_EVENT_CONTROL(orid)
Indexes	PK_EVENT_CONTROL(orid)

3.1.48. EVENT_CONTROL

Owner(s)	LEB
Category	Automatic Processing
Description	The EVENT_CONTROL and IN_EVENT_CONTROL tables contain event location and magnitude control parameters. This information acts as an archive of the specific

	user-defined controls that were used to determine the location and magnitude of a given orid. The table also includes two measurement columns (cov_sm_axes and cov_depth_time) that allow the coverage ellipse to be determined from the confidence ellipse axes.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	orid	*number(10,0)*	Origin identifier	N
I	evid	*number(10,0)*	Event identifier	Y
	prefer_loc	*varchar2(1)*	Preferred location identifier (S, F, R)	Y
	constrain_ot	*number(1,0)*	Flag to constrain origin time	Y
	constrain_latlon	*number(1,0)*	Flag to constrain latitude/longitude	Y
	constrain_depth	*number(1,0)*	Flag to constrain depth	Y
	src_dpnt_corr	*number(2,0)*	Source-dependent correction code	Y
	loc_src_dpnt_reg	*varchar2(15)*	Region name of source-dependent location correction	Y
	loc_sdv_screen	*number(1,0)*	Flag to ignore large data residuals in location	Y
	loc_sdv_mult	*float(24)*	Location large residual multiplier factor	Y
	loc_alpha_only	*number(1,0)*	Flag to use only primary stations in location	Y
	loc_all_stas	*number(1,0)*	Flag to use only stations with src_dpnt_corr	Y
	loc_dist_varwgt	*number(1,0)*	Flag to use distance variance weighting	Y
	mag_src_dpnt_reg	*varchar2(15)*	Region name of source-dependent magnitude correction	Y
	mag_sdv_screen	*number(1,0)*	Flag to ignore large magnitude data residuals	Y
	mag_sdv_mult	*float(24)*	Magnitude large residual multiplier factor	Y
	mag_alpha_only	*number(1,0)*	Flag to limit station net used in magnitude	Y
	mag_all_stas	*number(1,0)*	Flag to use only primary stations in magnitude	Y
	mb_min_dist	*float(24)*	Minimum distance (degrees) for mb	Y
	mb_max_dist	*float(24)*	Maximum distance (degrees) for mb	Y
	mmodel	*varchar2(15)*	Network magnitude model	Y
	cov_sm_axes	*float(24)*	Coverage ellipse semi-axes conversion factor	Y
	cov_depth_time	*float(24)*	Coverage ellipse depth/time conversion factor	Y
	lddate	*date*	Load date	Y

Primary key	PK_EVENT_CONTROL(orid)
Indexes	PK_EVENT_CONTROL(orid), EVNTCTRLEVIDX(evid)

3.1.49. EVSC_HYDRO

Owner(s)	IDCX
Category	Automatic Processing
Description	The EVSC_HYDRO table contains station-specific hydroacoustic event-screening results for the standard and custom subscription criteria. The table contains one record per origin identifier (orid) per station (sta).

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	orid	*number(10,0)*	Origin identifier	N
PI	sta	*varchar2(6)*	Station code	N
	cp_broad_band	*float(24)*	Hydroacoustic cepstral peak amplitude in 2-80 Hz band	Y
	snr_high_band	*float(24)*	Hydroacoustic signal-to-noise ratio in 32-64 Hz band	Y
	noise_high_band	*float(24)*	Hydroacoustic noise level in 32-64 Hz band	Y
	lddate	*date*	Load date	Y

Primary key	PK_EVSC_HYDRO(orid, sta)
Indexes	PK_EVSC_HYDRO(orid, sta)

3.1.50. EVSC_PROD

Owner(s)	IDCX
Category	Fundamental
Description	The EVSC_PROD table contains event screening results for the standard and custom subscription criteria. The table contains one record per origin identifier (orid) for each subscription (prodid).

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	prodid	*number(10,0)*	Product identifier	N
PI	orid	*number(10,0)*	Origin identifier	N
	score	*float(24)*	Composite screening score	Y
	dscore	*float(24)*	Depth screening score	Y
	mscore	*float(24)*	Mb minus Ms screening score	Y
	rscore	*float(24)*	Regional P/S screening score	Y
	hscore	*float(24)*	Hydroacoustic screening score	Y
	depth	*float(24)*	Depth estimate (kilometers)	Y
	deptherr	*float(24)*	Depth confidence interval	Y
	moveout_pp	*float(24)*	Moveout of pP-P travel times	Y
	moveout_sp	*float(24)*	Moveout of sP-P travel times	Y
	min_dt_pp	*float(24)*	PP-P travel time difference at nearest station	Y

			beyond 25 deg.	
	min_dt_sp	*float(24)*	SP-P travel time difference at nearest station beyond 25 deg.	Y
	ndp_snr_pp	*number(8,0)*	Number of pP phases with sufficient snr for moveout processing	Y
	ndp_snr_sp	*number(8,0)*	Number of sP phases with sufficient snr for moveout processing	Y
	mbms	*float(24)*	Mb minus Ms (including slope term)	Y
	mbmserr	*float(24)*	Mb minus Ms confidence interval	Y
	mb	*float(24)*	Mb magnitude used for event screening	Y
	ms	*float(24)*	Ms magnitude used for event screening	Y
	nsta_mb	*number(8,0)*	Number of stations used in network mb estimate	Y
	nsta_ms	*number(8,0)*	Number of stations used in network Ms estimate	Y
	smaj_sc	*float(24)*	Scaled semi-major axis of location error ellipse	Y
	smin_sc	*float(24)*	Scaled semi-minor axis of location error ellipse	Y
	strike	*float(24)*	Strike angle of location error ellipse semi-major axis	Y
	pctoffsh	*float(24)*	Percent of location error ellipse that is offshore	Y
	min_wdepth	*float(24)*	Minimum water depth within location error ellipse	Y
	clrpth	*number(1,0)*	Indicator of clear path to at least one hydroacoustic station	Y
	consider	*number(1,0)*	Considered for event screening flag	Y
	lddate	*date*	Load date	Y

Primary key	PK_EVSC_PROD(prodid, orid)
Indexes	PK_EVSC_PROD(prodid, orid), EVSC_PROD_ORIDX(orid)

3.1.51. EVSC_REGIONAL

Owner(s)	IDCX
Category	Fundamental
Description	The EVSC_REGIONAL table contains station-specific regional seismic phase amplitude measurements and quality flags for the standard and subscription criteria. The table contains one record per origin identifier (orid) per station (sta).

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	orid	*number(10,0)*	Origin identifier	N

PI	sta	*varchar2(6)*	Station code	N
PI	chan	*varchar2(8)*	Channel name	N
	delta	*float(24)*	Source-receiver distance in degrees	Y
	pnsmax	*float(24)*	Maximum of Pn/Sn and Pn/Lg	Y
	pnsmax_corr	*float(24)*	Amplitude ratio correction term	Y
	pnsmax_err	*float(24)*	Amplitude ratio error term	Y
	pnsn	*float(24)*	Pn/Sn amplitude ratio	Y
	pnlg	*float(24)*	Pn/Lg amplitude ratio	Y
	pn_snr	*float(24)*	Pn amplitude snr ratio	Y
	sn_snr	*float(24)*	Sn amplitude snr ratio	Y
	lg_snr	*float(24)*	Lg amplitude snr ratio	Y
	pnsn_qual	*varchar2(10)*	Pn/Sn amplitude ratio quality flags	Y
	pnlg_qual	*varchar2(10)*	Pn/Lg amplitude ratio quality flags	Y
	lddate	*date*	Load date	Y

Primary key	PK_EVSC_REGIONAL(orid, sta, chan)
Indexes	PK_EVSC_REGIONAL(orid, sta, chan)

3.1.52. FDSNCHAN

Owner(s)	STATIC
Category	Automatic Processing
Description	The FDSNCHAN table maps FDSN channel names to "old" channel names.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	mapid	*number(10,0)*	Mapping id	N
	oldname	*varchar2(20)*	Old channel name	N
	newname	*varchar2(20)*	FDSN channel name	N

Primary key	FDSNCHAN_PK(mapid)
Indexes	FDSNCHAN_PK(mapid)

3.1.53. FILEPRODUCT

Owner(s)	IDCX
Category	Data Services
Description	The FILEPRODUCT table contains descriptions of data files containing products stored on the UNIX filesystem. The typeid column links to the corresponding text description of that product in the FPDESCRIPTION table.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**

PI	fpid	*number(10,0)*	File product identifier	N
I	typeid	*number(10,0)*	Identifier for the product type	Y
	dir	*varchar2(64)*	Absolute path to the data file	Y
I	dfile	*varchar2(32)*	Name of file containing the fileproduct	Y
	foff	*number(10,0)*	Byte offset of data segment within file	Y
	dsize	*number(10,0)*	Size of the data file (in bytes)	Y
I	time	*float(53)*	Beginning time of the data	Y
I	endtime	*float(53)*	End time of the data	Y
I	sta	*varchar2(6)*	Station code	Y
I	chan	*varchar2(8)*	Channel name	Y
	author	*varchar2(16)*	Author name	Y
	version	*float(53)*	Version of the author	Y
	revision	*number(4,0)*	Revision number	Y
	obsolete	*number(1,0)*	Flag to indicate whether (1) or not (0) the data are obsolete.	Y
I	lddate	*date*	Load date	Y

Primary key	PK_FILEPRODUCT(fpid)
Indexes	FILEPROD_CHANX(chan), FILEPROD_TIMEX(time), FILEPROD_LDDATEX(lddate), FILEPROD_ENDTIMEX(endtime), FILEPROD_TID(typeid, sta), FILEPROD_DFILEX(dfile), PK_FILEPRODUCT(fpid)
Triggers	FILEPRODUCT_TO_DATAREADY, FILEPRODUCT_NULL_LDDATE

3.1.54. FILEPRODUCT_BU_20200610

Owner(s)	IDCX
Description	Not used at the IDC.

Pk/Fk/I	Column	Storage type	Description	Nullable
	fpid	*number(10,0)*		Y
	typeid	*number(10,0)*		Y
	dir	*varchar2(64)*		Y
	dfile	*varchar2(32)*		Y
	foff	*number(10,0)*		Y
	dsize	*number(10,0)*		Y
	time	*float(53)*		Y
	endtime	*float(53)*		Y
	sta	*varchar2(6)*		Y
	chan	*varchar2(8)*		Y

	author	*varchar2(16)*		Y
	version	*float(53)*		Y
	revision	*number(4,0)*		Y
	obsolete	*number(1,0)*		Y
	lddate	*date*		Y

3.1.55. FILEPRODUCT_TEMP

Owner(s)	IDCX
Description	Not used at the IDC.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
	fpid	*number(10,0)*		Y
	typeid	*number(10,0)*		Y
	dir	*varchar2(64)*		Y
	dfile	*varchar2(32)*		Y
	foff	*number(10,0)*		Y
	dsize	*number(10,0)*		Y
	time	*float(53)*		Y
	endtime	*float(53)*		Y
	sta	*varchar2(6)*		Y
	chan	*varchar2(8)*		Y
	author	*varchar2(16)*		Y
	version	*float(53)*		Y
	revision	*number(4,0)*		Y
	obsolete	*number(1,0)*		Y
	lddate	*date*		Y

3.1.56. FKDISC

Owner(s)	LEB
Category	Interactive Processing
Description	Not used at the IDC.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
	jdate	*number(8,0)*	Julian date for this data	Y
	time	*float(53)*	Epoch time	N
	tlen	*float(24)*	time window	Y
	sta	*varchar2(6)*	station code	Y

	fktyp	*varchar2(4)*	f-k type	Y
	arid	*number(10,0)*	Arrival identifier	N
	maxkx	*float(24)*	maximum x-wavenumber	Y
	maxsx	*float(24)*	maximum x-slowness	Y
	nx	*number(4,0)*	number of x-samples	Y
	maxky	*float(24)*	maximum y-wavenumber	Y
	maxsy	*float(24)*	maximum y-slowness	Y
	ny	*number(4,0)*	number of y-samples	Y
	cfreq	*float(24)*	center frequency	Y
	bandw	*float(24)*	bandwidth	Y
	commid	*number(10,0)*	Comment identifier	Y
	fkrid	*number(10,0)*	f-k recipe identifier	Y
	fkid	*number(10,0)*	f-k identifier	Y
	datsw	*number(10,0)*	data switch	Y
	foff	*number(10,0)*	Byte offset of data segment within file	Y
	dir	*varchar2(64)*	f-k directory	Y
	dfile	*varchar2(32)*	f-k data file	Y
	lddate	*date*	Load date	Y

3.1.57. FORBEAMAUX

Owner(s)	STATIC
Category	Data Services
Description	The FORBEAMAUX table contains the channels for which amplitude measurements in the event lists and bulletins have been made.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	sta	*varchar2(6)*	Station code	N
PI	chan	*varchar2(8)*	Channel name	N

Primary key	PK_FORBEAMAUX(sta, chan)
Indexes	PK_FORBEAMAUX(sta, chan)

3.1.58. FPDESCRIPTION

Owner(s)	IDCX
Category	Data Services
Description	The FPDESCRIPTION table contains descriptions of product types used with file products.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	typeid	*number(10,0)*	Identifier for the product type description	N
	prodtype	*varchar2(12)*	Product type	Y
	name	*varchar2(64)*	Descriptive listing of the product name	Y
	msgdtype	*varchar2(16)*	Type of data (ASCII, GIF89, and so on)	Y
	msgdformat	*varchar2(8)*	Format of the data, for example, binary, ps, IMS1.0, TXT, CD-1.1, CD-1.0, GSE2.0, IMS2.0).	Y
	header_fpid	*number(10,0)*	Fpid pointing to the header row for this product type	Y
	lddate	*date*	Load date	Y

Primary key	PK_FPDESCRIPTION(typeid)
Indexes	PK_FPDESCRIPTION(typeid)

3.1.59. FS_STAGEPRODUCT

Owner(s)	IDCX
Category	Data Services
Description	Obsolete.

Pk/Fk/I	Column	Storage type	Description	Nullable
	fpid	*number(10,0)*	obsolete	Y
	typeid	*number(10,0)*	obsolete	Y
	dir	*varchar2(64)*	obsolete	Y
	dfile	*varchar2(32)*	obsolete	Y
	foff	*number(8,0)*	obsolete	Y
	dsize	*number(8,0)*	obsolete	Y
	time	*float(53)*	obsolete	Y
	endtime	*float(53)*	obsolete	Y
	sta	*varchar2(6)*	obsolete	Y
	chan	*varchar2(8)*	obsolete	Y
	author	*varchar2(16)*	obsolete	Y
	version	*float(53)*	obsolete	Y
	revision	*number(4,0)*	obsolete	Y
	obsolete	*number(1,0)*	obsolete	Y
	lddate	*date*	Load date	Y

3.1.60. FTPFAILED

Owner(s)	IDCX
Category	Data Services
Description	The FTPFAILED table contains information on FTP data retrieval by VDMS, including the msgid (linking to the MSGDISC table), the destination address, number of failed attempts and the epochal time at which the transfer was last attempted.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	msgid	*number(10,0)*	Message identifier	N
	numfailedattempt	*number(4,0)*	Number of failed attempts	Y
	lastfailedtime	*float(53)*	Time of most recent attempt	Y
	ftp_address	*varchar2(64)*	FTP address	Y
	status	*varchar2(8)*	Status of this row.	Y
	lddate	*date*	Load date	Y

Primary key	PK_FTPFAILED(msgid)
Indexes	PK_FTPFAILED(msgid)

3.1.61. FTPLOGIN

Owner(s)	IDCX
Category	Data Services
Description	The FTPLOGIN table contains log on information for FTP data retrieval. The rows are used by the auxiliary data retrieval system to obtain data via FTP from auxiliary stations.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	ftp_address	*varchar2(64)*	FTP address for auxiliary data	N
	username	*varchar2(16)*	UNIX login	Y
	password	*varchar2(16)*	User password for FTP access	Y
	lddate	*date*	Load date	Y

Primary key	FTPLOGIN_PK(ftp_address)
Indexes	FTPLOGIN_PK(ftp_address)

3.1.62. GA_TAG

Owner(s)	SEL1
Category	Automatic Processing
Description	The GA_TAG table contains information on the use of arrivals and origins in the GA application.

Pk/Fk/I	Column	Storage type	Description	Nullable
	objtype	*varchar2(1)*	Type of identifier (a for arrival, o for origin)	Y
I	id	*number(10,0)*	Identification number (arid or orid)	Y
I	state	*varchar2(20)*	Use of arid or orid by the Global Association (GA) subsystem	Y

Indexes	GAIDX(id, state)

3.1.63. GREGION

Owner(s)	STATIC
Category	Core, Reference
Description	The GREGION table contains Flinn-Engdahl (F-E) geographic region numbers and their corresponding descriptions (see [Fli74]).

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	grn	*number(8,0)*	Geographic region number	N
I	grname	*varchar2(40)*	Geographic region name	Y
	lddate	*date*	Load date	Y

Primary key	PK_GREGION(grn)
Indexes	PK_GREGION(grn), GREGGRNAMEX(grname)

3.1.64. HYDRO_ARR_GROUP

Owner(s)	IDCX, REB, LEB
Category	Fundamental
Description	The HYDRO_ARR_GROUP table contains hydroacoustic arrival based estimates of slowness and azimuth.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	hydro_id	*number(10,0)*	Hydro-arrival-group identifier	N
	az1	*float(24)*	Azimuth estimated from lag times	Y
	az2	*float(24)*	Second possible azimuth (2 arrivals)	Y
	slow	*float(24)*	Slowness (s/km)	Y
	delaz	*float(24)*	Azimuth uncertainty	Y
	nhydarr	*number(4,0)*	Number of arrivals in hydro-arrival-group	Y
	net	*varchar2(8)*	Network identification string	Y
	hyd_grp_phase	*varchar2(8)*	Hydro-arrival-group phase	Y
	lddate	*date*	Load date	Y

Primary key	PK_HYDRO_ARR_GROUP(hydro_id)
Indexes	PK_HYDRO_ARR_GROUP(hydro_id)

3.1.65. HYDRO_ASSOC

Owner(s)	IDCX, REB, LEB
Category	Fundamental
Description	The HYDRO_ASSOC table contains hydroacoustic arrival based estimates of slowness and azimuth.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	arid	*number(10,0)*	Arrival identifier	N
I	hydro_id	*number(10,0)*	Hydro-arrival-group identifier	N
	azcontrib	*varchar2(1)*	Azimuth contribution flag (y or n)	Y
	lddate	*date*	Load date	Y

Primary key	PK_HYDRO_ASSOC(arid)
Indexes	HYDRO_ASSOC_ARIDX(arid, hydro_id), HYDRO_ASSOC_HIDX(hydro_id, arid)

3.1.66. HYDRO_FEATURES

Owner(s)	REB, LEB
Category	Fundamental
Description	The HYDRO_FEATURES table contains feature measurements for hydroacoustic data by the Detection and Feature Extraction (DFX) application.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	arid	*number(10,0)*	Arrival identifier	N
	peak_time	*float(53)*	Time of largest absolute signal value	Y
	peak_level	*float(24)*	Pressure of largest absolute signal value	Y
	total_energy	*float(24)*	Total energy in signal	Y
	mean_arrival_time	*float(53)*	Mean arrival time of signal energy	Y
	time_spread	*float(24)*	Rms time spread of signal	Y
	onset_time	*float(53)*	Estimated onset time of signal	Y
	termination_time	*float(53)*	Estimated termination time of signal	Y
	total_time	*float(53)*	Total time above threshold	Y
	num_cross	*number(8,0)*	Number of signal threshold crossings	Y
	ave_noise	*float(24)*	Average pressure of the noise segment	Y
	skewness	*float(24)*	Skew of the estimated signal energy	Y
	kurtosis	*float(24)*	Kurtosis of the estimated signal energy	Y

	cep_var_signal	*float(24)*	Variance of the cepstrum using spectrum	Y
	cep_delay_time_signal	*float(24)*	Bubble pulse delay time using spectrum	Y
	cep_peak_std_signal	*float(24)*	Number of standard deviations from the mean for amplitude using spectrum	Y
	cep_var_trend	*float(24)*	Variance of the cepstrum detrended using Noise Spectrum Equalization (NSE)	Y
	cep_delay_time_trend	*float(24)*	Bubble pulse delay time estimate using trend NSE	Y
	cep_peak_std_trend	*float(24)*	Number of standard deviations from the mean for amplitude using the trend	Y
PI	low_cut	*float(24)*	Low-cut frequency of filter	N
PI	high_cut	*float(24)*	High-cut frequency of filter	N
	ford	*number(8,0)*	Filter order	Y
	ftype	*varchar2(2)*	Filter type	Y
	fzp	*number(8,0)*	Filter causality	Y
	prob_weight_time	*float(53)*	Probability-weighted time	Y
	sigma_time	*float(53)*	Variance of the probability-weighted time	Y
	lddate	*date*	Load date	Y

Primary key	PK_HYDRO_FEATURES(arid, high_cut, low_cut)
Indexes	HYDARIDX(arid), PK_HYDRO_FEATURES(arid, high_cut, low_cut)

3.1.67. HYDRO_FEATURES

Owner(s)	IDCX
Category	Fundamental
Description	The HYDRO_FEATURES table contains feature measurements for hydroacoustic data by the Detection and Feature Extraction (DFX) application.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	arid	*number(10,0)*	Arrival identifier	N
	peak_time	*float(53)*	Time of largest absolute signal value	Y
	peak_level	*float(24)*	Pressure of largest absolute signal value	Y
	total_energy	*float(24)*	Total energy in signal	Y
	mean_arrival_time	*float(53)*	Mean arrival time of signal energy	Y
	time_spread	*float(24)*	Rms time spread of signal	Y
	onset_time	*float(53)*	Estimated onset time of signal	Y
	termination_time	*float(53)*	Estimated termination time of signal	Y
	total_time	*float(53)*	Total time above threshold	Y

	num_cross	*number(8,0)*	Number of signal threshold crossings	Y
	ave_noise	*float(24)*	Average pressure of the noise segment	Y
	skewness	*float(24)*	Skew of the estimated signal energy	Y
	kurtosis	*float(24)*	Kurtosis of the estimated signal energy	Y
	cep_var_signal	*float(24)*	Variance of the cepstrum using spectrum	Y
	cep_delay_time_signal	*float(24)*	Bubble pulse delay time using spectrum	Y
	cep_peak_std_signal	*float(24)*	Number of standard deviations from the mean for amplitude using spectrum	Y
	cep_var_trend	*float(24)*	Variance of the cepstrum detrended using Noise Spectrum Equalization (NSE)	Y
	cep_delay_time_trend	*float(24)*	Bubble pulse delay time estimate using trend NSE	Y
	cep_peak_std_trend	*float(24)*	Number of standard deviations from the mean for amplitude using the trend	Y
PI	low_cut	*float(24)*	Low-cut frequency of filter	N
PI	high_cut	*float(24)*	High-cut frequency of filter	N
	ford	*number(8,0)*	Filter order	Y
	ftype	*varchar2(2)*	Filter type	Y
	fzp	*number(8,0)*	Filter causality	Y
	prob_weight_time	*float(53)*	Probability-weighted time	Y
	sigma_time	*float(53)*	Variance of the probability-weighted time	Y
I	lddate	*date*	Load date	Y

Primary key	PK_HYDRO_FEATURES(arid, high_cut, low_cut)
Indexes	HYDARIDX(arid), PK_HYDRO_FEATURES(arid, high_cut, low_cut), HYDRO_FEATURES_LDDATEX(lddate)

3.1.68. INFRA_FEATURES

Owner(s)	REB, LEB
Category	Fundamental
Description	Never used.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
I	arid	*number(10,0)*	Arrival identifier	N
	eng_time	*float(53)*	energy start time	Y
	eng_dur	*float(24)*	energy duration	Y
	eng_deldur	*float(24)*	standard deviation for energy duration	Y
	coh_time	*float(53)*	coherence start time	Y

	coh_dur	*float(24)*	coherence duration	Y
	coh_deldur	*float(24)*	standard deviation for coherence duration	Y
	coinc_time	*float(53)*	coincident start time	Y
	coinc_dur	*float(24)*	coincident duration	Y
	coinc_deldur	*float(24)*	standard deviation for coincident duration	Y
	ford	*number(4,0)*	Filter order	Y
	zrcr_freq	*float(24)*	zero crossing frequency	Y
	zrcr_delfreq	*float(24)*	standard deviation for zero crossing frequency	Y
	crnr_freq	*float(24)*	corner frequency	Y
	crnr_delfreq	*float(24)*	standard deviation for corner frequency	Y
	coh_per	*float(24)*	spatial coherence period	Y
	coh_snr	*float(24)*	spatial coherence signal-to-noise ratio	Y
	total_energy	*float(24)*	Total energy in signal	Y
	auth	*varchar2(15)*	Source/originator	Y
	commid	*number(10,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

Indexes	INFRAARIDX(arid)

3.1.69. INFRA_FEATURES

Owner(s)	IDCX
Category	Fundamental
Description	The INFRA_FEATURES table contains feature measurements for infrasonic data from the DFX application.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	arid	*number(10,0)*	Arrival identifier	N
	eng_time	*float(53)*	energy start time	Y
	eng_dur	*float(24)*	energy duration	Y
	eng_deldur	*float(24)*	standard deviation for energy duration	Y
	coh_time	*float(53)*	coherence start time	Y
	coh_dur	*float(24)*	coherence duration	Y
	coh_deldur	*float(24)*	standard deviation for coherence duration	Y
	coinc_time	*float(53)*	coincident start time	Y
	coinc_dur	*float(24)*	coincident duration	Y
	coinc_deldur	*float(24)*	standard deviation for coincident duration	Y
	ford	*number(4,0)*	Filter order	Y
	zrcr_freq	*float(24)*	zero crossing frequency	Y

	zrcr_delfreq	*float(24)*	standard deviation for zero crossing frequency	Y
	crnr_freq	*float(24)*	corner frequency	Y
	crnr_delfreq	*float(24)*	standard deviation for corner frequency	Y
	coh_per	*float(24)*	spatial coherence period	Y
	coh_snr	*float(24)*	spatial coherence signal-to-noise ratio	Y
	total_energy	*float(24)*	Total energy in signal	Y
	auth	*varchar2(15)*	Source/originator	Y
	commid	*number(10,0)*	Comment identifier	Y
I	lddate	*date*	Load date	Y

Primary key	PK_INFRA_FEATURES(arid)
Indexes	PK_INFRA_FEATURES(arid), INFRA_FEATURES_LDDATEX(lddate)

3.1.70. INSTRUMENT

Owner(s)	STATIC
Category	Core, Reference
Description	The INSTRUMENT table contains ancillary calibration information. This table holds nominal one-frequency calibration factors for each instrument and pointers to the nominal frequency-dependent calibration for an instrument. It also holds pointers to the exact calibrations obtained by direct measurement on a particular instrument (see sensor).

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	inid	*number(8,0)*	Instrument identifier	N
	insname	*varchar2(50)*	Instrument name	Y
	instype	*varchar2(6)*	Instrument type (e.g. CMG3ES, Akashi, HMP45A)	Y
	band	*varchar2(1)*	Frequency band	Y
	digital	*varchar2(1)*	Data type, digital (d), or analog (a)	Y
	samprate	*float(24)*	Sampling rate (samples per second)	Y
	ncalib	*float(24)*	Nominal calibration (nanometers/digital count)	Y
	ncalper	*float(24)*	Nominal calibration period (seconds)	Y
	dir	*varchar2(64)*	Absolute path to the data file	Y
	dfile	*varchar2(32)*	Instrument response file name	Y
	rsptype	*varchar2(6)*	Response type	Y
	lddate	*date*	Load date	Y

Primary key	PK_INSTRUMENT(inid)
Indexes	PK_INSTRUMENT(inid)

3.1.71. INTERVAL

Owner(s)	IDCX
Category	Distributed Processing
Description	The INTERVAL table defines units of processing. The time, endtime, and name fields indicate processing times for a named object. The class field allows a single interval table to be used for different classes of objects.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	intvlid	*number(10,0)*	Interval identifier	N
I	class	*varchar2(16)*	Type of interval	N
I	name	*varchar2(20)*	String identifying the content of the interval	N
	time	*float(53)*	Starting time of data	Y
I	endtime	*float(53)*	Ending time of data	Y
I	state	*varchar2(16)*	Current processing state	Y
I	moddate	*date*	Time of last processing state change	Y
	lddate	*date*	Load date	Y

Primary key	PK_INTERVAL(intvlid)
Indexes	INMODX(moddate), INENDX(endtime), INCLANASTAMO(class, name, state, moddate), INCLASSX(class, name, endtime), PK_INTERVAL(intvlid)

3.1.72. INTERVAL

Owner(s)	SEGMENT
Category	Distributed Processing
Description	The INTERVAL table defines units of processing. The time, endtime, and name fields indicate processing times for a named object. The class field allows a single interval table to be used for different classes of objects.

Pk/Fk/I	Column	Storage type	Description	Nullable
	intvlid	*number(8,0)*	Interval identifier	N
I	class	*varchar2(16)*	Type of interval	N
I	name	*varchar2(20)*	String identifying the content of the interval	N
	time	*float(53)*	Starting time of data	Y
I	endtime	*float(53)*	Ending time of data	Y
	state	*varchar2(16)*	Current processing state	Y
I	moddate	*date*	Time of last processing state change	Y
	lddate	*date*	Load date	Y

Indexes	INMODX(moddate), INENDX(endtime), INCLASSX(class, name, endtime)

3.1.73. IN_EVENT_CONTROL

Owner(s)	LEB
Category	Automatic Processing
Description	The EVENT_CONTROL and IN_EVENT_CONTROL tables contain event location and magnitude control parameters. This information acts as an archive of the specific user-defined controls that were used to determine the location and magnitude of a given orid. The table also includes two measurement columns (cov_sm_axes and cov_depth_time) that allow the coverage ellipse to be determined from the confidence ellipse axes.

Pk/Fk/I	Column	Storage type	Description	Nullable
I	orid	*number(10,0)*	origin identifier	N
	evid	*number(10,0)*	event identification	Y
	prefer_loc	*varchar2(1)*	preferred location identifier (S, F, R)	Y
	constrain_ot	*number(1,0)*	flag to constrain origin time	Y
	constrain_latlon	*number(1,0)*	flag to constrain latitude/longitude	Y
	constrain_depth	*number(1,0)*	flag to constrain depth	Y
	src_dpnt_corr	*number(2,0)*	source-dependent correction code	Y
	loc_src_dpnt_reg	*varchar2(15)*	region name of source-dependent location correction	Y
	loc_sdv_screen	*number(1,0)*	flag to ignore large data residuals in location	Y
	loc_sdv_mult	*float(24)*	location large residual multiplier factor	Y
	loc_alpha_only	*number(1,0)*	flag to use only primary stations in location	Y
	loc_all_stas	*number(1,0)*	flag to use only stations with src_dpnt_corr	Y
	loc_dist_varwgt	*number(1,0)*	flag to use distance variance weighting	Y
	mag_src_dpnt_re g	*varchar2(15)*	region name of source-dependent magnitude correction	Y
	mag_sdv_screen	*number(1,0)*	flag to ignore large magnitude data residuals	Y
	mag_sdv_mult	*float(24)*	magnitude large residual multiplier factor	Y
	mag_alpha_only	*number(1,0)*	flag to limit station net used in magnitude	Y
	mag_all_stas	*number(1,0)*	flag to use only primary stations in mag-nitude	Y
	mb_min_dist	*float(24)*	minimum distance (degrees) for mb	Y
	mb_max_dist	*float(24)*	maximum distance (degrees) for mb	Y
	mmodel	*varchar2(15)*	network magnitude model	Y
	cov_sm_axes	*float(24)*	coverage ellipse semi-axes conversion factor	Y
	cov_depth_time	*float(24)*	coverage ellipse depth/time conversion factor	Y
	lddate	*date*	Load date	Y

3.1.74. LASTID

Owner(s)	IDCX
Category	Database and Utility
Description	The LASTID table contains counter values (last value used for keys). This table is a reference table from which programs may retrieve the last sequential value of one of the numeric keys. Unique keys are required before inserting a record in numerous tables. The table has exactly one row for each keyname. PROBLASTID and RMS_LASTID are views of the LASTID table.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	keyname	*varchar2(15)*	Identifier name (arid, orid, and so on)	N
	keyvalue	*number(10,0)*	Last value used for the identifier specified in the keyname column	N
	lddate	*date*	Load date	Y

Primary key	LASTID_PK(keyname)
Indexes	LASTIDX(keyname)
Triggers	LASTID_CHECKS

3.1.75. LASTID

Owner(s)	SEGMENT
Category	Database and Utility
Description	The LASTID table contains counter values (last value used for keys). This table is a reference table from which programs may retrieve the last sequential value of one of the numeric keys. Unique keys are required before inserting a record in numerous tables. The table has exactly one row for each keyname. PROBLASTID and RMS_LASTID are views of the LASTID table.

Pk/Fk/I	Column	Storage type	Description	Nullable
I	keyname	*varchar2(15)*	Identifier name (arid, orid, and so on)	N
	keyvalue	*number(10,0)*	Last value used for the identifier specified in the keyname column	N
	lddate	*date*	Load date	Y

Indexes	LASTIDX(keyname)

3.1.76. MAPCOLOR

Owner(s)	MAP
Category	Interactive Processing
Description	The MAPCOLOR table contains information to associate a mapid from the MAP-DISC table with a colormapid from the COLORDISC table. This table is used to plot the same map (mapid) in different colors (for example, brown, green, or outline).

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	mapid	*number(8,0)*	Map identifier	N
PI	colormapid	*number(8,0)*	Colormap identifier	N
	lddate	*date*	Load date	Y

Primary key	MAPCOLOR_PK(mapid, colormapid)
Indexes	MAPCOLOR_PK(mapid, colormapid)

3.1.77. MAPDISC

Owner(s)	MAP
Category	Interactive Processing
Description	The MAPDISC table contains information about map files that are on disk.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	mapid	*number(8,0)*	Map identifier	N
	mapname	*varchar2(64)*	Map name	N
	dfile	*varchar2(32)*	Map data filename	N
	dir	*varchar2(64)*	Absolute path to the data file	N
	maptype	*number(8,0)*	Map type	N
	mapfiletype	*varchar2(4)*	Map file type	N
	projection	*number(8,0)*	Map projection	N
	dimx	*number(8,0)*	Map x dimension	N
	dimy	*number(8,0)*	Map y dimension	N
	reflon	*float(24)*	Reference longitude	Y
	reflat	*float(24)*	Reference latitude	Y
	refoffsetlon	*float(24)*	Longitude reference offset	Y
	refoffsetlat	*float(24)*	Latitude reference offset	Y
	lonorigradians	*float(24)*	Longitude origin radians	Y
	latorigradians	*float(24)*	Latitude origin radians	Y
	scale	*float(24)*	Map scale	Y
	rotation	*float(24)*	Map rotation	Y
	latminor	*float(24)*	Latitude interval for minor grid lines	Y
	latmajor	*float(24)*	Latitude interval for major grid lines	Y
	lonminor	*float(24)*	Longitude interval for minor grid lines	Y
	lonmajor	*float(24)*	Longitude interval for major grid lines	Y
	bordercolor	*varchar2(32)*	Border color name	Y
	label	*varchar2(65)*	Map category	Y
	lddate	*date*	Load date	Y

	gctp1	*float(24)*	General cartographic transformation package variables	Y
	gctp2	*float(24)*	General cartographic transformation package variables	Y
	gctp3	*float(24)*	General cartographic transformation package variables	Y
	gctp4	*float(24)*	General cartographic transformation package variables	Y
	gctp5	*float(24)*	General cartographic transformation package variables	Y
	gctp6	*float(24)*	General cartographic transformation package variables	Y
	gctp7	*float(24)*	General cartographic transformation package variables	Y
	gctp8	*float(24)*	General cartographic transformation package variables	Y
	gctp9	*float(24)*	General cartographic transformation package variables	Y
	gctp10	*float(24)*	General cartographic transformation package variables	Y
	gctp11	*float(24)*	General cartographic transformation package variables	Y
	gctp12	*float(24)*	General cartographic transformation package variables	Y
	gctp13	*float(24)*	General cartographic transformation package variables	Y
	gctp14	*float(24)*	General cartographic transformation package variables	Y
	gctp15	*float(24)*	General cartographic transformation package variables	Y

Primary key	MAPDISC_PK(mapid)
Indexes	MAPDISC_PK(mapid)

3.1.78. MAPOVER

Owner(s)	MAP
Category	Interactive Processing
Description	The MAPOVER table contains links between the MAPDISC and OVERLAYDISC tables.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	mapid	*number(8,0)*	Map identifier	N
PI	overlayid	*number(8,0)*	Overlay identifier	N

	lddate	*date*	Load date	Y

Primary key	MAPOVER_PK(mapid, overlayid)
Indexes	MAPOVER_PK(mapid, overlayid)

3.1.79. MAPPOINT

Owner(s)	MAP
Category	Interactive Processing
Description	The MAPPOINT table contains labeled point data to be displayed by the Map application.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	lat	*float(24)*	Geographic latitude. Locations north of the equator have positive latitudes.	N
PI	lon	*float(24)*	Geographic longitude. Longitudes are measured positive east of the Greenwich meridian.	N
	mplabel	*varchar2(65)*	Map point label	Y
PI	mptype	*varchar2(20)*	Map point type	N
	mpdescrip	*varchar2(50)*	Map point description	Y
	lddate	*date*	Load date	Y

Primary key	MAPPOINT_PK(lat, lon, mptype)
Indexes	MAPPOINT_PK(lat, lon, mptype)

3.1.80. MSGAUX

Owner(s)	IDCX
Category	Data Services
Description	The MSGAUX table contains records of unsuccessfully processed VDMS messages.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	msgid	*number(10,0)*	Message identifier	N
PI	msgrow	*number(4,0)*	Line number in message	N
PI	state_count	*number(4,0)*	Number of failures	N
	command	*varchar2(24)*	VDMS command that could not be processed	Y
	sub_status	*varchar2(24)*	Cause of failure	Y
I	lddate	*date*	Load date	Y

Primary key	PK_MSGAUX(msgid, msgrow, state_count)
Indexes	MGSXMSGIDX(msgid), PK_MSGAUX(msgid, msgrow, state_count), MSGAUX_LDDATEX(lddate)

3.1.81. MSGDATATYPE

Owner(s)	IDCX
Category	Data Services
Description	The MSGDATATYPE table supports data tracking by recording each data section in a message for both incoming and outgoing VDMS data messages.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	msgid	*number(10,0)*	Message identifier	N
	msgdtype	*varchar2(16)*	Data type of the data section within the message	Y
	msgdformat	*varchar2(16)*	Format of the data, currently one of GSE2.0, IMS1.0 or IMS2.0.	Y
	status	*varchar2(32)*	Status of this row.	Y
PI	foff	*number(8,0)*	Byte offset of data segment within file	N
	msize	*number(10,0)*	Size of data section	Y
I	lddate	*date*	Load date	Y

Primary key	PK_MSGDATATYPE(msgid, foff)
Indexes	MSGTYPMSGIDX(msgid), MSGDATATYPE_LDDATEX(lddate), PK_MSGDATATYPE(msgid, foff)

3.1.82. MSGDEST

Owner(s)	IDCX
Category	Data Services
Description	The MSGDEST table contains information about VDMS messages sent from the IDC.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	msgdid	*number(10,0)*	Message destination identifier	N
I	msgid	*number(10,0)*	Message identifier of the VDMS response	Y
	transmeth	*varchar2(16)*	Method by which the response is to be delivered to the requester	Y
	emailto	*varchar2(64)*	Email address to send message	Y
I	status	*varchar2(32)*	Status of this row.	Y
	itime	*float(53)*	Initial time when message was received	Y
	stime	*float(53)*	Epochal time at which message was sent	Y
I	lddate	*date*	Load date	Y

Primary key	PK_MSGDEST(msgdid)
Indexes	MSGDSTSTATX(status), MSGDSTMSGIDZ(msgid), MSGDEST_LDDATEX(ld-date), PK_MSGDEST(msgdid)

3.1.83. MSGDISC

Owner(s)	IDCX
Category	Data Services
Description	The MSGDISC table contains information pertinent to VDMS messages including the date and time that the message was sent or received, identification information, and where the message is stored.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	msgid	*number(10,0)*	Message identifier	N
	userid	*number(8,0)*	User identifier	Y
	msgver	*varchar2(8)*	Message system version number	Y
	msgtype	*varchar2(16)*	Message type	Y
	subtype	*varchar2(2)*	Message subtype	Y
	extmsgid	*varchar2(20)*	Message identification string provided by the sender	Y
I	intid	*number(10,0)*	Internal identifier for message tracking	Y
	intidtype	*varchar2(16)*	Identifier type for the intid	Y
	msgsrc	*varchar2(16)*	Message source code	Y
I	itime	*float(53)*	Initial time when message was received	Y
I	idate	*number(8,0)*	Initial date message was received	Y
	imethod	*varchar2(8)*	Input method (email or ftp)	Y
	isrc	*varchar2(64)*	Initial source of message	Y
	msize	*number(10,0)*	Message size in bytes	Y
I	status	*varchar2(32)*	Status of this row.	Y
	subject	*varchar2(64)*	Subject header from email message	Y
	dir	*varchar2(64)*	Absolute path to the data file	Y
	dfile	*varchar2(32)*	Name of message file	Y
	foff	*number(10,0)*	Byte offset of data segment within file	Y
	mfoff	*number(10,0)*	Offset in bytes to beginning of message	Y
	fileoff	*number(10,0)*	Number of bytes to the first character of the email file (first character of the email header)	Y
	filesize	*number(10,0)*	Size of file	Y
	sigtype	*varchar2(64)*	Digital signature type	Y
	verifstatus	*varchar2(4)*	Authentication status	Y

	commid	*number(10,0)*	Comment identifier	Y
I	lddate	*date*	Load date	Y

Primary key	PK_MSGDISC(msgid)
Indexes	MSGDISC_LDDATEX(lddate), MSGIDATEX(idate), MSGSTATX(status), MSGINTIDX(intid), PK_MSGDISC(msgid), MSGDISC_ITIMEX(itime)

3.1.84. NA_VALUE

Owner(s)	IDCX
Category	Database and Utility
Description	The NA_VALUE table contains the default values to be inserted for a column when not available.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	attribute	*varchar2(30)*	Column name	N
	na_value	*varchar2(30)*	Value inserted when not available	Y

Primary key	PK_NA_VALUE(attribute)
Indexes	PK_NA_VALUE(attribute)

3.1.85. NETMAG

Owner(s)	SEL3, REB, SEL1, SEL2, LEB
Category	Core, Fundamental
Description	The NETMAG table contains estimates of network magnitudes of different types for an event. Each network magnitude has a unique magid. Station magnitudes used to compute the network magnitude are in the STAMAG table.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	magid	*number(10,0)*	Network magnitude identifier	N
	net	*varchar2(8)*	Network identification string	Y
I	orid	*number(10,0)*	Origin identifier	N
	evid	*number(10,0)*	Event identifier	Y
	magtype	*varchar2(6)*	Magnitude type, for example mb, Ms, ML	Y
	nsta	*number(8,0)*	Number of stations used	Y
	magnitude	*float(24)*	Magnitude	Y
	uncertainty	*float(24)*	Magnitude uncertainty	Y
	auth	*varchar2(15)*	Source/originator	Y
	commid	*number(10,0)*	Comment identifier	Y
I	lddate	*date*	Load date	Y

Primary key	PK_NETMAG(magid)
Indexes	PK_NETMAG(magid), NETMAG_LDDATEX(lddate), NMORIDX(orid)

3.1.86. NETWORK

Owner(s)	STATIC
Category	Core, Reference
Description	The NETWORK table contains general information about seismic networks (see AFFILIATION).

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	net	*varchar2(8)*	Network identification string	N
	netname	*varchar2(80)*	Network name	Y
	nettype	*varchar2(4)*	Network type: array, local, world-wide, and so on	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
	commid	*number(10,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

Primary key	PK_NETWORK(net)
Indexes	PK_NETWORK(net)

3.1.87. NOOPS_CHANNAME

Owner(s)	STATIC
Description	Obsolete.

Pk/Fk/I	Column	Storage type	Description	Nullable
	station	*varchar2(6)*	Station name	N
	stream	*varchar2(6)*	Stream name	N
	extern_sta	*varchar2(6)*	External station name	N
	extern_chan	*varchar2(8)*	External channel name	N
	intern_sta	*varchar2(6)*	Internal station name	N
	intern_chan	*varchar2(8)*	Internal channel name	N
	capability	*number(4,0)*	Capability	Y
	position	*number(4,0)*	Position	Y
	revision	*number(4,0)*	Revision number	Y
	lddate	*date*	Load date	Y

3.1.88. OLD_WFPROTO (VIEW)

Owner(s)	IDCX
Description	Obsolete.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
	sta	*varchar2(6)*	Station code	N
	chan	*varchar2(8)*	Channel name	N
	time	*float(53)*	Start epochal time of the waveform segment	N
	wfid	*number*	Unique waveform identifier (integer)	Y
	chanid	*number(8,0)*	Channel recording identifier	Y
	jdate	*number(8,0)*	Julian date for this data	Y
	endtime	*float(53)*	End epochal time of the waveform segment	N
	nsamp	*number*	Number of samples in the waveform seg-ment	Y
	samprate	*float(24)*	Sample rate for this record (samples per second)	Y
	calib	*float(24)*	Nominal calibration	Y
	calper	*float(24)*	Calibration period (seconds)	Y
	instype	*varchar2(6)*	Instrument type (e.g. CMG3ES, Akashi, HMP45A)	Y
	segtype	*char(1)*	Waveform segment type indicating if the waveform is original, segmented, virtual or duplicate	Y
	datatype	*varchar2(2)*	Data type (e.g. s3, s4, t4)	Y
	clip	*char(1)*	Flag indicating whether or not the data are clipped	Y
	dir	*varchar2(64)*	Absolute path to the data file	Y
	dfile	*varchar2(32)*	Waveform data file name	Y
	foff	*number*	Byte offset of data segment within file	Y
	commid	*number*	Comment identifier	Y
	lddate	*date*	Load date	Y

SQL Body	`SELECT s.sta, s.chan, s.time, -1 wfid, s.chanid, s.jdate, s.endtime, 0 nsamp, i.samprate, i.ncalib calib, i.ncalper calper, i.instype, '-' segtype, c.outtype datatype, '-' clip, rpad('-', 64, ' ') dir, rpad('-', 32, ' ') dfile, 0 foff, -1 commid, sysdate lddate FROM sensor s, instrument i, wfconv c WHERE c.chanid=s.chanid and i.inid=s.inid AND c.sta = s.sta and s.endtime > 9999999999`

3.1.89. ORIGERR

Owner(s)	IDCX, REB
Category	Core, Fundamental
Description	The ORIGERR table contains summaries of confidence bounds in origin estimations. The measurement fields are the elements of the location covariance matrix. The descriptive fields give the uncertainties in location, depth, and origin time. These quantities are calculated from the covariance matrix, assuming gaussian errors and a confidence level.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	orid	*number(10,0)*	Origin identifier	N
	sxx	*float(24)*	Covariance matrix element	Y
	syy	*float(24)*	Covariance matrix element	Y
	szz	*float(24)*	Covariance matrix element	Y
	stt	*float(24)*	Covariance matrix element	Y
	sxy	*float(24)*	Covariance matrix element	Y
	sxz	*float(24)*	Covariance matrix element	Y
	syz	*float(24)*	Covariance matrix element	Y
	stx	*float(24)*	Covariance matrix element	Y
	sty	*float(24)*	Covariance matrix element	Y
	stz	*float(24)*	Covariance matrix element	Y

	sdobs	*float(24)*	Standard error of observations	Y
	smajax	*float(24)*	Semi-major axis of error	Y
	sminax	*float(24)*	Semi-minor axis of error	Y
	strike	*float(24)*	Strike angle of location error ellipse semi-major axis	Y
	sdepth	*float(24)*	Depth error	Y
	stime	*float(24)*	Origin time error (seconds)	Y
	conf	*float(24)*	Confidence	Y
	commid	*number(10,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

Primary key	PK_ORIGERR(orid)
Indexes	PK_ORIGERR(orid)

3.1.90. ORIGERR

Owner(s)	SEL2, SEL3, SEL1, LEB
Category	Core, Fundamental
Description	The ORIGERR table contains summaries of confidence bounds in origin estimations. The measurement fields are the elements of the location covariance matrix. The descriptive fields give the uncertainties in location, depth, and origin time. These quantities are calculated from the covariance matrix, assuming gaussian errors and a confidence level.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	orid	*number(10,0)*	Origin identifier	N
	sxx	*float(24)*	Covariance matrix element	Y
	syy	*float(24)*	Covariance matrix element	Y
	szz	*float(24)*	Covariance matrix element	Y
	stt	*float(24)*	Covariance matrix element	Y
	sxy	*float(24)*	Covariance matrix element	Y
	sxz	*float(24)*	Covariance matrix element	Y
	syz	*float(24)*	Covariance matrix element	Y
	stx	*float(24)*	Covariance matrix element	Y
	sty	*float(24)*	Covariance matrix element	Y
	stz	*float(24)*	Covariance matrix element	Y
	sdobs	*float(24)*	Standard error of observations	Y
	smajax	*float(24)*	Semi-major axis of error	Y
	sminax	*float(24)*	Semi-minor axis of error	Y
	strike	*float(24)*	Strike angle of location error ellipse semi-major axis	Y

	sdepth	*float(24)*	Depth error	Y
	stime	*float(24)*	Origin time error (seconds)	Y
	conf	*float(24)*	Confidence	Y
	commid	*number(10,0)*	Comment identifier	Y
I	lddate	*date*	Load date	Y

Primary key	PK_ORIGERR(orid)
Indexes	PK_ORIGERR(orid), ORIGERR_LDDATEX(lddate)

3.1.91. ORIGERR_TEMP_GA

Owner(s)	SEL2, SEL3
Category	Core, Fundamental
Description	The ORIGERR_TEMP_GA table is used by the GA application to store temporary origin error information. Its structure is identical to the ORIGERR table. The measurement fields are the elements of the location covariance matrix. The descriptive fields give the uncertainties in location, depth, and origin time. These quantities are calculated from the covariance matrix, assuming gaussian errors and a confidence level.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
I	orid	*number(10,0)*	Origin identifier	N
	sxx	*float(24)*	Covariance matrix element	Y
	syy	*float(24)*	Covariance matrix element	Y
	szz	*float(24)*	Covariance matrix element	Y
	stt	*float(24)*	Covariance matrix element	Y
	sxy	*float(24)*	Covariance matrix element	Y
	sxz	*float(24)*	Covariance matrix element	Y
	syz	*float(24)*	Covariance matrix element	Y
	stx	*float(24)*	Covariance matrix element	Y
	sty	*float(24)*	Covariance matrix element	Y
	stz	*float(24)*	Covariance matrix element	Y
	sdobs	*float(24)*	Standard error of observations	Y
	smajax	*float(24)*	Semi-major axis of error	Y
	sminax	*float(24)*	Semi-minor axis of error	Y
	strike	*float(24)*	Strike angle of location error ellipse semi-major axis	Y
	sdepth	*float(24)*	Depth error	Y
	stime	*float(24)*	Origin time error (seconds)	Y
	conf	*float(24)*	Confidence	Y
	commid	*number(10,0)*	Comment identifier	Y

	lddate	*date*	Load date	Y

3.1.92. ORIGIN

Owner(s)	SEL2, SEL3, IDCX, SEL1
Category	Core, Fundamental
Description	The ORIGIN table contains information describing a derived or reported origin for a particular event.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
	lat	*float(24)*	Estimated latitude	N
	lon	*float(24)*	Estimated longitude	N
	depth	*float(24)*	Estimated depth (kilometers)	N
I	time	*float(53)*	Epoch time	N
PI	orid	*number(10,0)*	Unique origin identifier	N
	evid	*number(10,0)*	Event identifier	Y
	jdate	*number(8,0)*	Julian date for this data	Y
	nass	*number(4,0)*	Number of associated phases	Y
	ndef	*number(4,0)*	Number of time-defining phases	Y
	ndp	*number(4,0)*	Number of depth phases	Y
	grn	*number(8,0)*	Geographic region number	Y
	srn	*number(8,0)*	Seismic region number, as given in [Fli74]	Y
	etype	*varchar2(7)*	Event type	Y
	depdp	*float(24)*	Estimated depth from depth phases	Y
	dtype	*varchar2(1)*	Depth method used	Y
	mb	*float(24)*	Body wave magnitude	Y
	mbid	*number(10,0)*	Mb magnitude identifier	Y
	ms	*float(24)*	Surface wave magnitude (Ms)	Y
	msid	*number(10,0)*	Ms magnitude identifier	Y
	ml	*float(24)*	Local magnitude	Y
	mlid	*number(10,0)*	ML magnitude identifier	Y
	algorithm	*varchar2(15)*	Location algorithm used	Y
	auth	*varchar2(15)*	Source/originator	Y
	commid	*number(10,0)*	Comment identifier	Y
I	lddate	*date*	Load date	Y

Primary key	PK_ORIGIN(orid)
Indexes	PK_ORIGIN(orid), ORTIMEX(time), ORIGIN_LDDATEX(lddate)

3.1.93. ORIGIN

Owner(s)	LEB
Category	Core, Fundamental
Description	The ORIGIN table contains information describing a derived or reported origin for a particular event.

Pk/Fk/I	Column	Storage type	Description	Nullable
	lat	*float(24)*	Estimated latitude	N
	lon	*float(24)*	Estimated longitude	N
	depth	*float(24)*	Estimated depth (kilometers)	N
I	time	*float(53)*	Epoch time	N
PI	orid	*number(10,0)*	Unique origin identifier	N
I	evid	*number(10,0)*	Event identifier	Y
I	jdate	*number(8,0)*	Julian date for this data	Y
	nass	*number(4,0)*	Number of associated phases	Y
	ndef	*number(4,0)*	Number of time-defining phases	Y
	ndp	*number(4,0)*	Number of depth phases	Y
	grn	*number(8,0)*	Geographic region number	Y
	srn	*number(8,0)*	Seismic region number, as given in [Fli74]	Y
	etype	*varchar2(7)*	Event type	Y
	depdp	*float(24)*	Estimated depth from depth phases	Y
	dtype	*varchar2(1)*	Depth method used	Y
	mb	*float(24)*	Body wave magnitude	Y
	mbid	*number(10,0)*	Mb magnitude identifier	Y
	ms	*float(24)*	Surface wave magnitude (Ms)	Y
	msid	*number(10,0)*	Ms magnitude identifier	Y
	ml	*float(24)*	Local magnitude	Y
	mlid	*number(10,0)*	ML magnitude identifier	Y
	algorithm	*varchar2(15)*	Location algorithm used	Y
	auth	*varchar2(15)*	Source/originator	Y
	commid	*number(10,0)*	Comment identifier	Y
I	lddate	*date*	Load date	Y

Primary key	PK_ORIGIN(orid)
Indexes	EVIDX(evid), ANLOG_JDATEX(jdate), ORTIMEX(time), PK_ORIGIN(orid), ORIGIN_LDDATEX(lddate)

3.1.94. ORIGIN

Owner(s)	REB
Category	Core, Fundamental
Description	The ORIGIN table contains information describing a derived or reported origin for a particular event.

Pk/Fk/I	Column	Storage type	Description	Nullable
	lat	*float(24)*	Estimated latitude	N
	lon	*float(24)*	Estimated longitude	N
	depth	*float(24)*	Estimated depth (kilometers)	N
I	time	*float(53)*	Epoch time	N
PI	orid	*number(10,0)*	Unique origin identifier	N
	evid	*number(10,0)*	Event identifier	Y
	jdate	*number(8,0)*	Julian date for this data	Y
	nass	*number(4,0)*	Number of associated phases	Y
	ndef	*number(4,0)*	Number of time-defining phases	Y
	ndp	*number(4,0)*	Number of depth phases	Y
	grn	*number(8,0)*	Geographic region number	Y
	srn	*number(8,0)*	Seismic region number, as given in [Fli74]	Y
	etype	*varchar2(7)*	Event type	Y
	depdp	*float(24)*	Estimated depth from depth phases	Y
	dtype	*varchar2(1)*	Depth method used	Y
	mb	*float(24)*	Body wave magnitude	Y
	mbid	*number(10,0)*	Mb magnitude identifier	Y
	ms	*float(24)*	Surface wave magnitude (Ms)	Y
	msid	*number(10,0)*	Ms magnitude identifier	Y
	ml	*float(24)*	Local magnitude	Y
	mlid	*number(10,0)*	ML magnitude identifier	Y
	algorithm	*varchar2(15)*	Location algorithm used	Y
	auth	*varchar2(15)*	Source/originator	Y
	commid	*number(10,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

Primary key	PK_ORIGIN(orid)
Indexes	PK_ORIGIN(orid), ORTIMEX(time)

3.1.95. ORIGIN_TEMP_GA

Owner(s)	SEL2, SEL3

Category	Core, Fundamental
Description	The ORIGIN_TEMP_GA table contains information describing a derived or reported origin for a particular event. Its structure is identical to the ORIGIN table. The ORIGIN_TEMP_GA table is used by the GA application to store temporary origins.

Pk/Fk/I	Column	Storage type	Description	Nullable
	lat	*float(24)*	Geographic latitude. Locations north of the equator have positive latitudes.	N
	lon	*float(24)*	Geographic longitude. Longitudes are measured positive east of the Greenwich meridian.	N
	depth	*float(24)*	Estimated depth (kilometers)	N
I	time	*float(53)*	Epoch time	N
I	orid	*number(10,0)*	Origin identifier	N
	evid	*number(10,0)*	Event identifier	Y
	jdate	*number(8,0)*	Julian date for this data	Y
	nass	*number(4,0)*	Number of associated phases	Y
	ndef	*number(4,0)*	Number of time-defining phases	Y
	ndp	*number(4,0)*	Number of depth phases	Y
	grn	*number(8,0)*	Geographic region number	Y
	srn	*number(8,0)*	Seismic region number, as given in [Fli74]	Y
	etype	*varchar2(7)*	Event type	Y
	depdp	*float(24)*	Estimated depth from depth phases	Y
	dtype	*varchar2(1)*	Depth method used	Y
	mb	*float(24)*	Body wave magnitude	Y
	mbid	*number(10,0)*	Mb magnitude identifier	Y
	ms	*float(24)*	Surface wave magnitude (Ms)	Y
	msid	*number(10,0)*	Ms magnitude identifier	Y
	ml	*float(24)*	Local magnitude	Y
	mlid	*number(10,0)*	ML magnitude identifier	Y
	algorithm	*varchar2(15)*	Location algorithm used	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
	commid	*number(10,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

Indexes	OTGTIMEX(time), ORIGIN_TEMP_GAX(orid)

3.1.96. OUTAGE

Owner(s)	IDCX

Category	Data Services
Description	The OUTAGE table contains the availability of time-series data. If the available column is set to "f," it specifies that no data are available for the interval. Conversely, the outage table can be used to specify that data are available for an interval by setting the available column to "t."

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	otgid	*number(10,0)*	Outage identifier	N
I	sta	*varchar2(6)*	Station code	N
I	chan	*varchar2(8)*	Channel name	Y
	auxid	*varchar2(4)*	Auxiliary identification code	Y
I	time	*float(53)*	Start time of outage interval	Y
	endtime	*float(53)*	End time of outage interval	Y
	status	*varchar2(32)*	Status of this row.	Y
	auth	*varchar2(15)*	Source/originator of outage report	Y
	available	*varchar2(1)*	Flag to specify if data are unavailable (f) or available (t)	Y
	commid	*number(10,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

Primary key	PK_OUTAGE(otgid)
Indexes	PK_OUTAGE(otgid), OTGTIMEX(time), OTGSTAX(sta, chan, time)

3.1.97. OVERLAYDISC

Owner(s)	MAP
Category	Interactive Processing
Description	The OVERLAYDISC table contains the location of the overlays for the Map application.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	overlayid	*number(8,0)*	Overlay identifier	N
	overlayname	*varchar2(64)*	Overlay name	N
	dfile	*varchar2(32)*	Name of overlay file	N
	dir	*varchar2(64)*	Absolute path to the data file	N
	colorname	*varchar2(32)*	Overlay color name	N
	lddate	*date*	Load date	Y

Primary key	OVERLAYDISC_PK(overlayid)
Indexes	OVERLAYDISC_PK(overlayid)

3.1.98. PARRIVAL

Owner(s)	LEB
Category	Fundamental
Description	The PARRIVAL table contains the predicted arrivals and associations for origin-based amplitude measurements.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	parid	*number(10,0)*	Predicted arrival identifier	N
I	orid	*number(10,0)*	Origin identifier	Y
I	evid	*number(10,0)*	Event identifier	Y
	sta	*varchar2(6)*	Station code	Y
	time	*float(53)*	Epoch time	Y
	azimuth	*float(24)*	Azimuth	Y
	slow	*float(24)*	Predicted slowness for an arrival (s/deg)	Y
	phase	*varchar2(8)*	Phase type	Y
	delta	*float(24)*	Source-receiver distance in degrees	Y
	vmodel	*varchar2(15)*	Velocity model	Y
I	lddate	*date*	Load date	Y

Primary key	PK_PARRIVAL(parid)
Indexes	PARRORIDX(orid), PARREVIDX(evid), PARRIVAL_LDDATEX(lddate), PK_PARRIVAL(parid)

3.1.99. PARRIVAL

Owner(s)	SEL2, SEL3, SEL1
Category	Fundamental
Description	The PARRIVAL table contains the predicted arrivals and associations for origin-based amplitude measurements.

Pk/Fk/I	Column	Storage type	Description	Nullable
I	parid	*number(10,0)*	Predicted arrival identifier	N
I	orid	*number(10,0)*	Origin identifier	Y
	evid	*number(10,0)*	Event identifier	Y
	sta	*varchar2(6)*	Station code	Y
	time	*float(53)*	Epoch time	Y
	azimuth	*float(24)*	Azimuth	Y
	slow	*float(24)*	Predicted slowness for an arrival (s/deg)	Y
	phase	*varchar2(8)*	Phase type	Y
	delta	*float(24)*	Source-receiver distance in degrees	Y

	vmodel	*varchar2(15)*	Velocity model	Y
	lddate	*date*	Load date	Y

Indexes	PARRORIDX(orid), PARRIVALX(parid)

3.1.100. PARRIVAL

Owner(s)	REB
Category	Fundamental
Description	The PARRIVAL table contains the predicted arrivals and associations for origin-based amplitude measurements.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	parid	*number(10,0)*	Predicted arrival identifier	N
I	orid	*number(10,0)*	Origin identifier	Y
I	evid	*number(10,0)*	Event identifier	Y
	sta	*varchar2(6)*	Station code	Y
	time	*float(53)*	Epoch time	Y
	azimuth	*float(24)*	Azimuth	Y
	slow	*float(24)*	Predicted slowness for an arrival (s/deg)	Y
	phase	*varchar2(8)*	Phase type	Y
	delta	*float(24)*	Source-receiver distance in degrees	Y
	vmodel	*varchar2(15)*	Velocity model	Y
I	lddate	*date*	Load date	Y

Primary key	PK_PARRIVAL(parid)
Indexes	PAREVIDX(evid), PARRORIDX(orid), PARRIVAL_LDDATEX(lddate), PK_PARRIVAL(parid)

3.1.101. PARTICIPATION

Owner(s)	STATIC
Category	Reference
Description	The PARTICIPATION table contains station participation information for performance reporting.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	net	*varchar2(8)*	Network identification string	N
PI	sta	*varchar2(6)*	Station code	N
PI	begin_date	*number(8,0)*	Date participation began	N
	end_date	*number(8,0)*	Date participation ended	Y
	lddate	*date*	Load date	Y

Primary key	PK_PARTICIPATION(net, sta, begin_date)

3.1.102. PHASE_DESCRIPTION

Owner(s)	STATIC
Category	Interactive Analysis
Description	Distance and depth information for phases used in Interactive SHI analysis

Pk/Fk/I	Column	Storage type	Description	Nullable
	phase	*varchar2(8)*	Phase type	N
	mindelta	*float(24)*	Minimum distance (degrees)	N
	maxdelta	*float(24)*	Maximum allowable distance (degrees)	N
	mindepth	*float(24)*	Minimum allowable depth (km)	N
	maxdepth	*float(24)*	Maximum allowable depth (km)	N
	phase_type	*varchar2(24)*	Phase type	N
	prop_mode	*varchar2(1)*	Propagation mode (one of P,S,H,I,V or N)	N
	is_selected	*varchar2(1)*	Flag indicating if the phase can be selected by the analyst	N
	is_unique	*varchar2(1)*	Flag indicating whether or not the phase name is unique	N
	is_timeavail	*varchar2(1)*	Flag indicating whether or not travel time information is available for this phase	N
	is_depth_phase	*varchar2(1)*	Flag indicating whether or not the phase is a depth phase	N
	is_depth_sensitive	*varchar2(1)*	Flag indicating whether or not the phase is depth sensitive	N
	is_coda	*varchar2(1)*	Flag indicating whether or not the phase is a coda phase	N
	lddate	*date*	Load date	N

3.1.103. PHASE_WEIGHT_EVENT_DEFINE

Owner(s)	STATIC
Category	Interactive Analysis
Description	Time, azimuth and slowness weights used in the Event Definition Criteria

Pk/Fk/I	Column	Storage type	Description	Nullable
	phase_type	*varchar2(24)*	Phase type	N
	obs_type	*varchar2(24)*	Observation type	N
	time_weight	*float(24)*	Weight given to defining time for this phase	N
	az_weight	*float(24)*	Weight given to defining azimuth for this	N

			phase type.	
	slow_weight	*float(24)*	Weight given to defining slowness for this phase	N
	num_defining	*number(8,0)*	Number of defining phases	N
	lddate	*date*	Load date	N

3.1.104. PHASOR_DIST_DEPTH_RANGES

Owner(s)	STATIC
Category	Interactive Analysis
Description	Table containing distance and depth ranges for different phases used by the Phasor application.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
	phase	*varchar2(8)*	Phase type	Y
	min_dist	*float(24)*	Minimum allowable distance (degrees)	Y
	max_dist	*float(24)*	Maximum allowable distance (degrees)	Y
	min_depth	*float(24)*	Minimum allowable depth (km)	Y
	max_depth	*float(24)*	Maximum allowable depth (km)	Y
	mag_cutoff	*float(24)*	Lower bound of body wave magnitude for a phase to be considered for processing by Phasor	Y
	travel_time_error	*float(24)*	travel time error	Y
	lddate	*date*	Load date	N

3.1.105. PMCC_FEATURES

Owner(s)	IDCX
Category	Automatic Processing
Description	Features of infrasonic arrivals, populated by DFX-PMCC

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	sta	*varchar2(6)*	Station code	N
PI	arid	*number(10,0)*	Arrival identifier	N
	initial_time	*float(53)*	Initial PMCC detection time (epochal)	Y
	duration	*float(24)*	Duration in seconds	Y
	consistency	*float(24)*	Consistency value	Y
	correlation	*float(24)*	Correlation coefficient	Y
	famsize	*number(8,0)*	PMCC family size	Y
	minfreq	*float(24)*	Minimum frequency (Hz)	Y

	maxfreq	*float(24)*	Maximum frequency (Hz)	Y
	cfreq	*float(24)*	Central frequency (Hz)	Y
	sigmafreq	*float(24)*	Standard deviation of frequency values	Y
	rmsamp	*float(24)*	Root mean square amplitude	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
	commid	*number(10,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

Primary key	PK_PARTICIPATION(sta, arid)
Indexes	PK_PARTICIPATION(sta, arid), PMCC_FEAT_ARIX(arid)

3.1.106. PMCC_RECIPE

Owner(s)	IDCX
Category	Automatic Processing
Description	Processing recipes used for infrasound processing by DFX-PMCC

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	pmccrecid	*number(10,0)*	unique pmcc recipe identifier (integer)	N
	deflt	*number(8,0)*	flag indicating whether parameter takes default value	Y
	fgroup	*number(8,0)*	frequency group	Y
	winlen	*float(24)*	window length (seconds)	Y
	wingap	*float(24)*	window gap (seconds)	Y
	threshcons	*float(24)*	threshold consistency	Y
	threshnsens	*number(8,0)*	minimum number of sensors	Y
	qfactor	*float(24)*	quality factor	Y
	pmcc3d	*number(8,0)*	flag indicating whether three-dimensional mode is used	Y
	sound_speed	*float(24)*	sound speed (km/s)	Y
	elevation_angle	*float(24)*	elevation angle	Y
	threshfamlen	*float(24)*	threshold family length	Y
	threshfammin	*number(8,0)*	minimum family size threshold	Y
	threshfammax	*number(8,0)*	maximum family size threshold	Y
	speed_transition	*float(24)*	speed transition	Y
	time_tol	*float(24)*	time tolerance (seconds)	Y
	freq_tol	*float(24)*	frequency tolerance	Y
	sp_tol1	*float(24)*	minimum speed tolerance	Y
	sp_tol2	*float(24)*	maximum speed tolerance	Y

	az_tol1	*float(24)*	minimum azimuth tolerance	Y
	az_tol2	*float(24)*	maximum azimuth tolerance	Y
	auth	*varchar2(17)*	name of the application or user making the update	Y
	lddate	*date*	Load date	Y

Primary key	PMCC_RECIPE_PK(pmccrecid)
Indexes	PMCC_RECIPE_PK(pmccrecid)

3.1.107. PROBLASTID (VIEW)

Owner(s)	IDCX
Category	System Monitoring
Description	View of the LASTID table, used by System Monitoring software (Xlogger)

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
	keyname	*varchar2(15)*	Identifier name (arid, orid, and so on)	N
	keyvalue	*number(10,0)*	Last value used for the identifier specified in the keyname column	N
	lddate	*date*	Load date	Y

SQL Body

```
SELECT keyname, keyvalue, lddate
      FROM lastid
      where keyname in ( 'prid', 'plid', 'tmp$object' )
```

3.1.108. PROBLEM

Owner(s)	IDCX
Category	System Monitoring
Description	The PROBLEM table contains information related to problems with stations, communications, software, and hardware.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	prid	*number(10,0)*	Problem identifier	N
	procclass	*varchar2(17)*	Xlogger problem category	Y
	procname	*varchar2(17)*	Xlogger problem name	Y
	time	*number(17,5)*	Epoch time of start of problem	Y
	endtime	*number(17,5)*	Epoch time of end of problem	Y
	status	*varchar2(33)*	Status of the problem	Y
	class	*varchar2(33)*	Class of problem	Y
	descrip	*varchar2(129)*	One line description of problem	Y
	login	*varchar2(33)*	Login name of originator	Y

	lddate	*date*	Load date	Y

Primary key	PK_PROBLEM(prid)
Indexes	PK_PROBLEM(prid)

3.1.109. PROBLEMLOG

Owner(s)	IDCX
Category	System Monitoring
Description	The PROBLEMLOG table contains individual problem log entries relating to problems in the database table.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	plid	*number(10,0)*	Problem log identifier	N
	prid	*number(10,0)*	Problem identifier	Y
	time	*number(17,5)*	Time of log entry	Y
	dir	*varchar2(129)*	Absolute path to the data file	Y
	dfile	*varchar2(65)*	Filename of log file	Y
	login	*varchar2(33)*	Login name of originator	Y
	lddate	*date*	Load date	Y

Primary key	PK_PROBLEMLOG(plid)
Indexes	PK_PROBLEMLOG(plid)

3.1.110. PROBLEMMAIL

Owner(s)	IDCX
Category	System Monitoring
Description	The PROBLEMMAIL table contains instructions for distributing problem messages to subscribers.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	procclass	*varchar2(17)*	Xlogger problem category	N
PI	login	*varchar2(33)*	Login name of originator	N
	lddate	*date*	Load date	Y

Primary key	PK_PROBLEMMAIL(procclass, login)
Indexes	PK_PROBLEMMAIL(procclass, login)

3.1.111. PRODTRACK

Owner(s)	IDCX
Category	Data Services

Description	The PRODTRACK table queues and links data and subscription products. The dataid column links the product delivery to the data encapsulated in the DATAREADY table, and the msgid column links the product to the outgoing message, as referenced in the MSGDISC table. Thus, the PRODTRACK table allows for subscription tracking from the data to the product.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	prodid	*number(10,0)*	Product identifier	N
	delivid	*number(10,0)*	Delivery identifier	Y
PI	dataid	*number(10,0)*	Data ready identifier	N
PI	msgid	*number(10,0)*	Message identifier	N
I	status	*varchar2(12)*	Status of the product	Y
I	lddate	*date*	Load date	Y

Primary key	PRODTRACK_PK(prodid, dataid, msgid)
Indexes	INMSGIDX(msgid), INSTATUSX(status), PRODTRACK_PK(prodid, dataid, msgid), PRODTRACK_LDDATEX(lddate), INPRODIDX(prodid)

3.1.112. PRODUCTCRITERIA

Owner(s)	IDCX
Category	Data Services
Description	The PRODUCTCRITERIA table contains subscription information about the type of product and when and how often to distribute the data. Each unique product has one record.

Pk/Fk/I	Column	Storage type	Description	Nullable
I	prodid	*number(8,0)*	Product identifier	Y
	prodname	*varchar2(24)*	Product name (if a standard product)	Y
	delivid	*number(8,0)*	Last delivery for this product	Y
	cycle_size	*number(8,0)*	Product size to be reached before release (0 for no limit)	Y
	cycle_time	*number(4,0)*	Time interval between releases (0 for immediate)	Y
	hour_to_send	*number(2,0)*	Hour to send product	Y
	dow_to_send	*number(2,0)*	Day of week to send subscription	Y
	dom_to_send	*number(2,0)*	Day of month to send subscription	Y
	prodtype	*varchar2(32)*	Product type	Y
	prodsubtype	*varchar2(12)*	Product sub-type	Y
	prodfmt	*varchar2(6)*	Product format	Y
	supressempty	*char(2)*	Flag indicating whether or not to suppress sending of empty products	Y
	timelastsend	*float(54)*	Time at which product was last sent	Y

			(epochal)	
	timenextsend	*float(54)*	Time at which product will next be sent (epochal)	Y
	lddate	*date*	Load date	Y

3.1.113. PRODUCTTYPEEVPARS

Owner(s)	IDCX
Description	Obsolete.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	prodid	*number(8,0)*	Obsolete.	N
	ec_grpname	*varchar2(24)*	Obsolete.	Y
	ec_regname	*varchar2(24)*	Obsolete.	Y
	ec_depthco	*float(24)*	Obsolete.	Y
	ec_depthp	*float(24)*	Obsolete.	Y
	ec_mbmsco	*float(24)*	Obsolete.	Y
	ec_mbmsns	*number(8,0)*	Obsolete.	Y
	ec_mbmsp	*float(24)*	Obsolete.	Y
	ec_mbmscal	*float(24)*	Obsolete.	Y
	ec_mbmsfac	*float(24)*	Obsolete.	Y
	ec_onshorep	*float(24)*	Obsolete.	Y
	ec_ldpflg	*varchar2(1)*	Obsolete.	Y
	ec_ndef	*number(8,0)*	Obsolete.	Y
	ec_udat	*varchar2(1)*	Obsolete.	Y
	ec_popcrit	*varchar2(60)*	Obsolete.	Y
	ec_popmagc	*float(24)*	Obsolete.	Y
	ec_popmint	*number(8,0)*	Obsolete.	Y
	ec_popsnco	*float(24)*	Obsolete.	Y
	ec_popsimp	*float(24)*	Obsolete.	Y

Primary key	PK_PRODUCTTYPEEVPARS(prodid)

3.1.114. PRODUCTTYPEEVSC

Owner(s)	IDCX
Category	Data Services
Description	The PRODUCTTYPEEVSC table contains the input parameters that define the event-screening criteria for the standard case and national subscriptions. It is used in conjunction with the PRODUCTTYPEORIGIN table to specify the set of user input criteria. There is one record for each subscription (prodid).

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	prodid	*number(10,0)*	Product identifier	N
	grpname	*varchar2(24)*	Subscription group name	Y
	regname	*varchar2(24)*	Region name	Y
	min_ndef	*number(8,0)*	Minimum number of defining phases	Y
	min_mb	*float(24)*	Minimum mb for screening	Y
	depth_conf	*float(24)*	Depth screening confidence	Y
	depth_thresh	*float(24)*	Depth screening threshold	Y
	depth_kvalue	*float(24)*	Depth uncertainty k-value	Y
	min_ndp_pp	*number(8,0)*	Minimum required number of pP depth phases	Y
	min_ndp_sp	*number(8,0)*	Minimum required number of sP depth phases	Y
	min_moveout_pp	*float(24)*	Minimum moveout of pP-P travel time differences	Y
	min_moveout_sp	*float(24)*	Minimum moveout of sP-P travel time differences	Y
	min_dp_snr_pp	*float(24)*	Minimum pP depth phase snr	Y
	min_dp_snr_sp	*float(24)*	Minimum sP depth phase snr	Y
	mbms_conf	*float(24)*	Mb minus Ms screening confidence	Y
	mbms_thresh	*float(24)*	Mb minus Ms screening threshold	Y
	mbms_slope	*float(24)*	Slope term for mb minus Ms relation	Y
	magpref_mb	*varchar2(6)*	Mb magnitude type used for screening.	Y
	magpref_ms	*varchar2(6)*	Ms magnitude type used for screening.	Y
	mb_err	*float(24)*	Single-station mb uncertainty	Y
	ms_err	*float(24)*	Single-station Ms uncertainty	Y
	min_nsta_ms	*number(8,0)*	Minimum number of stations for ms	Y
	loc_conf	*float(24)*	Location error ellipse confidence	Y
	hydro_te_thresh	*float(24)*	Hydroacoustic total energy threshold	Y
	hydro_cp_thresh	*float(24)*	Hydroacoustic cepstral peak threshold	Y
	min_wdepth_thresh	*float(24)*	Minimum water depth threshold	Y
	reg_conf	*float(24)*	Regional screening confidence	Y
	lddate	*date*	Load date	Y

Primary key	PK_PRODUCTTYPEEVSC(prodid)

3.1.115. PRODUCTTYPEORIGIN

Owner(s)	IDCX

Category	Data Services
Description	The PRODUCTTYPEORIGIN table contains the details of origin subscriptions. It extends the PRODUCTCRITERIA table that is generic to all subscriptions. Each origin-based product has one record.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	prodid	*number(8,0)*	Product identifier	N
	minlat	*float(24)*	Minimum latitude of event	Y
	maxlat	*float(24)*	Maximum latitude of event	Y
	minlon	*float(24)*	Minimum longitude of event	Y
	maxlon	*float(24)*	Maximum longitude of event	Y
	mindepth	*float(24)*	Minimum depth value for a product constraint (km).	Y
	maxdepth	*float(24)*	Maximum allowable depth (km)	Y
	minmag	*float(24)*	Minimum magnitude	Y
	maxmag	*float(24)*	Maximum magnitude	Y
	magtype	*varchar2(4)*	Magnitude type, for example mb, Ms, ML	Y
	minmb_ms	*float(24)*	Minimum value of mb minus Ms	Y
	maxmb_ms	*float(24)*	Maximum value of mb minus Ms	Y
	mindep_err	*float(24)*	Minimum value of depth minus error	Y
	maxdep_err	*float(24)*	Maximum value of depth minus error	Y
	minesd	*float(24)*	Minimum event-station distance	Y
	maxesd	*float(24)*	Maximum event-station distance	Y

Primary key	PK_PRODUCTTYPEORIGIN(prodid)

3.1.116. PRODUCTTYPESTA

Owner(s)	IDCX
Category	Data Services
Description	The PRODUCTTYPESTA table contains the criteria used for defining subscription products with constraints that are based on the station. If a user requests a subscription for multiple stations, the table will have one PRODUCTCRITERIA row, but multiple PRODUCTTYPESTA rows (one for each station); all of the PRODUCTTYPESTA rows will have a common value of prodid.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	prodid	*number(8,0)*	Product identifier	N
	minlat	*float(24)*	Minimum station latitude	Y
	maxlat	*float(24)*	Maximum station latitude	Y
	minlon	*float(24)*	Minimum station longitude	Y
	maxlon	*float(24)*	Maximum station longitude	Y

PI	sta	*varchar2(6)*	Station code	N
PI	chan	*varchar2(8)*	Channel name	N

Primary key	PK_PRODUCTTYPESTA(prodid, sta, chan)
Indexes	PK_PRODUCTTYPESTA(prodid, sta, chan)

3.1.117. QCSTATS

Owner(s)	IDCX
Category	System Monitoring
Description	The QCSTATS table contains waveform data quality statistics.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	qcstatsid	*number(10,0)*	Data quality statistics identifier	N
PI	sta	*varchar2(6)*	Station code	N
I	chan	*varchar2(8)*	Channel name	N
I	time	*float(53)*	Interval start time	N
	jdate	*number(8,0)*	Julian date for this data	Y
I	endtime	*float(53)*	Interval end time	Y
	dettime	*float(53)*	Detection interval start time	Y
	detendtime	*float(53)*	Detection interval end time	Y
	missing	*float(53)*	Amount of missing data (seconds)	Y
	dropped	*number(8,0)*	Flag indicating if interval was dropped	Y
	nseg	*number(8,0)*	Number of masked segments	Y
	masked	*float(53)*	Amount of data in masked segments	Y
	pointspike	*float(53)*	Amount of data in masked due to point-spikes	Y
	spike	*float(53)*	Amount of data in masked due to spikes	Y
	nconstseg	*number(8,0)*	Number of constant valued segments	Y
	const	*float(53)*	Amount of data masked due to constant valued segments	Y
	avgconstval	*float(53)*	Average value in constant segments	Y
	stdconstval	*float(53)*	Standard deviation of constant values	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
I	lddate	*date*	Load date	Y

Primary key	QCSTATS_PK(qcstatsid)
Indexes	QCSTATSIDX(qcstatsid), QCSTATS_ENDSTCHNX(endtime, sta, chan), QCSTATS_LDDATEX(lddate), QCSTATS_TIMEX(time)

3.1.118. REBDONE_DATADAY_FLAG

Owner(s)	LEB
Category	Interactive Processing
Description	Not used at the IDC.

Pk/Fk/I	Column	Storage type	Description	Nullable
	dataday	*number(12,0)*	Julian day	Y
	state	*varchar2(12)*	state of processing	Y
	donetime	*float(53)*	time that REB was produced	Y
	lddate	*date*	load date	Y

3.1.119. REGCOEF

Owner(s)	STATIC
Category	Fundamental
Description	The REGCOEF table contains linear coefficients for regional processing.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	rcoefid	*varchar2(20)*	Linear coefficient set identifier	N
PI	rcoeftype	*varchar2(10)*	Linear coefficient value identifier	N
	rcoefvalue	*float(24)*	Linear coefficient value	Y
	ondate	*number(8,0)*	First julian date this row is valid	Y
	offdate	*number(8,0)*	Last Julian date this row is valid	Y
	lddate	*date*	Load date	Y

Primary key	SYS_C0028355(rcoefid, rcoeftype)
Indexes	PK_REGCOEF(rcoefid, rcoeftype)

3.1.120. REMARK

Owner(s)	IDCX, STATIC, SEL3, SEL1, SEL2
Category	Database and Utility
Description	Obsolete. It was used in the past to store tables and column comments.

Pk/Fk/I	Column	Storage type	Description	Nullable
I	commid	*number(10,0)*	Comment identifier	N
PI	commid	*number(10,0)*	Comment identifier	N
I	lineno	*number(8,0)*	Comment line number	N
PI	lineno	*number(8,0)*	Comment line number	N
	remark	*varchar2(80)*	Free-format comment	Y

	lddate	*date*	Load date	Y

Primary key	PK_REMARK(commid, lineno)
Indexes	REMARKX(commid, lineno)

3.1.121. REMARK

Owner(s)	LEB
Category	Database and Utility
Description	Obsolete. It was used in the past to store tables and column comments.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	commid	*number(10,0)*	Comment identifier	N
PI	lineno	*number(8,0)*	Comment line number	N
	remark	*varchar2(80)*	Free-format comment	Y
I	lddate	*date*	Load date	Y

Primary key	PK_REMARK(commid, lineno)
Indexes	REMARK_LDDATEX(lddate), PK_REMARK(commid, lineno)

3.1.122. REMARK

Owner(s)	REB
Category	Database and Utility
Description	Obsolete. It was used in the past to store tables and column comments.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	commid	*number(10,0)*	Comment identifier	N
PI	lineno	*number(8,0)*	Comment line number	N
	remark	*varchar2(80)*	Free-format comment	Y
	lddate	*date*	Load date	Y

Primary key	PK_REMARK(commid, lineno)
Indexes	PK_REMARK(commid, lineno)

3.1.123. REQUEST

Owner(s)	IDCX
Category	Data Services
Description	The REQUEST table defines segments of auxiliary waveform data to be acquired. The start_time, end_time, sta and chan fields define a single unit of data. Data import programs must succeed in acquiring all the data for a time interval before changing the state to indicate successful retrieval, otherwise the state will be updated to indicate

	whether data were partially retrieved or no data was retrieved.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	reqid	*number(10,0)*	Request identifier	N
	sta	*varchar2(6)*	Station code	N
	chan	*varchar2(8)*	Channel name	N
	array	*varchar2(8)*	Array code	Y
	orid	*number(10,0)*	Origin identifier	Y
	evid	*number(10,0)*	Event identifier	Y
I	start_time	*float(53)*	Starting time of requested waveform data	N
I	end_time	*float(53)*	Ending time of requested waveform data	N
	class	*varchar2(16)*	Type of request	Y
I	state	*varchar2(16)*	Current processing state	Y
	statecount	*number(8,0)*	Number of failed attempts (when state = failed)	Y
	complete	*number(8,0)*	Percentage of data acquired	Y
	requestor	*varchar2(15)*	Original author of record	Y
I	modtime	*float(53)*	Time of last state change (epoch time)	Y
	modauthor	*varchar2(15)*	Author of last state change	Y
I	lddate	*date*	Load date	Y

Primary key	PK_REQUEST(reqid)
Indexes	REQMODX(modtime), REQSTATEX(state), REQSTENDX(start_time, end_time), REQUEST_LDDATEX(lddate), PK_REQUEST(reqid), REQENDX(end_time)

3.1.124. REVAUDIT

Owner(s)	LEB
Category	Interactive Analysis
Description	Provides an audit trail of actions taken by SHI Lead Analysts running rebrevise during the course of LEB review.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	revid	*number(10,0)*	Revision identifier	N
	revfunction	*varchar2(32)*	Name of the revision function used	N
	auth	*varchar2(15)*	Name of the Analyst making the revision	N
I	revtagid1	*number(10,0)*	Revtagname1 value; the value of the foreign key identified in revtagname1	N
I	revtagname1	*varchar2(8)*	Revtagname1 type; the name of the foreign key whose value is revtagid1	N
	revtagid2	*number(10,0)*	Revtagname2 value; the value of the foreign	Y

			key identified in revtagname2	
	revtagname2	*varchar2(8)*	Revtagname2 type; the name of the foreign key whose value is revtagid2	Y
	revstate	*varchar2(16)*	State of the revision	Y
	lddate	*date*	Load date	Y

Primary key	PK_REVAUDIT(revid)
Indexes	REVTAGNDX(revtagid1, revtagname1), PK_REVAUDIT(revid)

3.1.125. RMS_LASTID (VIEW)

Owner(s)	IDCX
Category	Automatic Processing
Description	View of the LASTID table, used by radionuclide processing software

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
	keyname	*varchar2(15)*	Identifier name (arid, orid, and so on)	N
	keyvalue	*number(10,0)*	Last value used for the identifier specified in the keyname column	N
	lddate	*date*	Load date	Y

SQL Body

```
SELECT keyname, keyvalue, lddate
       FROM lastid
       where keyname = 'fpid'
```

3.1.126. RULESET

Owner(s)	STATIC
Category	Automatic Processing
Description	The RULESET table defines rule sets to fine tune cdquals Minimum Channel Mission Capability calculation. It is used by cdqual, see cdtools user guide for details.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	sta	*varchar2(6)*	Station code	N
PI	ondate	*number(8,0)*	First julian date this row is valid	N
I	offdate	*number(8,0)*	Last Julian date this row is valid	Y
I	name	*varchar2(32)*	Rule name	Y
PI	regexp	*varchar2(64)*	Regular expression	N
	minchan	*varchar2(8)*	Minimum number of channels	Y
	lddate	*date*	Load date	Y

Primary key	RULESET_PK(sta, ondate, regexp)
Indexes	RULESET_PK(sta, ondate, regexp), RULESETSN(sta, offdate, name)

3.1.127. SEISGRID

Owner(s)	STATIC
Category	Automatic Processing
Description	The SEISGRID table contains a natural seismicity grid, which includes the average number of events per year with magnitude greater than the threshold in this table for each latitude-longitude grid point (the grid points are defined in the SEISINDEX table). The SEISGRID table is used by the Anomalous Event Qualifier (AEQ) application to help identify anomalous events.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	grdname	*varchar2(6)*	Grid name	N
PI	icell	*number(8,0)*	Grid cell index	N
	magth	*float(24)*	Magnitude threshold	Y
	magtype	*varchar2(6)*	Magnitude type, for example mb, Ms, ML	Y
	nevyr	*float(24)*	Average number of events/year	Y
	lddate	*date*	Load date	Y

Primary key	PK_SEISGRID(grdname, icell)
Indexes	SEISGRIDX(icell), PK_SEISGRID(grdname, icell)

3.1.128. SEISINDEX

Owner(s)	STATIC
Category	Automatic Processing
Description	The SEISINDEX table contains the geographic grids of natural seismicity data in the SEISGRID table. The DSEISINDEX table contains the geographic grids of seismicity data in the DSEISGRID table. The SEISINDEX table is used by the Anomalous Event Qualifier (AEQ) application to help identify anomalous events.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	grdname	*varchar2(6)*	Grid name	N
	lat1	*float(24)*	Initial latitude	Y
	lon1	*float(24)*	Initial longitude	Y
	dlat	*float(24)*	Latitude increment	Y
	dlon	*float(24)*	Longitude increment	Y
	nlat	*number(8,0)*	Number of latitudes	Y
	nlon	*number(8,0)*	Number of longitudes	Y
	orderby	*varchar2(6)*	Order by (either latitude or longitude)	Y
	lddate	*date*	Load date	Y

Primary key	PK_SEISINDEX(grdname)
Indexes	PK_SEISINDEX(grdname)

3.1.129. SEMAPHORE

Owner(s)	IDCX
Category	Data Services
Description	Table used by the Message System to enforce locking of logfiles to prevent race conditions while rotating logfiles.

Pk/Fk/I	Column	Storage type	Description	Nullable
	sta	*varchar2(6)*	Station code	N
	pid	*number(10,0)*	Process id	Y
	lddate	*date*	Load date	Y

3.1.130. SENSOR

Owner(s)	STATIC
Category	Core, Reference
Description	The SENSOR table contains calibration information for specific sensor channels. This table provides a record of updates in the calibration factor or clock error of each instrument and links a sta/chan/time to a complete instrument response in the table instrument. Waveform data are converted into physical units through multiplication by the calib field located in WFDISC. The correct value of calib may not be accurately known when the wfdisc record is entered into the database. The sensor table provides the mechanism (calratio and calper) to "update" calib, without requiring possibly hundreds of wfdisc records to be updated. Through the foreign key inid, this table is linked to instrument, which has fields pointing to flat files holding detailed calibration information in a variety of formats (see instrument).

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	sta	*varchar2(6)*	Station code	N
PI	chan	*varchar2(8)*	Channel name	N
PI	time	*float(53)*	Epoch time of start of recording period	N
PI	endtime	*float(53)*	Epoch time of end of recording period	N
	inid	*number(8,0)*	Instrument identifier	N
	chanid	*number(8,0)*	Channel recording identifier	Y
	jdate	*number(8,0)*	Julian date for this data	Y
	calratio	*float(24)*	Calibration	Y
	calper	*float(24)*	Calibration period (seconds)	Y
	tshift	*float(24)*	Correction of data processing time	Y
	instant	*varchar2(1)*	(y, n) discrete/continuing snapshot	N
	lddate	*date*	Load date	Y

Primary key	PK_SENSOR(sta, chan, time, endtime)
Indexes	SENSSTAX(sta, chan), PK_SENSOR(sta, chan, time, endtime)

3.1.131. SITE

Owner(s)	STATIC
Category	Core, Reference
Description	The SITE table contains station location information. Site names and describes a point on the earth where measurements are made (for example, the location of an instrument or array of instruments). It contains information that normally changes infrequently, such as location. In addition, site contains fields that describe the offset of a station relative to an array reference location. Global data integrity implies that the sta/ondate in site be consistent with the sta/chan/ondate in SITECHAN.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	sta	*varchar2(6)*	Station code	N
PI	ondate	*number(8,0)*	First julian date this row is valid	N
	offdate	*number(8,0)*	Last Julian date this row is valid	Y
	lat	*number*	Geographic latitude. Locations north of the equator have positive latitudes.	Y
	lon	*number*	Geographic longitude. Longitudes are measured positive east of the Greenwich meridian.	Y
	elev	*number*	Elevation	Y
	staname	*varchar2(50)*	Station description	Y
	statype	*varchar2(4)*	Station type: single station, array	Y
	refsta	*varchar2(6)*	Reference station for array members	Y
	dnorth	*number*	Offset from array reference (km)	Y
	deast	*number*	Offset from array reference (km)	Y
	lddate	*date*	Load date	Y

Primary key	PK_SITE(sta, ondate)
Indexes	SITESTAX(sta), PK_SITE(sta, ondate)

3.1.132. SITEAUX

Owner(s)	STATIC
Category	Reference
Description	The SITEAUX table contains additional site-dependent parameters that are not included in the SITE table.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	sta	*varchar2(6)*	Station code	N
PI	chan	*varchar2(8)*	Channel name	N
PI	time	*float(53)*	Epoch time	N
	nois	*float(24)*	Noise amplitude	Y

	noissd	*float(24)*	Standard deviation of log noise	Y
	amcor	*float(24)*	Amplitude correction	Y
	amcorsd	*float(24)*	Correction standard deviation	Y
	snthrsh	*float(24)*	Signal/noise detection threshold	Y
	rely	*float(24)*	Station reliability	Y
	ptmcor	*float(24)*	P arrival time correction	Y
	stmcor	*float(24)*	S arrival time correction	Y
	staper	*float(24)*	Period for measurements	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
	commid	*number(10,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

Primary key	PK_SITEAUX(sta, chan, time)
Indexes	PK_SITEAUX(sta, chan, time)

3.1.133. SITECHAN

Owner(s)	STATIC
Category	Core, Reference
Description	The SITECHAN table contains station-channel information. This table describes the orientation of a recording channel at the site referenced by sta. It provides information about the various channels that are available at a station and maintains a record of the physical channel configuration at a site.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	sta	*varchar2(6)*	Station code	N
PI	chan	*varchar2(8)*	Channel identifier	N
PI	ondate	*number(8,0)*	First julian date this row is valid	N
I	chanid	*number(8,0)*	Channel recording identifier	Y
	offdate	*number(8,0)*	Last Julian date this row is valid	Y
	ctype	*varchar2(4)*	Channel type	Y
	edepth	*number*	Emplacement depth	Y
	hang	*number*	Horizontal angle	Y
	vang	*number*	Vertical angle	Y
	descrip	*varchar2(50)*	Channel description	Y
	lddate	*date*	Load date	Y

Primary key	PK_SITECHAN(sta, chan, ondate)
Indexes	SITECHANX(chanid), STCSTAX(sta, chan), PK_SITECHAN(sta, chan, ondate)

3.1.134. SITEPOLL

Owner(s)	STATIC
Category	Data Services
Description	The SITEPOLL table contains the station and channel names of auxiliary seismic stations that are polled periodically for system monitoring purposes.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	sta	*varchar2(6)*	Station code	N
PI	net	*varchar2(6)*	Network identification string	N
PI	chan	*varchar2(6)*	Channel name	N
	lddate	*date*	Load date	Y

Primary key	PK_SITEPOLL(sta, net, chan)
Indexes	PK_SITEPOLL(sta, net, chan)

3.1.135. SITEPOLLCA

Owner(s)	STATIC
Description	Obsolete.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
	sta	*varchar2(6)*	Station code	N
	net	*varchar2(6)*	Network identification string	Y
	chan	*varchar2(6)*	Channel name	Y
	lddate	*date*	Load date	Y

3.1.136. SITE_ADDRESS

Owner(s)	STATIC
Category	Reference
Description	The SITE_ADDRESS table contains address information not included in the SITE table.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	sta	*varchar2(6)*	Station code	N
	name	*varchar2(20)*	Expanded station name	Y
	locality	*varchar2(40)*	Locality of station	Y
	stat_prov	*varchar2(40)*	State or province	Y
	country	*varchar2(40)*	Country name	Y
	lddate	*date*	Load date	Y

Primary key	PK_SITE_ADDRESS(sta)
Indexes	PK_SITE_ADDRESS(sta)

3.1.137. SPLP

Owner(s)	REB
Category	Fundamental
Description	The SPLP table contains event characterization parameters for short-period/long-period energy ratios. The ratios are computed using the DFX application.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	orid	*number(10,0)*	Origin identifier	N
PI	sta	*varchar2(6)*	Station code	N
	rectype	*varchar2(8)*	Recipe type	N
	ratio	*float(24)*	Ratio of short-period to long-period energy	Y
I	lddate	*date*	Load date	Y

Primary key	PK_SPLP(orid, sta)
Indexes	SPLP_LDDATEX(lddate), PK_SPLP(orid, sta), SPLPORIDX(orid)

3.1.138. SPVAR

Owner(s)	REB
Category	Fundamental
Description	The SPVAR table contains the variance of the detrended log spectrum between fmin and fmax for an arrival identified by arid. The frequency bandwidth is based on a signal-to-noise ratio criterion. Each phase associated with an event has a SPVAR record.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	arid	*number(10,0)*	Arrival identifier	N
	fsid	*number(10,0)*	Fourier spectrum identifier	N
	acoef	*float(24)*	"a" coefficient for nonlinear trend	Y
	bcoef	*float(24)*	"b" coefficient for nonlinear trend	Y
	ccoef	*float(24)*	"c" coefficient for nonlinear trend	Y
PI	fmin	*float(24)*	Minimum frequency	N
PI	fmax	*float(24)*	Maximum frequency	N
	svar	*float(24)*	Variance of detrended log spectrum	Y
I	lddate	*date*	Load date	Y

Primary key	PK_SPVAR(arid, fmin, fmax)
Indexes	PK_SPVAR(arid, fmin, fmax), SPVAR_LDDATEX(lddate)

3.1.139. SREGION

Owner(s)	STATIC
Category	Core, Reference
Description	The SREGION table contains seismic region numbers and their equivalent descriptions (see [Fli74]).

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	srn	*number(8,0)*	Seismic region number, as given in [Fli74]	N
	srname	*varchar2(40)*	Seismic region name	Y
	lddate	*date*	Load date	Y

Primary key	PK_SREGION(srn)
Indexes	PK_SREGION(srn)

3.1.140. STAMAG

Owner(s)	LEB
Category	Core, Fundamental
Description	The STAMAG table contains station magnitude estimates based upon measurements made on specific seismic phases. Values in STAMAG are used to calculate network magnitudes stored in NETMAG.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	magid	*number(10,0)*	Station magnitude identifier	N
PI	ampid	*number(10,0)*	Amplitude identifier	N
PI	sta	*varchar2(6)*	Station code	N
I	arid	*number(10,0)*	Arrival identifier	Y
I	orid	*number(10,0)*	Origin identifier	Y
	evid	*number(10,0)*	Event identifier	Y
	phase	*varchar2(8)*	Phase type	Y
	delta	*float(24)*	Source-receiver distance in degrees	Y
	magtype	*varchar2(6)*	Magnitude type, for example mb, Ms, ML	Y
	magnitude	*float(24)*	Magnitude	Y
	uncertainty	*float(24)*	Magnitude uncertainty	Y
	magres	*float(24)*	Magnitude residual	Y
	magdef	*varchar2(1)*	"d" or "n" flag indicating if magnitude is defining or nondefining	Y
	mmodel	*varchar2(15)*	Magnitude model	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
	commid	*number(10,0)*	Comment identifier	Y

I	lddate	*date*	Load date	Y

Primary key	PK_STAMAG(magid, ampid, sta)
Indexes	SMAMPIDX(ampid), STAMAG_LDDATEX(lddate), SMARIDX(arid), PK_STAMAG(magid, ampid, sta), SMMAGIDX(magid, sta), SMORIDX(orid)

3.1.141. STAMAG

Owner(s)	REB
Category	Core, Fundamental
Description	The STAMAG table contains station magnitude estimates based upon measurements made on specific seismic phases. Values in STAMAG are used to calculate network magnitudes stored in NETMAG.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	magid	*number(10,0)*	Station magnitude identifier	N
PI	ampid	*number(10,0)*	Amplitude identifier	N
PI	sta	*varchar2(6)*	Station code	N
I	arid	*number(10,0)*	Arrival identifier	Y
I	orid	*number(10,0)*	Origin identifier	Y
	evid	*number(10,0)*	Event identifier	Y
	phase	*varchar2(8)*	Phase type	Y
	delta	*float(24)*	Source-receiver distance in degrees	Y
	magtype	*varchar2(6)*	Magnitude type, for example mb, Ms, ML	Y
	magnitude	*float(24)*	Magnitude	Y
	uncertainty	*float(24)*	Magnitude uncertainty	Y
	magres	*float(24)*	Magnitude residual	Y
	magdef	*varchar2(1)*	"d" or "n" flag indicating if magnitude is defining or nondefining	Y
	mmodel	*varchar2(15)*	Magnitude model	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
I	commid	*number(10,0)*	Comment identifier	Y
I	lddate	*date*	Load date	Y

Primary key	PK_STAMAG(magid, ampid, sta)
Indexes	SMAMPIDX(ampid), STAMAG_LDDATEX(lddate), SMARIDX(arid), PK_STAMAG(magid, ampid, sta), SM_ARID_COMMID_X(arid, commid), SMMAGIDX(magid, sta), SMORIDX(orid)

3.1.142. STAMAG

Owner(s)	SEL2, SEL3, SEL1

Category	Core, Fundamental
Description	The STAMAG table contains station magnitude estimates based upon measurements made on specific seismic phases. Values in STAMAG are used to calculate network magnitudes stored in NETMAG.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	magid	*number(10,0)*	Station magnitude identifier	N
PI	ampid	*number(10,0)*	Amplitude identifier	N
PI	sta	*varchar2(6)*	Station code	N
I	arid	*number(10,0)*	Arrival identifier	Y
I	orid	*number(10,0)*	Origin identifier	Y
	evid	*number(10,0)*	Event identifier	Y
	phase	*varchar2(8)*	Phase type	Y
	delta	*float(24)*	Source-receiver distance in degrees	Y
	magtype	*varchar2(6)*	Magnitude type, for example mb, Ms, ML	Y
	magnitude	*float(24)*	Magnitude	Y
	uncertainty	*float(24)*	Magnitude uncertainty	Y
	magres	*float(24)*	Magnitude residual	Y
	magdef	*varchar2(1)*	"d" or "n" flag indicating if magnitude is defining or nondefining	Y
	mmodel	*varchar2(15)*	Magnitude model	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
	commid	*number(10,0)*	Comment identifier	Y
I	lddate	*date*	Load date	Y

Primary key	PK_STAMAG(magid, ampid, sta)
Indexes	STAMAG_LDDATEX(lddate), SMARIDX(arid), PK_STAMAG(magid, ampid, sta), SMORIDX(orid), SMMAGIDX(magid, sta)

3.1.143. STANET

Owner(s)	STATIC
Category	Core, Reference
Description	The STANET table groups array sites into an array "network." Its structure is identical to the AFFILIATION table.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	net	*varchar2(8)*	Network identification string	N
PI	sta	*varchar2(6)*	Station code	N
	lddate	*date*	Load date	Y

Primary key	PK_STANET(net, sta)
Indexes	STANETSTAX(sta), PK_STANET(net, sta)

3.1.144. STASSOC

Owner(s)	IDCX
Category	Core, Fundamental
Description	The STASSOC table contains summary information about groups of related arrivals. This table defines the group of phases seen at a single station from the same event.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	stassid	*number(10,0)*	Station association (stassoc) identifier.	N
P	sta	*varchar2(6)*	Station code	Y
	etype	*varchar2(7)*	Event type	Y
	location	*varchar2(32)*	Apparent location description	Y
	dist	*float(24)*	Estimated distance	Y
	azimuth	*float(24)*	Estimated azimuth	Y
	lat	*float(24)*	Geographic latitude. Locations north of the equator have positive latitudes.	Y
	lon	*float(24)*	Geographic longitude. Longitudes are measured positive east of the Greenwich meridian.	Y
	depth	*float(24)*	Estimated depth (kilometers)	Y
I	time	*float(53)*	Estimated origin time	Y
	imb	*float(24)*	Estimated mb	Y
	ims	*float(24)*	Initial estimated Ms	Y
	iml	*float(24)*	Initial estimated ML	Y
	auth	*varchar2(15)*	Name of the application or user making the update	Y
	commid	*number(10,0)*	Comment identifier	Y
I	lddate	*date*	Load date	Y

Primary key	PK_STASSOC(stassid)
Indexes	PK_STASSOC(stassid), STASSOC_LDDATEX(lddate), STASSTIMEX(time)

3.1.145. STATION_PHASE_RELY

Owner(s)	STATIC
Category	Interactive Analysis
Description	Table containing reliability estimates for azimuth and slowness at different primary seismic stations.

Pk/Fk/I	Column	Storage type	Description	Nullable
	sta	*varchar2(6)*	Station code	N
	statype	*varchar2(24)*	Station type	Y
	az_rel	*number(8,3)*	Azimuth reliability	Y
	slo_rel	*number(8,3)*	Slowness reliability	Y
	min_azerr	*number(8,3)*	Minimum azimuth error	Y
	max_azerr	*number(8,3)*	Maximum azimuth error	Y
	req_azslo_dist	*number(8,0)*	Maximum distance from hypocenter to disregard azimuth and slowness residuals	Y
	req_azslo_snr	*number(8,0)*	Minimum signal-to-noise ratio required to disregard azimuth and slowness residuals	Y
	lddate	*date*	Load date	N

3.1.146. STA_RELY

Owner(s)	STATIC
Category	Interactive Analysis
Description	Table containing estimates for time, azimuth and slowness reliability at different primary seismic stations.

Pk/Fk/I	Column	Storage type	Description	Nullable
	sta	*varchar2(6)*	Station code	N
	az_rely	*varchar2(1)*	Azimuth reliability	Y
	slow_rely	*varchar2(1)*	Slowness reliability	Y
	time_rely	*varchar2(1)*	Time reliability	Y
	lddate	*date*	Load date	N

3.1.147. SUBS

Owner(s)	IDCX
Category	Data Services
Description	The SUBS table is used by the Subscription Subsystem. It records what email address receives which products. In addition, it tracks the POC for the products.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	userid	*number(8,0)*	User identifier	N
	intid	*number(10,0)*	Internal identifier for message tracking	Y
	intidtype	*varchar2(16)*	Identifier type for the intid	Y
	subsid	*number(10,0)*	Subscription identifier	Y
	subsname	*varchar2(24)*	Subscription name	Y

PI	prodid	*number(10,0)*	Product identifier	N
	address	*varchar2(64)*	FTP and email address of destination	Y
	deliv_meth	*varchar2(6)*	Delivery method (email or ftp)	Y
	status	*varchar2(6)*	Status of this row	Y
	ondate	*date*	The date subscription is "on"	Y
	offdate	*date*	The date that the subscription is "off"	Y
	initialdate	*date*	Initial date of subscription	Y
	lddate	*date*	Load date	Y

Primary key	PK_SUBS(userid, prodid)
Indexes	PK_SUBS(userid, prodid)

3.1.148. SUBSUSER

Owner(s)	IDCX
Category	Data Services
Description	The SUBSUSER table is used by the Subscription Subsystem to track authorized users of the system. A user is identified by the username and domain from the email header.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	userid	*number(8,0)*	User identifier	N
	username	*varchar2(24)*	UNIX login or user name component of email address	Y
	domain	*varchar2(48)*	Domain name from the incoming subscription message	Y
	status	*varchar2(24)*	Status of this user	Y
	pocid	*number(8,0)*	Point of contact identifier	Y
	priority	*number(2,0)*	User priority	Y
	lddate	*date*	Load date	Y

Primary key	PK_SUBSUSER(userid)
Indexes	PK_SUBSUSER(userid)

3.1.149. THIRDMOM

Owner(s)	REB
Category	Fundamental
Description	The THIRDMOM table contains the third moment of frequency and the percentage of signal frequency amplitudes greater than the corresponding noise frequency amplitudes for an arrival identified by arid. The measurements are used for event screening.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	arid	*number(10,0)*	Arrival identifier	N
	sta	*varchar2(6)*	Station code	N
	rectype	*varchar2(8)*	Recipe type	N
	tmf	*float(24)*	Third moment of frequency	Y
	tmfpct	*float(24)*	Percentage of signal spectrum amplitudes greater than noise spectrum amplitudes	Y
	lddate	*date*	Load date	Y

Primary key	PK_THIRDMOM(arid)
Indexes	PK_THIRDMOM(arid)

3.1.150. TIMEFREQ

Owner(s)	REB
Category	Fundamental
Description	The TIMEFREQ table contains the time-frequency measurements for event characterization.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	orid	*number(10,0)*	Origin identifier	N
PI	sta	*varchar2(6)*	Station code	N
	rectype	*varchar2(8)*	Recipe type	N
	zavpct	*float(24)*	Ratio of bad points to total (vertical)	Y
	navpct	*float(24)*	Ratio of bad points to total (north)	Y
	eavpct	*float(24)*	Ratio of bad points to total (east)	Y
	xavpct	*float(24)*	Ratio of bad points to total (cross-correlation)	Y
	zavcep	*float(24)*	Average 2-D cepstrum max (vertical)	Y
	navcep	*float(24)*	Average 2-D cepstrum max (north)	Y
	eavcep	*float(24)*	Average 2-D cepstrum max (east)	Y
	zavcor	*float(24)*	Average autocorrelation (vertical)	Y
	navcor	*float(24)*	Average autocorrelation (north)	Y
	eavcor	*float(24)*	Average autocorrelation (east)	Y
	xcor	*float(24)*	Zero cross-correlation	Y
	lddate	*date*	Load date	Y

Primary key	PK_TIMEFREQ(orid, sta)
Indexes	PK_TIMEFREQ(orid, sta)

3.1.151. TIMESTAMP

Owner(s)	IDCX
Category	Distributed Processing
Description	The TIMESTAMP table is used for scheduling automatic processing of time-series data.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	procclass	*varchar2(16)*	Process class	N
PI	procname	*varchar2(16)*	Process name	N
	time	*float(53)*	Last epoch time	Y
	lddate	*date*	Load date	Y

Primary key	TIMESTAMP_PK(procclass, procname)
Indexes	TIMESTAMP_PK(procclass, procname)

3.1.152. WEIGHTS

Owner(s)	STATIC
Category	Data Services
Description	The WEIGHTS table is used to store weighting information for calculating the weights of REB events. Only those events with sufficient weight are migrated from the LEB to the REB.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	phase	*varchar2(8)*	Phase type	N
PI	statype	*varchar2(4)*	Station type (ar or ss)	N
PI	net	*varchar2(8)*	Network identification string	N
	tweight	*float(24)*	Time weight	Y
	aweight	*float(24)*	Azimuth weight	Y
	sweight	*float(24)*	Slowness weight	Y
	ondate	*number(8,0)*	First julian date this row is valid	Y
	offdate	*number(8,0)*	Last Julian date this row is valid	Y
	lddate	*date*	Load date	Y

Primary key	SYS_C0028356(phase, statype, net)
Indexes	PK_WEIGHTS(phase, statype, net)

3.1.153. WFAUX

Owner(s)	IDCX
Category	Fundamental

Description	Not used at the IDC.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	wfid	*number(10,0)*	waveform identifier	N
	length	*number(10,0)*	waveform length, bytes	N

Primary key	WFAUX_PK(wfid)
Indexes	WFAUXX(wfid)

3.1.154. WFCONV

Owner(s)	IDCX
Category	Data Services
Description	Not used at the IDC.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	sta	*varchar2(6)*	station code	N
PI	chan	*varchar2(8)*	channel code	N
	chanid	*number(8,0)*	channel identifier	Y
	inauth	*varchar2(1)*	input authenticated (y or n)	Y
	incomp	*varchar2(2)*	input compression type	Y
	intype	*varchar2(2)*	input fixed-width data type	Y
	insamp	*number(8,0)*	input samples per packet	Y
	outauth	*varchar2(1)*	output authenticated (y or n)	Y
	outcomp	*varchar2(2)*	output compression type	Y
	outtype	*varchar2(2)*	output fixed-width data type	Y
	outsamp	*number(8,0)*	output samples per packet	Y
	strip	*varchar2(1)*	data stripped of headers	Y
	commid	*number(10,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

Primary key	PK_WFCONV(sta, chan)
Indexes	PK_WFCONV(sta, chan)

3.1.155. WFDISC

Owner(s)	SEGMENT
Category	Core
Description	The WFDISC table contains a waveform header file and descriptive information. This table provides a pointer (or index) to waveforms stored on disk. The waveforms themselves are stored in ordinary disk files called waveform or ".w" (dotw) files as a sequence of sample values (usually in a binary representation, as defined in the data-

	type column).

Pk/Fk/I	Column	Storage type	Description	Nullable
I	sta	*varchar2(6)*	Station code	N
	chan	*varchar2(8)*	Channel name	N
I	time	*float(53)*	Start epochal time of the waveform segment	N
PI	wfid	*number(10,0)*	Unique waveform identifier (integer)	N
	chanid	*number(8,0)*	Channel recording identifier	Y
	jdate	*number(8,0)*	Julian date for this data	Y
	endtime	*float(53)*	End epochal time of the waveform segment	Y
	nsamp	*number(8,0)*	Number of samples in the waveform segment	Y
	samprate	*float(24)*	Sample rate for this record (samples per second)	Y
	calib	*float(24)*	Nominal calibration	Y
	calper	*float(24)*	Calibration period (seconds)	Y
	instype	*varchar2(6)*	Instrument type (e.g. CMG3ES, Akashi, HMP45A)	Y
	segtype	*varchar2(1)*	Waveform segment type indicating if the waveform is original, segmented, virtual or duplicate	Y
	datatype	*varchar2(2)*	Data type (e.g. s3, s4, t4)	Y
	clip	*varchar2(1)*	Flag indicating whether or not the data are clipped	Y
I	dir	*varchar2(64)*	Absolute path to the data file	Y
I	dfile	*varchar2(32)*	Waveform data file name	Y
	foff	*number(10,0)*	Byte offset of data segment within file	Y
	commid	*number(8,0)*	Comment identifier	Y
I	lddate	*date*	Load date	Y

Primary key	PK_WFDISC(wfid)
Indexes	PK_WFDISC(wfid), WFDISC_LDDATEX(lddate), WFSTAX(sta, time), WFDIRX(dir, dfile), WFTIMEX(time)

3.1.156. WFDISC

Owner(s)	IDCX
Category	Core
Description	The WFDISC table contains a waveform header file and descriptive information. This table provides a pointer (or index) to waveforms stored on disk. The waveforms themselves are stored in ordinary disk files called waveform or ".w" (dotw) files as a sequence of sample values (usually in a binary representation, as defined in the datatype column).

Pk/Fk/I	Column	Storage type	Description	Nullable
I	sta	*varchar2(6)*	Station code	N
I	chan	*varchar2(8)*	Channel name	N
I	time	*float(53)*	Start epochal time of the waveform segment	N
PI	wfid	*number(10,0)*	Unique waveform identifier (integer)	N
	chanid	*number(8,0)*	Channel recording identifier	Y
	jdate	*number(8,0)*	Julian date for this data	Y
I	endtime	*float(53)*	End epochal time of the waveform segment	Y
	nsamp	*number(8,0)*	Number of samples in the waveform segment	Y
	samprate	*float(24)*	Sample rate for this record (samples per second)	Y
	calib	*float(24)*	Nominal calibration	Y
	calper	*float(24)*	Calibration period (seconds)	Y
	instype	*varchar2(6)*	Instrument type (e.g. CMG3ES, Akashi, HMP45A)	Y
	segtype	*varchar2(1)*	Waveform segment type indicating if the waveform is original, segmented, virtual or duplicate	Y
	datatype	*varchar2(2)*	Data type (e.g. s3, s4, t4)	Y
	clip	*varchar2(1)*	Flag indicating whether or not the data are clipped	Y
I	dir	*varchar2(64)*	Absolute path to the data file	Y
I	dfile	*varchar2(32)*	Waveform data file name	Y
	foff	*number(10,0)*	Byte offset of data segment within file	Y
	commid	*number(10,0)*	Comment identifier	Y
I	lddate	*date*	Load date	Y

Primary key	PK_WFDISC(wfid)
Indexes	WF_TIME_ENDTIME_IDX(time, endtime), WFDISC_LDDATEX(lddate), PK_WFDISC(wfid), WFSTAX(sta, time, endtime, chan), WFTIMEX(time), WFDIRX(dir, dfile)
Triggers	WFDISC_ENDTIME, WFDISC_NVIAR_ENDTIME

3.1.157. WFDISC_NOMIG

Owner(s)	SEGMENT
Description	Obsolete.

Pk/Fk/I	Column	Storage type	Description	Nullable
	sta	*varchar2(6)*	Station code	N

	chan	*varchar2(8)*	Channel name	N
	time	*float(53)*	Start epochal time of the waveform segment	N
	wfid	*number(8,0)*	Unique waveform identifier (integer)	N
	chanid	*number(8,0)*	Channel recording identifier	Y
	jdate	*number(8,0)*	Julian date for this data	Y
	endtime	*float(53)*	End epochal time of the waveform segment	Y
	nsamp	*number(8,0)*	Number of samples in the waveform segment	Y
	samprate	*float(24)*	Sample rate for this record (samples per second)	Y
	calib	*float(24)*	Nominal calibration	Y
	calper	*float(24)*	Calibration period (seconds)	Y
	instype	*varchar2(6)*	Instrument type (e.g. CMG3ES, Akashi, HMP45A)	Y
	segtype	*varchar2(1)*	Waveform segment type indicating if the waveform is original, segmented, virtual or duplicate	Y
	datatype	*varchar2(2)*	Data type (e.g. s3, s4, t4)	Y
	clip	*varchar2(1)*	Flag indicating whether or not the data are clipped	Y
	dir	*varchar2(64)*	Absolute path to the data file	Y
	dfile	*varchar2(32)*	Waveform data file name	Y
	foff	*number(10,0)*	Byte offset of data segment within file	Y
	commid	*number(8,0)*	Comment identifier	Y
	lddate	*date*	Load date	Y

3.1.158. WFTAG

Owner(s)	SEL2, IDCX
Category	Core, Fundamental
Description	The WFTAG table links various identifiers (for example, orid, arid, and stassid to wfid). Linkages can also be determined indirectly using sta, chan, and time. However, it is more efficient to use the WFTAG table.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	tagname	*varchar2(8)*	Key (arid, orid, evid, and so on)	N
PI	tagid	*number(10,0)*	Tagname value	N
PI	wfid	*number(10,0)*	Waveform identifier	N
	lddate	*date*	Load date	Y

Primary key	PK_WFTAG(tagname, tagid, wfid)
Indexes	WFTWFIDX(wfid), PK_WFTAG(tagname, tagid, wfid), WFTTAGIDX(tagid)

3.1.159. WFTAG

Owner(s)	SEGMENT
Category	Core, Fundamental
Description	The WFTAG table links various identifiers (for example, orid, arid, and stassid to wfid). Linkages can also be determined indirectly using sta, chan, and time. However, it is more efficient to use the WFTAG table.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	tagname	*varchar2(8)*	Key (arid, orid, evid, and so on)	N
PI	tagid	*number(8,0)*	Tagname value	N
PI	wfid	*number(10,0)*	Waveform identifier	N
	lddate	*date*	Load date	Y

Primary key	PK_WFTAG(tagname, tagid, wfid)
Indexes	WFTWFIDX(wfid), PK_WFTAG(tagname, tagid, wfid), WFTTAGIDX(tagid)

3.1.160. WFTAG

Owner(s)	SEL3, SEL1
Category	Core, Fundamental
Description	The WFTAG table links various identifiers (for example, orid, arid, and stassid to wfid). Linkages can also be determined indirectly using sta, chan, and time. However, it is more efficient to use the WFTAG table.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	tagname	*varchar2(8)*	Key (arid, orid, evid, and so on)	N
PI	tagid	*number(10,0)*	Tagname value	N
PI	wfid	*number(10,0)*	Waveform identifier	N
	lddate	*date*	Load date	Y

Primary key	PK_WFTAG(tagname, tagid, wfid)
Indexes	WFTWFIDX(wfid), PK_WFTAG(tagname, tagid, wfid), WFTTAGIDX(tagid)

3.1.161. XTAG

Owner(s)	IDCX
Category	Database and Utility
Description	The XTAG table links various identifiers (for example, orid, arid, stassid, and wfid to other identifiers). This table is a generalization of the WFTAG table, which is limited to linking exclusively to the wfid. The thisdb column describes the database account

	for the record specified by thisid and thisname; thatdb describes the database account for the record specified by thatid and thatname. When a parent/child relationship exists between the records, thisid should designate the parent, and thatid should designate the child.

Pk/Fk/I	Column	Storage type	Description	Nullable
	thisid	*number(10,0)*	Thisname identifier	Y
I	thatid	*number(10,0)*	Thatname identifier	Y
	thisname	*varchar2(8)*	Key for thisid (grid, orid, ntid, and so on)	Y
	thatname	*varchar2(8)*	Key for thatid (arid, orid, nfid, and so on)	Y
	thisdb	*varchar2(32)*	Database account for the records specified by thisid and thisname	Y
	thatdb	*varchar2(32)*	Database account for the records specified by thatid and thatname	Y
	lddate	*date*	Load date	Y

Indexes	XTAGTHATIDNDX(thatid)

3.2. S/H/I Column Descriptions

3.2.1. *account*

Table(s)	DATAREADY (IDCX)			
Description	Database account name. The tagid and tagname pointing to the data to be distributed by the Subscription Subsystem are in this database account.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)		- (hyphen)	a24	N
Range	any string up to 24 characters			

3.2.2. *acoef*

Table(s)	SPVAR (REB)			
Description	Coefficient "a" of the quadratic trend of the log spectrum between frequencies fmin and fmax. The spectrum is measured in nm-sec.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f7.2	Y
Range	any floating point value			

3.2.3. *action*

Table(s)	ALLOCATE_HOUR (LEB), ALLOCATE_HOUR (REB)			
Description	Analyst task performed on this time-block of data.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)		NOT ALLOWED	a16	N
Range	action IN {AfterShock, Allocate, Bull_QC, Del_Pass, RebDone, Scan_Pass}			

3.2.4. *address*

Table(s)	SUBS (IDCX)			
Description	FTP and email address (normally fully qualified in the form user@domain) for a user of the Subscription system.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(64)		NOT ALLOWED	a64	Y
Range	any valid email address			

3.2.5. *algorithm*

Table(s)	ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3)
Description	Location algorithm used. This column is a brief textual description of the al-

	gorithm used for computing a seismic origin.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)		- (hyphen)	a15	Y
Range	any string up to the character field width			

3.2.6. amcor

Table(s)	SITEAUX (STATIC)			
Description	Site-dependent log amplitude correction.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f10.1	Y
Range	amcor > -999.0			

3.2.7. amcorsd

Table(s)	SITEAUX (STATIC)			
Description	Standard deviation for log amplitude correction.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f5.2	Y
Range	amcorsd > 0.0			

3.2.8. amp

Table(s)	ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB)			
Description	Measured amplitude defined by amptype.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	nanometers or dimensionless depending on the type of channel	-1.0	f11.2	Y
Range	amp > 0.0			

3.2.9. amp

Table(s)	AMPLITUDE (IDCX), AMPLITUDE (LEB), AMPLITUDE (REB)			
Description	Measured amplitude defined by amptype. Amplitude is greater than zero in all cases except amptype=FmSig, which can be negative (and is for around 50% of cases).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	nanometers or dimensionless depending on the type of channel	-1.0	f11.2	Y
Range	amp > 0.0 (except FmSig: can be negative)			

3.2.10. amp_hi

Table(s)	BREGION_TAB (STATIC)			
Description	Upper bound of the amplitude window. Never used.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,3)	nanometers	-1	f8.3	Y
Range				

3.2.11. amp_lo

Table(s)	BREGION_TAB (STATIC)			
Description	Lower bound of the amplitude window. Never used.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,3)	nanometers	-1	f8.3	Y
Range				

3.2.12. ampid

Table(s)	STAMAG (LEB), STAMAG (REB), STAMAG (SEL1), STAMAG (SEL2), STAMAG (SEL3)			
Description	Amplitude identifier. Every amplitude measure is assigned a unique positive integer that identifies it in the database. If an associated stamag record exists, then ampid links it to amplitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	N
Range	ampid > 0			

3.2.13. ampid

Table(s)	AMPLITUDE (IDCX), AMPLITUDE (LEB), AMPLITUDE (REB)			
Description	Amplitude identifier. Every amplitude measure is assigned a unique positive integer that identifies it in the database. If an associated stamag record exists, then ampid links it to amplitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	ampid > 0			

3.2.14. amplr

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB)
Description	Maximum 3-component amplitude for all overlapping time windows used in the polarization analysis. This column is equal to the sum of the square roots of the eigenvalues. The only difference between amps and amplr is in the definition of the overlapping time windows.

Storage type	Unit	NA value	External	Nullable
float(24)	nanometers	-1.0	f7.2	Y
Range	amplr > 0.0			

3.2.15. ampp

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB)			
Description	3-component amplitude measured at the time of the maximum rectilinearity. This column is equal to the sum of the square roots of the eigenvalues (that is, it is the sum of the amplitudes measured along the three axes of the polarization ellipsoid).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	nanometers	-1.0	f7.2	Y
Range	ampp > 0.0			

3.2.16. amps

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB)			
Description	Maximum 3-component amplitude for all overlapping time windows used in the polarization analysis. This column is equal to the sum of the square roots of the eigenvalues. The only difference between amps and amplr is in the definition of the overlapping time windows.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	nanometers	-1.0	f7.2	Y
Range	amps > 0.0			

3.2.17. amptime

Table(s)	AMPLITUDE (IDCX), AMPLITUDE (LEB), AMPLITUDE (REB)			
Description	Epoch time of amplitude measure.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	-9999999999.999	f17.5	Y
Range	any valid epoch time			

3.2.18. amptype

Table(s)	AMPDESCRIPT (IDCX)			
Description	Amplitude measure descriptor. This descriptor is used to uniquely identify an amplitude measurement and link the description in ampdescript with actual measurements in amplitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		- (hyphen)	a8	N
Range	any free-format string up to eight characters			

3.2.19. amptype

Table(s)	AMPLITUDE (IDCX), AMPLITUDE (LEB), AMPLITUDE (REB)			
Description	Amplitude measure descriptor. This descriptor is used to uniquely identify an amplitude measurement and link the description in ampdescript with actual measurements in amplitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		- (hyphen)	a8	Y
Range	any free-format string up to eight characters			

3.2.20. apmarid

Table(s)	APMA (IDCX), APMA (LEB)			
Description	Amplitude measure descriptor. This descriptor is used to uniquely identify an amplitude measurement and link the description in ampdescript with actual measurements in amplitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		- (hyphen)	a8	Y
Range	any free-format string up to eight characters			

3.2.21. apmarid

Table(s)	APMA (REB)			
Description	Unique apma recipe identifier. Each arrival in apma is assigned a positive integer identifying it with the recipe used in the polarization analysis.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	Y
Range	apmarid > 0			

3.2.22. archid

Table(s)	ARCH_DATA_TYPE (IDCX)			
Description	Archive identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	archid > 0			

3.2.23. archiveport

Table(s)	DLMAN (IDCX)			
Description	Archiver port.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(6,0)		-1	i6	Y

Range	0 <= archiveport <= 16383

3.2.24. arid

Table(s)	AMP3C (IDCX), AMP3C (LEB), AMP3C (REB)			
Description	Arrival identifier. Each arrival is assigned a positive integer (if available) identifying it with a unique sta, chan, and time. Note that arid in the AMP3C, AMPLITUDE and STAMAG tables is also allowed to have a NA value of -1.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	N
Range	arid >= -1			

3.2.25. arid

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB), ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB), ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3), DETECTION (IDCX), DETECTION (LEB), DETECTION (REB), FKDISC (LEB), HYDRO_ASSOC (IDCX), HYDRO_ASSOC (LEB), HYDRO_ASSOC (REB), HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB), INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB), PMCC_FEATURES (IDCX), SPVAR (REB), THIRDMOM (REB)			
Description	Arrival identifier. Each arrival is assigned a positive integer identifying it with a unique sta, chan, and time.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	arid > 0			

3.2.26. arid

Table(s)	AMPLITUDE (IDCX), AMPLITUDE (LEB), AMPLITUDE (REB), STAMAG (LEB), STAMAG (REB), STAMAG (SEL1), STAMAG (SEL2), STAMAG (SEL3)			
Description	Arrival identifier. Each arrival is assigned a positive integer (if available) identifying it with a unique sta, chan, and time. Note that arid in the AMP3C, AMPLITUDE and STAMAG tables is also allowed to have a NA value of -1.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	Y
Range	arid >= -1			

3.2.27. array

Table(s)	REQUEST (IDCX)
Description	Array code. Network or station name.

Storage type	Unit	NA value	External	Nullable
varchar2(8)		NOT ALLOWED	a8	Y
Range	any string matching the net column in Affiliation (Stanet)			

3.2.28. attenid

Table(s)	ATTENCOEF (STATIC)			
Description	Attenuation coefficient set identifier. Each set of attenuation coefficients is assigned a unique positive integer to identify the change history.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(20)		- (hyphen)	a20	N
Range	any valid string up to 20 characters			

3.2.29. attribute

Table(s)	NA_VALUE (IDCX)			
Description	Name of the column to which a NA value is to be assigned.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(30)		NOT ALLOWED	a30	N
Range	any valid string up to the character width			

3.2.30. auth

Table(s)	REVAUDIT (LEB)			
Description	Author, the originator of the data. Auth may also identify an application generating or modifying the record, such as an automated interpretation or signal-processing program.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)		- (hyphen)	a15	N
Range	any string up to the column character width			

3.2.31. auth

Table(s)	AMPLITUDE (IDCX), AMPLITUDE (LEB), AMPLITUDE (REB), APMA (IDCX), APMA (LEB), APMA (REB), ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB), EVENT (LEB), EVENT (REB), EVENT (SEL1), EVENT (SEL2), EVENT (SEL3), NETWORK (STATIC), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3), OUTAGE (IDCX), PMCC_FEATURES (IDCX), QCSTATS (IDCX), SITEAUX (STATIC), STASSOC (IDCX)			
Description	Author, the originator of the data. Auth may also identify an application generating or modifying the record, such as an automated interpretation or signal-processing program.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)		- (hyphen)	a15	Y

Range	any string up to the column character width

3.2.32. auth

Table(s)	INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB), NETMAG (LEB), NETMAG (REB), NETMAG (SEL1), NETMAG (SEL2), NETMAG (SEL3), ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), STAMAG (LEB), STAMAG (REB), STAMAG (SEL1), STAMAG (SEL2), STAMAG (SEL3)			
Description	Author, the originator of the data. Auth may also identify an application generating the record, such as an automated interpretation or signal-processing program.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)		- (hyphen)	a15	Y
Range	any string up to the column character width			

3.2.33. auth

Table(s)	DISCARD (LEB), DISCARD (REB)			
Description	Name of the Analyst discarding the event			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)		- (hyphen)	a15	Y
Range	any string up to the column character width			

3.2.34. auth

Table(s)	ALLOCATE_HOUR (LEB), ALLOCATE_HOUR (REB)			
Description	Name of the Analyst processing the time block			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)		- (hyphen)	a16	Y
Range	any string up to the column character width			

3.2.35. auth

Table(s)	PMCC_RECIPE (IDCX)			
Description	Author, the originator of the data. Auth may also identify an application generating or modifying the record, such as an automated interpretation or signal-processing program.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(17)		- (hyphen)	a17	Y
Range	any string up to the column character width			

3.2.36. author

Table(s)	FILEPRODUCT (IDCX)

Description	Author of the data pointed to by the dir and dfile attributes			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)		- (hyphen)	a16	Y
Range	any string up to the character field width			

3.2.37. author

Table(s)	FS_STAGEPRODUCT (IDCX)			
Description	obsolete			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)			a16	Y
Range				

3.2.38. author

Table(s)	FILEPRODUCT_BU_20200610 (IDCX), FILEPRODUCT_TEMP (IDCX)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)				Y
Range				

3.2.39. auxid

Table(s)	OUTAGE (IDCX)			
Description	Auxiliary identification code.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(4)		- (hyphen)	a4	Y
Range	any valid auxiliary code up to four characters			

3.2.40. available

Table(s)	OUTAGE (IDCX)			
Description	Flag to specify if data are available (t) or unavailable (f).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)		NOT ALLOWED	a1	Y
Range	available IN {t, f}			

3.2.41. ave_noise

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)
Description	Average pressure of the noise segment.

Storage type	Unit	NA value	External	Nullable
float(24)	dB re mPa	-1.0	f9.4	Y
Range	ave_noise > 0.0			

3.2.42. avgconstval

Table(s)	QCSTATS (IDCX)			
Description	Average value of data in masked constant segments.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)		-999.0	f17.5	Y
Range	aveconstval >= 0.0			

3.2.43. aweight

Table(s)	WEIGHTS (STATIC)			
Description	Azimuth weight.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		0.0	f5.2	Y
Range	aweight >= 0.0			

3.2.44. az1

Table(s)	HYDRO_ARR_GROUP (IDCX), HYDRO_ARR_GROUP (LEB), HYDRO_ARR_GROUP (REB)			
Description	Azimuth estimated from the time lags of arrivals in a hydro-arrival group.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-1.0	f7.2	Y
Range	0.0 <= az1 < 360.0			

3.2.45. az2

Table(s)	HYDRO_ARR_GROUP (IDCX), HYDRO_ARR_GROUP (LEB), HYDRO_ARR_GROUP (REB)			
Description	Azimuth estimated from the time lags of arrivals in a hydro-arrival group. This second azimuth estimate is only needed when only two arrivals exist in a group, which results in an ambiguity between two equally likely azimuths. The error is the same for the two azimuths.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-1.0	f7.2	Y
Range	0.0 <= az2 < 360.0			

3.2.46. az_rel

Table(s)	STATION_PHASE_RELY (STATIC)

Description	Azimuth reliability estimate			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,3)		-1	f8.3	Y
Range	0.0 <= az_rel <= 1.0			

3.2.47. az_rely

Table(s)	STA_RELY (STATIC)			
Description	Azimuth reliability flag. The value is a single-character flag to indicate whether (y) or not (n) the azimuth is considered to be reliable.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)			a1	Y
Range	az_rely IN { 0,1}			

3.2.48. az_tol1

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	Y
Range				

3.2.49. az_tol2

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	Y
Range				

3.2.50. az_weight

Table(s)	PHASE_WEIGHT_EVENT_DEFINE (STATIC)			
Description	Weight given to defining azimuth for this phase type.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	N
Range				

3.2.51. azcontrib

Table(s)	HYDRO_ASSOC (IDCX), HYDRO_ASSOC (LEB), HYDRO_ASSOC (REB)
Description	Flag that specifies if an arrival that belongs to a hydro arrival group was used to calculate the azimuth.

Storage type	Unit	NA value	External	Nullable
varchar2(1)		- (hyphen)	a1	Y
Range	azcontrib IN {y, n}			

3.2.52. azdef

Table(s)	ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3)			
Description	Azimuth-defining code. The one-character flag indicates whether or not the azimuth of a phase was used to constrain the event location solution. This column is defining (azdef = d) if it was used in the location, non defining (azdef = n) if it was not.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)		- (hyphen)	a1	Y
Range	azdef IN {d, n}			

3.2.53. azi_hi

Table(s)	BREGION_TAB (STATIC)			
Description	Maximal azimuth to consider.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,3)	degrees		f8.3	Y
Range	0.0 <= azi_hi <= 360.0			

3.2.54. azi_lo

Table(s)	BREGION_TAB (STATIC)			
Description	Minimal azimuth to consider.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,3)	degrees		f8.3	Y
Range	0.0 <= azi_lo <= 360.0			

3.2.55. azimuth

Table(s)	STASSOC (IDCX)			
Description	Estimated azimuth. This value is the estimated station-to-event azimuth measured clockwise from North.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-1.0	f7.2	Y
Range	0.0 <= azimuth < 360.0			

3.2.56. *azimuth*

Table(s)	ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB)			
Description	Observed azimuth. This value is the estimated station-to-event azimuth measured clockwise from North. The estimate can be made in a variety of ways, including f-k or polarization analysis.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-1.0	f7.2	Y
Range	0.0 <= azimuth < 360.0			

3.2.57. *azimuth*

Table(s)	PARRIVAL (LEB), PARRIVAL (REB), PARRIVAL (SEL1), PARRIVAL (SEL2), PARRIVAL (SEL3)			
Description	Predicted azimuth. This value is the estimated station-to-event azimuth measured clockwise from North.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-1.0	f7.2	Y
Range	0.0 <= azimuth < 360.0			

3.2.58. *azres*

Table(s)	DEFINE_PHASE_RESIDUAL (STATIC)			
Description	Allowable azimuth residual			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	NOT ALLOWED	f7.1	N
Range	-180.0 <= azres <= 180.0			

3.2.59. *azres*

Table(s)	ALLOW_RESID (LEB), ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3)			
Description	Azimuth residual. The value is the difference between the measured station-to-event azimuth for an arrival and the true azimuth. The true azimuth is the bearing to the inferred event origin.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999.0	f7.1	Y
Range	-180.0 <= azres <= 180.0			

3.2.60. *band*

Table(s)	INSTRUMENT (STATIC)
Description	Frequency band. The value is a qualitative indicator of frequency passband for an instrument. Values should reflect the response curve rather than just the

	sample rate. Recommended values are as follows: s (short-period) m (mid-period) i (intermediate-period) l (long-period) b (broadband) h (high-frequency, very short-period) v (very long-period) For a better notion of the instrument characteristics, see the instrument response curve.

Storage type	Unit	NA value	External	Nullable
varchar2(1)		- (hyphen)	a1	Y
Range	band IN {s, m, i, l, b, h, v}			

3.2.61. bandw

Table(s)	AMPLITUDE (IDCX), AMPLITUDE (LEB), AMPLITUDE (REB), DETECTION (IDCX), DETECTION (LEB), DETECTION (REB)			
Description	Difference between the high and low frequency bands used in the processing detection or amplitude processing.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	Hertz	-1.0	f7.3	Y
Range	bandw > 0.0			

3.2.62. bandw

Table(s)	FKDISC (LEB)			
Description	Frequency bandwidth.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	Hertz	-1.0	f7.3	Y
Range	bandw > 0.0			

3.2.63. bcoef

Table(s)	SPVAR (REB)			
Description	Coefficient "b" of the quadratic trend of the log spectrum between frequencies fmin and fmax. The spectrum is measured in nm-sec.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f7.2	Y
Range	any floating point value			

3.2.64. begin_date

Table(s)	PARTICIPATION (STATIC)			
Description	Beginning date of station participation in a particular net.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i8	N
Range	any valid Julian date			

3.2.65. belief

Table(s)	ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3)			
Description	Phase identification confidence level. The value is a qualitative estimate of the confidence that a seismic phase is correctly identified.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f4.2	Y
Range	0.0 <= belief <= 1.0			

3.2.66. bmtyp

Table(s)	DETECTION (IDCX), DETECTION (LEB), DETECTION (REB)			
Description	String indicating a coherent (coh), incoherent (inc), or horizontal (hor) beam type.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(4)		- (hyphen)	a4	Y
Range	bmtyp IN {coh, inc, hor}			

3.2.67. bordercolor

Table(s)	MAPDISC (MAP)			
Description	Map border color name. A solid colored border may appear on the top, bottom, and right of any raster map.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)		- (hyphen)	a32	Y
Range	any string up to 32 characters that forms a valid X11 color name (for example, black)			

3.2.68. bregid

Table(s)	BREGION_DEF (STATIC), BREGION_TAB (STATIC)			
Description	Region identification number			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i8	N
Range	bregid > 0			

3.2.69. bregname

Table(s)	BREGION_DEF (STATIC), BREGION_TAB (STATIC)			
Description	Name of the region.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)		NOT ALLOWED	a32	N

Range	any valid string up to 32 characters

3.2.70. calib

Table(s)	OLD_WFPROTO (IDCX), WFDISC (IDCX), WFDISC (SEGMENT), WF-DISC_NOMIG (SEGMENT)			
Description	Calibration factor. The value is the conversion factor that maps digital data to earth displacement. The factor holds true at the oscillation period specified by the column calper. A positive value means ground motion increasing in component direction (up, north, east) is indicated by increasing counts. A negative value means the opposite. Calib generally reflects the best calibration information available at the time of recording, but refinement may be given in Sensor, reflecting a subsequent recalibration of the instrument (see calratio).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	nanometers/digital count	NOT ALLOWED	f16.6	Y
Range	any nonzero floating point number			

3.2.71. calper

Table(s)	OLD_WFPROTO (IDCX), SENSOR (STATIC), WFDISC (IDCX), WFDISC (SEGMENT), WFDISC_NOMIG (SEGMENT)			
Description	Calibration period. This gives the period for which calib, ncalib, and calratio are valid.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	NOT ALLOWED	f16.6	Y
Range	calper > 0.0			

3.2.72. calratio

Table(s)	SENSOR (STATIC)			
Description	Calibration conversion ratio. The value is a dimensionless calibration correction factor that permits small refinements to the calibration correction made using calib and calper from the Wfdisc table. Often, the wfdisc calib contains the nominal calibration assumed at the time of data recording. If the instrument is recalibrated, calratio provides a mechanism to update calibrations from wfdisc with the new information without modifying the wfdisc table. A positive value means ground motion increasing in component direction (up, north, east) is indicated by increasing counts. A negative value means the opposite. Calratio is meant to reflect the most accurate calibration information for the time period for which the sensor record is appropriate, but the nominal value may appear until other information is available.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f16.6	Y
Range	any nonzero floating point number			

3.2.73. capability

Table(s)	NOOPS_CHANNAME (STATIC)			
Description	Capability. These values are used by the Station Quality application, squal. cd2w only processes channels with a capability less than ten (10). In addition, cd2w only updates the waveinterval table for channels with a capability equal to one (1).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)		NOT ALLOWED	i4	Y
Range	-1 <= capability < 18			

3.2.74. capability

Table(s)	CHANNAME (STATIC)			
Description	Not used by CD2WNG. These values were used by the Station Quality application, squal.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)		NOT ALLOWED	i4	Y
Range	-1 <= capability < 18			

3.2.75. ccoef

Table(s)	SPVAR (REB)			
Description	Coefficient "c" of the quadratic trend of the log spectrum between frequencies fmin and fmax. The spectrum is measured in nm-sec.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f7.2	Y
Range	any floating point value			

3.2.76. cep_delay_time_signal

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Bubble pulse delay time estimate where the cepstrum is computed from the NSE-detrended spectrum.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-1.0	f9.4	Y
Range	cep_delay_time_signal > 0.0			

3.2.77. cep_delay_time_trend

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)
Description	Bubble pulse delay time estimate where the cepstrum is computed from the trend of NSE-detrended spectrum.

Storage type	Unit	NA value	External	Nullable
float(24)	seconds	-1.0	f9.4	Y
Range	cep_delay_time_trend > 0.0			

3.2.78. cep_peak_std_signal

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Number of standard deviations from the mean for the largest cepstrum amplitude where the cepstrum is computed from the NSE-detrended spectrum.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f9.4	Y
Range	cep_peak_std_signal > 0.0			

3.2.79. cep_peak_std_trend

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Number of standard deviations from the mean for the largest cepstrum amplitude where the cepstrum is computed with the trend of the NSE-detrended spectrum.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f9.4	Y
Range	cep_peak_std_trend > 0.0			

3.2.80. cep_var_signal

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Variance of the cepstrum computed using NSE-detrended spectrum.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-1.0	f9.4	Y
Range	cep_var_signal > 0.0			

3.2.81. cep_var_trend

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Variance of the cepstrum computed using the trend from the NSE-detrended spectrum.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f9.4	Y
Range	cep_var_trend > 0.0			

3.2.82. cfreq

Table(s)	PMCC_FEATURES (IDCX)			
Description	Central frequency (Hz)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	Hertz	-1.0	f7.2	Y
Range	cfreq > 0.0			

3.2.83. cfreq

Table(s)	AMP3C (IDCX), AMP3C (LEB), AMP3C (REB), DETECTION (IDCX), DETECTION (LEB), DETECTION (REB)			
Description	Central frequency of a beam or f-k spectrum (Hz)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	Hertz	-1.0	f7.2	Y
Range	cfreq > 0.0			

3.2.84. cfreq

Table(s)	FKDISC (LEB)			
Description	Centre frequency of a beam or f-k spectrum.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	Hertz	-1.0	f7.2	Y
Range	cfreq > 0.0			

3.2.85. chan

Table(s)	SITEPOLL (STATIC)			
Description	Channel identifier. The value is an eight-character code that specifies a particular channel within a network (station), which, taken together with sta and time, uniquely identifies seismic timeseries data, including the geographic location, spatial orientation, sensor, and subsequent data processing (beam channel descriptor).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		NOT ALLOWED	a6	N
Range	any alphanumeric string up to the character field width			

3.2.86. chan

Table(s)	SITEPOLLCA (STATIC)
Description	Channel identifier. The value is an eight-character code that specifies a particular channel within a network (station), which, taken together with sta and time, uniquely identifies seismic timeseries data, including the geographic location, spatial orientation, sensor, and subsequent data processing (beam channel descriptor).

Storage type	Unit	NA value	External	Nullable
varchar2(6)		NOT ALLOWED	a6	Y
Range	any alphanumeric string up to the character field width			

3.2.87. chan

Table(s)	ATTENCOEF (STATIC), BEAMAUX (STATIC), CHAN_GROUPS (STATIC), DERVDISC (IDCX), EVSC_REGIONAL (IDCX), FOR-BEAMAUX (STATIC), OLD_WFPROTO (IDCX), PRODUCTTYPESTA (IDCX), QCSTATS (IDCX), REQUEST (IDCX), SENSOR (STATIC), SITEAUX (STATIC), SITECHAN (STATIC), WFDISC (IDCX), WFDISC (SEGMENT), WFDISC_NOMIG (SEGMENT)			
Description	Channel identifier. The value is an eight-character code that specifies a particular channel within a network (station), which, taken together with sta and time, uniquely identifies seismic timeseries data, including the geographic location, spatial orientation, sensor, and subsequent data processing (beam channel descriptor).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		NOT ALLOWED	a8	N
Range	any alphanumeric string up to the character field width			

3.2.88. chan

Table(s)	WFCONV (IDCX)			
Description	Channel identifier. The value is an eight-character code that specifies a particular channel within a network (station), which, taken together with sta and time, uniquely identifies seismic timeseries data, including the geographic location, spatial orientation, sensor, and subsequent data processing (beam channel descriptor).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		NOT ALLOWED	a8	N
Range	any lower-case string up to eight characters			

3.2.89. chan

Table(s)	AMPLITUDE (IDCX), AMPLITUDE (LEB), AMPLITUDE (REB), AR-RIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB), CHAN_GROUPS_AUXWF (STATIC), DETECTION (IDCX), DETECTION (LEB), DETECTION (REB), FILEPRODUCT (IDCX), OUTAGE (IDCX)			
Description	Channel identifier. The value is an eight-character code that specifies a particular channel within a network (station), which, taken together with sta and time, uniquely identifies seismic timeseries data, including the geographic location, spatial orientation, sensor, and subsequent data processing (beam channel descriptor).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		NOT ALLOWED	a8	Y

Range	any alphanumeric string up to the character field width

3.2.90. chan

Table(s)	FS_STAGEPRODUCT (IDCX)			
Description	obsolete			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)			a8	Y
Range				

3.2.91. chan

Table(s)	FILEPRODUCT_BU_20200610 (IDCX), FILEPRODUCT_TEMP (IDCX)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)				Y
Range				

3.2.92. chanid

Table(s)	WFCONV (IDCX)			
Description	Channel recording identifier. The value is a surrogate key used to uniquely identify a specific recording. Chanid duplicates the information of the compound key sta, chan, time.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i10	Y
Range	chanid > 0			

3.2.93. chanid

Table(s)	ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB), OLD_WFPROTO (IDCX), SENSOR (STATIC), SITECHAN (STATIC), WFDISC (IDCX), WFDISC (SEGMENT), WFDISC_NOMIG (SEGMENT)			
Description	Channel recording identifier. The value is a surrogate key used to uniquely identify a specific recording. Chanid duplicates the information of the compound key sta, chan, time.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	chanid > 0			

3.2.94. class

Table(s)	INTERVAL (IDCX), INTERVAL (SEGMENT)
Description	Problem class or object class for interval and request.

Storage type	Unit	NA value	External	Nullable
varchar2(16)		- (hyphen)	a16	N
Range	any free-format string up to the character limit			

3.2.95. class

Table(s)	CHAN_GROUPS (STATIC)			
Description	Type of channel group.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)		- (hyphen)	a16	N
Range	any free-format string up to the character limit			

3.2.96. class

Table(s)	REQUEST (IDCX)			
Description	Problem class or object class for interval and request.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)		- (hyphen)	a16	Y
Range	any free-format string up to the character limit			

3.2.97. class

Table(s)	CHAN_GROUPS_AUXWF (STATIC)			
Description	Type of channel group.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)		- (hyphen)	a16	Y
Range	any free-format string up to the character limit			

3.2.98. class

Table(s)	PROBLEM (IDCX)			
Description	Problem class or object class for interval and request.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(33)		- (hyphen)	a33	Y
Range	any free-format string up to the character limit			

3.2.99. clip

Table(s)	OLD_WFPROTO (IDCX)			
Description	Clipped data flag. The value is a single-character flag to indicate whether (c) or not (n) the data were clipped.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

char(1)		- (hyphen)	a1	Y
Range	clip IN {c, n}			

3.2.100. clip

Table(s)	AMPLITUDE (IDCX), AMPLITUDE (LEB), AMPLITUDE (REB), ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB), WFDISC (IDCX), WFDISC (SEGMENT), WFDISC_NOMIG (SEGMENT)			
Description	Clipped data flag. The value is a single-character flag to indicate whether (c) or not (n) the data were clipped.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)		- (hyphen)	a1	Y
Range	clip IN {c, n}			

3.2.101. clrpth

Table(s)	EVSC_PROD (IDCX)			
Description	Hydroacoustic clear-path flag. Set to 1 if all paths within the location error ellipse are clear to at least one hydroacoustic station in a given set.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(1,0)		-1	i1	Y
Range	clrpth IN {0,1}			

3.2.102. coh_deldur

Table(s)	INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB)			
Description	Estimated standard deviation in coh_dur.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-1.0	f7.2	Y
Range	coh_deldur > 0.0			

3.2.103. coh_dur

Table(s)	INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB)			
Description	Time period during which the spatial coherence (reckoned as F-Statistic) “beam” exceeded its threshold for the current time interval of spatial coherence in excess of its threshold value.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-999.0	f7.2	Y
Range	coh_dur > 0.0			

3.2.104. coh_per

Table(s)	INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB)			
Description	Dominant period of the spatially coherent signal. The value is estimated from the inverse of the frequency of the maximum power in a windowed spectrum of the traditional beamformed waveform data during the time interval defined by coinc_time and coh_dur.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-999.0	f7.2	Y
Range	coh_per > 0.0			

3.2.105. coh_snr

Table(s)	INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB)			
Description	Equivalent, equal channel, coherent signal-to-noise ratio; the inband power in the spatially coherent fraction of the arrival divided by the total inband non-coherent noise.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-1.0	f7.2	Y
Range	coh_snr > 0.0			

3.2.106. coh_time

Table(s)	INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB)			
Description	Earliest time at which the spatial coherence (determined as F-Statistic) “beam” exceeded its threshold for the current time interval of spatial coherence in excess of its threshold value.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	–9999999999.999	f17.5	Y
Range	coh_time > –9999999999.999			

3.2.107. coinc_deldur

Table(s)	INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB)			
Description	Estimated standard deviation in coinc_dur.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-1.0	f7.2	Y
Range	coinc_deldur > 0.0			

3.2.108. coinc_dur

Table(s)	INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB)			
Description	Time period during which both the STA/LTA on the traditional beam and the sample-by-sample F-Statistic beams exceed their respective thresholds for the current time interval of coincidence detection.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-999.0	f7.2	Y
Range	coinc_dur > 0.0			

3.2.109. coinc_time

Table(s)	INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB)			
Description	Earliest time at which the STA/LTA applied to the traditional beam and the spatial coherence “beam” both exceeded their respective thresholds for the current time interval of coincidence detection.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	–9999999999.999	f17.5	Y
Range	coinc_time > –9999999999.999			

3.2.110. colormapid

Table(s)	COLORDISC (MAP), MAPCOLOR (MAP)			
Description	Colordisc identifier. Each colordisc is assigned a unique positive integer that identifies it in a database. The colormapid identifies color-lookup tables available to maps.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i8	N
Range	colormapid > 0			

3.2.111. colormapname

Table(s)	COLORDISC (MAP)			
Description	Colormap name that identifies the color-lookup table in a listing of available tables.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(64)		NOT ALLOWED	a64	Y
Range	any string up to 64 characters			

3.2.112. colorname

Table(s)	OVERLAYDISC (MAP)
Description	Overlay color name.

Storage type	Unit	NA value	External	Nullable
varchar2(32)		- (hyphen)	a32	N
Range	any valid color name			

3.2.113. command

Table(s)	MSGAUX (IDCX)			
Description	Command that was being executed when the failure occurred. If this cannot be determined, such as a caught signal from UNIX, then the value is set to "signal caught."			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)		- (hyphen)	a24	Y
Range	any string up to the character field width that is a valid user name			

3.2.114. commid

Table(s)	OLD_WFPROTO (IDCX)			
Description	Comment identifier. The value is a key that points to free-form comments entered in the REMARK table. These comments store additional information about a record in another table. The REMARK table can have many records with the same commid and different lineno, but the same commid will appear in only one other record among the rest of the tables in the database (see lineno)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number		-1	i8	Y
Range	commid > 0			

3.2.115. commid

Table(s)	REMARK (IDCX), REMARK (LEB), REMARK (REB), REMARK (SEL1), REMARK (SEL2), REMARK (SEL3), REMARK (STATIC)			
Description	Comment identifier. The value is a key that points to free-form comments entered in the REMARK table. These comments store additional information about a record in another table. The REMARK table can have many records with the same commid and different lineno, but the same commid will appear in only one other record among the rest of the tables in the database (see lineno)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	commid > 0			

3.2.116. commid

Table(s)	ALLOCATE_HOUR (LEB), ALLOCATE_HOUR (REB), APMA (IDCX), APMA (LEB), APMA (REB), ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB), ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3), DATAUSER (IDCX), DERVDISC (IDCX), DE-

	TECTION (IDCX), DETECTION (LEB), DETECTION (REB), DLMAN (IDCX), EVENT (LEB), EVENT (REB), EVENT (SEL1), EVENT (SEL2), EVENT (SEL3), FKDISC (LEB), INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB), MSGDISC (IDCX), NETMAG (LEB), NETMAG (REB), NETMAG (SEL1), NETMAG (SEL2), NETMAG (SEL3), NETWORK (STATIC), ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3), ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3), OUTAGE (IDCX), PMCC_FEATURES (IDCX), SITEAUX (STATIC), STAMAG (LEB), STAMAG (REB), STAMAG (SEL1), STAMAG (SEL2), STAMAG (SEL3), STASSOC (IDCX), WFCONV (IDCX)
Description	Comment identifier. The value is a key that points to free-form comments entered in the REMARK table. These comments store additional information about a record in another table. The REMARK table can have many records with the same commid and different lineno, but the same commid will appear in only one other record among the rest of the tables in the database (see lineno)

Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	Y
Range	commid > 0			

3.2.117. commid

Table(s)	WFDISC (IDCX)
Description	Comment identifier. The value is a key that points to free-form comments entered in the REMARK table. These comments store additional information about a record in another table. The REMARK table can have many records with the same commid and different lineno, but the same commid will appear in only one other record among the rest of the tables in the database (see lineno)

Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i8	Y
Range	commid > 0			

3.2.118. commid

Table(s)	WFDISC (SEGMENT), WFDISC_NOMIG (SEGMENT)
Description	Comment identifier. The value is a key that points to free-form comments entered in the REMARK table. These comments store additional information about a record in another table. The REMARK table can have many records with the same commid and different lineno, but the same commid will appear in only one other record among the rest of the tables in the database (see lineno)

Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	commid > 0			

3.2.119. complete

Table(s)	REQUEST (IDCX)			
Description	Percentage complete. Percentage of waveform data acquired for this request.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)	percent	NOT ALLOWED	i8	Y
Range	0 <= complete <= 100			

3.2.120. complexity

Table(s)	COMPLEXITY (REB)			
Description	Signal complexity measure estimated by DFX application.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f11.4	Y
Range	complexity >= 0.0			

3.2.121. conf

Table(s)	ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3)			
Description	Confidence measure for a particular event identification method.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f5.3	Y
Range	0.5 <= conf <= 1.0			

3.2.122. connmanport

Table(s)	DLMAN (IDCX)			
Description	Connection manager (ConnMan) port number used to send messages to the disk-loop manager application.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(6,0)		0	i6	Y
Range	1 <= connmanport <= 16383			

3.2.123. consider

Table(s)	EVSC_PROD (IDCX)			
Description	Flag indicating whether (1) or not (0) an event was considered for screening.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(1,0)		NOT ALLOWED	i1	Y
Range	consider IN {0, 1}			

3.2.124. consistency

Table(s)	PMCC_FEATURES (IDCX)			
Description	Mean consistency value of the detection pixels in the PMCC family (seconds)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	Y
Range				

3.2.125. const

Table(s)	QCSTATS (IDCX)			
Description	Amount of data in the detection processing interval masked due to constant segments.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	-999.0	f17.5	Y
Range	const >= 0.0			

3.2.126. constrain_depth

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)			
Description	Logical descriptor that tells location process whether or not to fix (constrain) the current hypocentral depth. If TRUE (1), the depth will be fixed to the value specified on the first (summary) line of the DATA file or as specified by the depth column of the Origin (Origin_temp_ga) table. If FALSE (0), the depth is an independent solution parameter. Default is TRUE.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(1,0)		NOT ALLOWED	i1	Y
Range	constrain_depth IN {0, 1}			

3.2.127. constrain_latlon

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)			
Description	Logical descriptor that tells location process whether or not to fix (constrain) the current epicentral location. If TRUE (1), the latitude and longitude will be fixed to the value specified by the lat and lon columns of the Origin (Origin_temp_ga) table. If FALSE (0), the latitude and longitude are independent solution parameters. Default is FALSE.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(1,0)		NOT ALLOWED	i1	Y
Range	constrain_latlon IN {0, 1}			

3.2.128. constrain_ot

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)			
Description	Logical descriptor that tells location process whether or not to fix (constrain) the current origin time. If TRUE (1), the origin time will be fixed to the value specified by the time column of the Origin (Origin_temp_ga) table. If FALSE (0), the origin time is an independent solution parameter. Default is FALSE.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(1,0)		NOT ALLOWED	i1	Y
Range	constrain_ot IN {0, 1}			

3.2.129. controlport

Table(s)	DLMAN (IDCX)			
Description	DataControl port. Number used to send commands to the diskloop manager application.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(6,0)		0	i6	Y
Range	0 <= controlport <= 16383			

3.2.130. correlation

Table(s)	PMCC_FEATURES (IDCX)			
Description	Mean correlation coefficient of the detection pixels in the PMCC family			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.6	Y
Range				

3.2.131. country

Table(s)	SITE_ADDRESS (STATIC)			
Description	Full country name for a sensor site.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(40)		- (hyphen)	a40	Y
Range	any string up to 40 characters			

3.2.132. cov_depth_time

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)
Description	Coverage ellipse depth/time conversion factor. The value is the conversion factor to be multiplied by the depth and origin time axes (sdepth and stime) of the confidence ellipse to recover the coverage ellipse without having to do a complete relocation.

Storage type	Unit	NA value	External	Nullable
float(24)		-999.0	f9.4	Y
Range	cov_depth_time > 0.0			

3.2.133. cov_sm_axes

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)			
Description	Coverage ellipse semi-axis conversion factor. The value is the conversion factor to be multiplied by the semi-major and semi-minor axes of the confidence ellipse to recover the coverage ellipse without having to do a complete relocation.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f9.4	Y
Range	cov_sm_axes > 0.0			

3.2.134. cp_broad_band

Table(s)	EVSC_HYDRO (IDCX)			
Description	The cep_peak_std_signal from table Hydro_features in the 2-80 Hz band for a given orid/sta pair.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f7.2	Y
Range	cp_broad_band > 0.0			

3.2.135. crnr_delfreq

Table(s)	INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB)			
Description	Estimated standard deviation in crnr_freq.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	Hertz	–1.0	f7.2	Y
Range	crnr_delfreq > 0.0			

3.2.136. crnr_freq

Table(s)	INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB)			
Description	Corner frequency estimated from a windowed traditional FFT spectrum (rendered on a dB power scaling) applied to the traditional beam-formed waveform data.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	Hertz	–1.0	f7.2	Y
Range	crnr_freq > 0.0			

3.2.137. ctype

Table(s)	SITECHAN (STATIC)			
Description	Channel type. This column specifies the type of data channel: n (normal, a normal instrument response), b (beam, a coherent beam formed with array data), or i (an incoherent beam or energy stack).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(4)		- (hyphen)	a4	Y
Range	ctype IN {n, b, i}			

3.2.138. cycle_size

Table(s)	PRODUCTCRITERIA (IDCX)			
Description	Size to which a subscription product should be allowed to grow before distributing.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)	Kilobytes	-1	i8	Y
Range	cycle_size > 0			

3.2.139. cycle_time

Table(s)	PRODUCTCRITERIA (IDCX)			
Description	Period of cyclicity for a product in the Subscription Subsystem that is how often a product should be delivered.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)	Hours	-1	i4	Y
Range	cycle_time > 0			

3.2.140. data_info

Table(s)	DATAREADY (IDCX)			
Description	Miscellaneous data information for the Subscription Subsystem, such as the station name for station processing.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)		- (hyphen)	a24	Y
Range	any character string up to 24 characters			

3.2.141. dataday

Table(s)	REBDONE_DATADAY_FLAG (LEB)			
Description	Julian day of this dataday.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(12,0)		NOT ALLOWED	i12	Y

Range	Julian dates are of the form yyyyddd

3.2.142. dataid

Table(s)	DATAREADY (IDCX)			
Description	Unique identifier for the DATAREADY table.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	N
Range	dataid >= 0			

3.2.143. dataid

Table(s)	PRODTRACK (IDCX)			
Description	Unique identifier for the dataready table.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	N
Range	dataid >= 0			

3.2.144. datatype

Table(s)	DERVDISC (IDCX)			
Description	Data type (bi: binary as:ASCII)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2)		- (hyphen)	a2	Y
Range	datatype IN {bi, as}			

3.2.145. datatype

Table(s)	OLD_WFPROTO (IDCX), WFDISC (IDCX), WFDISC (SEGMENT), WF-DISC_NOMIG (SEGMENT)			
Description	Data type of waveform segment			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2)		- (hyphen)	a2	Y
Range	any valid data type in lowercase			

3.2.146. datatype

Table(s)	ARCH_DATA_TYPE (IDCX)			
Description	Data type (or class of data).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)		- (hyphen)	a24	Y
Range	any uppercase string up to the character field width			

3.2.147. datsw

Table(s)	FKDISC (LEB)			
Description	A switch to indicate a data format data type. Proper values will be defined through the software libraries and include files. A manual (man) page will explain the meaning of datsw values and reference related software man pages.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	Y
Range	datsw > 0			

3.2.148. deast

Table(s)	SITE (STATIC)			
Description	Distance east. This column gives the "easting," or the relative position of an array element east of the location of the array centre specified by the value of refsta (see dnorth).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	kilometers	0.0	f9.4	Y
Range	-20,000.0 <= deast <= 20,000.0			

3.2.149. deflt

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			i1	Y
Range				

3.2.150. delaz

Table(s)	ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB), DETECTION (IDCX), DETECTION (LEB), DETECTION (REB), HYDRO_ARR_GROUP (IDCX), HYDRO_ARR_GROUP (LEB), HYDRO_ARR_GROUP (REB)			
Description	Azimuth uncertainty. This column is an estimate of the standard deviation of the azimuth of a signal.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-1.0	f7.2	Y
Range	delaz > 0.0			

3.2.151. deliv_meth

Table(s)	SUBS (IDCX)			
Description	Delivery method for subscription products.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

varchar2(6)		- (hyphen)	a6	Y
Range	deliv_meth IN {ftp, email, www}			

3.2.152. delivid

Table(s)	PRODTRACK (IDCX)			
Description	Identifier that is unique and consecutive for each product constraint.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	Y
Range	delivid >= 0			

3.2.153. delivid

Table(s)	PRODUCTCRITERIA (IDCX)			
Description	Last delivery identifier for this product			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	delivid >= 0			

3.2.154. delslo

Table(s)	ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB)			
Description	Slowness uncertainty. This column is an estimate of the standard deviation of the slowness of a signal. Note that different units are used in ARRIVAL and DETECTION tables.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds/degree	-1.0	f7.2	Y
Range	delslo > 0.0			

3.2.155. delslo

Table(s)	DETECTION (IDCX), DETECTION (LEB), DETECTION (REB)			
Description	Slowness uncertainty. This column is an estimate of the standard deviation of the slowness of a signal. Note that different units are used in ARRIVAL and DETECTION tables.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds/kilometer	-1.0	f7.2	Y
Range	delslo > 0.0			

3.2.156. delta

Table(s)	ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3), EVSC_REGIONAL (IDCX), PARRIVAL (LEB), PARRIVAL

	(REB), PARRIVAL (SEL1), PARRIVAL (SEL2), PARRIVAL (SEL3), STAMAG (LEB), STAMAG (REB), STAMAG (SEL1), STAMAG (SEL2), STAMAG (SEL3)			
Description	Source-receiver distance in degrees. This column is the arc length, over the Earth's surface, of the path the seismic phase follows from source to receiver. The location of the origin is specified in the origin (origin_temp_ga) record referenced by the column orid. The column arid points to the record in the arrival table that identifies the receiver. The value of the column can exceed 360 degrees. The geographic distance between source and receiver is delta modulo(180).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-1.0	f8.3	Y
Range	delta >= 0.0			

3.2.157. deltim

Table(s)	ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB), DETECTION (IDCX), DETECTION (LEB), DETECTION (REB)			
Description	Arrival time uncertainty. This column is an estimate of the standard deviation of an arrival time.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-1.0	f6.3	Y
Range	deltim > 0.0			

3.2.158. depdp

Table(s)	ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3)			
Description	Depth as estimated from depth phases. The value is a measure of event depth estimated from a depth phase or an average of several depth phases. Depth is measured positive in a downwards direction starting from the earths surface (see ndp).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	-999.0	f9.4	Y
Range	0.0 <= depdp < 1000.0			

3.2.159. depth

Table(s)	ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3)			
Description	Source depth in kilometers. This column gives the depth (positive down) of the event origin. Negative depth implies an atmospheric event.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	-999.0	f9.4	N

Range	-100.0 <= depth < 1000.0 0

3.2.160. depth

Table(s)	EVSC_PROD (IDCX)			
Description	Depth estimate in kilometers. This column gives the depth of the event origin. Must be >= 0. Atmospheric events, with negative depth are not allowed.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	-999.0	f9.4	Y
Range	0 <= depth < 1000.0			

3.2.161. depth

Table(s)	STASSOC (IDCX)			
Description	Source depth in kilometers. This column gives the depth (positive down) of the event origin. Negative depth implies an atmospheric event.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	-999.0	f9.4	Y
Range	-100.0 <= depth < 1000.0 0			

3.2.162. depth_conf

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Confidence level of a one-sided confidence interval of the source depth, used for the depth screening criterion.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	0 < depth_conf < 1.0			

3.2.163. depth_kvalue

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Depth uncertainty k-value, used to specify additional uncertainty in seismic free-depth solutions.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	-999.0	f7.2	Y
Range	0.0 < depth_kvalue < 1000.0			

3.2.164. depth_thresh

Table(s)	PRODUCTTYPEEVSC (IDCX)
Description	Depth screening threshold. An event with a one-sided confidence interval for its source depth that is deeper than this threshold is screened out at the confidence level given by depth_conf.

Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	-999.0	f7.2	Y
Range	0.0 < depth_thresh < 1000.0			

3.2.165. deptherr

Table(s)	EVSC_PROD (IDCX)			
Description	Depth error. This is the size of the one-sided depth confidence interval used for event screening for a confidence level given by depth_conf in table PRODUCT-TYPEEVSC. A model uncertainty term, given by depth_kvalue in table PRO-DUCTTYPEEVSC, is included for free-depth solutions.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	-999.0	f7.2	Y
Range	deptherr > 0.0			

3.2.166. dervid

Table(s)	DERVDISC (IDCX)			
Description	Derived data unique identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	dervid > 0			

3.2.167. dervtype

Table(s)	DERVDISC (IDCX)			
Description	Nature of the derived data (pix:PMCC detection pixels, fam: PMCC detection family)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(4)		- (hyphen)	a4	Y
Range	dervtype IN { fam, pix }			

3.2.168. descr

Table(s)	AMPDESCRIPT (IDCX)			
Description	Text description. Describes amplitude measurement parameters.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(255)		- (hyphen)	a255	Y
Range	any free-format string up to column size			

3.2.169. descrip

Table(s)	PROBLEM (IDCX)

Description	Text description.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(129)		- (hyphen)	a129	Y
Range	any free-format string up to the character limit			

3.2.170. descrip

Table(s)	SITECHAN (STATIC)			
Description	Text description.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(50)		- (hyphen)	a50	Y
Range	any free-format string up to the character limit			

3.2.171. detendtime

Table(s)	QCSTATS (IDCX)			
Description	End time of actual interval used for detection processing.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	-999.0	f17.5	Y
Range	detendtime < 9999999999.999			

3.2.172. dettime

Table(s)	QCSTATS (IDCX)			
Description	Start time of actual interval used for detection processing.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	-999.0	f17.5	Y
Range	dettime < 9999999999.999			

3.2.173. dfile

Table(s)	COLORDISC (MAP), MAPDISC (MAP), OVERLAYDISC (MAP)			
Description	Name of the data file. Must conform to UNIX file naming conventions.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)		NOT ALLOWED	a32	N
Range	any string up to the character limit that conforms to UNIX filename syntax			

3.2.174. dfile

Table(s)	FKDISC (LEB)
Description	Name of data file. Name of the heap file (fwfile). In fkdisc, the value is the file-name of an f-k disk file. In fsdisc, the value is the filename of a Fourier Spec-trum disk file (see dir), and so on.

Storage type	Unit	NA value	External	Nullable
varchar2(32)		NOT ALLOWED	a32	Y
Range	any string up to the character limit that conforms to UNIX filename syntax			

3.2.175. dfile

Table(s)	DERVDISC (IDCX), FILEPRODUCT (IDCX), FS_STAGEPRODUCT (IDCX), INSTRUMENT (STATIC), MSGDISC (IDCX), OLD_WFPROTO (IDCX), WFDISC (IDCX), WFDISC (SEGMENT), WFDISC_NOMIG (SEGMENT)			
Description	Name of the data file. Must conform to UNIX file naming conventions.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)		NOT ALLOWED	a32	Y
Range	any string up to the character limit that conforms to UNIX filename syntax			

3.2.176. dfile

Table(s)	FILEPRODUCT_BU_20200610 (IDCX), FILEPRODUCT_TEMP (IDCX)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)				Y
Range				

3.2.177. dfile

Table(s)	PROBLEMLOG (IDCX)			
Description	Name of the data file. Must conform to UNIX file naming conventions.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(65)		NOT ALLOWED	a65	Y
Range	any string up to the character limit that conforms to UNIX filename syntax			

3.2.178. digital

Table(s)	INSTRUMENT (STATIC)			
Description	Flag denoting whether this instrument record describes an analog (a) or digital (d) recording system.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)		- (hyphen)	a1	Y
Range	digital IN {d, a}			

3.2.179. dimx

Table(s)	MAPDISC (MAP)

Description	Width (or x-dimension) of the map in pixels.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)	pixels	NOT ALLOWED	i8	N
Range	dimx > 0			

3.2.180. dimy

Table(s)	MAPDISC (MAP)			
Description	Height (or y-dimension) of the map in pixels.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)	pixels	NOT ALLOWED	i8	N
Range	dimy > 0			

3.2.181. dir

Table(s)	PROBLEMLOG (IDCX)			
Description	Directory. This column is the directory part of a path name and must conform to UNIX directory naming conventions. Relative path names or "." (dot), the notation for the current directory, may be used.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(129)		NOT ALLOWED	a129	Y
Range	any string that conforms to UNIX directory name syntax			

3.2.182. dir

Table(s)	COLORDISC (MAP), MAPDISC (MAP), OVERLAYDISC (MAP)			
Description	Directory. This column is the directory part of a path name and must conform to UNIX directory naming conventions. Relative path names or "." (dot), the notation for the current directory, may be used.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(64)		NOT ALLOWED	a64	N
Range	any string that conforms to UNIX directory name syntax			

3.2.183. dir

Table(s)	DERVDISC (IDCX), FILEPRODUCT (IDCX), FS_STAGEPRODUCT (IDCX), INSTRUMENT (STATIC), MSGDISC (IDCX), OLD_WFPROTO (IDCX), WFDISC (IDCX), WFDISC (SEGMENT), WFDISC_NOMIG (SEGMENT)			
Description	Directory. This column is the directory part of a path name and must conform to UNIX directory naming conventions. Relative path names or "." (dot), the notation for the current directory, may be used.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(64)		NOT ALLOWED	a64	Y

Range	any string that conforms to UNIX directory name syntax

3.2.184. dir

Table(s)	FKDISC (LEB)			
Description	Directory. This column is the directory part of a path name. Relative path names or "." (dot), the notation for the current directory, may be used. Directory where the heap file is located (fwfile). Directory to find file (msgdisc).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(64)		NOT ALLOWED	a64	Y
Range	any string that conforms to UNIX directory name syntax			

3.2.185. dir

Table(s)	FILEPRODUCT_BU_20200610 (IDCX), FILEPRODUCT_TEMP (IDCX)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(64)				Y
Range				

3.2.186. dist

Table(s)	STASSOC (IDCX)			
Description	Estimated distance. This column gives the approximate source-receiver distance as calculated from slowness (array measurements only), incident angle, or (S-P) times.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-1.0	f7.2	Y
Range	0.0 <= dist <= 180.0			

3.2.187. dlat

Table(s)	DSEISINDEX (STATIC), SEISINDEX (STATIC)			
Description	Latitude increment between grid cells in the related (d)seisgrid file			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	NOT ALLOWED	f9.4	Y
Range	dlat >= 0.0			

3.2.188. dlid

Table(s)	DLMAN (IDCX)			
Description	Diskloop manager identification.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number(10,0)		NOT ALLOWED	i10	N
Range	dlid > 0			

3.2.189. dlon

Table(s)	DSEISINDEX (STATIC), SEISINDEX (STATIC)			
Description	Longitude increment between grid cells in Seisgrid (Dseisgrid).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	NOT ALLOWED	f9.4	Y
Range	dlon >= 0.0			

3.2.190. dmax

Table(s)	ATTENCOEF (STATIC)			
Description	Maximum distance for which the regional distance correction is applicable.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	-999.0	f7.2	Y
Range	0.0 < dmax < 2500.0			

3.2.191. dmin

Table(s)	ATTENCOEF (STATIC)			
Description	Minimum distance for which the regional distance correction is applicable.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	-999.0	f7.2	Y
Range	0.0 < dmin < 2500.0			

3.2.192. dnorth

Table(s)	SITE (STATIC)			
Description	Distance north. This column gives the "northing," or relative position of array element north of the array centre specified by the value of refsta (see deast).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	kilometers	0.0	f9.4	Y
Range	-20,000.0 <= dnorth <= 20,000.0			

3.2.193. dom_to_send

Table(s)	PRODUCTCRITERIA (IDCX)			
Description	Day of month to send product.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(2,0)		-1	i2	Y

Range	0 < dom_to_send <= 31

3.2.194. domain

Table(s)	DATAUSER (IDCX)			
Description	Domain name for a Subscription Subsystem user.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(48)		- (hyphen) NOT ALLOWED for datauser	a48	N
Range	any string up to 48 characters that is a valid internet domain			

3.2.195. domain

Table(s)	SUBSUSER (IDCX)			
Description	Domain name for a Subscription Subsystem user.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(48)		- (hyphen) NOT ALLOWED for datauser	a48	Y
Range	any string up to 48 characters that is a valid internet domain			

3.2.196. donetime

Table(s)	REBDONE_DATADAY_FLAG (LEB)			
Description	Epoch time that REB was completed.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)		NOT ALLOWED	f17.5	Y
Range	any valid epoch time			

3.2.197. dow_to_send

Table(s)	PRODUCTCRITERIA (IDCX)			
Description	Day of week to deliver a product.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(2,0)		-1	i2	Y
Range	1 <= dow_to_send <= 7			

3.2.198. dropped

Table(s)	QCSTATS (IDCX)			
Description	Flag that indicates if the interval was dropped by DFX due to excessive masking.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number(8,0)		-1	i8	Y
Range	dropped IN {0, 1}			

3.2.199. dscore

Table(s)	EVSC_PROD (IDCX)			
Description	Score for the depth event-screening criterion.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	dscore > -999.0			

3.2.200. dsize

Table(s)	FILEPRODUCT (IDCX)			
Description	Size of data file in bytes.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)	bytes	NOT ALLOWED	i10	Y
Range	0 < dsize < 99,999,999			

3.2.201. dsize

Table(s)	FILEPRODUCT_BU_20200610 (IDCX), FILEPRODUCT_TEMP (IDCX)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)				Y
Range				

3.2.202. dsize

Table(s)	FS_STAGEPRODUCT (IDCX)			
Description	obsolete			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			i8	Y
Range				

3.2.203. dtype

Table(s)	ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3)
Description	Depth determination flag. This single-character flag indicates the method by which the depth was determined or constrained during the location process. The recommended values are f (free), d (from depth phases), r (restrained by location program) or g (restrained by geophysicist). In cases r or g, either the auth

	column should indicate the agency or person responsible for this action, or the commid column should point to an explanation in the Remark table.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)		- (hyphen)	a1	Y
Range	dtype IN {f, d, r, g}			

3.2.204. duration

Table(s)	PMCC_FEATURES (IDCX)			
Description	Duration of the PMCC family (seconds)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-999.0	f8.3	Y
Range	duration > 0			

3.2.205. duration

Table(s)	AMPLITUDE (IDCX), AMPLITUDE (LEB), AMPLITUDE (REB)			
Description	Total duration of amplitude window. Combined with start_time, the entire amplitude time window is specified. May also be employed to compute a coda duration magnitude if amp and per columns contain NA values.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-999.0	f7.2	Y
Range	duration >= 0			

3.2.206. duration

Table(s)	CHAN_GROUPS (STATIC), CHAN_GROUPS_AUXWF (STATIC)			
Description	Not used. Always set to -1			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)				Y
Range				

3.2.207. eavcep

Table(s)	TIMEFREQ (REB)			
Description	Average maximum value in the two-dimensional cepstrum of the east component traces.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f7.2	Y
Range	eavcep >= 0			

3.2.208. eavcor

Table(s)	TIMEFREQ (REB)			
Description	Average autocorrelation along the time axis across all frequencies excluding randomized points of the east component traces.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f7.2	Y
Range	eavcor >= 0			

3.2.209. eavpct

Table(s)	TIMEFREQ (REB)			
Description	Average ratio of bad points to total of the east component traces.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f7.2	Y
Range	0 <= eavpct <= 1			

3.2.210. ec_consider

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)				Y
Range				

3.2.211. ec_depthco

Table(s)	PRODUCTTYPEEVPARS (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.212. ec_deptherr

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.213. ec_depthp

Table(s)	PRODUCTTYPEEVPARS (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.214. ec_dscore

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.215. ec_grpname

Table(s)	PRODUCTTYPEEVPARS (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)				Y
Range				

3.2.216. ec_hscore

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.217. ec_icat

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)				Y
Range				

3.2.218. ec_ievcat

Table(s)	EVCHAR_PROD (IDCX)

Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)				Y
Range				

3.2.219. ec_irej

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)				Y
Range				

3.2.220. ec_iscore

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.221. ec_ldpflg

Table(s)	PRODUCTTYPEEVPARS (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)				Y
Range				

3.2.222. ec_lscore

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.223. ec_mbmscal

Table(s)	PRODUCTTYPEEVPARS (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

float(24)				Y
Range				

3.2.224. ec_mbmsco

Table(s)	PRODUCTTYPEEVPARS (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.225. ec_mbmsfac

Table(s)	PRODUCTTYPEEVPARS (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.226. ec_mbmsns

Table(s)	PRODUCTTYPEEVPARS (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)				Y
Range				

3.2.227. ec_mbmsp

Table(s)	PRODUCTTYPEEVPARS (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.228. ec_mscore

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.229. ec_msmb

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.230. ec_msmberr

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.231. ec_ndef

Table(s)	PRODUCTTYPEEVPARS (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)				Y
Range				

3.2.232. ec_nsta_mb

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)				Y
Range				

3.2.233. ec_nsta_ms

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)				Y
Range				

3.2.234. ec_onshorep

Table(s)	PRODUCTTYPEEVPARS (IDCX)

Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.235. ec_pctoffsh

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.236. ec_popcrit

Table(s)	PRODUCTTYPEEVPARS (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(60)				Y
Range				

3.2.237. ec_popmagc

Table(s)	PRODUCTTYPEEVPARS (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.238. ec_popmint

Table(s)	PRODUCTTYPEEVPARS (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)				Y
Range				

3.2.239. ec_popsimp

Table(s)	PRODUCTTYPEEVPARS (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

float(24)				Y
Range				

3.2.240. ec_popsnco

Table(s)	PRODUCTTYPEEVPARS (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.241. ec_pscore

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.242. ec_pvaluemin

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.243. ec_regname

Table(s)	PRODUCTTYPEEVPARS (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)				Y
Range				

3.2.244. ec_score

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.245. ec_smajax

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.246. ec_sminax

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.247. ec_stamin

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)				Y
Range				

3.2.248. ec_strike

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)				Y
Range				

3.2.249. ec_udat

Table(s)	PRODUCTTYPEEVPARS (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)				Y
Range				

3.2.250. edepth

Table(s)	SITECHAN (STATIC)

Description	Emplacement depth. This column gives the depth at which the instrument is positioned, relative to the value of elev in the Site table.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	kilometers	NOT ALLOWED	f9.4	Y
Range	edepth >= 0.0			

3.2.251. elev

Table(s)	SITE (STATIC)			
Description	Surface elevation. This column is the elevation of the surface of the earth above a seismic station relative to mean sea level.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	kilometers	-999.0	f9.4	Y
Range	-10.0 <= elev <= 10.0			

3.2.252. elevation_angle

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	Y
Range				

3.2.253. ema

Table(s)	ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB)			
Description	Emergence angle. This column is the emergence angle of an arrival, as observed at a three-component station or array. The value increases from the vertical direction towards the horizontal.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-1.0	f7.2	Y
Range	0.0 <= ema <= 90.0			

3.2.254. emaillimit

Table(s)	DATAUSER (IDCX)			
Description	Maximum size of message that will be delivered via email in the Message Subsystem.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)	bytes	-1	i8	Y
Range	emaillimit >= 0			

3.2.255. emailto

Table(s)	MSGDEST (IDCX)			
Description	Destination email address.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(64)		- (hyphen)	a64	Y
Range	any string up to 64 characters			

3.2.256. emares

Table(s)	ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3)			
Description	Emergence angle residual. This column is the difference between an observed emergence angle and the theoretical prediction for the same phase, assuming an event location as specified by the accompanying orid.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999.0	f7.1	Y
Range	-90.0 <= emares <= 90.0			

3.2.257. end_date

Table(s)	PARTICIPATION (STATIC)			
Description	Date a station was discontinued from a network.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	any valid Julian date where end_date > begin_date (yyyyddd)			

3.2.258. end_time

Table(s)	REQUEST (IDCX)			
Description	Ending time of comparison or processing.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	NOT ALLOWED	f17.5	N
Range	any valid epoch time			

3.2.259. endtime

Table(s)	BEAMAUX (STATIC), SENSOR (STATIC)			
Description	End epochal time given as seconds and fractions of a second since 00:00:00.000 01-Jan-1970; stored in a double-precision floating number. This represents the endtime of the data segment.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	9999999999.999	f17.5	N

Range	endtime < +9999999999.999			

3.2.260. endtime

Table(s)	OLD_WFPROTO (IDCX)			
Description	End epochal time given as seconds and fractions of a second since 00:00:00.000 01-Jan-1970; stored in a double-precision floating number. This represents the endtime of the data segment.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	NOT ALLOWED	f17.5	N
Range	endtime < +9999999999.999			

3.2.261. endtime

Table(s)	FILEPRODUCT (IDCX), INTERVAL (IDCX), INTERVAL (SEGMENT), OUTAGE (IDCX), QCSTATS (IDCX)			
Description	End epochal time given as seconds and fractions of a second since 00:00:00.000 01-Jan-1970; stored in a double-precision floating number. This represents the endtime of the data segment.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	9999999999.999	f17.5	Y
Range	endtime < +9999999999.999			

3.2.262. endtime

Table(s)	WFDISC (IDCX), WFDISC (SEGMENT), WFDISC_NOMIG (SEGMENT)			
Description	End epochal time given as seconds and fractions of a second since 00:00:00.000 01-Jan-1970; stored in a double-precision floating number. This represents the endtime of the data segment.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	NOT ALLOWED	f17.5	Y
Range	endtime < +9999999999.999			

3.2.263. endtime

Table(s)	FS_STAGEPRODUCT (IDCX)			
Description	Epoch time. Epochal time is given as seconds and fractions of a second since 00:00:00.000 01-Jan-1970, and is stored in a double-precision floating number. This represents the endtime of the data segment.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds		f17.5	Y
Range	endtime < +9999999999.999			

3.2.264. endtime

Table(s)	FILEPRODUCT_BU_20200610 (IDCX), FILEPRODUCT_TEMP (IDCX)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)				Y
Range				

3.2.265. endtime

Table(s)	PROBLEM (IDCX)			
Description	End epochal time given as seconds and fractions of a second since 00:00:00.000 01-Jan-1970; stored in a double-precision floating number. This represents the endtime of the data segment.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(17,5)	seconds	9999999999.999	f17.5	Y
Range	endtime < +9999999999.999			

3.2.266. eng_deldur

Table(s)	INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB)			
Description	Estimated standard deviation in eng_dur.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-1.0	f7.2	Y
Range	eng_deldur > 0.0			

3.2.267. eng_dur

Table(s)	INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB)			
Description	Time period during which the STA/LTA on the traditional beam exceeded its threshold for the current time interval.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-999.0	f7.2	Y
Range	eng_dur > 0.0			

3.2.268. eng_time

Table(s)	INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB)			
Description	Earliest time at which the STA/LTA applied to the traditional beam exceeded its threshold for the current time interval.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

float(53)	seconds	–9999999999.999	f17.5	Y
Range	eng_time > –9999999999.999			

3.2.269. esaz

Table(s)	ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3)			
Description	Event-to-station azimuth measured in degrees clockwise from North.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999.0	f7.2	Y
Range	0.0 <= esaz <= 360.0			

3.2.270. etype

Table(s)	ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3), STASSOC (IDCX)			
Description	Event type. Describes the type of event.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(7)		- (hyphen)	a7	Y
Range	etype IN {QUAKE, BLAST, EXPL, IND}			

3.2.271. evid

Table(s)	DISCARD (LEB), DISCARD (REB)			
Description	Event identifier. Each event is assigned a unique positive integer that identifies it in a database. Several records in the origin table can have the same evid. this can accommodate opinions about the location of the event.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	N
Range	evid > 0			

3.2.272. evid

Table(s)	EVENT (LEB), EVENT (REB), EVENT (SEL1), EVENT (SEL2), EVENT (SEL3)			
Description	Event identifier. Each event is assigned a unique positive integer that identifies it in a database. Several records in the origin table can have the same evid. this can accommodate opinions about the location of the event.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	evid > 0			

3.2.273. evid

Table(s)	IN_EVENT_CONTROL (LEB)			
Description	Event identifier. Each event is assigned a unique positive integer that identifies it in a database. Several records in the origin table can have the same evid. Analyst have several opinions about the location of the event.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1 NOT ALLOWED for event	i10	Y
Range	evid > 0			

3.2.274. evid

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), NETMAG (LEB), NETMAG (REB), NETMAG (SEL1), NETMAG (SEL2), NETMAG (SEL3), ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3), PARRIVAL (LEB), PARRIVAL (REB), PARRIVAL (SEL1), PARRIVAL (SEL2), PARRIVAL (SEL3), REQUEST (IDCX), STAMAG (LEB), STAMAG (REB), STAMAG (SEL1), STAMAG (SEL2), STAMAG (SEL3)			
Description	Event identifier. Each event is assigned a unique positive integer that identifies it in a database. Several records in the origin table can have the same evid. this can accommodate opinions about the location of the event.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	Y
Range	evid > 0			

3.2.275. evname

Table(s)	EVENT (LEB), EVENT (REB), EVENT (SEL1), EVENT (SEL2), EVENT (SEL3)			
Description	Event name. This is the common name of the event identified by evid.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)		- (hyphen)	a15	Y
Range	any free-format string up to 15 characters			

3.2.276. extern_chan

Table(s)	CHANNAME (STATIC), NOOPS_CHANNAME (STATIC)			
Description	The channel name used by the sending station.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		NOT ALLOWED	a8	N
Range	any string up to the character field width			

3.2.277. *extern_sta*

Table(s)	CHANNAME (STATIC), NOOPS_CHANNAME (STATIC)			
Description	The site name used by the sending station.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		NOT ALLOWED	a6	N
Range	any upper-case string up to the character field width			

3.2.278. *extmsgid*

Table(s)	MSGDISC (IDCX)			
Description	Value of the msgid column in a message that is received by the message system.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(20)		-1	a20	Y
Range	any string up to 20 characters			

3.2.279. *famsize*

Table(s)	PMCC_FEATURES (IDCX)			
Description	Number of detection pixels in the PMCC family			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			i8	Y
Range				

3.2.280. *fgroup*

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			i8	Y
Range				

3.2.281. *fileoff*

Table(s)	MSGDISC (IDCX)			
Description	Number of bytes to the first character of the email file (first character of the email header). fileoff will always be 0 on the operations system, but will be reset when archived.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)	bytes	-1	i10	Y
Range	fileoff > 0			

3.2.282. *filesize*

Table(s)	MSGDISC (IDCX)			
Description	Size of file.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)	bytes	-1	i10	Y
Range	fileoff > 0			

3.2.283. *fkid*

Table(s)	FKDISC (LEB)			
Description	Uniquely identifies a f-k spectrum file.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	Y
Range	fkid > 0			

3.2.284. *fkqual*

Table(s)	DETECTION (IDCX), DETECTION (LEB), DETECTION (REB)			
Description	An integer quantifying the quality of the f-k spectrum. An fkqual = 1 is high quality; an fkqual = 4 is low quality.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)		-1	f7.6	Y
Range	1 <= fkqual <= 4			

3.2.285. *fkrid*

Table(s)	FKDISC (LEB)			
Description	Uniquely defines a f-k spectrum recipe.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	Y
Range	fkrid > 0			

3.2.286. *fktyp*

Table(s)	FKDISC (LEB)			
Description	String that identifies the type of f-k spectrum; examples are monochromatic (mono) and broadband (broa).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(4)		NOT ALLOWED	a4	Y
Range	any lower-case string up to four characters			

3.2.287. *fm*

Table(s)	ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB)			
Description	First motion. This is a two-character indication of first motion. The first character describes first motion seen on short-period channels and the second holds for long-period instruments. Compression on a short-period sensor is denoted by c, dilatation by a d; and compression on a long-period sensor is denoted by u, dilatation by an r. Empty character positions will be indicated by dots (for example, ".r" for dilatation on a long-period sensor).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2)		- (hyphen)	a2	Y
Range	all two-letter permutations of {c | d | .}, {u | r | .}			

3.2.288. *fmax*

Table(s)	SPVAR (REB)			
Description	Maximum frequency of a band with snr > 3 dB used for the spectral variance calculation.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	Hertz	NOT ALLOWED	f7.2	N
Range	fmax > fmin			

3.2.289. *fmin*

Table(s)	SPVAR (REB)			
Description	Minimum frequency of a band with snr > 3 dB used for the spectral variance calculation.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	Hertz	NOT ALLOWED	f7.2	N
Range	0 < fmin < fmax			

3.2.290. *foff*

Table(s)	OLD_WFPROTO (IDCX)			
Description	File offset; the byte offset of a data segment within a physical data file. This column is nonzero if the data reference does not occur at the beginning of the file.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	bytes	NOT ALLOWED	i10	Y
Range	foff >= 0			

3.2.291. *foff*

Table(s)	DERVDISC (IDCX), FILEPRODUCT (IDCX), FKDISC (LEB), MSGDISC (IDCX), WFDISC (IDCX), WFDISC (SEGMENT), WFDISC_NOMIG (SEG-

	MENT)			
Description	File offset; the byte offset of a data segment within a physical data file. This column is nonzero if the data reference does not occur at the beginning of the file.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)	bytes	NOT ALLOWED	i10	Y
Range	foff >= 0			

3.2.292. foff

Table(s)	FILEPRODUCT_BU_20200610 (IDCX), FILEPRODUCT_TEMP (IDCX)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)				Y
Range				

3.2.293. foff

Table(s)	MSGDATATYPE (IDCX)			
Description	File offset; the byte offset of a data segment within a physical data file. This column is nonzero if the data reference does not occur at the beginning of the file.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)	bytes	NOT ALLOWED	i8	N
Range	foff >= 0			

3.2.294. foff

Table(s)	FS_STAGEPRODUCT (IDCX)			
Description	obsolete			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			i8	Y
Range				

3.2.295. ford

Table(s)	INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB)			
Description	Filter order. In infra_features, this column identifies the order of the Infinite Impulse Response (IIR) filter used to extract the spectral band in which the standard fk spectrum calculation was performed.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)		0	i8	Y

Range	ford > 0

3.2.296. *ford*

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Filter order. In infra_features, this column identifies the order of the Infinite Impulse Response (IIR) filter used to extract the spectral band in which the standard fk spectrum calculation was performed.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		0	i8	Y
Range	ford > 0			

3.2.297. *forwardport*

Table(s)	DLMAN (IDCX)			
Description	Forwarder port used by the diskloop manager.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(6,0)		0	i6	Y
Range	1 <= forwardport <= 16383			

3.2.298. *fpid*

Table(s)	FILEPRODUCT (IDCX)			
Description	File product identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	fpid > 0			

3.2.299. *fpid*

Table(s)	FS_STAGEPRODUCT (IDCX)			
Description	obsolete			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)			i10	Y
Range				

3.2.300. *fpid*

Table(s)	FILEPRODUCT_BU_20200610 (IDCX), FILEPRODUCT_TEMP (IDCX)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)				Y

Range	

3.2.301. *freq*

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB)			
Description	Centre frequency of the wideband polarization analysis. For example, if only the 2 - 4 Hz and 4 - 8 Hz bands satisfy the signal-to-noise ratio criterion, then freq is set to 5.0 Hz.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	Hertz	-1.0	f7.2	Y
Range	freq > 0.0			

3.2.302. *freq_tol*

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	Y
Range				

3.2.303. *fsid*

Table(s)	SPVAR (REB)			
Description	Fourier spectrum identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	N
Range	fsid > 0			

3.2.304. *fstat*

Table(s)	DETECTION (IDCX), DETECTION (LEB), DETECTION (REB)			
Description	F-statistic; a measure of the signal-to-noise ratio at the peak in the f-k spectrum.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f8.5	Y
Range	fstat >= 0			

3.2.305. *ftp_address*

Table(s)	FTPLOGIN (IDCX)			
Description	FTP address of site from which IDC is attempting to transfer data message.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(64)		NOT ALLOWED	a64	N
Range	any string up to 64 characters			

3.2.306. *ftp_address*

Table(s)	FTPFAILED (IDCX)			
Description	FTP address of site from which IDC is attempting to transfer data message.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(64)		NOT ALLOWED	a64	Y
Range	any string up to 64 characters			

3.2.307. *ftype*

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Filter type. This indicates the type of filtering that was performed for a Butterworth filter. "BP" indicates a band-pass filter between low_cut and high_cut; "LP" indicates a low-pass filter below high_cut; "HP" indicates a high-pass filter above low_cut; "BR" indicates a band-reject filter outside low_cut and high_cut.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2)		- (hyphen)	a2	Y
Range	ftype IN {BP, LP, HP, BR}			

3.2.308. *fzp*

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Filter causality. This flag indicates zero-phase filtering. If it is 1, the filter is zero-phase (noncausal); if it is 0, the filter is not zero-phase (causal).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i1	Y
Range	fzp IN {0,1}			

3.2.309. *gctp1*

Table(s)	MAPDISC (MAP)			
Description	General cartographic transformation package variable. The default for all values is 0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f10.4	Y
Range				

3.2.310. *gctp10*

Table(s)	MAPDISC (MAP)
Description	General cartographic transformation package variable. The default for all values is 0.

Storage type	Unit	NA value	External	Nullable
float(24)		NOT ALLOWED	f10.4	Y
Range				

3.2.311. gctp11

Table(s)	MAPDISC (MAP)			
Description	General cartographic transformation package variable. The default for all values is 0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f10.4	Y
Range				

3.2.312. gctp12

Table(s)	MAPDISC (MAP)			
Description	General cartographic transformation package variable. The default for all values is 0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f10.4	Y
Range				

3.2.313. gctp13

Table(s)	MAPDISC (MAP)			
Description	General cartographic transformation package variable. The default for all values is 0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f10.4	Y
Range				

3.2.314. gctp14

Table(s)	MAPDISC (MAP)			
Description	General cartographic transformation package variable. The default for all values is 0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f10.4	Y
Range				

3.2.315. gctp15

Table(s)	MAPDISC (MAP)

Description	General cartographic transformation package variable. The default for all values is 0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f10.4	Y
Range				

3.2.316. gctp2

Table(s)	MAPDISC (MAP)			
Description	General cartographic transformation package variable. The default for all values is 0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f10.4	Y
Range				

3.2.317. gctp3

Table(s)	MAPDISC (MAP)			
Description	General cartographic transformation package variable. The default for all values is 0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f10.4	Y
Range				

3.2.318. gctp4

Table(s)	MAPDISC (MAP)			
Description	General cartographic transformation package variable. The default for all values is 0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f10.4	Y
Range				

3.2.319. gctp5

Table(s)	MAPDISC (MAP)			
Description	General cartographic transformation package variable. The default for all values is 0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f10.4	Y
Range				

3.2.320. gctp6

Table(s)	MAPDISC (MAP)			
Description	General cartographic transformation package variable. The default for all values is 0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f10.4	Y
Range				

3.2.321. gctp7

Table(s)	MAPDISC (MAP)			
Description	General cartographic transformation package variable. The default for all values is 0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f10.4	Y
Range				

3.2.322. gctp8

Table(s)	MAPDISC (MAP)			
Description	General cartographic transformation package variable. The default for all values is 0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f10.4	Y
Range				

3.2.323. gctp9

Table(s)	MAPDISC (MAP)			
Description	General cartographic transformation package variable. The default for all values is 0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f10.4	Y
Range				

3.2.324. grdname

Table(s)	DSEISGRID (STATIC), DSEISINDEX (STATIC), SEISGRID (STATIC), SEISINDEX (STATIC)			
Description	Name for identifying the basis of a natural seismicity grid.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		NOT ALLOWED	a6	N

Range	any free-format string up to six characters

3.2.325. grn

Table(s)	GREGION (STATIC)			
Description	Geographic region number, as defined by [Fli74].			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	N
Range	grn > 0			

3.2.326. grn

Table(s)	ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3)			
Description	Geographic region number, as defined by [Fli74].			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	grn > 0			

3.2.327. grname

Table(s)	GREGION (STATIC)			
Description	Geographic region name. This column is the common name of a geographic region, as given in [Fli74]. Names may have changed due to changing political circumstances (for example, old RHODESIA = new ZIMBABWE) (see grn and srname).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(40)		NOT ALLOWED	a40	Y
Range	any upper-case string up to 40 characters			

3.2.328. grpname

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Group name for subscriptions.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)		- (hyphen)	a24	Y
Range	any valid string up to 24 characters			

3.2.329. gvhi

Table(s)	AMPDESCRIPT (IDCX)
Description	High group velocity for determining a time window. This column defines the start time of an amplitude measurement window if toff is null. If gvhi is used,

	then gvlo must be used to define the end time of the window.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers/second	-999.0	f5.2	Y
Range	gvhi > gvlo			

3.2.330. gvlo

Table(s)	AMPDESCRIPT (IDCX)			
Description	Low group velocity for determining a time window. This column defines the end time of an amplitude measurement window if tlen is null or if gvhi is used to define the start time of the window.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers/second	-999.0	f5.2	Y
Range	gvlo > 0			

3.2.331. hamp

Table(s)	AMP3C (IDCX), AMP3C (LEB), AMP3C (REB)			
Description	Horizontal amplitude. Absolute maximum amplitude (nm) measured on the root of the sum of the squares of two horizontally-oriented components filtered in a frequency band centred at cfreq Hz.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	nanometers	-999.0	f11.2	Y
Range	hamp >= 0.0			

3.2.332. hang

Table(s)	SITECHAN (STATIC)			
Description	Horizontal orientation of seismometer. This column specifies the orientation of the seismometer in the horizontal plane, measured clockwise from North. For a North-South orientation with the seismometer pointing toward the north, hang = 0.0; for East-West orientation with the seismometer pointing toward the west, hang = 270.0 (see vang).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	degrees	NOT ALLOWED	f6.1	Y
Range	0.0 <= hang < 360.0			

3.2.333. header_fpid

Table(s)	FPDESCRIPTION (IDCX)			
Description	Fpid pointing to the header row for this product type.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	Y
Range	header_fpid > 0			

3.2.334. *high_cut*

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	High-cut frequency of filter.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	Hertz	-1.0	f9.4	N
Range	0.0 <= high_cut <= sample rate/2			

3.2.335. *hmxmn*

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB)			
Description	Maximum-to-minimum horizontal amplitude ratio defined as (l1/l2)1/2 where l1 and l2 are the maximum and minimum eigenvalues obtained by solving the 2-D eigensystem using only the horizontal components. This S-type value is calculated at the time of maximum 3-component amplitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f7.2	Y
Range	hmxmn >= 0.0			

3.2.336. *hour*

Table(s)	ALLOCATE_HOUR (LEB), ALLOCATE_HOUR (REB)			
Description	Starting hour of a time block for interactive analysis.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(2,0)	hours	NOT ALLOWED	i2	N
Range	0 <= hour <= 23			

3.2.337. *hour_to_send*

Table(s)	PRODUCTCRITERIA (IDCX)			
Description	Hour at which the product is to be sent.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(2,0)	hours	NOT ALLOWED	i2	Y
Range	0 <= hours_to_send <= 23			

3.2.338. *hscore*

Table(s)	EVSC_PROD (IDCX)			
Description	Score for the hydroacoustic event-screening criterion.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	hscore > -999.0			

3.2.339. hsnr

Table(s)	AMP3C (IDCX), AMP3C (LEB), AMP3C (REB)			
Description	Horizontal signal-to-noise ratio. Ratio of hamp to the root-mean-square amplitude of the root of the sum of the squares of two horizontally oriented components filtered in a frequency band centred at cfreq Hz.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f10.2	Y
Range	hsnr >= 0.0			

3.2.340. htov

Table(s)	AMP3C (IDCX), AMP3C (LEB), AMP3C (REB)			
Description	Horizontal-to-vertical power ratio. One-half times the square of the ratio of hamp to vamp.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f10.2	Y
Range	htov >= 0.0			

3.2.341. hvrat

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB)			
Description	Horizontal-to-vertical power ratio defined as (C3 + C2)/2C1 where C1, C2, and C3 are the diagonal elements of the covariance matrix (C1 corresponds to the vertical component). This is an S-phase-type value that is calculated at the time of the maximum 3-component amplitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f7.2	Y
Range	hvrat >= 0.0			

3.2.342. hvratp

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB)			
Description	Horizontal-to-vertical power ratio defined as (C3 + C2)/2C1 where C1, C2, and C3 are the diagonal elements of the covariance matrix (C1 corresponds to the vertical component). This is a P-phase-type value that is calculated at the time of maximum rectilinearity.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f7.2	Y
Range	hvratp >= 0.0			

3.2.343. hyd_grp_phase

Table(s)	HYDRO_ARR_GROUP (IDCX), HYDRO_ARR_GROUP (LEB), HYDRO_ARR_GROUP (REB)

Description	Phase name resulting from hydro group processing by the application HASE.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		- (hyphen)	a4	Y
Range	Any valid hydro or seismic phase name. currently hyd_grp_phase IN {H, T, N, P}			

3.2.344. hydro_cp_thresh

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Threshold of the hydroacoustic cepstral peak screening criterion.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	dB re microPascals	-999.0	f7.2	Y
Range	0.0 < hydro_cp_thresh < 999.0			

3.2.345. hydro_id

Table(s)	HYDRO_ARR_GROUP (IDCX), HYDRO_ARR_GROUP (LEB), HYDRO_ARR_GROUP (REB), HYDRO_ASSOC (IDCX), HYDRO_ASSOC (LEB), HYDRO_ASSOC (REB)			
Description	Identifier which is the primary key in the hydro_arr_group table and the foreign key in hydro_assoc.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	hydro_id > 0			

3.2.346. hydro_te_thresh

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Threshold of the hydroacoustic total energy screening criterion.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	dB re microPascals	-999.0	f7.2	Y
Range	0.0 < hydro_te_thresh < 999.0			

3.2.347. icell

Table(s)	DSEISGRID (STATIC), SEISGRID (STATIC)			
Description	Grid cell index.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i8	N
Range	icell > 0			

3.2.348. id

Table(s)	GA_TAG (SEL1)			
Description	Arrival or origin identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	Y
Range	id > 0			

3.2.349. idate

Table(s)	MSGDISC (IDCX)			
Description	Initial Julian date message that was received.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	any valid Julian date			

3.2.350. imb

Table(s)	STASSOC (IDCX)			
Description	Initial body wave magnitude. This column is an analysts estimate of the body wave magnitude using data from a single station (see iml, ims, magnitude, magtype, mb, ml, and ms).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	imb > -2.0			

3.2.351. imethod

Table(s)	MSGDISC (IDCX)			
Description	Method of transmission for a message.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		- (hyphen)	a8	Y
Range	imethod IN {email, ftp}			

3.2.352. iml

Table(s)	STASSOC (IDCX)			
Description	Initial local magnitude. This column is an analysts estimate of the local using data from a single station (see imb, ims, magnitude, magtype, mb, ml, and ms).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	iml > -2.0			

3.2.353. *ims*

Table(s)	STASSOC (IDCX)			
Description	Initial surface wave magnitude. The value in this column is an analysts estimate of surface wave magnitude using data from a single station (see iml, imb, magnitude, magtype, mb, ml, and ms).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	ims > -2.0			

3.2.354. *inang1*

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB)			
Description	Apparent incidence angle (measured from the vertical) of the eigenvector (e1) associated with the largest eigenvalue (l1). This column is also called the long-axis incidence angle or the emergence angle. This P-type value is calculated at the time of maximum rectilinearity.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-1.0	f7.2	Y
Range	0.0 <= inang1 < 90.0			

3.2.355. *inang3*

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB)			
Description	Apparent incidence angle (measured from the vertical) of the eigenvector (e3) associated with the smallest eigenvalue (l3). This column is also called the short-axis incidence angle. This S-type value is measured at the time of the maximum 3-component amplitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-1.0	f7.2	Y
Range	0.0 <= inang3 < 90.0			

3.2.356. *inarrival*

Table(s)	AMPLITUDE (IDCX), AMPLITUDE (LEB), AMPLITUDE (REB)			
Description	Flag to indicate whether or not amp is the same as it is in the ARRIVAL table.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)		NOT ALLOWED	a1	Y
Range	inarrival IN {y, n}			

3.2.357. *inauth*

Table(s)	WFCONV (IDCX)
Description	Flag showing if input data are authenticated.

Storage type	Unit	NA value	External	Nullable
varchar2(1)		- (hyphen)	a1	Y
Range	inauth IN {y, n}			

3.2.358. incomp

Table(s)	WFCONV (IDCX)			
Description	Input data compression type. The only type currently supported is Canadian compression (CA).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2)		- (hyphen)	a2	Y
Range	incomp IN {CA}			

3.2.359. inid

Table(s)	INSTRUMENT (STATIC), SENSOR (STATIC)			
Description	Instrument identifier. This column is a unique key to the instrument table and inid provides the only link between sensor and instrument.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED -1 for sensor.	i8	N
Range	inid > 0			

3.2.360. initial_time

Table(s)	PMCC_FEATURES (IDCX)			
Description	Time of the first detection pixel in the PMCC family (epochal)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds		f17.5	Y
Range				

3.2.361. initialdate

Table(s)	SUBS (IDCX)			
Description	Initial date of a subscription.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	ORACLE Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

3.2.362. insamp

Table(s)	WFCONV (IDCX)
Description	Number of input samples per packet.

Storage type	Unit	NA value	External	Nullable
number(8,0)		0	i8	Y
Range	insamp > 0			

3.2.363. insname

Table(s)	INSTRUMENT (STATIC)			
Description	Instrument name. This character string contains the name of the instrument.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(50)		- (hyphen)	a50	Y
Range	any free-format string up to 50 characters			

3.2.364. instant

Table(s)	SENSOR (STATIC)			
Description	Snapshot indicator. When instant = y, the snapshot was taken at the time of a discrete procedural change, such as an adjustment of the instrument gain; when instant = n, the snapshot is of a continuously changing process, such as calibration drift. This value is important for tracking time corrections and calibrations. The default value is y.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)		NOT ALLOWED	a1	N
Range	instant IN {y, n}			

3.2.365. instype

Table(s)	INSTRUMENT (STATIC), OLD_WFPROTO (IDCX), WFDISC (IDCX), WFDISC (SEGMENT), WFDISC_NOMIG (SEGMENT)			
Description	Instrument type. This character string is used to indicate the instrument type. Some examples are: W200P, A100L2, MB2000, PTB101 and CMG3ES.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		- (hyphen)	a6	Y
Range	any alphanumeric string up to the character field width			

3.2.366. intern_chan

Table(s)	CHANNAME (STATIC)			
Description	The channel name used by CD2WNG. Links to the chan column in the SENSOR and WFDISC tables.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		NOT ALLOWED	a8	N
Range	any lower-case string up to the character field width			

3.2.367. *intern_chan*

Table(s)	NOOPS_CHANNAME (STATIC)			
Description	The name of the channel as chosen by the data consumer. The translation is from extern_chan to intern_chan.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		NOT ALLOWED	a8	N
Range	any lower-case string up to the character field width			

3.2.368. *intern_sta*

Table(s)	CHANNAME (STATIC)			
Description	The site name used by CD2WNG. Links to the sta column in the SENSOR and WFDISC tables.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		NOT ALLOWED	a6	N
Range	any upper-case string up the character field width			

3.2.369. *intern_sta*

Table(s)	NOOPS_CHANNAME (STATIC)			
Description	The site name used by cd2w. Links to the sta column in the sensor and wfdisc tables. If the waveSaveFormat parameter is SAVE_SEPARATE, then this name is also used in the waveform file names (e.g. I26H3.BDF.20080223.20-24.w).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		NOT ALLOWED	a6	N
Range	any upper-case string up the character field width			

3.2.370. *intid*

Table(s)	MSGDISC (IDCX), SUBS (IDCX)			
Description	Either the locally generated msgid of an earlier table entry that evoked the creation of this table entry or the reqid from the request table of an internally generated request			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	Y
Range	intid > 0			

3.2.371. *intidtype*

Table(s)	MSGDISC (IDCX)
Description	Identifier type for the intid (usually msgid,but can be reqid, delivid, wmreq_msgid). Set to - (hyphen) for incoming radionuclide data messages and VDMS requests.

Storage type	Unit	NA value	External	Nullable
varchar2(16)		- (hyphen)	a16	Y
Range	intidtype IN { msgid, reqid, delivid, wmreq_msgid }			

3.2.372. *intidtype*

Table(s)	SUBS (IDCX)			
Description	Message identification number (msgid), linking back to the entry in the msgdisc table that initiated the subscription request.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)		NOT ALLOWED	a16	Y
Range	intidtype IN { msgid }			

3.2.373. *intvlid*

Table(s)	INTERVAL (IDCX)			
Description	Interval identifier. Each interval is assigned a unique positive integer that identifies it in the database.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	intvlid > 0			

3.2.374. *intvlid*

Table(s)	INTERVAL (SEGMENT)			
Description	Interval identifier. Each interval is assigned a unique positive integer that identifies it in the database.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i10	N
Range	intvlid > 0			

3.2.375. *intype*

Table(s)	WFCONV (IDCX)			
Description	Input fixed width datatype.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2)		- (hyphen)	a2	Y
Range	same as datatype			

3.2.376. *inwfactivity*

Table(s)	CHAN_GROUPS (STATIC), CHAN_GROUPS_AUXWF (STATIC)
Description	Not used. Always set to -1

Storage type	Unit	NA value	External	Nullable
number(1,0)				Y
Range				

3.2.377. iphase

Table(s)	ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB)			
Description	Reported phase. This eight-character column holds the name initially given to a seismic phase. Standard seismological labels for the types of signals (or phases) are used (for example, P, PKP, PcP, pP). Both upper- and lower-case letters are available and should be used when appropriate, for example, pP or PcP (see phase).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		- (hyphen)	a8	Y
Range	any string up to eight characters that conforms to seismological practice			

3.2.378. is_coda

Table(s)	PHASE_DESCRIPTION (STATIC)			
Description	Flag to specify if phase is a coda phase (y) or not (n).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)			a1	N
Range	is_coda IN { y, n }			

3.2.379. is_depth_phase

Table(s)	PHASE_DESCRIPTION (STATIC)			
Description	Flag to specify if phase is a depth phase (y) or not (n).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)			a1	N
Range	is_depth_phase IN { y, n }			

3.2.380. is_depth_sensitive

Table(s)	PHASE_DESCRIPTION (STATIC)			
Description	Flag to specify if phase is depth sensitive (y) or not (n).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)			a1	N
Range	is_depth_sensitive IN { y, n }			

3.2.381. is_selected

Table(s)	PHASE_DESCRIPTION (STATIC)

Description	Flag to specify if phase is selected (y) or not (n).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)			a1	N
Range	is_selected IN { y, n }			

3.2.382. is_timeavail

Table(s)	PHASE_DESCRIPTION (STATIC)			
Description	Flag to specify whether travel time information is available (y) or not (n).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)			a1	N
Range	is_timeavail IN { y, n }			

3.2.383. is_unique

Table(s)	PHASE_DESCRIPTION (STATIC)			
Description	Flag to specify if phase is a coda phase (y) or not (n).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)			a1	N
Range	is_unique IN { y, n }			

3.2.384. isrc

Table(s)	MSGDISC (IDCX)			
Description	Initial source of message.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(64)		- (hyphen)	a64	Y
Range	any string up to 64 characters			

3.2.385. itime

Table(s)	MSGDEST (IDCX)			
Description	Initial time when message was inserted into the MSGDEST table.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	-9999999999.999	f17.5	Y
Range	any valid epoch time			

3.2.386. itime

Table(s)	MSGDISC (IDCX)
Description	Initial time when message was inserted into the msgdisc table by the Mes-sageReceive application.

Storage type	Unit	NA value	External	Nullable
float(53)	seconds	-9999999999.999	f17.5	Y
Range	any valid epoch time			

3.2.387. jdate

Table(s)	ALLOCATE_HOUR (LEB), ALLOCATE_HOUR (REB)			
Description	Julian date; date of an arrival, origin, seismic recording, and so on. The same information is available in epoch time, but the Julian date format is more convenient for many types of searches. Dates B.C. are negative. The year will never equal 0000, and the day will never equal 000. Where only the year is known, the day of the year is 001; where only year and month are known, the day of year is the first day of the month. Only the year is negated for B.C., so 1 January of 10 B.C. is -0010001 (see time). A jdate begins at midnight and ends just before midnight the following day. The jdate must be consistent with the time in the same record (if specified).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	N
Range	Julian dates are of the form yyyyddd			

3.2.388. jdate

Table(s)	ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB), DERVDISC (IDCX), DETECTION (IDCX), DETECTION (LEB), DETECTION (REB), FKDISC (LEB), OLD_WFPROTO (IDCX), ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3), QCSTATS (IDCX), SENSOR (STATIC), WFDISC (IDCX), WFDISC (SEGMENT), WFDISC_NOMIG (SEGMENT)			
Description	Julian date; date of an arrival, origin, seismic recording, and so on. The same information is available in epoch time, but the Julian date format is more convenient for many types of searches. Dates B.C. are negative. The year will never equal 0000, and the day will never equal 000. Where only the year is known, the day of the year is 001; where only year and month are known, the day of year is the first day of the month. Only the year is negated for B.C., so 1 January of 10 B.C. is -0010001 (see time). A jdate begins at midnight and ends just before midnight the following day. The jdate must be consistent with the time in the same record (if specified).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	Julian dates are of the form yyyyddd			

3.2.389. keyname

Table(s)	LASTID (IDCX), LASTID (SEGMENT), PROBLASTID (IDCX), RMS_LASTID (IDCX)
Description	Identifier type. This column contains the actual name of a key whose last assigned numeric value is saved in keyvalue.

Storage type	Unit	NA value	External	Nullable
varchar2(15)		NOT ALLOWED	a15	N
Range	keyname IN {arid, chanid, commid, evid, inid, orid, stassid, wfid, dataid, prodid, subsid, and so on}			

3.2.390. keyvalue

Table(s)	LASTID (IDCX), LASTID (SEGMENT), PROBLASTID (IDCX), RMS_LASTID (IDCX)			
Description	Current identifier value. This column maintains the last assigned value (a positive integer) of the counter for the specified keyname. The keyvalue is the last counter value used for the column keyname. Key values are maintained in the database to ensure uniqueness.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	keyvalue > 0			

3.2.391. kurtosis

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Kurtosis of the estimated signal energy between onset_time and termination_time.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-9999999999999	f9.4	Y
Range	-10000000.0 < kurtosis< 10000000.0			

3.2.392. label

Table(s)	MAPDISC (MAP)			
Description	Header for Map listing. A label, such as world, categorizes each Map. Label is used to build a sorted list of maps in the Map program.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(65)		- (hyphen)	a65	Y
Range	any string up to 65 characters			

3.2.393. lastfailedtime

Table(s)	FTPFAILED (IDCX)			
Description	Time of most recent attempt to retrieve data message by FTP.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)		NOT ALLOWED	f17.5	Y
Range	any valid epoch time			

3.2.394. lat

Table(s)	MAPPOINT (MAP), ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3)			
Description	Geographic latitude. Locations north of the equator have positive latitudes.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999.0	f9.4	N
Range	-90.0 <= lat <= 90.0			

3.2.395. lat

Table(s)	STASSOC (IDCX)			
Description	Geographic latitude. Locations north of the equator have positive latitudes.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999.0	f9.4	Y
Range	-90.0 <= lat <= 90.0			

3.2.396. lat

Table(s)	SITE (STATIC)			
Description	Geographic latitude. Locations north of the equator have positive latitudes.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	degrees	-999.0	f9.4	Y
Range	-90.0 <= lat <= 90.0			

3.2.397. lat1

Table(s)	DSEISINDEX (STATIC), SEISINDEX (STATIC)			
Description	Southern-most latitude of the first grid cell in Seisgrid (Dseisgrid).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	NOT ALLOWED	f9.4	Y
Range	-90.0 <= lat1 <= 90.0			

3.2.398. lat_hi

Table(s)	BREGION_DEF (STATIC)			
Description	Maximum latitude of the region. Locations north of the equator have positive latitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,3)	degrees		f8.3	Y
Range	-90.0 <= lat_hi <= 90.0			

3.2.399. lat_lo

Table(s)	BREGION_DEF (STATIC)			
Description	Minimum latitude of the region. Locations north of the equator have positive latitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,3)	degrees		f8.3	Y
Range	-90.0 <= lat_lo <= 90.0			

3.2.400. latmajor

Table(s)	MAPDISC (MAP)			
Description	Latitude interval for displaying major grid lines in the Map application.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999	f9.4	Y
Range	0.0 < latmajor < 90.0			

3.2.401. latminor

Table(s)	MAPDISC (MAP)			
Description	Latitude interval for displaying minor grid lines in the Map application.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999	f9.4	Y
Range	0 < latminor < 90.0			

3.2.402. latorigradians

Table(s)	MAPDISC (MAP)			
Description	Latitude origin radians. Coordinates in radians of the lower left corner in the Map application. The Map application uses this for mercator projections only.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	radians	-999	f9.4	Y
Range	-pi/2 < latorigradians < pi/2			

3.2.403. lddate

Table(s)	DEFINE_PHASE_RESIDUAL (STATIC), DISCARD (LEB), DISCARD (REB), PHASE_DESCRIPTION (STATIC), PHASE_WEIGHT_EVENT_DEFINE (STATIC), PHASOR_DIST_DEPTH_RANGES (STATIC), STATION_PHASE_RELY (STATIC), STA_RELY (STATIC)			
Description	Load date. The date and time the record was inserted into the database.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	ORACLE Date	NOT ALLOWED	a21	N

Range	any valid ORACLE date

3.2.404. lddate

Table(s)	AFFILIATION (STATIC), AFFILIATION_EXCL (STATIC), AFFILIATION_LP (STATIC), AFFILIATION_SUB (STATIC), ALLOCATE_HOUR (LEB), ALLOCATE_HOUR (REB), ALLOW_RESID (LEB), AMP3C (IDCX), AMP3C (LEB), AMP3C (REB), AMPDESCRIPT (IDCX), AMPLITUDE (IDCX), AMPLITUDE (LEB), AMPLITUDE (REB), APMA (IDCX), APMA (LEB), APMA (REB), ARCH_DATA_TYPE (IDCX), ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB), ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3), ATTENCOEF (STATIC), BREGION_DEF (STATIC), BREGION_TAB (STATIC), CEPPKS (REB), CHANNAME (STATIC), CHAN_GROUPS (STATIC), CHAN_GROUPS_AUXWF (STATIC), COLORDISC (MAP), COMPLEXITY (REB), DATAREADY (IDCX), DATAUSER (IDCX), DERVDISC (IDCX), DETECTION (IDCX), DETECTION (LEB), DETECTION (REB), DLMAN (IDCX), DSEISGRID (STATIC), DSEISINDEX (STATIC), EVCHAR_PROD (IDCX), EVENT (LEB), EVENT (REB), EVENT (SEL1), EVENT (SEL2), EVENT (SEL3), EVENT_CONTROL (LEB), EVENT_CONTROL (REB), EVSC_HYDRO (IDCX), EVSC_PROD (IDCX), EVSC_REGIONAL (IDCX), FILEPRODUCT (IDCX), FKDISC (LEB), FPDESCRIPTION (IDCX), FS_STAGEPRODUCT (IDCX), FTPFAILED (IDCX), FTPLOGIN (IDCX), GREGION (STATIC), HYDRO_ARR_GROUP (IDCX), HYDRO_ARR_GROUP (LEB), HYDRO_ARR_GROUP (REB), HYDRO_ASSOC (IDCX), HYDRO_ASSOC (LEB), HYDRO_ASSOC (REB), HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB), INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB), INSTRUMENT (STATIC), INTERVAL (IDCX), INTERVAL (SEGMENT), IN_EVENT_CONTROL (LEB), LASTID (IDCX), LASTID (SEGMENT), MAPCOLOR (MAP), MAPDISC (MAP), MAPOVER (MAP), MAPPOINT (MAP), MSGAUX (IDCX), MSGDATATYPE (IDCX), MSGDEST (IDCX), MSGDISC (IDCX), NETMAG (LEB), NETMAG (REB), NETMAG (SEL1), NETMAG (SEL2), NETMAG (SEL3), NETWORK (STATIC), NOOPS_CHANNAME (STATIC), OLD_WFPROTO (IDCX), ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3), ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3), OUTAGE (IDCX), OVERLAYDISC (MAP), PARRIVAL (LEB), PARRIVAL (REB), PARRIVAL (SEL1), PARRIVAL (SEL2), PARRIVAL (SEL3), PARTICIPATION (STATIC), PMCC_FEATURES (IDCX), PMCC_RECIPE (IDCX), PROBLASTID (IDCX), PROBLEM (IDCX), PROBLEMLOG (IDCX), PROBLEMMAIL (IDCX), PRODTRACK (IDCX), PRODUCTCRITERIA (IDCX), PRODUCTTYPEEVSC (IDCX), QCSTATS (IDCX), REBDONE_DATADAY_FLAG (LEB), REGCOEF (STATIC), REMARK (IDCX), REMARK (LEB), REMARK (REB), REMARK (SEL1), REMARK (SEL2), REMARK (SEL3), REMARK (STATIC), REQUEST (IDCX), REVAUDIT (LEB), RMS_LASTID (IDCX), RULESET (STATIC), SEISGRID (STATIC), SEISINDEX (STATIC), SEMAPHORE (IDCX), SENSOR (STATIC), SITE

	(STATIC), SITEAUX (STATIC), SITECHAN (STATIC), SITEPOLL (STATIC), SITEPOLLCA (STATIC), SITE_ADDRESS (STATIC), SPLP (REB), SPVAR (REB), SREGION (STATIC), STAMAG (LEB), STAMAG (REB), STAMAG (SEL1), STAMAG (SEL2), STAMAG (SEL3), STANET (STATIC), STASSOC (IDCX), SUBS (IDCX), SUBSUSER (IDCX), THIRDMOM (REB), TIMEFREQ (REB), TIMESTAMP (IDCX), WEIGHTS (STATIC), WFCONV (IDCX), WFDISC (IDCX), WFDISC (SEGMENT), WFDISC_NOMIG (SEGMENT), WFTAG (IDCX), WFTAG (SEGMENT), WFTAG (SEL1), WFTAG (SEL2), WFTAG (SEL3), XTAG (IDCX)			
Description	Load date. The date and time the record was inserted into the database.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	ORACLE Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

3.2.405. lddate

Table(s)	FILEPRODUCT_BU_20200610 (IDCX), FILEPRODUCT_TEMP (IDCX)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date				Y
Range				

3.2.406. length

Table(s)	WFAUX (IDCX)			
Description	Length of file, bytes (dlfile), waveform length, bytes (wfaux).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)	bytes	NOT ALLOWED	i10	N
Range	length > 0			

3.2.407. lg_snr

Table(s)	EVSC_REGIONAL (IDCX)			
Description	Signal-to-noise ratio of the Lg measurement.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	lg_snr > 0.0			

3.2.408. lineno

Table(s)	REMARK (IDCX), REMARK (LEB), REMARK (REB), REMARK (SEL1), REMARK (SEL2), REMARK (SEL3), REMARK (STATIC)
Description	Line number. This integer is assigned as a sequence number for multiple line comments.

Storage type	Unit	NA value	External	Nullable
number(8,0)		NOT ALLOWED	i8	N
Range	lineno > 0			

3.2.409. loc_all_stas

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)			
Description	Logical descriptor that informs the location process whether or not it should use only stations with source-dependent corrections in event locations. If TRUE (1), use all stations in event location. If FALSE (0), only use phase data from stations possessing either an SSSC, SRST, or test-site correction. Any data without a valid correction will not be included in the final event location. Only meaningful if src_dpnt_corr is > 0. Default is TRUE.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(1,0)		NOT ALLOWED	i1	Y
Range	loc_all_stas IN {0, 1}			

3.2.410. loc_alpha_only

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)			
Description	Logical descriptor that restricts phase data to be used in event location to only those stations contained in the substation list. If FALSE (0), use all stations provided in the Site table. If TRUE (1), only "PRIMARY" station data are used to locate events. This is option desirable in cases where the station network has varying station qualities contributing to events. Default is FALSE.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(1,0)		NOT ALLOWED	i1	Y
Range	loc_alpha_only IN {0, 1}			

3.2.411. loc_conf

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Confidence level of location error ellipse used to assess whether the error ellipse was onshore, offshore or mixed (in other words, partially onshore and offshore).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	0.0 < loc_conf < 1.0			

3.2.412. loc_dist_varwgt

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)
Description	Logical descriptor that informs the location process if predefined distance variance weighting should be applied to the event location. The predefined weight-

	ing is a set of data variances as a function of distance. If FALSE (0) and both user_var_wgt and srst_var_wgt are also set to FALSE, then variances are determined by the deltim, delslo, and delaz from Arrival. Default is FALSE.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(1,0)		NOT ALLOWED	i1	Y
Range	loc_dist_varwgt IN {0, 1}			

3.2.413. loc_sdv_mult

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)			
Description	Large residual multiplier factor. This column is only meaningful when loc_sdv_screen is set to TRUE (1). If TRUE, all data with travel-time/azimuth/slowness residuals greater than this factor times its data variance (standard error) will be ignored during any given iteration of the location process. Default is 3.0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f5.2	Y
Range	loc_sdv_mult > 0.0			

3.2.414. loc_sdv_screen

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)			
Description	Logical descriptor that tells the location process whether or not to ignore data with travel-time/azimuth/slowness residuals greater than loc_sdv_mult times its data standard error in determining an event location. If FALSE (0), include data regardless of its residuals, provided it meets other pertinent conditions. Default is FALSE.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(1,0)		NOT ALLOWED	i1	Y
Range	loc_sdv_screen IN {0, 1}			

3.2.415. loc_src_dpnt_reg

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)			
Description	Source-dependent region identifier for event location. If source-dependent corrections are applied as part of event location process (src_dpnt_corr > 0), then loc_src_dpnt_reg indicates region name.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)		- (hyphen)	a15	Y
Range	any free-format string up to 15 characters			

3.2.416. locality

Table(s)	SITE_ADDRESS (STATIC)

Description	Geographical location within a country.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(40)		- (hyphen)	a40	Y
Range	any string up to 40 characters			

3.2.417. location

Table(s)	STASSOC (IDCX)			
Description	Location description. This character string describes the location of an event identified from data recorded at a single station. An examples is Fiji-Tonga.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)		- (hyphen)	a32	Y
Range	any free-format string up to 32 characters			

3.2.418. logat

Table(s)	ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB)			
Description	Log of amplitude divided by period. This measurement of signal size is often reported instead of the amplitude and period separately. This column is only filled if the separate measurements are not available.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	log (nanometers/seconds)	-999.0	f7.2	Y
Range	logat > 0.0			

3.2.419. login

Table(s)	PROBLEMMAIL (IDCX)			
Description	Login name of originator of log entry or a mail subscriber.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(33)		NOT ALLOWED	a33	N
Range	any valid string up to the field width that is a valid email address			

3.2.420. login

Table(s)	PROBLEM (IDCX), PROBLEMLOG (IDCX)			
Description	Login name of originator of log entry or a mail subscriber.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(33)		NOT ALLOWED	a33	Y
Range	any valid string up to the field width that is a valid email address			

3.2.421. lon

Table(s)	MAPPOINT (MAP), ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB),

	ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3)			
Description	Geographic longitude. Longitudes are measured positive east of the Greenwich meridian.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999.0	f9.4	N
Range	-180.0 <= lon <= 180.0			

3.2.422. lon

Table(s)	STASSOC (IDCX)			
Description	Geographic longitude. Longitudes are measured positive east of the Greenwich meridian.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999.0	f9.4	Y
Range	-180.0 <= lon <= 180.0			

3.2.423. lon

Table(s)	SITE (STATIC)			
Description	Geographic longitude. Longitudes are measured positive east of the Greenwich meridian.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	degrees	-999.0	f9.4	Y
Range	-180.0 <= lon <= 180.0			

3.2.424. lon1

Table(s)	DSEISINDEX (STATIC), SEISINDEX (STATIC)			
Description	Western-most longitude of the first grid cell in Seisgrid (Dseisgrid).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	NOT ALLOWED	f9.4	Y
Range	-180.0 <= lon1 <= 180.0			

3.2.425. lon_hi

Table(s)	BREGION_DEF (STATIC)			
Description	Maximum longitude of the region. Locations east of the Greenwich Meridian have positive longitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,3)	degrees		f8.3	Y
Range	-180.0 <= lon_hi <= 180.0			

3.2.426. lon_lo

Table(s)	BREGION_DEF (STATIC)			
Description	Minimum longitude of the region. Locations east of the Greenwich Meridian have positive longitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,3)	degrees		f8.3	Y
Range	-180.0 <= lon_lo <= 180.0			

3.2.427. lonmajor

Table(s)	MAPDISC (MAP)			
Description	Longitude interval (in degrees) for displaying major grid lines in the Map application.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999	f9.4	Y
Range	0 < lonmajor < 180.0			

3.2.428. lonminor

Table(s)	MAPDISC (MAP)			
Description	Longitude interval (in degrees) for displaying minor grid lines in the Map application.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999	f9.4	Y
Range	-180.0 < lonminor < 180.0			

3.2.429. lonorigradians

Table(s)	MAPDISC (MAP)			
Description	Longitude origin radians. Coordinates in radians of the lower left corner in the Map application. Map uses this for mercator projections only.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	radians	-999	f9.4	Y
Range	-p <= latorigradians <= p			

3.2.430. low_cut

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Low-cut frequency of filter.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	Hertz	-1.0	f9.4	N

Range	low_cut > 0.0

3.2.431. machine

Table(s)	DLMAN (IDCX)			
Description	Fully qualified domain name of the computer where the connection manager resides.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)		- (hyphen)	a32	N
Range	any string up to 32 characters that points to a valid machine			

3.2.432. mag_all_stas

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)			
Description	Logical descriptor that informs magnitude process whether or not it should only use amplitude information from stations with magnitude test-site corrections. If TRUE (1), use all amplitude information in event magnitudes. If FALSE (0), use only amplitude data from stations possessing a magnitude test-site correction; any data without a valid correction will not be included in the magnitude determination. Only meaningful if mag_src_dpnt_reg is not null or "-." Default is TRUE.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(1,0)		NOT ALLOWED	i1	Y
Range	mag_all_stas IN {0, 1}			

3.2.433. mag_alpha_only

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)			
Description	Logical descriptor that restricts amplitude data to be used in the magnitude determination to only those stations contained in the substation list. If FALSE (0), use all valid amplitudes. If TRUE (1), only "Primary seismic" station data are used for the magnitude calculation. This option is desirable in cases where the station network has varying station qualities contributing to the magnitude. Default is FALSE.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(1,0)		NOT ALLOWED	i1	Y
Range	mag_alpha_only IN {0, 1}			

3.2.434. mag_cutoff

Table(s)	PHASOR_DIST_DEPTH_RANGES (STATIC)
Description	Lower bound of body wave magnitude for a phase to be considered for processing by Phasor, if the event mb is >= than this value the program will add it to the phase list if mb-based Automated Phase Selection

	mode of the program is selected.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	magnitude	-999.0	f7.2	Y
Range	mb >= -2.0			

3.2.435. mag_sdv_mult

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)			
Description	Magnitude large residual multiplier factor. This column is meaningful only when mag_sdv_screen is set to TRUE (1). If TRUE, an amplitude with magnitude residuals greater than this factor times its data variance (standard error) will be ignored by the magnitude process. Default is 3.0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f5.2	Y
Range	mag_sdv_mult > 0.0			

3.2.436. mag_sdv_screen

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)			
Description	Logical descriptor that tells magnitude process whether or not to ignore amplitude data with magnitude residuals greater than mag_sdv_mult times its data standard error in determining the given magnitude. If FALSE (0), include data regardless of its residuals, provided it meets other pertinent conditions. Default is FALSE.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(1,0)		NOT ALLOWED	i1	Y
Range	mag_sdv_screen IN {0, 1}			

3.2.437. mag_src_dpnt_reg

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)			
Description	Source-dependent region identifier for magnitude determination. If source-dependent corrections are applied as part of the event magnitude determination process, then mag_src_dpnt_reg indicates the region name.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)		- (hyphen)	a15	Y
Range	any free-format string up to 15 characters			

3.2.438. magdef

Table(s)	STAMAG (LEB), STAMAG (REB), STAMAG (SEL1), STAMAG (SEL2), STAMAG (SEL3)

Description	Magnitude defining switch. A one-character flag indicating whether or not a station magnitude for a given stamag record was used in determining the network magnitude. This column is defining (magdef = d) if it is used in network magnitude calculation or nondefining (magdef = n) if it is not used.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)		- (hyphen)	a1	Y
Range	magdef IN {d, n}			

3.2.439. magid

Table(s)	NETMAG (LEB), NETMAG (REB), NETMAG (SEL1), NETMAG (SEL2), NETMAG (SEL3)			
Description	Network magnitude identifier. This value is assigned to identify a network magnitude in the NETMAG table. This column is required for every network magnitude. Origins are linked to their corresponding mb, Ms and ML magnitudes via the mbid, msid and mlid columns respectively.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	magid > 0			

3.2.440. magid

Table(s)	STAMAG (LEB), STAMAG (REB), STAMAG (SEL1), STAMAG (SEL2), STAMAG (SEL3)			
Description	Station magnitude identifier. This value is assigned to identify a station magnitude in the STAMAG table.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	magid > 0			

3.2.441. magnitude

Table(s)	NETMAG (LEB), NETMAG (REB), NETMAG (SEL1), NETMAG (SEL2), NETMAG (SEL3), STAMAG (LEB), STAMAG (REB), STAMAG (SEL1), STAMAG (SEL2), STAMAG (SEL3)			
Description	Magnitude. This column gives the magnitude value of the type indicated in magtype. The value is derived in a variety of ways, which are not necessarily linked directly to an arrival (see imb, iml, ims, magtype, mb, ml, and ms).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	magnitude	NOT ALLOWED -999.0 for netmag	f7.2	Y
Range	magnitude > -2.0			

3.2.442. magpref_mb

Table(s)	PRODUCTTYPEEVSC (IDCX)

Description	Mb magnitude type used for screening (see Netmag.magtype). Default is mb_ave.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		NOT ALLOWED	a6	Y
Range	any mb magnitude type up to six characters			

3.2.443. magpref_ms

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Ms magnitude type used for screening (see Netmag.magtype). Default is ms_ave.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		NOT ALLOWED	a6	Y
Range	any Ms magnitude type up to six characters			

3.2.444. magres

Table(s)	STAMAG (LEB), STAMAG (REB), STAMAG (SEL1), STAMAG (SEL2), STAMAG (SEL3)			
Description	Magnitude residual. This column is the difference between the magnitude for a given stamag record and the network magnitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	magnitude	-999.0	f7.2	Y
Range	-10.0 < magres < 10.0			

3.2.445. magth

Table(s)	DSEISGRID (STATIC), SEISGRID (STATIC)			
Description	Magnitude threshold used to calculate the number of events per year in each grid cell.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f7.2	Y
Range	any valid magnitude value			

3.2.446. magtype

Table(s)	PRODUCTTYPEORIGIN (IDCX)			
Description	Magnitude type, for example mb, Ms, ML			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(4)		NOT ALLOWED	a4	Y
Range	any valid magnitude type up to the character field width			

3.2.447. magtype

Table(s)	DSEISGRID (STATIC), NETMAG (LEB), NETMAG (REB), NETMAG (SEL1), NETMAG (SEL2), NETMAG (SEL3), SEISGRID (STATIC), STAMAG (LEB), STAMAG (REB), STAMAG (SEL1), STAMAG (SEL2), STAMAG (SEL3)			
Description	Magnitude type, for example mb, Ms, ML			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		NOT ALLOWED	a6	Y
Range	any valid magnitude type up to the character field width			

3.2.448. mapfiletype

Table(s)	MAPDISC (MAP)			
Description	Specifies how the Map program handles the referenced Map file. If mapfiletype = all, then the program reads the file in its entirety. If mapfiletype = blk, then the program reads only the blocks necessary for the display area.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(4)		NOT ALLOWED	a4	N
Range	mapfiletype IN {all, blk}			

3.2.449. mapid

Table(s)	FDSNCHAN (STATIC)			
Description	Mapping identifier between old and new channel names			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)			i10	N
Range	mapid > 0			

3.2.450. mapid

Table(s)	MAPCOLOR (MAP), MAPDISC (MAP), MAPOVER (MAP)			
Description	Mapdisc identifier. Each mapdisc is assigned a unique positive integer that identifies it in a database.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i8	N
Range	mapid > 0			

3.2.451. mapname

Table(s)	MAPDISC (MAP)			
Description	Name of the map. Each map in the Map application is assigned a name for identifying the map in a list of all maps.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

varchar2(64)		NOT ALLOWED	a64	N
Range	any string up to 64 characters			

3.2.452. maptype

Table(s)	MAPDISC (MAP)			
Description	Type of map. A positive integer enumerator for identifying the output graphic type, either raster or vector (maptype = 1 for raster and maptype = 2 for vector).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i8	N
Range	maptype IN {1, 2}			

3.2.453. masked

Table(s)	QCSTATS (IDCX)			
Description	Amount of data in the processing interval masked due to point-spikes, spikes, or constant value segments.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	-999.0	f17.5	Y
Range	masked >= 0			

3.2.454. max_azerr

Table(s)	STATION_PHASE_RELY (STATIC)			
Description	Maximum azimuth error			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,3)	degrees		f8.3	Y
Range	0.0 <= max_azerr <= 360.0			

3.2.455. max_depth

Table(s)	PHASOR_DIST_DEPTH_RANGES (STATIC)			
Description	Maximum allowable depth (km)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	NOT ALLOWED	f9.4	Y
Range	0 <= max_depth <= 700			

3.2.456. max_dist

Table(s)	PHASOR_DIST_DEPTH_RANGES (STATIC)			
Description	Maximum allowable distance (degrees)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees		f8.3	Y

Range	

3.2.457. maxdelta

Table(s)	DEFINE_PHASE_RESIDUAL (STATIC), PHASE_DESCRIPTION (STATIC)			
Description	Maximum allowable distance (degrees)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-1.0	f8.3	N
Range	maxdelta >= 0.0			

3.2.458. maxdelta

Table(s)	ALLOW_RESID (LEB)			
Description	Maximum station to event distance.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-1.0	f8.3	Y
Range	maxdelta >= 0.0			

3.2.459. maxdep_err

Table(s)	PRODUCTTYPEORIGIN (IDCX)			
Description	Maximum of depth_error product constraint.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	999.0	f9.4	Y
Range	mindeperr < maxdep_err < 999.0			

3.2.460. maxdepth

Table(s)	DEFINE_PHASE_RESIDUAL (STATIC), PHASE_DESCRIPTION (STATIC)			
Description	Maximum allowable depth (km)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	NOT ALLOWED	f9.4	N
Range	0 <= maxdepth <= 700			

3.2.461. maxdepth

Table(s)	PRODUCTTYPEORIGIN (IDCX)			
Description	Maximum depth value for a product constraint.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	999.0	f9.4	Y
Range	mindepth < maxdepth < 999.0			

3.2.462. maxesd

Table(s)	PRODUCTTYPEORIGIN (IDCX)			
Description	Maximum distance between the event and a station.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-1	f6.2	Y
Range	minesd <= maxesd <= 180.0			

3.2.463. maxfreq

Table(s)	PMCC_FEATURES (IDCX)			
Description	Maximum frequency of the detection pixels in the PMCC family (Hz)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	Hertz		f9.4	Y
Range				

3.2.464. maxkx

Table(s)	FKDISC (LEB)			
Description	Maximum wavenumber along x-axis in an f-k spectrum. F-k spectra are assumed to be symmetrical, ranging from -maxkx to maxkx.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers-1	-1.0 (Either maxkx or maxsx must be set.)	f7.4	Y
Range	maxkx > 0.0			

3.2.465. maxky

Table(s)	FKDISC (LEB)			
Description	Maximum wavenumber along y-axis of an f-k spectrum. F-k spectra are assumed to be symmetrical, ranging from -maxky to maxky.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers-1	-1.0 (Either maxky or maxsy must be set.)	f7.4	Y
Range	maxky > 0.0			

3.2.466. maxlat

Table(s)	PRODUCTTYPEORIGIN (IDCX), PRODUCTTYPESTA (IDCX)			
Description	Maximum latitude. Locations north of the equator have positive latitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	999.0	f9.4	Y

Range	-90.0 <= maxlat <= 90.0			

3.2.467. maxlon

Table(s)	PRODUCTTYPEORIGIN (IDCX), PRODUCTTYPESTA (IDCX)			
Description	Maximum longitude. Locations east of the Greenwich Meridian have positive longitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	999.0	f9.4	Y
Range	-180.0 <= maxlon <= 180.0			

3.2.468. maxmag

Table(s)	PRODUCTTYPEORIGIN (IDCX)			
Description	Maximum value of magnitude for a product constraint.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	magnitude	999.0	f7.2	Y
Range	minmag < maxmag < 999.0			

3.2.469. maxmb_ms

Table(s)	PRODUCTTYPEORIGIN (IDCX)			
Description	Maximum value of mb - Ms.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	magnitude	999.0	f7.2	Y
Range	minmb_ms < maxmb_ms < 999.0			

3.2.470. maxsx

Table(s)	FKDISC (LEB)			
Description	Maximum slowness along the x-axis in a broadband f-k spectrum. F-k spectra are assumed to be symmetrical, ranging from -maxsx to maxsx.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds/kilometer	-1.0 (Either maxkx or maxsx must be set.)	f7.4	Y
Range	maxsx > 0.0			

3.2.471. maxsy

Table(s)	FKDISC (LEB)			
Description	Maximum slowness along the y-axis in a broadband f-k spectrum. F-k spectra are assumed to be symmetrical, ranging from -maxsy to maxsy.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

float(24)	seconds/kilometer	-1.0 (Either maxsy or maxky must be set.)	f7.4	Y
Range	maxsy > 0.0			

3.2.472. mb

Table(s)	EVSC_PROD (IDCX), ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3)			
Description	Body wave magnitude, mb. (origin) This is the body wave magnitude of an event. The identifier mbid that points to magid in the Netmag table is associated with this column. The information in that record summarizes the method of analysis and data used (see imb, iml, ims, magnitude, magtype, ml, and ms). (evsc_prod) Body wave magnitude for event screening. The type of measurement is indicated by magtype_mb.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	magnitude	-999.0	f7.2	Y
Range	mb > -2.0			

3.2.473. mb_err

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Uncertainty of single-station mb magnitude estimates, used in the computation of the confidence interval of the network estimate of mb minus Ms.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	magnitude	-999.0	f7.2	Y
Range	0.0 < mb_err < 10.0			

3.2.474. mb_max_dist

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)			
Description	Body wave magnitude (mb) station magnitudes at distances greater than mb_max_dist will not be used in network magnitude calculations.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999.0	f9.4	Y
Range	0.0 <= mb_max_dist <= 180.0			

3.2.475. mb_min_dist

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)			
Description	Body wave magnitude (mb) station magnitudes at distances less than mb_min_dist will not be used in network magnitude calculations.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

float(24)	degrees	-999.0	f9.4	Y
Range	0.0 <= mb_min_dist <= 180.0			

3.2.476. mbid

Table(s)	ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3)			
Description	Magnitude identifier for mb. This column stores the magid for a record in NETMAG. mbid is a foreign key joining ORIGIN to NETMAG where ORIGIN.mbid = NETMAG.magid (see magid, mlid, and msid).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	Y
Range	mbid > 0			

3.2.477. mbms

Table(s)	EVSC_PROD (IDCX)			
Description	Difference of body and surface wave magnitudes, mb minus Ms, including a slope term given by mbms_slope of table PRODUCTTYPEEVSC.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	magnitude	-999.0	f7.2	Y
Range	mbms > -999.0			

3.2.478. mbms_conf

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Confidence level for the mb minus Ms screening criterion. This confidence level is for a one-sided confidence interval for mb minus Ms.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	0.0 < mbms_conf < 1.0			

3.2.479. mbms_slope

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Slope term (A) for the mb minus Ms relation (Amb - Ms) to account for calibration of magnitude dependence of the screening criterion. The standard default value is 1.25. A typical range of reasonable values is from +1.0 to +2.0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	0.0 < mbms_slope < 999.0			

3.2.480. mbms_thresh

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Threshold for the mb minus Ms screening criterion. Events with one-sided confidence intervals for mb minus Ms (Amb - Ms, including the slope term) less than this threshold are screened out at the confidence level given by mbms_conf. Typical values of this threshold range from +1.0 to +4.0, depending on the slope term given by mbms_slope.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	magnitude	-999.0	f7.2	Y
Range	0.0 < mbms_thresh < 999.0			

3.2.481. mbmserr

Table(s)	EVSC_PROD (IDCX)			
Description	Error of mb minus Ms. This is the size of the one-sided confidence interval used for the mb minus Ms screening criterion for a confidence level given by mbms_conf of table Producttypeevsc.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	magnitude	-999.0	f7.2	Y
Range	mbmserr > -999.0			

3.2.482. mean_arrival_time

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Mean arrival time of the estimated signal energy, in epoch time.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	NOT ALLOWED	f17.5	Y
Range	any valid epoch time			

3.2.483. merge_adjacent

Table(s)	ARCH_DATA_TYPE (IDCX)			
Description	Merge flag. If y, Archive should merge adjacent rows.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2)		- (hyphen)	a2	Y
Range	merge_adjacent IN {y, n}			

3.2.484. method

Table(s)	DERVDISC (IDCX)			
Description	Method or Application associated to the dervdisc entry.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

varchar2(17)		- (hyphen)	a17	Y
Range	any string up to the character field width			

3.2.485. mfoff

Table(s)	MSGDISC (IDCX)			
Description	Offset in bytes to beginning of message.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)	bytes	-1	i10	Y
Range	mfoff > 0			

3.2.486. min_azerr

Table(s)	STATION_PHASE_RELY (STATIC)			
Description	Minimum azimuth error			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,3)	degrees		f8.3	Y
Range	0.0 <= min_azerr <= 360.0			

3.2.487. min_depth

Table(s)	PHASOR_DIST_DEPTH_RANGES (STATIC)			
Description	Minimum allowable depth (km)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	NOT ALLOWED	f9.4	Y
Range	-999.0 < min_depth < max_depth			

3.2.488. min_dist

Table(s)	PHASOR_DIST_DEPTH_RANGES (STATIC)			
Description	Minimum allowable distance (degrees)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees		f8.3	Y
Range				

3.2.489. min_dp_snr_pp

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Minimum pP depth phase signal-to-noise ratio required for depth phase analysis.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	0 < min_dp_snr_pp < 999			

3.2.490. min_dp_snr_sp

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Minimum sP depth phase signal-to-noise ratio required for depth phase analysis.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	0 < min_dp_snr_sp < 999			

3.2.491. min_dt_pp

Table(s)	EVSC_PROD (IDCX)			
Description	PP-P travel-time difference at nearest station beyond 25 deg.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-999.0	f7.2	Y
Range	0 < min_dt_pp < 999			

3.2.492. min_dt_sp

Table(s)	EVSC_PROD (IDCX)			
Description	SP-P travel-time difference at nearest station beyond 25 deg.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-999.0	f7.2	Y
Range	0 < min_dt_sp < 999			

3.2.493. min_mb

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Minimum mb magnitude for application of event-screening criteria.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	magnitude	-999.0	f7.2	Y
Range	min_mb > -999.0			

3.2.494. min_moveout_pp

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Minimum (pP-P) travel time moveout required for the depth screening criterion to be applied to depth-phase solutions.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-999.0	f7.2	Y
Range	-999.0 < min_moveout_pp < 999.0			

3.2.495. min_moveout_sp

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Minimum (sP-P) travel time moveout required for the depth screening criterion to be applied to depth-phase solutions.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-999.0	f7.2	Y
Range	-999.0 < min_moveout_sp < 999.0			

3.2.496. min_ndef

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Minimum number of defining phases required for the event-screening criteria to be applied to a seismic-acoustic event.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	min_ndef > 0			

3.2.497. min_ndp_pp

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Minimum number of pP depth phases required for the depth screening criterion to be applied to depth-phase solutions.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	min_ndp_pp > 0			

3.2.498. min_ndp_sp

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Minimum number of sP depth phases required for the depth screening criterion to be applied to depth-phase solutions.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	min_ndp_sp > 0			

3.2.499. min_nsta_ms

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Minimum number of stations required to contribute to the network Ms estimate for the mb minus Ms screening criterion to be applied.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y

Range	0 < min_nsta_ms < 1000

3.2.500. min_wdepth

Table(s)	EVSC_PROD (IDCX)			
Description	Minimum depth of water within the location error ellipse defined by smaj_sc, smin_sc, and strike.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	meters	-999.0	f7.2	Y
Range	min_wdepth > 0.0			

3.2.501. min_wdepth_thresh

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Minimum water depth threshold for application of the hydroacoustic screening criteria.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	-999.0	f7.2	Y
Range	0.0 < min_wdepth_thresh < 10.0			

3.2.502. minchan

Table(s)	RULESET (STATIC)			
Description	Minimum number of channels. It can be a number of channels or a percentage.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)			a8	Y
Range				

3.2.503. mindelta

Table(s)	DEFINE_PHASE_RESIDUAL (STATIC)			
Description	Minimum allowable distance (degrees)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees		f8.3	N
Range				

3.2.504. mindelta

Table(s)	PHASE_DESCRIPTION (STATIC)			
Description	Minimum distance (degrees)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees		f8.3	N
Range				

3.2.505. mindelta

Table(s)	ALLOW_RESID (LEB)			
Description	Minimum station to event distance.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-1.0	f8.3	N
Range	mindelta >= 0.0			

3.2.506. mindep_err

Table(s)	PRODUCTTYPEORIGIN (IDCX)			
Description	Minimum value of depth_error constraint.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	-999.0	f9.4	Y
Range	-999.0 < mindep_err < maxdep_err			

3.2.507. mindepth

Table(s)	DEFINE_PHASE_RESIDUAL (STATIC), PHASE_DESCRIPTION (STATIC)			
Description	Minimum allowable depth (km)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	NOT ALLOWED	f9.4	N
Range	-999.0 < mindepth < maxdepth			

3.2.508. mindepth

Table(s)	PRODUCTTYPEORIGIN (IDCX)			
Description	Minimum depth value for a product constraint (km).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	-999.0	f9.4	Y
Range	-999.0 < mindepth < maxdepth			

3.2.509. minesd

Table(s)	PRODUCTTYPEORIGIN (IDCX)			
Description	Minimum distance between an event and stations.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-1.0	f6.2	Y
Range	0.0 <= minesd <= maxesd			

3.2.510. minfreq

Table(s)	PMCC_FEATURES (IDCX)

Description	Minimum frequency of the detection pixels in the PMCC family (Hz)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	Hertz		f9.4	Y
Range				

3.2.511. minlat

Table(s)	PRODUCTTYPEORIGIN (IDCX), PRODUCTTYPESTA (IDCX)			
Description	Minimum latitude. Locations north of the equator have positive latitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999.0	f9.4	Y
Range	-90.0 <= minlat <= 90.0			

3.2.512. minlon

Table(s)	PRODUCTTYPEORIGIN (IDCX), PRODUCTTYPESTA (IDCX)			
Description	Minimum longitude defining a reference area. Locations east of the Greenwich Meridian have positive longitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999.0	f9.4	Y
Range	-180.0 <= minlon <= 180.0			

3.2.513. minmag

Table(s)	PRODUCTTYPEORIGIN (IDCX)			
Description	Minimum value of the magnitude constraint.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	magnitude	-999.0	f7.2	Y
Range	-999.0 < minmag < maxmag			

3.2.514. minmb_ms

Table(s)	PRODUCTTYPEORIGIN (IDCX)			
Description	Minimum value of mb - Ms product constraint.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	magnitude	-999.0	f7.2	Y
Range	-999.0 < minmb_ms < maxmb_ms			

3.2.515. missing

Table(s)	QCSTATS (IDCX)
Description	Amount of missing data in the interval, measured in seconds.

Storage type	Unit	NA value	External	Nullable
float(53)	seconds	NOT ALLOWED	f17.5	Y
Range	missing < 9999999999.999			

3.2.516. ml

Table(s)	ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3)			
Description	Local magnitude (ML) of an event. The identifier mlid, which points to magid in the Netmag table, is associated with this column. The information in that record summarizes the method of analysis and the data used (see imb, iml, ims, magnitude, magtype, mb, and ms).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	magnitude	-999.0	f7.2	Y
Range	ml > -2.0			

3.2.517. mlid

Table(s)	ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3)			
Description	Magnitude identifier for ML. This column stores the magid for a record in NETMAG. mlid is a foreign key joining ORIGIN to NETMAG, where ORIGIN.mlid = NETMAG.magid (see magid, msid, and mbid).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	Y
Range	mlid > 0			

3.2.518. mmodel

Table(s)	IN_EVENT_CONTROL (LEB)			
Description	Magnitude model. This character string identifies the magnitude model employed for station (stamag) or overall network magnitude calculation (event_control). In stamag, mmodel is the unique magnitude model as extracted from the magnitude correction file. In event_control, mmodel indicates only whether or not mixed models were employed (mixed) or a unique magnitude model was used for all stations. In the latter case, it would be identical to STAMAG.mmodel.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)		- (hyphen)	a15	Y
Range	any free-format string up to 15 characters			

3.2.519. mmodel

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), STAMAG (LEB),

	STAMAG (REB), STAMAG (SEL1), STAMAG (SEL2), STAMAG (SEL3)			
Description	Magnitude model. This character string identifies the magnitude model employed for station (stamag) or overall network magnitude calculation (event_control). In stamag, mmodel is the unique magnitude model as extracted from the magnitude correction file. In event_control, mmodel indicates only whether or not mixed models were employed (mixed) or a unique magnitude model was used for all stations. In the latter case, it would be identical to stamag.mmodel.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)		- (hyphen)	a15	Y
Range	any free-format string up to 15 characters			

3.2.520. modauthor

Table(s)	REQUEST (IDCX)			
Description	Author of last state change.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)		- (hyphen)	a15	Y
Range	any string up to 15 characters			

3.2.521. moddate

Table(s)	INTERVAL (IDCX), INTERVAL (SEGMENT)			
Description	Modification date. The date and time the record was last updated (state column) in the database.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	ORACLE Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

3.2.522. modtime

Table(s)	REQUEST (IDCX)			
Description	Modification time. The epoch time that the record was last updated in the database.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	NOT ALLOWED	f17.5	Y
Range	any valid epoch time			

3.2.523. moveout_pp

Table(s)	EVSC_PROD (IDCX)			
Description	Moveout of (pP-P) travel times for seismic stations between 25 and 100 degrees from an event.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

float(24)	seconds	-999.0	f7.2	Y
Range	moveout_pp > -999.0			

3.2.524. moveout_sp

Table(s)	EVSC_PROD (IDCX)			
Description	Moveout of (sP-P) travel times for seismic stations between 25 and 100 degrees from an event.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-999.0	f7.2	Y
Range	moveout_sp > -999.0			

3.2.525. mpdescrip

Table(s)	MAPPOINT (MAP)			
Description	Arbitrary string describing the referenced geographic point.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(50)		- (hyphen)	a50	Y
Range	any string up to 50 characters			

3.2.526. mplabel

Table(s)	MAPPOINT (MAP)			
Description	String used as a label for the geographic point described by a record in the MAP-POINT table (for example, Paris, London and so on).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(65)		- (hyphen)	a65	Y
Range	any string up to 65 characters			

3.2.527. mptype

Table(s)	MAPPOINT (MAP)			
Description	String specifying the type of geographic point described by a record in the MAP-POINT table. Examples include cities, mines, and so on.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(20)		NOT ALLOWED	a20	N
Range	any free-format (spaces allowed) string up to 20 characters			

3.2.528. ms

Table(s)	EVSC_PROD (IDCX), ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3)
Description	Surface wave magnitude.

Storage type	Unit	NA value	External	Nullable
float(24)	magnitude	-999.0	f7.2	Y
Range	Ms > -2.0			

3.2.529. ms_err

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Uncertainty of single-station Ms magnitude estimates used in the computation of the confidence interval of the network estimate of mb minus Ms.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	magnitude	-999.0	f7.2	Y
Range	0.0 < ms_err < 10.0			

3.2.530. mscore

Table(s)	EVSC_PROD (IDCX)			
Description	Score for the mb minus Ms event-screening criterion.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	mscore > -999.0			

3.2.531. msgdformat

Table(s)	MSGDATATYPE (IDCX)			
Description	Format of the data, currently one of GSE2.0, IMS1.0 or IMS2.0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)		NOT ALLOWED	a16	Y
Range	any string up to the character field width			

3.2.532. msgdformat

Table(s)	FPDESCRIPTION (IDCX)			
Description	Format of the data, for example, binary, ps, IMS1.0, TXT, CD-1.1, CD-1.0, GSE2.0, IMS2.0).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		NOT ALLOWED	a8	Y
Range	any string up to the character field width			

3.2.533. msgdid

Table(s)	MSGDEST (IDCX)			
Description	Message destination identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number(10,0)		-1	i10	N
Range	msgdid > 0			

3.2.534. msgdtype

Table(s)	FPDESCRIPTION (IDCX), MSGDATATYPE (IDCX)			
Description	Data type of a data section within an VDMS message.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)		NOT ALLOWED	a16	Y
Range	any string up to 16 characters that is a recognized data type			

3.2.535. msgid

Table(s)	FTPFAILED (IDCX), MSGAUX (IDCX), MSGDATATYPE (IDCX), MSG-DISC (IDCX), PRODTRACK (IDCX)			
Description	Message identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	N
Range	msgid > 0			

3.2.536. msgid

Table(s)	MSGDEST (IDCX)			
Description	The message identifier of the response message created by VDMS.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	Y
Range	msgid > 0			

3.2.537. msgrow

Table(s)	MSGAUX (IDCX)			
Description	Number of lines in a message.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)	lines	-1	i4	N
Range	msgrow > 0			

3.2.538. msgsrc

Table(s)	MSGDISC (IDCX)			
Description	Source code from where the message was sent.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)		- (hyphen)	a16	Y

Range	any string up to 16 characters

3.2.539. msgtype

Table(s)	DATAUSER (IDCX)			
Description	Message type.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)		- (hyphen)	a16	N
Range	any string up to 16 characters			

3.2.540. msgtype

Table(s)	MSGDISC (IDCX)			
Description	Message type.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)		- (hyphen)	a16	Y
Range	any string up to 16 characters			

3.2.541. msgver

Table(s)	MSGDISC (IDCX)			
Description	Message Subsystem version number.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		- (hyphen)	a8	Y
Range	any string up to eight characters			

3.2.542. msid

Table(s)	ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3)			
Description	Magnitude identifier for Ms. This column stores the magid for a record in NETMAG. msid is a foreign key joining ORIGIN to NETMAG, where ORIGIN.msid = NETMAG.magid (see magid, mlid, and mbid).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	Y
Range	msid > 0			

3.2.543. msize

Table(s)	MSGDISC (IDCX)			
Description	Size of bytes of message or section of a message.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number(10,0)	bytes	-1	i10	Y
Range	msize > 0			

3.2.544. msize

Table(s)	MSGDATATYPE (IDCX)			
Description	Size of bytes of message or section of a message.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)	bytes	-1	i8	Y
Range	msize > 0			

3.2.545. mtype

Table(s)	AMPDESCRIPT (IDCX)			
Description	Measurement type. This column defines how the amplitude is measured in a given time window. The following values are allowed: peak (maximum amplitude), stav (maximum short-term average amplitude), rms (root-mean-squared amplitude), peak2tr (maximum peak-to-trough amplitude), and 1stpeak (first peak amplitude).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		- (hyphen)	a8	Y
Range	mtype IN {peak, stav, rms, peak2tr, 1stpeak}			

3.2.546. na_value

Table(s)	NA_VALUE (IDCX)			
Description	Value to be inserted for a column when no other value is available.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(30)		NOT ALLOWED	a30	Y
Range	any valid string up to the character width			

3.2.547. name

Table(s)	INTERVAL (IDCX), INTERVAL (SEGMENT)			
Description	Name of the station or processing pipeline described by this row. Examples are sel1, sel2, sel3, ANALYSIS, RECALL, REB, TMPR, MIG, EVCH, EVSC, SEG and QTR.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(20)		NOT ALLOWED	a20	N
Range	any string up to the character limit			

3.2.548. name

Table(s)	CHAN_GROUPS (STATIC)

Description	Name of the station.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(20)		NOT ALLOWED	a20	N
Range	any alphanumeric string up to the character field width			

3.2.549. name

Table(s)	SITE_ADDRESS (STATIC)			
Description	Name of a constant, variable, or parameter.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(20)		- (hyphen)	a20	Y
Range	any string up to the character limit			

3.2.550. name

Table(s)	CHAN_GROUPS_AUXWF (STATIC)			
Description	Name of the station.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(20)		NOT ALLOWED	a20	Y
Range	any alphanumeric string up to the character field width			

3.2.551. name

Table(s)	RULESET (STATIC)			
Description	Name of the rule.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)		NOT ALLOWED	a32	Y
Range	any valid string up to 32 characters			

3.2.552. name

Table(s)	FPDESCRIPTION (IDCX)			
Description	Name of a constant, variable, or parameter.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(64)		- (hyphen)	a64	Y
Range	any string up to the character limit			

3.2.553. nass

Table(s)	ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3)
Description	Number of associated arrivals. This column gives the number of arrivals associ-

	ated with the origin.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)		-1	i4	Y
Range	nass > 0			

3.2.554. navcep

Table(s)	TIMEFREQ (REB)			
Description	Average maximum value in the two-dimensional cepstrum of the north component traces.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f7.2	Y
Range	navcep >= 0			

3.2.555. navcor

Table(s)	TIMEFREQ (REB)			
Description	Average autocorrelation along the time axis across all frequencies excluding randomized points of the north component traces.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f7.2	Y
Range	navcor >= 0			

3.2.556. navpct

Table(s)	TIMEFREQ (REB)			
Description	Average ratio of bad points to total of the north component traces.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f7.2	Y
Range	0 <= navpct <= 1			

3.2.557. ncalib

Table(s)	BEAMAUX (STATIC), INSTRUMENT (STATIC)			
Description	Nominal calibration factor. This conversion factor maps digital data to earth displacement. The factor holds true at the oscillation period specified by ncalper. A positive value means ground motion increasing in component direction (up, north, east) is indicated by increasing counts. A negative value means the opposite. Actual calibration for a particular recording is determined using the WFDISC and SENSOR tables (see calratio).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	nanometers per digital count	NOT ALLOWED	f16.6	Y
Range	any nonzero floating point number			

3.2.558. *ncalper*

Table(s)	BEAMAUX (STATIC), INSTRUMENT (STATIC)			
Description	Calibration period. This column is the period for which ncalib is valid.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	NOT ALLOWED	f16.6	Y
Range	ncalper > 0.0			

3.2.559. *nconstseg*

Table(s)	QCSTATS (IDCX)			
Description	Number of constant valued segments in the detection processing interval.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	nconstseg >= 0			

3.2.560. *ndef*

Table(s)	ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3)			
Description	For a given origin, this is the number of time-defining phases that contributed to the location of the origin. A time-defining phase is a phase whose time is used as a constraint in the location.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)		NOT ALLOWED	i4	Y
Range	0 < ndef <= nass			

3.2.561. *ndp*

Table(s)	ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3)			
Description	Number of depth phases. This column gives the number of depth phases used in calculating depth/depdp (see depdp).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)		-1	i4	Y
Range	ndp >= 0			

3.2.562. *ndp_snr_pp*

Table(s)	EVSC_PROD (IDCX)
Description	Number of pP depth phases meeting the snr criterion defined by min_dp_snr_pp of table PRODUCTTYPEEVSC.

Storage type	Unit	NA value	External	Nullable
number(8,0)		-1	i8	Y
Range	ndp_snr_pp > -1			

3.2.563. ndp_snr_sp

Table(s)	EVSC_PROD (IDCX)			
Description	Number of sP depth phases meeting the snr criterion defined by min_dp_snr_sp of table PRODUCTTYPEEVSC.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	ndp_snr_sp > -1			

3.2.564. net

Table(s)	SITEPOLL (STATIC)			
Description	Unique network identifier. This character string is the name of a seismic network. Examples include YKA, I02AR, H01W2, SADO, CUR_IDC and IMS_PRI.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		NOT ALLOWED	a6	N
Range	any string up to the character field width			

3.2.565. net

Table(s)	SITEPOLLCA (STATIC)			
Description	Unique network identifier. This character string is the name of a seismic network. Examples include YKA, I02AR, H01W2, SADO, CUR_IDC and IMS_PRI.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		NOT ALLOWED	a6	Y
Range	any string up to the character field width			

3.2.566. net

Table(s)	AFFILIATION (STATIC), AFFILIATION_EXCL (STATIC), NETWORK (STATIC), PARTICIPATION (STATIC), STANET (STATIC), WEIGHTS (STATIC)			
Description	Unique network identifier. This character string is the name of a seismic network. Examples include YKA, I02AR, H01W2, SADO, CUR_IDC and IMS_PRI.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		NOT ALLOWED	a8	N
Range	any string up to the character field width			

3.2.567. net

Table(s)	AFFILIATION_SUB (STATIC)			
Description	Unique network identifier. This character string is the name of a seismic network. Examples include YKA, I02AR, H01W2, SADO, CUR_IDC and IMS_PRI.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		NOT ALLOWED	a6	N
Range	any upper-case string up to the character field width			

3.2.568. net

Table(s)	DERVDISC (IDCX)			
Description	Infrasound network name (collection of stations)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		NOT ALLOWED	a8	Y
Range	any string up to the character field width			

3.2.569. net

Table(s)	NETMAG (LEB), NETMAG (REB), NETMAG (SEL1), NETMAG (SEL2), NETMAG (SEL3)			
Description	Unique network identifier. This character string is the name of a seismic network. Examples include YKA, I02AR, H01W2, SADO, CUR_IDC and IMS_PRI.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		- (hyphen)	a8	Y
Range	any string up to eight characters			

3.2.570. net

Table(s)	AFFILIATION_LP (STATIC), HYDRO_ARR_GROUP (IDCX), HYDRO_ARR_GROUP (LEB), HYDRO_ARR_GROUP (REB)			
Description	Unique network identifier. This character string is the name of a seismic network. Examples include YKA, I02AR, H01W2, SADO, CUR_IDC and IMS_PRI.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		NOT ALLOWED	a8	Y
Range	any string up to the character field width			

3.2.571. netname

Table(s)	NETWORK (STATIC)
Description	Network name. String containing the name of a network.

Storage type	Unit	NA value	External	Nullable
varchar2(80)		- (hyphen)	a80	Y
Range	any string up to 80 characters			

3.2.572. nettype

Table(s)	NETWORK (STATIC)			
Description	Network type. This four-character string specifies the type of network (ar = array, lo = local area, ww = world-wide) for the given value of net.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(4)		- (hyphen)	a4	Y
Range	any lower-case string up to four characters			

3.2.573. nevyr

Table(s)	DSEISGRID (STATIC), SEISGRID (STATIC)			
Description	Average number of events per year with magnitude above magth whose location is within the grid cell defined by icell.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f9.2	Y
Range	nevyr >= 0			

3.2.574. newname

Table(s)	FDSNCHAN (STATIC)			
Description	FDSN channel identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(20)		NOT ALLOWED	a20	N
Range	any alphanumeric string up to the character field width			

3.2.575. nhydarr

Table(s)	HYDRO_ARR_GROUP (IDCX), HYDRO_ARR_GROUP (LEB), HYDRO_ARR_GROUP (REB)			
Description	Number of arrivals in the group.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)		-1	i4	Y
Range	nhydarr <= number of stations in the group			

3.2.576. nlat

Table(s)	DSEISINDEX (STATIC), SEISINDEX (STATIC)
Description	Number of latitudes in Seisgrid (Dseisgrid).

Storage type	Unit	NA value	External	Nullable
number(8,0)		NOT ALLOWED	i8	Y
Range	nlat > 0.0			

3.2.577. nlon

Table(s)	DSEISINDEX (STATIC), SEISINDEX (STATIC)			
Description	Number of longitudes in Seisgrid (Dseisgrid).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i8	Y
Range	nlon > 0.0			

3.2.578. nois

Table(s)	SITEAUX (STATIC)			
Description	Nominal background seismic noise level.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	nanometers	-1.0	f10.1	Y
Range	nois >= 0.0			

3.2.579. noise_high_band

Table(s)	EVSC_HYDRO (IDCX)			
Description	Hydroacoustic noise level in the high-frequency band (32-64 Hz) from table amplitude for a given orid/sta pair.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	dB re mPa	-1.0	f7.2	Y
Range	noise_high_band > 0.0			

3.2.580. noissd

Table(s)	SITEAUX (STATIC)			
Description	Standard deviation of the log noise amplitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f5.2	Y
Range	noissd > 0.0			

3.2.581. note_missing_data

Table(s)	ARCH_DATA_TYPE (IDCX)			
Description	Missing data flag. If y, there are missing data for the datatype indicated in the arch_data_type table.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

varchar2(2)		- (hyphen)	a2	Y
Range	note_missing_data IN {y, n}			

3.2.582. nsamp

Table(s)	OLD_WFPROTO (IDCX)			
Description	Number of samples in the waveform segment. This must be greater than one, otherwise the time and endtime will be equal and the time interval will be zero.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number		NOT ALLOWED	i8	Y
Range	nsamp > 1			

3.2.583. nsamp

Table(s)	WFDISC (IDCX), WFDISC (SEGMENT), WFDISC_NOMIG (SEGMENT)			
Description	Number of samples in the waveform segment. This must be greater than one, otherwise the time and endtime will be equal and the time interval will be zero.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i8	Y
Range	nsamp > 1			

3.2.584. nseg

Table(s)	QCSTATS (IDCX)			
Description	Number of masked segments in the detection processing interval.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	nseg >= 0			

3.2.585. nsta

Table(s)	NETMAG (LEB), NETMAG (REB), NETMAG (SEL1), NETMAG (SEL2), NETMAG (SEL3)			
Description	Number of stations contributing to the network magnitude estimate.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	nsta > -1			

3.2.586. nsta_mb

Table(s)	EVSC_PROD (IDCX)			
Description	Number of stations contributing to the mb estimate used in event screening.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number(8,0)		-1	i8	Y
Range	nsta_mb > -1			

3.2.587. nsta_ms

Table(s)	EVSC_PROD (IDCX)			
Description	Number of stations contributing to the Ms estimate used for event screening.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	nsta_ms > -1			

3.2.588. num_cross

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Number of times that the estimated signal pressure squared crosses noise_onset_thresh between onset_time and termination_time.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	num_cross > 0			

3.2.589. num_defining

Table(s)	PHASE_WEIGHT_EVENT_DEFINE (STATIC)			
Description	Number of defining phases			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			i8	N
Range				

3.2.590. numfailedattempt

Table(s)	FTPFAILED (IDCX)			
Description	Number of failed attempts to retrieve message via FTP.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)		0	i4	Y
Range	numfailedattempt > 0			

3.2.591. nx

Table(s)	FKDISC (LEB)			
Description	Total number of X sample points (either slowness or wavenumber, depending on fktyp) in a f-k spectrum.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number(4,0)		NOT ALLOWED	i4	Y
Range	nx > 0			

3.2.592. ny

Table(s)	FKDISC (LEB)			
Description	Total number of Y sample points (either slowness or wavenumber, depending on fktyp) in a f-k spectrum.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)		NOT ALLOWED	i4	Y
Range	ny > 0			

3.2.593. objtype

Table(s)	GA_TAG (SEL1)			
Description	Defines the id as either an arid (a) or an orid (o).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)		NOT ALLOWED	a1	Y
Range	objtype IN {a, o}			

3.2.594. obs_type

Table(s)	PHASE_WEIGHT_EVENT_DEFINE (STATIC)			
Description	Observation type.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)		- (hyphen)	a24	N
Range	any string up to (16, 24) characters that is a valid user name			

3.2.595. obsolete

Table(s)	FILEPRODUCT (IDCX)			
Description	Flag to indicate if the data in the fileproduct file are obsolete. 0 indicates that the data are not obsolete, and 1 indicates that the data are obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(1,0)		NOT ALLOWED	i1	Y
Range	obsolete IN {0, 1}			

3.2.596. obsolete

Table(s)	FS_STAGEPRODUCT (IDCX)			
Description	obsolete			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(1,0)			i1	Y

Range	

3.2.597. obsolete

Table(s)	FILEPRODUCT_BU_20200610 (IDCX), FILEPRODUCT_TEMP (IDCX)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(1,0)				Y
Range				

3.2.598. offdate

Table(s)	SUBS (IDCX)			
Description	Indicates the last date at which the subscription was active. For currently active subscriptions, this is set to 01-Jan-4700. Unlike other uses of ondate in the IDC Database Schema, the column accepts any valid ORACLE date.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	ORACLE Date	01 Jan 4700	a21	Y
Range	any valid ORACLE date			

3.2.599. offdate

Table(s)	AFFILIATION_SUB (STATIC), CHAN_GROUPS (STATIC)			
Description	Turn off date. This column is the date after which the archive specifications, regional coefficient, station, sensor, or subscription indicated was no longer applicable, turned off, dismantled, or moved (see ondate).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	N
Range	Julian date of the form yyyyddd			

3.2.600. offdate

Table(s)	ARCH_DATA_TYPE (IDCX), CHAN_GROUPS_AUXWF (STATIC), REGCOEF (STATIC), RULESET (STATIC), SITE (STATIC), SITECHAN (STATIC), WEIGHTS (STATIC)			
Description	Turn off date. This column is the date after which the archive specifications, regional coefficient, station, sensor, or subscription indicated was no longer applicable, turned off, dismantled, or moved (see ondate).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	Julian date of the form yyyyddd			

3.2.601. oldname

Table(s)	FDSNCHAN (STATIC)

Description	Old channel name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(20)		NOT ALLOWED	a20	N
Range	any alphanumeric string up to the character field width			

3.2.602. ondate

Table(s)	SUBS (IDCX)			
Description	Indicates the first date at which the subscription became active. Unlike other uses of ondate in the IDC Database Schema, the column accepts any valid ORACLE date.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	ORACLE Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

3.2.603. ondate

Table(s)	CHAN_GROUPS (STATIC)			
Description	Turn on date. This column is the date on which the archive specifications, regional coefficient, station, sensor, or subscription indicated became applicable or began operating. Offdate and ondate are not intended to accommodate temporary downtimes, but rather to indicate the time period for which the columns of the station (lat, lon, elev) are valid for the given station code. Stations are often moved, but with the station code remaining unchanged.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	N
Range	Julian date of the form yyyyddd			

3.2.604. ondate

Table(s)	AFFILIATION_SUB (STATIC), RULESET (STATIC), SITE (STATIC), SITECHAN (STATIC)			
Description	Turn on date. This column is the date on which the archive specifications, regional coefficient, station, sensor, or subscription indicated became applicable or began operating. Offdate and ondate are not intended to accommodate temporary downtimes, but rather to indicate the time period for which the columns of the station (lat, lon, elev) are valid for the given station code. Stations are often moved, but with the station code remaining unchanged.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i8	N
Range	Julian date of the form yyyyddd			

3.2.605. ondate

Table(s)	REGCOEF (STATIC)

Description	Turn on date. This column is the date on which the archive specifications, regional coefficient, station, sensor, or subscription indicated became applicable or began operating. Offdate and ondate are not intended to accommodate temporary downtimes, but rather to indicate the time period for which the columns of the station (lat, lon, elev) are valid for the given station code. Stations are often moved, but with the station code remaining unchanged.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		- (hyphen)	i8	Y
Range	Julian date of the form yyyyddd			

3.2.606. ondate

Table(s)	CHAN_GROUPS_AUXWF (STATIC)			
Description	Turn on date. This column is the date on which the archive specifications, regional coefficient, station, sensor, or subscription indicated became applicable or began operating. Offdate and ondate are not intended to accommodate temporary downtimes, but rather to indicate the time period for which the columns of the station (lat, lon, elev) are valid for the given station code. Stations are often moved, but with the station code remaining unchanged.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	Julian date of the form yyyyddd			

3.2.607. ondate

Table(s)	ARCH_DATA_TYPE (IDCX), WEIGHTS (STATIC)			
Description	Turn on date. This column is the date on which the archive specifications, regional coefficient, station, sensor, or subscription indicated became applicable or began operating. Offdate and ondate are not intended to accommodate temporary downtimes, but rather to indicate the time period for which the columns of the station (lat, lon, elev) are valid for the given station code. Stations are often moved, but with the station code remaining unchanged.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i8	Y
Range	Julian date of the form yyyyddd			

3.2.608. onset_time

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Estimated onset time of signal.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	NOT ALLOWED	f17.5	Y
Range	any valid epoch time			

3.2.609. orderby

Table(s)	DSEISINDEX (STATIC), SEISINDEX (STATIC)			
Description	Grid order. The seismic grid can either be ordered by latitude or by longitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		NOT ALLOWED	a6	Y
Range	orderby IN {lat, lon}			

3.2.610. orid

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)				N
Range				

3.2.611. orid

Table(s)	IN_EVENT_CONTROL (LEB)			
Description	Origin identifier that relates a record in these tables to a record in the origin table.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	orid > 0			

3.2.612. orid

Table(s)	ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3), CEPPKS (REB), COMPLEXITY (REB), EVENT_CONTROL (LEB), EVENT_CONTROL (REB), EVSC_HYDRO (IDCX), EVSC_PROD (IDCX), EVSC_REGIONAL (IDCX), NETMAG (LEB), NETMAG (REB), NETMAG (SEL1), NETMAG (SEL2), NETMAG (SEL3), ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3), SPLP (REB), TIMEFREQ (REB)			
Description	Origin identifier that relates to a record in the origin table.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	orid > 0			

3.2.613. orid

Table(s)	ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORI-

	GIN (SEL2), ORIGIN (SEL3)			
Description	Unique origin identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	orid > 0			

3.2.614. orid

Table(s)	PARRIVAL (LEB), PARRIVAL (REB), PARRIVAL (SEL1), PARRIVAL (SEL2), PARRIVAL (SEL3), REQUEST (IDCX), STAMAG (LEB), STAMAG (REB), STAMAG (SEL1), STAMAG (SEL2), STAMAG (SEL3)			
Description	Origin identifier that relates to a record in the origin table.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	Y
Range	orid > 0			

3.2.615. otgid

Table(s)	OUTAGE (IDCX)			
Description	Outage identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	otgid > 0			

3.2.616. outauth

Table(s)	WFCONV (IDCX)			
Description	Flag showing if output data are authenticated.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)		- (hyphen)	a1	Y
Range	outauth IN {y, n}			

3.2.617. outcomp

Table(s)	WFCONV (IDCX)			
Description	Output data compression type. The only type currently supported is Canadian compression (CA).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2)		0	a2	Y
Range	outcomp IN {CA}			

3.2.618. outsamp

Table(s)	WFCONV (IDCX)			
Description	Number of output samples per packet.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		0	i8	Y
Range	outsamp > 0			

3.2.619. outtype

Table(s)	WFCONV (IDCX)			
Description	Output fixed width datatype.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2)		- (hyphen)	a2	Y
Range	same as datatype			

3.2.620. overlayid

Table(s)	MAPOVER (MAP), OVERLAYDISC (MAP)			
Description	Overlay identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i8	N
Range	overlayid > 0			

3.2.621. overlayname

Table(s)	OVERLAYDISC (MAP)			
Description	Name of the map overlay.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(64)		- (hyphen)	a64	N
Range	any free format character string up to 64 characters			

3.2.622. parid

Table(s)	PARRIVAL (LEB), PARRIVAL (REB), PARRIVAL (SEL1), PARRIVAL (SEL2), PARRIVAL (SEL3)			
Description	Predicted arrival identifier. Every event-based parrival measure is assigned a unique positive integer that identifies it in the database. If an associated amplitude record exists, then parid links it to parrival.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	parid > 0			

3.2.623. parid

Table(s)	AMPLITUDE (IDCX), AMPLITUDE (LEB), AMPLITUDE (REB)			
Description	Predicted arrival identifier. Every event-based parrival measure is assigned a unique positive integer that identifies it in the database. If an associated amplitude record exists, then parid links it to parrival.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	Y
Range	parid >= -1			

3.2.624. password

Table(s)	FTPLOGIN (IDCX)			
Description	Password for remote FTP site for pushing data messages from PIDC.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)		NOT ALLOWED	a16	Y
Range	any string up to 16 characters			

3.2.625. pctoffsh

Table(s)	EVSC_PROD (IDCX)			
Description	Percentage of location error ellipse that is determined to be offshore.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	0.0 <= pctoffsh < 100.0			

3.2.626. peak_level

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Pressure of largest absolute signal value.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	dB re mPa	-1.0	f9.4	Y
Range	peak_level >= 0.0			

3.2.627. peak_time

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Epoch time of largest absolute signal value.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	NOT ALLOWED	f17.5	Y
Range	any valid epoch time			

3.2.628. per

Table(s)	AMPLITUDE (IDCX), AMPLITUDE (LEB), AMPLITUDE (REB), ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB)			
Description	Measured period at the time of the amplitude measurement.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-999.0	f7.2	Y
Range	per > 0.0			

3.2.629. per_hi

Table(s)	BREGION_TAB (STATIC)			
Description	Upper bound of the period window. Never used.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,3)	seconds	-1	f8.3	Y
Range				

3.2.630. per_lo

Table(s)	BREGION_TAB (STATIC)			
Description	Lower bound of the period window. Never used.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,3)	seconds	-1	f8.3	Y
Range				

3.2.631. phase

Table(s)	COMPLEXITY (REB)			
Description	Phase type. The identity of a phase that has been associated to an arrival. Standard labels for phases are used (for example, P, PKP, PcP, pP, and so on). Both upper- and lower-case letters are available and should be used when appropriate; for example, pP or PcP.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		- (hyphen) if this column does not apply to seismic phases	a6	N
Range	any string up to the character field width that conforms to scientific practice			

3.2.632. phase

Table(s)	ALLOW_RESID (LEB), DEFINE_PHASE_RESIDUAL (STATIC), PHASE_DESCRIPTION (STATIC), WEIGHTS (STATIC)
Description	Phase type. The identity of a phase that has been associated to an arrival. Standard labels for phases are used (for example, P, PKP, PcP, pP, and so on). Both

	upper- and lower-case letters are available and should be used when appropriate; for example, pP or PcP.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		- (hyphen) if this column does not apply to seismic phases	a8	N
Range	any string up to the character field width that conforms to scientific practice			

3.2.633. phase

Table(s)	PHASOR_DIST_DEPTH_RANGES (STATIC)			
Description	Phase type. The identity of a phase that has been associated to an arrival. Standard labels for phases are used (for example, P, PKP, PcP, pP, and so on). Both upper- and lower-case letters are available and should be used when appropriate; for example, pP or PcP.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		- (hyphen) if this column does not apply to seismic phases	a8	Y
Range	any string up to the character field width that conforms to scientific practice			

3.2.634. phase

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB), ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3), PARRIVAL (LEB), PARRIVAL (REB), PARRIVAL (SEL1), PARRIVAL (SEL2), PARRIVAL (SEL3), STAMAG (LEB), STAMAG (REB), STAMAG (SEL1), STAMAG (SEL2), STAMAG (SEL3)			
Description	Phase type. The identity of a phase that has been associated to an arrival. Standard labels for phases are used (for example, P, PKP, PcP, pP, and so on). Both upper- and lower-case letters are available and should be used when appropriate; for example, pP or PcP.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		- (hyphen) if this column does not apply to seismic phases	a8	Y
Range	any string up to the character field width that conforms to scientific practice			

3.2.635. phase_type

Table(s)	PHASE_DESCRIPTION (STATIC), PHASE_WEIGHT_EVENT_DEFINE (STATIC)

Description	Phase type			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)		- (hyphen)	a24	N
Range	any valid string up to 24 characters			

3.2.636. pid

Table(s)	SEMAPHORE (IDCX)			
Description	Process id of the ParseData handling the station			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	Y
Range	0 < pid < system-dependent pid limit			

3.2.637. pkamp

Table(s)	CEPPKS (REB)			
Description	Amplitude of consistent cepstral peak. This column value is set to zero if there are no consistent peaks.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	nanometer-seconds	0.0	f7.5	Y
Range	pkamp > 0.0			

3.2.638. pkqf

Table(s)	CEPPKS (REB)			
Description	Frequency of consistent cepstral peak. This column value is set to zero if no consistent peaks exist.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	0.0	f11.8	N
Range	pkqf > 0.0			

3.2.639. planlr

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB)			
Description	Planarity of an S-type polarization column defined as 1 - l3/l2, where l2 and l3 are eigenvalues from the decomposition of the covariance matrix. Planarity is measured at the time of maximum 3-component amplitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f7.2	Y
Range	0.0 <= planlr <= 1.0			

3.2.640. plans

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB)			
Description	Planarity of an S-type polarization column defined as 1 - l3/l2, where l2 and l3 are eigenvalues from the decomposition of the covariance matrix. Planarity is measured at the time of maximum 3-component amplitude. The only difference between plans and planlr is in the definition of the overlapping time windows.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f7.2	Y
Range	0.0 <= plans <= 1.0			

3.2.641. plid

Table(s)	PROBLEMLOG (IDCX)			
Description	Problem log identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	plid > 0			

3.2.642. pmcc3d

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			i1	Y
Range				

3.2.643. pmccrecid

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)			i10	N
Range				

3.2.644. pn_snr

Table(s)	EVSC_REGIONAL (IDCX)			
Description	Signal-to-noise ratio of the Pn measurement.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	pn_snr > 0.0			

3.2.645. pnlg

Table(s)	EVSC_REGIONAL (IDCX)			
Description	Logarithm (base 10) of the distance corrected Pn/Lg ratio.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	pnlg > -999.0			

3.2.646. pnlg_qual

Table(s)	EVSC_REGIONAL (IDCX)			
Description	Data quality indicator for the Pn/Lg measurement. A string of zeros indicates good data quality. See quality flag note for pnsn_qual.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(10)		- (hyphen)	a10	Y
Range	any valid ORACLE string			

3.2.647. pnsmax

Table(s)	EVSC_REGIONAL (IDCX)			
Description	Maximum of the Pn/Sn and Pn/Lg ratios.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	pnsmax > -999.0			

3.2.648. pnsmax_corr

Table(s)	EVSC_REGIONAL (IDCX)			
Description	Correction term of the maximum of the Pn/Sn and Pn/Lg ratios.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	pnsmax_corr > -999.0			

3.2.649. pnsmax_err

Table(s)	EVSC_REGIONAL (IDCX)			
Description	Standard error of the maximum of the Pn/Sn and Pn/Lg ratios.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	pnsmax_err > -999.0			

3.2.650. pnsn

Table(s)	EVSC_REGIONAL (IDCX)			
Description	Logarithm (base 10) of the distance-corrected Pn/Sn amplitude ratio.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	pnsn > -999.0			

3.2.651. pnsn_qual

Table(s)	EVSC_REGIONAL (IDCX)			
Description	Data quality indicator for the Pn/Sn amplitude ratio measurement. A string of zeros indicates good data quality. Each position in the quality string indicates the state of data quality test. A 0 character indicates the data passed the test, a 1 indicates the data failed the test. Reading from left-to-right, the test indicators are ordered as follows: 1. Missing data - 1 indicates that Pn, Sn, Lg signal or noise values are not available for the calculation. 2. Signal-to-noise - 1 indicates that the snr for a given amplitude ratio does not satisfy the input criteria. 3. No distance correction - 1 indicates that there is no distance correction data available to apply to this amplitude ratio (see Attencoef). 4. Exceeds valid range of distance correction - 1 indicates the event is outside the valid range of applicability for the distance correction given in Attencoef. 5. No correction grid file - 1 indicates there is no correction grid file provided for the station under consideration. 6. Exceeds valid range of correction grid file - 1 indicates the event is outside the valid range of the correction grid file provided for the station. 7. Spare field (not currently used) - set to 0. 8. Anomalous data value - 1 indicates an anomalous regional phase amplitude measurement, invalidating the P/S measurement.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(10)		- (hyphen)	a10	Y
Range	any valid ORACLE string			

3.2.652. pocid

Table(s)	DATAUSER (IDCX), SUBSUSER (IDCX)			
Description	Point of contact identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	pocid > 0			

3.2.653. pointspike

Table(s)	QCSTATS (IDCX)			
Description	Amount of data in the detection processing interval masked due to point-spikes.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	-999.0	f17.5	Y

Range	pointspike >= 0.0

3.2.654. position

Table(s)	CHANNAME (STATIC)			
Description	Not used by CD2WNG. The number of this channel in the mask column of the waveinterval and clf table. The first station channel should have a position zero, the second channel position one and so on.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)		NOT ALLOWED	i4	Y
Range	position >= 0			

3.2.655. position

Table(s)	NOOPS_CHANNAME (STATIC)			
Description	The number of this channel in the mask column of the waveinterval and clf table. The first station channel should have a position zero, the second channel position one and so on.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)		NOT ALLOWED	i4	Y
Range	position >= 0			

3.2.656. prefer_loc

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)			
Description	Preferred location identifier. This column indicates which of three possible location solutions is the chosen location. The hypocentre can be either held to a surface location (S), determined with no constraints at all (free depth, F), or restrained based on the settings of constrain_ot, constrain_latlon, and constrain_depth, (R). The constrained location (R) can be fixed in origin time/ latitude and longitude/depth. Prefer_loc takes precedence to the actual constraint settings (constrain_ot, constrain_latlon, and constrain_depth) when prefer_loc indicates a surface (S) or free depth (F) location. Default is "S."			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)		- (hyphen)	a1	Y
Range	prefer_loc IN {F, S, R}			

3.2.657. prefor

Table(s)	EVENT (LEB), EVENT (REB), EVENT (SEL1), EVENT (SEL2), EVENT (SEL3)			
Description	Preferred origin. This column holds the origin identifier (orid) that points to the preferred origin for a seismic event.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	Y

Range	prefor > 0

3.2.658. prid

Table(s)	PROBLEM (IDCX)			
Description	Problem identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	prid > 0			

3.2.659. prid

Table(s)	PROBLEMLOG (IDCX)			
Description	Problem identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	Y
Range	prid > 0			

3.2.660. primarykey

Table(s)	ARCH_DATA_TYPE (IDCX)			
Description	Not used.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)		- (hyphen)	a24	Y
Range	any string up to 24 characters			

3.2.661. priority

Table(s)	DATAUSER (IDCX)			
Description	Priority assigned to process.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(2,0)		NOT ALLOWED	i2	N
Range	priority > 0			

3.2.662. priority

Table(s)	SUBSUSER (IDCX)			
Description	Priority assigned to process.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(2,0)		-1	i2	Y
Range	priority > 0			

3.2.663. prob_weight_time

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Probability weighted time. The weight for a sample is the probability that the samples amplitude is the maximum amplitude associated with the arrival within the frequency band defined by low_cut, high_cut, ford, and ftype.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	-999.0	f17.5	Y
Range	any valid epoch time			

3.2.664. procclass

Table(s)	TIMESTAMP (IDCX)			
Description	Process class used to group processes.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)		NOT ALLOWED	a16	N
Range	any string up to the character field width			

3.2.665. procclass

Table(s)	PROBLEMMAIL (IDCX)			
Description	Category of problem, such as Stations, Software, Message or Interactive.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(17)		NOT ALLOWED	a17	N
Range	any string up to the character field width			

3.2.666. procclass

Table(s)	PROBLEM (IDCX)			
Description	Category of problem, such as Stations, Software, Message or Interactive.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(17)		NOT ALLOWED	a17	Y
Range	any string up to the character field width			

3.2.667. procname

Table(s)	TIMESTAMP (IDCX)			
Description	Process name that identifies a process within a process class.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)		NOT ALLOWED	a16	N
Range	any string up to character limit			

3.2.668. procname

Table(s)	PROBLEM (IDCX)			
Description	Process name that identifies a process within a process class.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(17)		NOT ALLOWED	a17	Y
Range	any string up to 16 characters			

3.2.669. prodfmt

Table(s)	PRODUCTCRITERIA (IDCX)			
Description	The format of the product. Must be one of the currently supported IDC product formats: GSE2.0, IMS1.0.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		- (hyphen)	a6	Y
Range	prodfmt IN { GSE2.0, IMS1.0 }			

3.2.670. prodid

Table(s)	EVCHAR_PROD (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)				N
Range				

3.2.671. prodid

Table(s)	PRODTRACK (IDCX)			
Description	Product identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	N
Range	prodid > 0			

3.2.672. prodid

Table(s)	EVSC_PROD (IDCX), SUBS (IDCX)			
Description	Product identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	prodid > 0			

3.2.673. prodid

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Product identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i8	N
Range	prodid > 0			

3.2.674. prodid

Table(s)	PRODUCTTYPEEVPARS (IDCX)			
Description	Obsolete.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)				N
Range				

3.2.675. prodid

Table(s)	PRODUCTTYPEORIGIN (IDCX), PRODUCTTYPESTA (IDCX)			
Description	Product identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	N
Range	prodid > 0			

3.2.676. prodid

Table(s)	PRODUCTCRITERIA (IDCX)			
Description	Product identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	prodid > 0			

3.2.677. prodname

Table(s)	PRODUCTCRITERIA (IDCX)			
Description	Name of the product.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)		- (hyphen)	a24	Y
Range	any valid string up to 24 characters			

3.2.678. prodsubtype

Table(s)	PRODUCTCRITERIA (IDCX)

Description	Subtype of the product. Typically corresponds to one of the IDC SHI event bulletins such as SEL1, SEL2, SEL3, LEB, REB etc.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(12)		- (hyphen)	a12	Y
Range	prodsubtype IN { sel1, sel2, sel3, reb, etc. }			

3.2.679. prodtype

Table(s)	FPDESCRIPTION (IDCX)			
Description	Product type.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(12)		- (hyphen)	a12	Y
Range	prodtype IN {origin, event, bulletin, arrival, detection, waveform}			

3.2.680. prodtype

Table(s)	PRODUCTCRITERIA (IDCX)			
Description	Product type.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)		- (hyphen)	a32	Y
Range	prodtype IN {origin, event, bulletin, arrival, detection, waveform}			

3.2.681. projection

Table(s)	MAPDISC (MAP)			
Description	Projection of the Map; a positive integer enumerator for uniquely classifying the stereographic projection of the Map. Azimuthal equidistant = 2; Mercator = 3.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i8	N
Range	projection IN {2, 3}			

3.2.682. prop_mode

Table(s)	PHASE_DESCRIPTION (STATIC)			
Description	Indicates the propagation mode for this phase. One of P,S,H,I,V or N.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)			a1	N
Range	prop_mode IN { P,S,H,I,V,N }			

3.2.683. ptime

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB)
Description	Epoch time at which P-type polarization columns are estimated. This column

	value is the centre of the time window with maximum rectilinearity.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	-9999999999999	f17.5	Y
Range	any valid epoch time			

3.2.684. ptmcor

Table(s)	SITEAUX (STATIC)			
Description	P-wave arrival time correction.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-999.0	f6.3	Y
Range	ptmcor > -999.0			

3.2.685. ptyp

Table(s)	CEPPKS (REB)			
Description	Consistent cepstral peak type. This column is FC-PHS if consistent Fourier cepstral peaks are found across two or more phases for one array and no peak is in the noise cepstrum at this quefrency. Otherwise, it is "-" if no consistent cepstral peaks are found.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		- (hyphen)	a6	Y
Range	ptyp IN {FC-PHS}			

3.2.686. qcstatsid

Table(s)	QCSTATS (IDCX)			
Description	Data quality statistics identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	qcstatsid > 0.0			

3.2.687. qfactor

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	Y
Range				

3.2.688. qual

Table(s)	ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB)

Description	Onset quality. This single-character flag is used to denote the sharpness of the onset of a seismic phase. This relates to the timing accuracy as follows: i (impulsive) - accurate to +/-0.2 seconds e (emergent) - accuracy between +/-(0.2 to 1.0 seconds) w (weak) - timing uncertain to > 1 second			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)		- (hyphen)	a1	Y
Range	qual IN {i, e, w}			

3.2.689. ratio

Table(s)	SPLP (REB)			
Description	Ratio of short-period to long-period energy.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f10.8	Y
Range	ratio > 0			

3.2.690. ratiotype

Table(s)	ATTENCOEF (STATIC)			
Description	Amplitude ratio type. This identifies the type of P/S amplitude ratio (for example, Pn/Lg or Pn/Sn) for which the attenuation coefficients apply.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		- (hyphen)	a6	N
Range	any valid string up to 6 characters			

3.2.691. rcoefid

Table(s)	REGCOEF (STATIC)			
Description	Linear coefficient set identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(20)		- (hyphen)	a20	N
Range	any valid string up to 20 characters			

3.2.692. rcoeftype

Table(s)	REGCOEF (STATIC)			
Description	Type of linear weighting coefficient used in regional P/S screening criterion.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(10)		- (hyphen)	a10	N
Range	any valid string up to 10 characters			

3.2.693. rcoefvalue

Table(s)	REGCOEF (STATIC)			
Description	Value of linear weighting coefficient used in regional P/S screening criterion. Identified by rcoeftype.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	any valid floating point value			

3.2.694. reason

Table(s)	DISCARD (LEB), DISCARD (REB)			
Description	Reason an automated system event was discarded by an analyst.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(30)		NOT ALLOWED	a30	N
Range	any valid string up to the character width			

3.2.695. recid

Table(s)	DERVDISC (IDCX)			
Description	Unique record identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	Y
Range	recid > 0			

3.2.696. rect

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB), ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB)			
Description	Signal rectilinearity defined as 1 - (l3 + l2)/2l1 where l1, l2, and l3 are the three eigenvalues from the decomposition of the covariance matrix. This column value is the maximum rectilinearity for all overlapping time windows.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f7.3	Y
Range	0.0 <= rect <= 1.0			

3.2.697. rectype

Table(s)	SPLP (REB)			
Description	Recipe type. This term identifies the algorithm used to calculate the parameter.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		- (hyphen)	a8	N
Range	any string up to the character field width			

3.2.698. rectype

Table(s)	THIRDMOM (REB), TIMEFREQ (REB)			
Description	Recipe type. This term identifies the algorithm used to calculate the parameter.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		NOT ALLOWED	a8	N
Range	any string up to the character field width			

3.2.699. rectype

Table(s)	COMPLEXITY (REB)			
Description	Recipe type. This term identifies the algorithm used to calculate the parameter.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		- (hyphen)	a8	Y
Range	any string up to the character field width			

3.2.700. reflat

Table(s)	MAPDISC (MAP)			
Description	Latitude reference; latitude of the center of the Map application.s projection (used for azimuthal equidistant projections only).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999	f9.4	Y
Range	-90.0 <= reflat <= 90.0			

3.2.701. reflon

Table(s)	MAPDISC (MAP)			
Description	Longitude reference. Longitude of the center of the Map application's projection (used for azimuthal equidistant projections only).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999	f9.4	Y
Range	-180.0 <= reflon <= 180.0			

3.2.702. refoffsetlat

Table(s)	MAPDISC (MAP)			
Description	Latitude offset reference. This column value is the reference (in pixels) from the lower left corner of the map to the center of the Map applications projection. In the case where the reference point is at the center of the map, the offsets are equal to half the map width and height. For azimuthal equidistant projections only.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	pixels	-1	f9.4	Y

Range	refoffsetlat > 0			

3.2.703. refoffsetlon

Table(s)	MAPDISC (MAP)			
Description	Longitude offset reference. This column value is the reference (in pixels) from the lower left corner of the map to the center of the Map application.s projection. For azimuthal equidistant projections only.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	pixels	-1	f9.4	Y
Range	refoffsetlon > 0			

3.2.704. refsta

Table(s)	SITE (STATIC)			
Description	Reference station. This string specifies the reference station with respect to which array members are located (see deast, dnorth).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		- (hyphen)	a6	Y
Range	any sta from tables			

3.2.705. reg_conf

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Confidence level of the regional seismic P/S screening criterion.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	0.0 < reg_conf < 1.0			

3.2.706. regexp

Table(s)	RULESET (STATIC)			
Description	Regular expression to describe the channels where the rule applies.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(64)		NOT ALLOWED	a64	N
Range	any alphanumeric string up to the character field width			

3.2.707. regname

Table(s)	PRODUCTTYPEEVSC (IDCX)			
Description	Region name for subscriptions.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)		- (hyphen)	a24	Y

Range	any valid string up to 24 characters

3.2.708. rely

Table(s)	SITEAUX (STATIC)			
Description	Station reliability. This column is an estimate of the percentage of time that the station is up.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f5.2	Y
Range	0.0 <= rely <= 1.0			

3.2.709. remark

Table(s)	REMARK (IDCX), REMARK (LEB), REMARK (REB), REMARK (SEL1), REMARK (SEL2), REMARK (SEL3), REMARK (STATIC)			
Description	Descriptive text. This single line of text is an arbitrary comment about a record in the database. The comment is linked to its parent table only by forward reference from commid in the record of the table of interest (see commid, lineno).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(80)		- (hyphen)	a80	Y
Range	any string up to 80 characters			

3.2.710. req_azslo_dist

Table(s)	STATION_PHASE_RELY (STATIC)			
Description	Maximum distance from hypocenter to disregard azimuth and slowness residuals			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)	degrees	-1	i8	Y
Range	dis_dist >= 0.0			

3.2.711. req_azslo_snr

Table(s)	STATION_PHASE_RELY (STATIC)			
Description	Minimum signal-to-noise ratio required to disregard azimuth and slowness residuals			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	dis_allow >= 0.0			

3.2.712. reqid

Table(s)	REQUEST (IDCX)
Description	Request identifier. Unique key to allow tracking of requests by the Message

	Subsystem.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	reqid > 0			

3.2.713. requestor

Table(s)	REQUEST (IDCX)			
Description	Original requestor of this data. The requestor is the person or program that requests this waveform data.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)		- (hyphen)	a15	Y
Range	any string up to 15 characters			

3.2.714. revfunction

Table(s)	REVAUDIT (LEB)			
Description	Name of the revision function used.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)		NOT ALLOWED	a32	N
Range	any function name in rebrevise			

3.2.715. revid

Table(s)	REVAUDIT (LEB)			
Description	Revision identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	revid > 0			

3.2.716. revision

Table(s)	CHANNAME (STATIC)			
Description	Link between the clf and channame table to indicate which position values in the channame table should be used. This column is needed because channels may be added and removed from a station. The channame table stores each combination of channels using different revision values. This allows historical data to be analysed.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)		NOT ALLOWED	i4	N
Range	revision > 0			

3.2.717. revision

Table(s)	FILEPRODUCT (IDCX)			
Description	Revision number of the data file.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)		-1	i4	Y
Range	revision > 0			

3.2.718. revision

Table(s)	NOOPS_CHANNAME (STATIC)			
Description	link between the clf and channame table to indicate which position values in the channame table should be used. This column is needed because channels may be added and removed from a station. The channame table stores each combination of channels using different revision values. This allows historical data to be analysed.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)		NOT ALLOWED	i4	Y
Range	revision > 0			

3.2.719. revision

Table(s)	FS_STAGEPRODUCT (IDCX)			
Description	obsolete			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)			i4	Y
Range				

3.2.720. revision

Table(s)	FILEPRODUCT_BU_20200610 (IDCX), FILEPRODUCT_TEMP (IDCX)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)				Y
Range				

3.2.721. revstate

Table(s)	REVAUDIT (LEB)			
Description	State of the revision.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)		NOT ALLOWED	a16	Y
Range	revstate IN {DONE|FAILED|ABORTED}			

3.2.722. revtagid1

Table(s)	REVAUDIT (LEB)			
Description	Value of the foreign key named in revtagname1.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	revtagid1 > 0			

3.2.723. revtagid2

Table(s)	REVAUDIT (LEB)			
Description	Value of the foreign key named in revtagname2.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	Y
Range	revtagid2 > 0			

3.2.724. revtagname1

Table(s)	REVAUDIT (LEB)			
Description	Name of the foreign key whose value is in revtagid1.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		NOT ALLOWED	a8	N
Range	revtagname1 IN {valid identifier}			

3.2.725. revtagname2

Table(s)	REVAUDIT (LEB)			
Description	Name of the foreign key whose value is in revtagid2.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		- (hyphen)	a8	Y
Range	revtagname2 IN {valid identifier}			

3.2.726. rid

Table(s)	AMP3C (IDCX), AMP3C (LEB), AMP3C (REB)			
Description	Recipe identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		- (hyphen)	a8	N
Range	any string up to eight characters long			

3.2.727. rmsamp

Table(s)	PMCC_FEATURES (IDCX)

Description	Mean value of the root mean square amplitudes of the detection pixels in the family (Pa)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	Y
Range				

3.2.728. rotation

Table(s)	MAPDISC (MAP)			
Description	Map rotation. This is the rotation of the projection from 0?, or due north. Rotation specifies the azimuth of the y-raster in degrees clockwise from north (for azimuthal equidistant projections only).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-1	f9.4	Y
Range	0.0 <= rotation < 360.0			

3.2.729. rscore

Table(s)	EVSC_PROD (IDCX)			
Description	Score for the regional seismic P/S event-screening criterion.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	rscore > -999.0			

3.2.730. rsptype

Table(s)	INSTRUMENT (STATIC)			
Description	Instrument response type. The column value denotes the style in which detailed calibration data are stored. The neighboring column dfile tells where the calibration data are saved. Rsptype = paz indicates the data are the poles and zeros of the Laplace transform. Rsptype = fap indicates the data are amplitude/phase values at a range of frequencies. Rsptype = fir indicates that the response type is a finite impulse response table. Rsptype = pazfir indicates a combination of poles, zeros, and finite impulse response. Other codes may be defined.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		NOT ALLOWED	a6	Y
Range	any lower-case string up to six characters			

3.2.731. running

Table(s)	DLMAN (IDCX)			
Description	Flag indicating whether or not DLMan is running.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)		- (hyphen)	a1	Y

Range	running IN {y, n}

3.2.732. samprate

Table(s)	INSTRUMENT (STATIC)			
Description	Sampling rate. This column is the sample rate in samples/second. The column value is specifically the nominal sample rate, not accounting for clock drift.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	samples/sec	NOT ALLOWED	f11.7	Y
Range	samprate > 0.0			

3.2.733. samprate

Table(s)	OLD_WFPROTO (IDCX), WFDISC (IDCX), WFDISC (SEGMENT), WF-DISC_NOMIG (SEGMENT)			
Description	Sampling rate. This column is the sample rate in samples/second. The value may vary slightly from the nominal to reflect clock drift.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	samples/sec	NOT ALLOWED	f11.7	Y
Range	samprate > 0.0			

3.2.734. scale

Table(s)	MAPDISC (MAP)			
Description	Map scale.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	radians per pixel for mercator projections; kilometers per pixel for azimuthal equidistant projections	-1	f9.4	Y
Range	scale > 0			

3.2.735. score

Table(s)	EVSC_PROD (IDCX)			
Description	Composite event-screening score. This score numerically indicates the degree to which a particular event meets or does not meet the combined screening criteria.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	score > -999.0			

3.2.736. sdepth

Table(s)	ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORI-

	GERR_TEMP_GA (SEL3)
Description	Depth error. This is the maximum error of a depth estimate for a level of confidence given by conf (see smajax, sminax, and sxx, syy, szz, stt, sxy, sxz, syz, stx, sty, stz).

Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	-1.0	f9.4	Y
Range	sdepth > 0.0			

3.2.737. sdobs

Table(s)	ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3)
Description	Standard error of one observation. This column is derived from the discrepancies in the arrival times of the phases used to locate an event. This column is defined as the square root of the sum of the squares of the time residuals divided by the number of degrees of freedom. The latter is the number of defining observations (ndef in Origin (Origin_temp_ga)) minus the dimension of the system solved (4 if depth is allowed to be a free variable, 3 if depth is constrained).

Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f9.4	Y
Range	sdobs > 0.0			

3.2.738. seaz

Table(s)	ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3), DETECTION (IDCX), DETECTION (LEB), DETECTION (REB)
Description	Station-to-event azimuth calculated from the station and event locations and measured clockwise from north.

Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999.0	f7.2	Y
Range	0.0 <= seaz <= 360.0			

3.2.739. seazlr

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB)
Description	Azimuth of the eigenvector (e3) associated with the smallest eigenvalue (l3). This column is corrected by 180° to give an estimate of the station-to-event azimuth (with an 180° ambiguity). This column is an S-type column calculated at the time of the maximum 3-component amplitude. The only difference between seazs and seazlr is in the definition of the overlapping time windows.

Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999.0	f7.2	Y
Range	0.0 <= seazlr <= 360.0			

3.2.740. seazp

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB)			
Description	Azimuth of the eigenvector (e1) associated with the largest eigenvalue (l1). The column value is corrected by 180° to give an estimate of the station-to-event azimuth. This P-type value is calculated at the time of maximum rectilinearity.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999.0	f7.2	Y
Range	0.0 <= seazp <= 360.0			

3.2.741. seazs

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB)			
Description	Azimuth of the eigenvector (e3) associated with the smallest eigenvalue (l3). This column is corrected by 180° to give an estimate of the station-to-event azimuth (with an 180° ambiguity). This column is an S-type column calculated at the time of the maximum 3-component amplitude. The only difference between seazs and seazlr is in the definition of the overlapping time windows.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees	-999.0	f7.2	Y
Range	0.0 <= seazs <= 360.0			

3.2.742. secondkey

Table(s)	ARCH_DATA_TYPE (IDCX)			
Description	Not used.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)		- (hyphen)	a24	Y
Range	any string up to 24 characters			

3.2.743. segtype

Table(s)	OLD_WFPROTO (IDCX)			
Description	Flag indicating whether the waveform segment is original (o), virtual (v), segmented (s) or duplicated (d).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)		- (hyphen)	a1	Y
Range	segtype IN {o, v, s, d}			

3.2.744. segtype

Table(s)	WFDISC (IDCX), WFDISC (SEGMENT), WFDISC_NOMIG (SEGMENT)
Description	Flag indicating whether the waveform segment is original (o), virtual (v), segmented (s) or duplicated (d).

Storage type	Unit	NA value	External	Nullable
varchar2(1)		- (hyphen)	a1	Y
Range	segtype IN {o, v, s, d}			

3.2.745. servicetime

Table(s)	DATAUSER (IDCX)			
Description	Last time a request from the user with the userid in the datauser table was serviced.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	-999999999999	f17.5	Y
Range	servicetime >= 0			

3.2.746. sigma_time

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Standard deviation of the probability weighted time.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)		-999.0	f17.5	Y
Range	sigma_time >= 0			

3.2.747. sigmafreq

Table(s)	PMCC_FEATURES (IDCX)			
Description	Standard deviation of the frequency values of the detection pixels in the family (Hz)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f10.4	Y
Range				

3.2.748. sigtype

Table(s)	MSGDISC (IDCX)			
Description	Digital signature type.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(64)		- (hyphen)	a64	Y
Range	ASCII character string			

3.2.749. skewness

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)

Description	Skew of the estimated signal energy between onset_time and termination_time.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-9999999999999	f9.4	Y
Range	-10000000.0 < skewness < 10000000.0			

3.2.750. slo_hi

Table(s)	BREGION_TAB (STATIC)			
Description	Upper bound of the slowness window.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,3)	seconds/degree		f8.3	Y
Range	slo_hi > 0.0			

3.2.751. slo_lo

Table(s)	BREGION_TAB (STATIC)			
Description	Lower bound of the slowness window.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,3)	seconds/degree		f8.3	Y
Range	slo_lo > 0.0			

3.2.752. slo_rel

Table(s)	STATION_PHASE_RELY (STATIC)			
Description	Slowness reliability estimate			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,3)		-999.0	f8.3	Y
Range	0.0 <= slo_rel <= 1.0			

3.2.753. slodef

Table(s)	ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3)			
Description	Slowness defining code. This one-character flag indicates whether or not the slowness of a phase was used to constrain the event location. This column is defining (slodef = d) or non defining (slodef = n) for this arrival.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)		- (hyphen)	a1	Y
Range	slodef IN {d, n}			

3.2.754. slores

Table(s)	DEFINE_PHASE_RESIDUAL (STATIC)			
Description	Slowness residual. This column gives the difference between an observed slowness and a theoretical prediction. The prediction is calculated for the related phase and event origin described in the record.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds/kilometer	-999.0	f7.2	N
Range	slores > -999.0			

3.2.755. slores

Table(s)	ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3)			
Description	Slowness residual. This column gives the difference between an observed slowness and a theoretical prediction. The prediction is calculated for the related phase and event origin described in the record.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds/kilometer	-999.0	f7.2	Y
Range	slores > -999.0			

3.2.756. slores

Table(s)	ALLOW_RESID (LEB)			
Description	The maximum allowable difference between an observed slowness and a theoretical prediction.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds/degree	-999.0	f7.2	Y
Range	slores > -999.0			

3.2.757. slow

Table(s)	ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB)			
Description	Observed slowness of a detected arrival. Units are seconds/degree.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds/degree	-1.0	f7.2	Y
Range	slow >= 0.0			

3.2.758. slow

Table(s)	DETECTION (IDCX), DETECTION (LEB), DETECTION (REB), HYDRO_ARR_GROUP (IDCX), HYDRO_ARR_GROUP (LEB), HYDRO_ARR_GROUP (REB)
Description	Observed slowness of an arrival. Units are seconds/kilometer.

Storage type	Unit	NA value	External	Nullable
float(24)	seconds/kilometer	-1.0	f7.2	Y
Range	slow >= 0.0			

3.2.759. slow

Table(s)	PARRIVAL (LEB), PARRIVAL (REB), PARRIVAL (SEL1), PARRIVAL (SEL2), PARRIVAL (SEL3)			
Description	Slowness of a predicted arrival. Units are seconds/degree.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds/degree	-1.0	f7.2	Y
Range	slow >= 0.0			

3.2.760. slow_rely

Table(s)	STA_RELY (STATIC)			
Description	Slowness reliability flag. The value is a single-character flag to indicate whether (y) or not (n) the slowness is considered to be reliable.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)			a1	Y
Range	slow_rely IN { 0,1}			

3.2.761. slow_weight

Table(s)	PHASE_WEIGHT_EVENT_DEFINE (STATIC)			
Description	Weight given to defining slowness for this phase			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	N
Range				

3.2.762. smaj_sc

Table(s)	EVSC_PROD (IDCX)			
Description	Semi-major axis of error ellipse, used for onshore/offshore determination, for a confidence level given by loc_conf of table PRODUCTTYPEEVSC.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	-999.0	f7.2	Y
Range	smaj_sc > 0.0			

3.2.763. smajax

Table(s)	ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3)

Description	Semi-major axis of error ellipse for a given confidence. The column value is the length of the semi-major axis of the location error ellipse. The value is found by projecting the covariance matrix onto the horizontal plane. The level of confidence is specified by conf (see sdepth, sminax, and sxx, syy, szz, stt, sxy, sxz, syz, stx, sty, stz).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	-1.0	f9.4	Y
Range	smajax > 0.0			

3.2.764. smin_sc

Table(s)	EVSC_PROD (IDCX)			
Description	Semi-minor axis of error ellipse, used for onshore/offshore determination, for a confidence level given by loc_conf of table PRODUCTTYPEEVSC.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	-999.0	f7.2	Y
Range	smin_sc > 0.0			

3.2.765. sminax

Table(s)	ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3)			
Description	Semi-minor axis of error ellipse. The column value is the length of the semi-minor axis of the location error ellipse. The value is found by projecting the covariance matrix onto the horizontal plane. The level of confidence is specified by conf (see sdepth, smajax, and sxx, syy, szz, stt, sxy, sxz, syz, stx, sty, stz).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	kilometers	-1.0	f9.4	Y
Range	sminax > 0.0			

3.2.766. sn_snr

Table(s)	EVSC_REGIONAL (IDCX)			
Description	Signal-to-noise ratio of the Sn measurement.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	sn_snr > 0.0			

3.2.767. snr

Table(s)	AMPLITUDE (IDCX), AMPLITUDE (LEB), AMPLITUDE (REB), APMA (IDCX), APMA (LEB), APMA (REB), ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB), COMPLEXITY (REB), DETECTION (IDCX), DETECTION (LEB), DETECTION (REB)

Description	Signal-to-noise ratio. This is an estimate of the ratio of the amplitude of the signal to amplitude of the noise immediately preceding it. For apma, this value is based on the maximum 3-component amplitudes (see amps). This column is the average signal-to-noise ratio for the frequency bands that contributed to the final polarization estimates.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f10.2	Y
Range	snr > 0.0			

3.2.768. snr_hi

Table(s)	BREGION_TAB (STATIC)			
Description	Upper bound of the snr window.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,3)		-1	f8.3	Y
Range				

3.2.769. snr_high_band

Table(s)	EVSC_HYDRO (IDCX)			
Description	Hydroacoustic signal-to-noise ratio in the high-frequency band (32-64 Hz) from table Amplitude for a given orid/sta pair.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f7.2	Y
Range	snr_high_band > 0.0			

3.2.770. snr_lo

Table(s)	BREGION_TAB (STATIC)			
Description	Lower bound of the snr window.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,3)		-1	f8.3	Y
Range				

3.2.771. snthrsh

Table(s)	SITEAUX (STATIC)			
Description	Nominal signal-to-noise ratio.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f5.2	Y
Range	snthrsh > 1.0			

3.2.772. sound_speed

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	Y
Range				

3.2.773. sp_tol1

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	Y
Range				

3.2.774. sp_tol2

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	Y
Range				

3.2.775. speed_transition

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	Y
Range				

3.2.776. spike

Table(s)	QCSTATS (IDCX)			
Description	Amount of data in the detection processing interval masked due to spikes.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	-999.0	f17.5	Y
Range	spike >= 0.0			

3.2.777. sproid

Table(s)	DETECTION (IDCX), DETECTION (LEB), DETECTION (REB)

Description	Uniquely identifies a set of parameters used in the signal processing.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	Y
Range	sproid > 0			

3.2.778. src_dpnt_corr

Table(s)	EVENT_CONTROL (LEB), EVENT_CONTROL (REB), IN_EVENT_CONTROL (LEB)			
Description	Identification of whether or not, and what type of, source-dependent corrections were applied to the location. 0 = No source-dependent corrections applied to the event location. 1 = Test-site travel-time corrections applied to the event location. 2 = Source-Region Station-Timing (SRST) corrections applied to the event location. 3 = Regional level source-specific station corrections (SSSC) applied to the event location. SRST correction is not applied, even if it exists. 4 = Local level SSSCs applied to the location. SRST correction is not applied, even if it exists.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(2,0)		0	i2	Y
Range	src_dpnt_corr IN {0, 1, 2, 3, 4}			

3.2.779. srn

Table(s)	SREGION (STATIC)			
Description	Seismic region number, as given in [Fli74] (see grn, grname, and srname).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i8	N
Range	srn > 0			

3.2.780. srn

Table(s)	ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3)			
Description	Seismic region number, as given in [Fli74] (see grn, grname, and srname).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	srn > 0			

3.2.781. srname

Table(s)	SREGION (STATIC)			
Description	Seismic region name. This column is the common name of a seismic region, as given in [Fli74]. Names may have changed due to changing political circumstances (see srn and grname).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

varchar2(40)		NOT ALLOWED	a40	Y
Range	any upper-case string up to 40 characters			

3.2.782. sta

Table(s)	AFFILIATION (STATIC), AFFILIATION_EXCL (STATIC), AFFILIATION_SUB (STATIC), ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB), ATTENCOEF (STATIC), BEAMAUX (STATIC), BREGION_TAB (STATIC), CEPPKS (REB), CHAN_GROUPS (STATIC), COMPLEXITY (REB), DERVDISC (IDCX), EVSC_HYDRO (IDCX), EVSC_REGIONAL (IDCX), FORBEAMAUX (STATIC), OLD_WFPROTO (IDCX), OUTAGE (IDCX), PARTICIPATION (STATIC), PMCC_FEATURES (IDCX), PRODUCTTYPESTA (IDCX), QCSTATS (IDCX), REQUEST (IDCX), RULESET (STATIC), SEMAPHORE (IDCX), SENSOR (STATIC), SITE (STATIC), SITEAUX (STATIC), SITECHAN (STATIC), SITEPOLL (STATIC), SITEPOLLCA (STATIC), SITE_ADDRESS (STATIC), SPLP (REB), STAMAG (LEB), STAMAG (REB), STAMAG (SEL1), STAMAG (SEL2), STAMAG (SEL3), STANET (STATIC), STATION_PHASE_RELY (STATIC), STA_RELY (STATIC), THIRDMOM (REB), TIMEFREQ (REB), WFDISC (IDCX), WFDISC (SEGMENT), WFDISC_NOMIG (SEGMENT)			
Description	Station code. This column value is the code name of a seismic, hydroacoustic, or infrasonic observatory and identifies a geographic location recorded in the SITE table.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		NOT ALLOWED	a6	N
Range	any upper-case string up to the character field width			

3.2.783. sta

Table(s)	WFCONV (IDCX)			
Description	Station code. This column value is the code name of a seismic, hydroacoustic, or infrasonic observatory and identifies a geographic location recorded in the SITE table.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		NOT ALLOWED - (hyphen) for assoc, chan_groups, dlfile, fileproduct, fkdisc, fsdisc, qcstats, stassoc, thirdmom	a6	N
Range	any upper-case string up to the character field width			

3.2.784. sta

Table(s)	ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3), FILEPRODUCT (IDCX), STASSOC (IDCX)

Description	Station code. This column value is the code name of a seismic, hydroacoustic, or infrasonic observatory and identifies a geographic location recorded in the SITE table.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		- (hyphen)	a6	Y
Range	any upper-case string up to the character field width			

3.2.785. sta

Table(s)	AFFILIATION_LP (STATIC), CHAN_GROUPS_AUXWF (STATIC), DETECTION (IDCX), DETECTION (LEB), DETECTION (REB), FS_STAGE-PRODUCT (IDCX), PARRIVAL (LEB), PARRIVAL (REB), PARRIVAL (SEL1), PARRIVAL (SEL2), PARRIVAL (SEL3)			
Description	Station code. This column value is the code name of a seismic, hydroacoustic, or infrasonic observatory and identifies a geographic location recorded in the SITE table.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		NOT ALLOWED	a6	Y
Range	any upper-case string up to the character field width			

3.2.786. sta

Table(s)	FKDISC (LEB)			
Description	Station code. This column value is the code name of a seismic, hydroacoustic, or infrasonic observatory and identifies a geographic location recorded in the SITE table.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		NOT ALLOWED - (hyphen) for assoc, chan_groups, dlfile, fileproduct, fkdisc, fsdisc, qcstats, stassoc, thirdmom	a6	Y
Range	any upper-case string up to the character field width			

3.2.787. sta

Table(s)	FILEPRODUCT_BU_20200610 (IDCX), FILEPRODUCT_TEMP (IDCX)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)				Y
Range				

3.2.788. staname

Table(s)	SITE (STATIC)			
Description	Station name/description. This column value is the full name of the station whose codename is in sta. As an example, one record in the site table connects sta = ANMO to staname = ALBUQUERQUE, NEW MEXICO (SRO).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(50)		- (hyphen)	a50	Y
Range	any upper-case string up to 50 characters			

3.2.789. staper

Table(s)	SITEAUX (STATIC)			
Description	Standard period at which noise estimates are made.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-1.0	f5.2	Y
Range	staper > 0.0			

3.2.790. start_time

Table(s)	REQUEST (IDCX)			
Description	Epoch start time of the data interval. Epochal time is given as seconds since hour 0 January 1, 1970.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	NOT ALLOWED	f17.5	N
Range	any valid epoch time			

3.2.791. start_time

Table(s)	AMPLITUDE (IDCX), AMPLITUDE (LEB), AMPLITUDE (REB)			
Description	Epoch start time of the data interval. Epochal time is given as seconds since hour 0 January 1, 1970.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	NOT ALLOWED	f17.5	Y
Range	any valid epoch time			

3.2.792. stassid

Table(s)	STASSOC (IDCX)
Description	Station association identification. The wavetrain from a single event may be made up of a number of arrivals. A unique stassid joins those arrivals believed to have come from a common event as measured at a single station. Stassid is also the key to the stassoc table, which contains additional signal measurements not contained within the arrival table, such as station magnitude estimates and computed signal characteristics.

Storage type	Unit	NA value	External	Nullable
number(10,0)		NOT ALLOWED	i10	N
Range	stassid > 0			

3.2.793. stassid

Table(s)	ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB)			
Description	Station association identification. The wavetrain from a single event may be made up of a number of arrivals. A unique stassid joins those arrivals believed to have come from a common event as measured at a single station. Stassid is also the key to the stassoc table, which contains additional signal measurements not contained within the arrival table, such as station magnitude estimates and computed signal characteristics.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	Y
Range	stassid > 0			

3.2.794. stat_prov

Table(s)	SITE_ADDRESS (STATIC)			
Description	State or province of a country.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(40)		- (hyphen)	a40	Y
Range	any string up to 40 characters			

3.2.795. state

Table(s)	REBDONE_DATADAY_FLAG (LEB)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(12)		- (hyphen)	a12	Y
Range	Not used			

3.2.796. state

Table(s)	INTERVAL (IDCX), INTERVAL (SEGMENT), REQUEST (IDCX)			
Description	Processing state. The processing state of the interval within the automated processing system.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)		- (hyphen)	a16	Y
Range	a set of strings defined at each installation for each automated processing system. For example, done, ready, queued, requested, timeout, running.			

3.2.797. *state*

Table(s)	GA_TAG (SEL1)			
Description	The state in the ga_tag table is used by GAassoc and GAconflict to recognize arrivals from auxiliary stations and handle them appropriately.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(20)		NOT ALLOWED	a20	Y
Range	any state currently recognized by GA applications			

3.2.798. *state_count*

Table(s)	MSGAUX (IDCX)			
Description	Number of failures of the message system to process a request.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(4,0)		NOT ALLOWED	i4	N
Range	state_count >= 0			

3.2.799. *statecount*

Table(s)	REQUEST (IDCX)			
Description	Count of failures. When state = failed, the statecount column records the number of failures to acquire this data.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i8	Y
Range	statecount >= 0			

3.2.800. *station*

Table(s)	CHANNAME (STATIC)			
Description	Station name.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		NOT ALLOWED	a6	N
Range	any upper-case character string up to the field width			

3.2.801. *station*

Table(s)	NOOPS_CHANNAME (STATIC)			
Description	Station name. Provides the link between the channame and waveinterval tables.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		NOT ALLOWED	a6	N
Range	any upper-case character string up to the field width			

3.2.802. status

Table(s)	PRODTRACK (IDCX)			
Description	Status of the product, as related to the operation of Subscription system. Rows for which there are currently no active subscription have status NOACTIVE. Successfully delivered subscriptions have status DONE. NEW indicates new entries, with QUEUED indicating that there is some backlog of subscriptions to be processed.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(12)		- (hyphen)	a12	Y
Range	status IN {NEW, DONE, NOACTIVE, QUEUED}			

3.2.803. status

Table(s)	DATAUSER (IDCX)			
Description	Flag indicating whether the user is currently active or inactive for requests and subscriptions. For subsuser possible values are a (active) or I (inactive). For datauser, possible values are ACTIVE or INACTIVE.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)		NOT ALLOWED	a24	N
Range	datauser status IN { ACTIVE, INACTIVE }. subsuser IN { a, I }			

3.2.804. status

Table(s)	SUBSUSER (IDCX)			
Description	Flag indicating whether the user is currently active or inactive for requests and subscriptions. For subsuser possible values are a (active) or I (inactive). For datauser, possible values are ACTIVE or INACTIVE.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)		- (hyphen)	a24	Y
Range	datauser status IN { ACTIVE, INACTIVE }. subsuser IN { a, I }			

3.2.805. status

Table(s)	MSGDATATYPE (IDCX), MSGDISC (IDCX)			
Description	Status of the current message. The NA value for all these status fields is - (hyphen), except in the MSGDATATYPE table where it is limited to DONE or FAILED.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)		- (hyphen)	a32	Y
Range	msgdatatype status IN { DONE, FAILED }, otherwise any character string up to the caracter field width.			

3.2.806. status

Table(s)	OUTAGE (IDCX)			
Description	Status of the current message. The NA value for all these status fields is - (hyphen), except in the msgdatatype table where it is limited to DONE or FAILED.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)		- (hyphen)	a32	Y
Range	msgdatatype status IN { DONE, FAILED }, otherwise any character string up to the caracter field width.			

3.2.807. status

Table(s)	MSGDEST (IDCX)			
Description	Status of the current message. The NA value for all these status fields is - (hyphen), except in the MSGDATATYPE table where it is limited to DONE or FAILED.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)		- (hyphen)	a32	Y
Range	msgdatatype status IN { DONE, FAILED }, otherwise any character string up to the caracter field width.			

3.2.808. status

Table(s)	PROBLEM (IDCX)			
Description	The status field indicates whether the problem is currently open or closed.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(33)		- (hyphen)	a33	Y
Range	status IN {open, closed}			

3.2.809. status

Table(s)	SUBS (IDCX)			
Description	(Subs): Status of the subscription, either a (active) or I (inactive). (Waveinterval): status of the time interval specified by time and endtime), currently always set to NEW.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)		- (hyphen)	a6	Y
Range	subs status in { a, i }, waveinterval status IN { NEW }			

3.2.810. status

Table(s)	DATAREADY (IDCX)
Description	Possible values for dataready are: n=new, i=insert, c=change, d=delete or -(hyphen). For ftpfailed, possible values are RETRY or FAILED.

Storage type	Unit	NA value	External	Nullable
varchar2(8)		- (hyphen)	a8	Y
Range	any valid string up to the character limit			

3.2.811. status

Table(s)	FTPFAILED (IDCX)			
Description	Status of FTP attempt (retry or failed)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		- (hyphen)	a8	Y
Range	any valid string up to the character limit			

3.2.812. statype

Table(s)	STATION_PHASE_RELY (STATIC)			
Description	Type of station			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)		- (hyphen)	a24	Y
Range	any valid string up to 24 characters			

3.2.813. statype

Table(s)	ALLOW_RESID (LEB), DEFINE_PHASE_RESIDUAL (STATIC), WEIGHTS (STATIC)			
Description	Station type. This character string specifies the station type. Recommended entries are ss (single station) or ar (array).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(4)		- (hyphen)	a4	N
Range	statype IN {ss, ar}			

3.2.814. statype

Table(s)	SITE (STATIC)			
Description	Station type. This character string specifies the station type. Recommended entries are ss (single station) or ar (array).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(4)		- (hyphen)	a4	Y
Range	statype IN {ss, ar}			

3.2.815. stav

Table(s)	DETECTION (IDCX), DETECTION (LEB), DETECTION (REB)
Description	Short-term average used to describe the amplitude of a signal. The amplitude is

	averaged over a small time interval, typically 1-2 seconds. This time window is defined in Sigpro processing.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	nanometers	-1.0	a18	Y
Range	stav > 0.0			

3.2.816. stdconstval

Table(s)	QCSTATS (IDCX)			
Description	Standard deviation of data in masked constant segments.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)		-999.0	f17.5	Y
Range	stdconstval >= 0.0			

3.2.817. stime

Table(s)	ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3)			
Description	Origin time error in seconds.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-1.0	f8.2	Y
Range	stime >= 0.0			

3.2.818. stime

Table(s)	APMA (IDCX), APMA (LEB), APMA (REB)			
Description	This column is the epoch time at which S-type polarization columns are estimated. The value is the centre of the time window with the maximum 3-component amplitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds since 01-Jan-1970 00:00:00	9999999999.999	f17.5	Y
Range	any valid epoch time			

3.2.819. stime

Table(s)	MSGDEST (IDCX)			
Description	This column is the epochal time at which the corresponding message was sent.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds since 01-Jan-1970 00:00:00	9999999999.999	f17.5	Y
Range	any valid epochal time			

3.2.820. stmcor

Table(s)	SITEAUX (STATIC)			
Description	S-wave arrival time correction.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-999.0	f6.3	Y
Range	stmcor > -999.0			

3.2.821. stream

Table(s)	CHANNAME (STATIC)			
Description	The connection name used in the data transmission. This is the name used in the CD Receiver output files (e.g. ARCES.20080124.20-24.w) In most cases, the stream name is the same as the station name. But for some stations the connection name differs from the station name expected by the processing applications that read CD2WNG output. For example, SONM has a connection name SONMS. This column also links to the sta in the FRAMEPRODUCT table.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)			a6	N
Range				

3.2.822. stream

Table(s)	NOOPS_CHANNAME (STATIC)			
Description	the connection name used in the data transmission. This is the name used in the CD Receiver output files (e.g. ARCES.20080124.20-24.w) In most cases, the stream name is the same as the station name. But for some stations the connection name differs from the station name expected by the processing applications that read cd2w's output. For example, SONM has a connection name SONMS. This column also links to the sta in the frameproduct table.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)			a6	N
Range				

3.2.823. strike

Table(s)	EVSC_PROD (IDCX), ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3)			
Description	Strike of semi-major axis of error ellipse. This column is the strike of the semi-major axis of the location error ellipse, measured in degrees clockwise from the North (see smajax).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	degrees (clockwise from North)	-1.0	f6.2	Y

Range	0.0 <= strike <= 360.0

3.2.824. strip

Table(s)	WFCONV (IDCX)			
Description	Flag showing whether or not the data are stripped of headers (y/n).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)		- (hyphen)	a1	Y
Range	strip IN {n, y}			

3.2.825. stt

Table(s)	ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3)			
Description	Elements of the covariance matrix for the location identified by orid. The covariance matrix is symmetric (and positive definite) so that sxy = syx, and so on, (x, y, z, t) refer to latitude, longitude, depth, and origin time, respectively. These columns (together with sdobs, ndef, and dtype) provide the information necessary to construct the K-dimensional (K = 2, 3, 4) confidence ellipse or ellipsoids at any confidence limit desired.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	stt - seconds squared (sec2)	-1.0	f15.4	Y
Range	stt > 0.0			

3.2.826. stx

Table(s)	ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3)			
Description	Elements of the covariance matrix for the location identified by orid. The covariance matrix is symmetric (and positive definite) so that sxy = syx, and so on, (x, y, z, t) refer to latitude, longitude, depth, and origin time, respectively. These columns (together with sdobs, ndef, and dtype) provide the information necessary to construct the K-dimensional (K = 2, 3, 4) confidence ellipse or ellipsoids at any confidence limit desired.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	stx - kilometers per second (km/sec)	-1.0	f15.4	Y
Range				

3.2.827. sty

Table(s)	ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3)

Description	Elements of the covariance matrix for the location identified by orid. The covariance matrix is symmetric (and positive definite) so that sxy = syx, and so on, (x, y, z, t) refer to latitude, longitude, depth, and origin time, respectively. These columns (together with sdobs, ndef, and dtype) provide the information necessary to construct the K-dimensional (K = 2, 3, 4) confidence ellipse or ellipsoids at any confidence limit desired.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	sty - kilometers per second (km/sec)	-1.0	f15.4	Y
Range				

3.2.828. *stype*

Table(s)	ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB)			
Description	Signal type. This single-character flag indicates the event or signal type. The following definitions hold: l = local event r = regional event t = teleseismic event m = mixed or multiple event g = glitch (for example, non-seismic detection) e = calibration activity obfuscated the data l, r, and t are supplied by the reporting station or as an output of post-detection processing. g and c come from analyst comment or from status bits from GDSN and RSTN data.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)		- (hyphen)	a1	Y
Range	stype IN {l, r, t, m, g, c}			

3.2.829. *stz*

Table(s)	ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3)			
Description	Elements of the covariance matrix for the location identified by orid. The covariance matrix is symmetric (and positive definite) so that sxy = syx, and so on, (x, y, z, t) refer to latitude, longitude, depth, and origin time, respectively. These columns (together with sdobs, ndef, and dtype) provide the information necessary to construct the K-dimensional (K = 2, 3, 4) confidence ellipse or ellipsoids at any confidence limit desired.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	stz - kilometers per second (km/sec)	-1.0	f15.4	Y
Range				

3.2.830. *sub_status*

Table(s)	MSGAUX (IDCX)			
Description	Cause of failure.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)		NOT ALLOWED	a24	Y

Range	any string up to 24 characters			

3.2.831. subject

Table(s)	MSGDISC (IDCX)			
Description	Subject header from an email message.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(64)		- (hyphen)	a64	Y
Range	any string up to 64 characters			

3.2.832. subsid

Table(s)	SUBS (IDCX)			
Description	Subscription identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	Y
Range	subsid > 0			

3.2.833. subsname

Table(s)	SUBS (IDCX)			
Description	Subscription name, which is defined by subscriber.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)		- (hyphen)	a24	Y
Range	any string up to 24 characters			

3.2.834. subtype

Table(s)	MSGDISC (IDCX)			
Description	Specification of whether or not the request includes waveforms. In the future, this column may contain indications of other message subtypes.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2)		- (hyphen)	a2	Y
Range	subtype IN {V, R, L}			

3.2.835. supressempty

Table(s)	PRODUCTCRITERIA (IDCX)			
Description	Flag indicating whether (y) or not (n) VDMS should send out empty subscription messages when no data are available (Not currently used at the IDC).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(2)		- (hyphen)	a2	Y
Range	suppressempty IN { y, n }			

3.2.836. svar

Table(s)	SPVAR (REB)			
Description	Variance of the detrended log spectrum between fmin and fmax. The spectrum is measured in nm-sec.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f12.6	Y
Range	any floating point value			

3.2.837. sweight

Table(s)	WEIGHTS (STATIC)			
Description	Slowness weight.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		0.0	f5.2	Y
Range	sweight >= 0.0			

3.2.838. sxx

Table(s)	ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3)			
Description	Elements of the covariance matrix for the location identified by orid. The covariance matrix is symmetric (and positive definite) so that sxy = syx, and so on, (x, y, z, t) refer to latitude, longitude, depth, and origin time, respectively. These columns (together with sdobs, ndef, and dtype) provide the information necessary to construct the K-dimensional (K = 2, 3, 4) confidence ellipse or ellipsoids at any confidence limit desired.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	sxx - kilometers squared (km2)	-1.0	f15.4	Y
Range	sxx > 0.0			

3.2.839. sxy

Table(s)	ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3)			
Description	Elements of the covariance matrix for the location identified by orid. The covariance matrix is symmetric (and positive definite) so that sxy = syx, and so on, (x, y, z, t) refer to latitude, longitude, depth, and origin time, respectively. These columns (together with sdobs, ndef, and dtype) provide the information necessary to construct the K-dimensional (K = 2, 3, 4) confidence ellipse or ellipsoids at any confidence limit desired.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	sxy - kilometers squared	-1.0	f15.4	Y

	(km2)			
Range				

3.2.840. sxz

Table(s)	ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3)			
Description	Elements of the covariance matrix for the location identified by orid. The covariance matrix is symmetric (and positive definite) so that sxy = syx, and so on, (x, y, z, t) refer to latitude, longitude, depth, and origin time, respectively. These columns (together with sdobs, ndef, and dtype) provide the information necessary to construct the K-dimensional (K = 2, 3, 4) confidence ellipse or ellipsoids at any confidence limit desired.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	sxz - kilometers squared (km2)	-1.0	f15.4	Y
Range				

3.2.841. syy

Table(s)	ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3)			
Description	Elements of the covariance matrix for the location identified by orid. The covariance matrix is symmetric (and positive definite) so that sxy = syx, and so on, (x, y, z, t) refer to latitude, longitude, depth, and origin time, respectively. These columns (together with sdobs, ndef, and dtype) provide the information necessary to construct the K-dimensional (K = 2, 3, 4) confidence ellipse or ellipsoids at any confidence limit desired.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	syy - kilometers squared (km2)	-1.0	f15.4	Y
Range	syy > 0.0			

3.2.842. syz

Table(s)	ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3)			
Description	Elements of the covariance matrix for the location identified by orid. The covariance matrix is symmetric (and positive definite) so that sxy = syx, and so on, (x, y, z, t) refer to latitude, longitude, depth, and origin time, respectively. These columns (together with sdobs, ndef, and dtype) provide the information necessary to construct the K-dimensional (K = 2, 3, 4) confidence ellipse or ellipsoids at any confidence limit desired.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

float(24)	syz - kilometers squared (km2)	-1.0	f15.4	Y
Range				

3.2.843. szz

Table(s)	ORIGERR (IDCX), ORIGERR (LEB), ORIGERR (REB), ORIGERR (SEL1), ORIGERR (SEL2), ORIGERR (SEL3), ORIGERR_TEMP_GA (SEL2), ORIGERR_TEMP_GA (SEL3)			
Description	Elements of the covariance matrix for the location identified by orid. The covariance matrix is symmetric (and positive definite) so that sxy = syx, and so on, (x, y, z, t) refer to latitude, longitude, depth, and origin time, respectively. These columns (together with sdobs, ndef, and dtype) provide the information necessary to construct the K-dimensional (K = 2, 3, 4) confidence ellipse or ellipsoids at any confidence limit desired.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	szz - kilometers squared (km2)	-1.0	f15.4	Y
Range	szz > 0.0			

3.2.844. table_name

Table(s)	ARCH_DATA_TYPE (IDCX)			
Description	Name of table encapsulating the data type.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)		- (hyphen)	a32	Y
Range	any string up to the character field width that is a valid table name			

3.2.845. tablename

Table(s)	DATAREADY (IDCX)			
Description	Database table name containing data ready to be distributed by the Subscription Subsystem.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)		NOT ALLOWED	a24	Y
Range	any string up to the character field width that is a valid table name			

3.2.846. tagid

Table(s)	WFTAG (IDCX), WFTAG (SEL1), WFTAG (SEL2), WFTAG (SEL3)			
Description	Tagname value. This column contains the value of a foreign key identified in tagname. For example, if tagname is arid, then wftag may be joined to Arrival where arrival.arid = wftag.tagid. If tagname is orid, then wftag and Origin (Origin_temp_ga) may be joined where origin.orid = wftag.tagid.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number(10,0)		NOT ALLOWED	i10	N
Range	tagid > 0			

3.2.847. tagid

Table(s)	DATAREADY (IDCX)			
Description	Tagname value. This column contains the value of a foreign key identified in tagname. For example, if tagname is arid, then wftag may be joined to Arrival where ARRIVAL.arid = WFTAG.tagid. If tagname is orid, then wftag and Origin (Origin_temp_ga) may be joined where ORIGIN.orid = WFTAG.tagid.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	Y
Range	tagid > 0			

3.2.848. tagid

Table(s)	WFTAG (SEGMENT)			
Description	Tagname value. This column contains the value of a foreign key identified in tagname. For example, if tagname is arid, then wftag may be joined to Arrival where arrival.arid = wftag.tagid. If tagname is orid, then wftag and Origin (Origin_temp_ga) may be joined where origin.orid = wftag.tagid.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i10	N
Range	tagid > 0			

3.2.849. tagid2

Table(s)	DATAREADY (IDCX)			
Description	Secondary tag value used by the Subscription Subsystem for data types that require more than one identifier (for example, time range for origin).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	Y
Range	tagid2 > 0			

3.2.850. tagname

Table(s)	DATAREADY (IDCX)			
Description	Tagname type. This column value is the name of the foreign key whose value is in tagid.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(12)		NOT ALLOWED	a12	Y
Range	any character string up to the field width			

3.2.851. tagname

Table(s)	WFTAG (IDCX), WFTAG (SEGMENT), WFTAG (SEL1), WFTAG (SEL2), WFTAG (SEL3)			
Description	Tagname type. This column value is the name of the foreign key whose value is in tagid.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		NOT ALLOWED	a8	N
Range	tagname IN {arid, evid, orid, stassid, msgid}			

3.2.852. termination_time

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Estimated termination time of signal.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	-9999999999999	f17.5	Y
Range	any valid epoch time			

3.2.853. thatdb

Table(s)	XTAG (IDCX)			
Description	Database account for the records specified by thatname and thatid.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)		- (hyphen)	a32	Y
Range	any character string up to 32 characters that is a valid account name			

3.2.854. thatid

Table(s)	XTAG (IDCX)			
Description	Identifier for thatname.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	Y
Range	thatid > 0			

3.2.855. thatname

Table(s)	XTAG (IDCX)			
Description	Key for thatid.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		NOT ALLOWED	a8	Y
Range	thatname IN {arid, orid, wfid .}			

3.2.856. thisdb

Table(s)	XTAG (IDCX)			
Description	Database account for the records specified by thisname and thisid.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)		- (hyphen)	a32	Y
Range	any character string up to 32 characters that is a valid account name			

3.2.857. thisid

Table(s)	XTAG (IDCX)			
Description	Identifier for thisname.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	Y
Range	thisid > 0			

3.2.858. thisname

Table(s)	XTAG (IDCX)			
Description	Key for thisid.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)		NOT ALLOWED	a8	Y
Range	thisname IN {arid, orid, wfid .}			

3.2.859. threshcons

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	Y
Range				

3.2.860. threshfamlen

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	Y
Range				

3.2.861. threshfammax

Table(s)	PMCC_RECIPE (IDCX)

Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			i8	Y
Range				

3.2.862. threshfammin

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			i8	Y
Range				

3.2.863. threshnsens

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			i8	Y
Range				

3.2.864. time

Table(s)	ARRIVAL (IDCX), ARRIVAL (LEB), ARRIVAL (REB), BEAMAUX (STATIC), DERVDISC (IDCX), FKDISC (LEB), OLD_WFPROTO (IDCX), ORIGIN (IDCX), ORIGIN (LEB), ORIGIN (REB), ORIGIN (SEL1), ORIGIN (SEL2), ORIGIN (SEL3), ORIGIN_TEMP_GA (SEL2), ORIGIN_TEMP_GA (SEL3), QCSTATS (IDCX), SENSOR (STATIC), SITEAUX (STATIC), WFDISC (IDCX), WFDISC (SEGMENT), WFDISC_NOMIG (SEGMENT)			
Description	Epoch time, given as seconds since midnight, January 1, 1970, and stored in a double-precision floating number. time refers to the table in which it is found; for example, in arrival it is the arrival time, in origin it is the origin time, in wfdisc it is the start time of data, and in sensor it is the start time for which measurements are valid. Where the date of historical events is known, time is set to the start time of that date. Where the date of contemporary arrival measurements is known but no time is given, then time is set to the NA Value. Times are given to, at most, one millisecond accuracy. Where the date is unknown, or prior to February 10, 1653, time is set to the NA Value.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	-9999999999.999	f17.5	N
Range	any valid epoch time			

3.2.865. time

Table(s)	DETECTION (IDCX), DETECTION (LEB), DETECTION (REB), FILE-

	PRODUCT (IDCX), INTERVAL (IDCX), INTERVAL (SEGMENT), OUTAGE (IDCX), PARRIVAL (LEB), PARRIVAL (REB), PARRIVAL (SEL1), PARRIVAL (SEL2), PARRIVAL (SEL3), STASSOC (IDCX), TIMESTAMP (IDCX)
Description	Epoch time, given as seconds since midnight, January 1, 1970, and stored in a double-precision floating number. time refers to the table in which it is found; for example, in arrival it is the arrival time, in origin it is the origin time, in wfdisc it is the start time of data, and in sensor it is the start time for which measurements are valid. Where the date of historical events is known, time is set to the start time of that date. Where the date of contemporary arrival measurements is known but no time is given, then time is set to the NA Value. Times are given to, at most, one millisecond accuracy. Where the date is unknown, or prior to February 10, 1653, time is set to the NA Value.

Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	-9999999999.999	f17.5	Y
Range	any valid epoch time			

3.2.866. time

Table(s)	FS_STAGEPRODUCT (IDCX)
Description	Epoch time, given as seconds since midnight, January 1, 1970, and stored in a double-precision floating number. time refers to the table in which it is found; for example, in arrival it is the arrival time, in origin it is the origin time, in wfdisc it is the start time of data, and in sensor it is the start time for which measurements are valid. Where the date of historical events is known, time is set to the start time of that date. Where the date of contemporary arrival measurements is known but no time is given, then time is set to the NA Value. Times are given to, at most, one millisecond accuracy. Where the date is unknown, or prior to February 10, 1653, time is set to the NA Value.

Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds		f17.5	Y
Range	any valid epoch time			

3.2.867. time

Table(s)	FILEPRODUCT_BU_20200610 (IDCX), FILEPRODUCT_TEMP (IDCX)
Description	

Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)				Y
Range				

3.2.868. time

Table(s)	PROBLEM (IDCX), PROBLEMLOG (IDCX)
Description	Epoch time, given as seconds since midnight, January 1, 1970, and stored in a double-precision floating number. time refers to the table in which it is found; for example, in arrival it is the arrival time, in origin it is the origin time, in wf-

	disc it is the start time of data, and in sensor it is the start time for which measurements are valid. Where the date of historical events is known, time is set to the start time of that date. Where the date of contemporary arrival measurements is known but no time is given, then time is set to the NA Value. Times are given to, at most, one millisecond accuracy. Where the date is unknown, or prior to February 10, 1653, time is set to the NA Value.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(17,5)	seconds	-9999999999.999	f17.5	Y
Range	any valid epoch time			

3.2.869. time_rely

Table(s)	STA_RELY (STATIC)			
Description	Time reliability flag. The value is a single-character flag to indicate whether (y) or not (n) the time is considered to be reliable.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)			a1	Y
Range	time_rely IN { 0,1}			

3.2.870. time_spread

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Root-mean-square time spread of the estimated signal energy between onset_time and termination_time.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-1.0	f9.4	Y
Range	timespread > 0.0			

3.2.871. time_tol

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	Y
Range				

3.2.872. time_weight

Table(s)	PHASE_WEIGHT_EVENT_DEFINE (STATIC)			
Description	Weight given to defining time for this phase			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	N
Range				

3.2.873. timedef

Table(s)	ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3)			
Description	Time-defining code. This one-character flag indicates whether or not the time of a phase was used to constrain the event location. This column is defining (timedef = d) or non defining (timedef = n).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)		- (hyphen)	a1	Y
Range	timedef IN {n, d}			

3.2.874. timelastsend

Table(s)	PRODUCTCRITERIA (IDCX)			
Description	Last epoch time that the product was delivered by the Subscription system.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(54)	seconds	-9999999999.999	f17.5	Y
Range	any valid epoch time			

3.2.875. timenextsend

Table(s)	PRODUCTCRITERIA (IDCX)			
Description	Next epoch time that the product will be delivered by the Subscription system.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(54)	seconds	-9999999999.999	f17.5	Y
Range	any valid epoch time			

3.2.876. timeres

Table(s)	ALLOW_RESID (LEB), ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3)			
Description	Time residual. This column is a travel-time residual measured in seconds. The residual is found by taking the observed arrival time (saved in the ARRIVAL table) of a seismic phase and subtracting the expected arrival time. The expected arrival time is calculated by a formula based on an earth velocity model (column vmodel), an event location and origin time (saved in table ORIGIN (Origin_temp_ga)), the distance to the station (column dist in table ASSOC), and the particular seismic phase (column phase in table ASSOC).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-999.0	f8.3	Y
Range	timeres > -999.0			

3.2.877. timres

Table(s)	DEFINE_PHASE_RESIDUAL (STATIC)			
Description	Time residual (seconds)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	NOT ALLOWED	f8.3	N
Range	timres >= 0.0			

3.2.878. tlen

Table(s)	DERVDISC (IDCX)			
Description	Duration of the data interval in seconds.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds		f8.3	Y
Range	tlen > 0			

3.2.879. tlen

Table(s)	AMPDESCRIPT (IDCX), FKDISC (LEB)			
Description	Time window length. Tlen should be NA in ampdescript if a velocity window is used.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-1.0	f10.3	Y
Range	tlen > 0.0			

3.2.880. tmf

Table(s)	THIRDMOM (REB)			
Description	Third moment of frequency.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f7.2	Y
Range	tmf >= 0.0			

3.2.881. tmfpct

Table(s)	THIRDMOM (REB)			
Description	Percentage of signal spectrum amplitudes greater than their corresponding noise spectrum amplitudes in the frequency range [tmf-fmin, tmf-fmax]. tmf-fmin and tmf-fmax are par-file parameters.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f7.2	Y
Range	0 <= tmfpct <= 100			

3.2.882. *toff*

Table(s)	AMPDESCRIPT (IDCX)			
Description	Offset from theoretical or observed arrival time. This column is used to define the start time of the amplitude measurement window and may be used in conjunction with either tlen to define a static window or with gvlo to define a dynamic window. If toff is set to -999, then gvhi must be used to define the start time of the window.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-999.0	f6.2	Y
Range	toff >= 0.0			

3.2.883. *total_energy*

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Total energy in the signal between onset_time and termination_time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	dB re mPa	-1.0	f9.4	Y
Range	total_energy > 0.0			

3.2.884. *total_energy*

Table(s)	INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB)			
Description	Total energy in the signal between onset_time and termination_time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	dB re µPa	-1.0	f9.4	Y
Range	total_energy > 0.0			

3.2.885. *total_time*

Table(s)	HYDRO_FEATURES (IDCX), HYDRO_FEATURES (LEB), HYDRO_FEATURES (REB)			
Description	Total time that the estimated signal pressure squared exceeds noise_onset_thresh between onset_time and termination_time.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	seconds	-1.0	f17.5	Y
Range	total_time > 0.0			

3.2.886. *transmeth*

Table(s)	MSGDEST (IDCX)
Description	Method by which the response is to be delivered to the requestor.

Storage type	Unit	NA value	External	Nullable
varchar2(16)		- (hyphen)	a16	Y
Range	any string up to 16 characters			

3.2.887. travel_time_error

Table(s)	PHASOR_DIST_DEPTH_RANGES (STATIC)			
Description	Travel time error in seconds, used for building error window for Phasor processing.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	-1.0	f8.3	Y
Range	travel_time_error >= 0.0			

3.2.888. tshift

Table(s)	SENSOR (STATIC)			
Description	Correction for clock errors. This column is designed to accommodate discrepancies between actual time and the numerical time written by data recording systems. Actual time is the sum of the reported time plus tshift.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	seconds	NOT ALLOWED	f6.2	Y
Range	any valid real number			

3.2.889. tweight

Table(s)	WEIGHTS (STATIC)			
Description	Time weight.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		0.0	f5.2	Y
Range	tweight >= 0.0			

3.2.890. typeid

Table(s)	FPDESCRIPTION (IDCX)			
Description	Identifier for the product type description.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i10	N
Range	typeid > 0			

3.2.891. typeid

Table(s)	FILEPRODUCT (IDCX)
Description	Identifier for the product type description.

Storage type	Unit	NA value	External	Nullable
number(10,0)		NOT ALLOWED	i10	Y
Range	typeid > 0			

3.2.892. *typeid*

Table(s)	FS_STAGEPRODUCT (IDCX)			
Description	obsolete			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)			i10	Y
Range				

3.2.893. *typeid*

Table(s)	FILEPRODUCT_BU_20200610 (IDCX), FILEPRODUCT_TEMP (IDCX)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)				Y
Range				

3.2.894. *uncertainty*

Table(s)	NETMAG (LEB), NETMAG (REB), NETMAG (SEL1), NETMAG (SEL2), NETMAG (SEL3), STAMAG (LEB), STAMAG (REB), STAMAG (SEL1), STAMAG (SEL2), STAMAG (SEL3)			
Description	Magnitude uncertainty. This column value is the standard deviation of the accompanying magnitude measurement.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f7.2	Y
Range	uncertainty > 0.0			

3.2.895. *units*

Table(s)	AMPLITUDE (IDCX), AMPLITUDE (LEB), AMPLITUDE (REB)			
Description	Units of amplitude measure.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)		- (hyphen)	a15	Y
Range	units IN {nm}			

3.2.896. *userid*

Table(s)	SUBS (IDCX)
Description	User identifier for Subscription and Message Subsystems.

Storage type	Unit	NA value	External	Nullable
number(8,0)		-1	i8	N
Range	userid > 0			

3.2.897. userid

Table(s)	DATAUSER (IDCX), SUBSUSER (IDCX)			
Description	User identifier for Subscription and Message Subsystems.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i8	N
Range	userid > 0			

3.2.898. userid

Table(s)	MSGDISC (IDCX)			
Description	User identifier for Subscription and Message Subsystems.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		-1	i8	Y
Range	userid > 0			

3.2.899. username

Table(s)	FTPLOGIN (IDCX)			
Description	UNIX login name or email address for FTP logins.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)		- (hyphen)	a16	Y
Range	any string up to the character field width that is a valid UNIX user name			

3.2.900. username

Table(s)	DATAUSER (IDCX)			
Description	User name component of the email address.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)		NOT ALLOWED	a24	N
Range	any string up to the character field width that is a valid UNIX user name			

3.2.901. username

Table(s)	SUBSUSER (IDCX)			
Description	(Datauser/Subsuser): user name component of the email address. (Ftplogin): UNIX login name or email address for FTP logins.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

varchar2(24)		NOT ALLOWED	a24	Y
Range	any string up to the character field width that is a valid UNIX user name			

3.2.902. *vamp*

Table(s)	AMP3C (IDCX), AMP3C (LEB), AMP3C (REB)			
Description	Vertical amplitude.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f11.2	Y
Range	vamp >= 0.0			

3.2.903. *vang*

Table(s)	SITECHAN (STATIC)			
Description	Vertical orientation of seismometer. This column measures the angle between the sensitive axis of a seismometer and the outward-pointing vertical direction. For a vertically oriented seismometer, vang = 0. For a horizontally oriented seismometer, vang = 90 (see hang).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	degrees	NOT ALLOWED	f6.1	Y
Range	0.0 <= vang <= 90.0			

3.2.904. *verifstatus*

Table(s)	MSGDISC (IDCX)			
Description	Authentication status of the message, either PASS, FAIL or (hyphen) for not tested/applicable.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(4)		- (hyphen)	a4	Y
Range	ASCII character string			

3.2.905. *version*

Table(s)	FILEPRODUCT (IDCX)			
Description	Version of the software that generated the file product.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)		-1.0	f6.2	Y
Range	version > 0.0			

3.2.906. *version*

Table(s)	FS_STAGEPRODUCT (IDCX)
Description	obsolete

Storage type	Unit	NA value	External	Nullable
float(53)			f17.5	Y
Range				

3.2.907. version

Table(s)	FILEPRODUCT_BU_20200610 (IDCX), FILEPRODUCT_TEMP (IDCX)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)				Y
Range				

3.2.908. vmodel

Table(s)	ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3), PARRIVAL (LEB), PARRIVAL (REB), PARRIVAL (SEL1), PARRIVAL (SEL2), PARRIVAL (SEL3)			
Description	Velocity model. This character string identifies the velocity model of the earth used to compute the travel times of seismic phases. A velocity model is required for event location (if phase is defining) or for computing travel-time residuals.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)		- (hyphen)	a15	Y
Range	any string up to 15 characters			

3.2.909. vsnr

Table(s)	AMP3C (IDCX), AMP3C (LEB), AMP3C (REB)			
Description	Vertical signal-to-noise ratio. Ratio of vamp to root-mean-square amplitude of a vertically-oriented component filtered in a frequency band centred at cfreq Hz.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f10.2	Y
Range	vsnr >= 0.0			

3.2.910. wfid

Table(s)	OLD_WFPROTO (IDCX)			
Description	Unique waveform identifier (integer)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number		NOT ALLOWED	i8	Y
Range	wfid > 0			

3.2.911. *wfid*

Table(s)	WFDISC (IDCX), WFDISC (SEGMENT)			
Description	Unique waveform identifier (integer)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		NOT ALLOWED	i8	N
Range	wfid > 0			

3.2.912. *wfid*

Table(s)	WFAUX (IDCX), WFTAG (IDCX), WFTAG (SEGMENT), WFTAG (SEL1), WFTAG (SEL2), WFTAG (SEL3)			
Description	Unique waveform identifier for a wfdisc record.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)		-1	i10	N
Range	wfid > 0			

3.2.913. *wfid*

Table(s)	WFDISC_NOMIG (SEGMENT)			
Description	Unique waveform identifier (integer)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)		NOT ALLOWED	i8	N
Range	wfid > 0			

3.2.914. *wgt*

Table(s)	ASSOC (IDCX), ASSOC (LEB), ASSOC (REB), ASSOC (SEL1), ASSOC (SEL2), ASSOC (SEL3), ASSOC_TEMP_GA (SEL2), ASSOC_TEMP_GA (SEL3)			
Description	Location weight. This column gives the final weight assigned to the allied arrival by the location program. This column is used primarily for location programs that adaptively weight data by their residuals.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-1.0	f6.3	Y
Range	0.0 <= wgt < 1.0			

3.2.915. *wingap*

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	Y

Range	

3.2.916. winlen

Table(s)	PMCC_RECIPE (IDCX)			
Description	Not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)			f8.3	Y
Range				

3.2.917. xavpct

Table(s)	TIMEFREQ (REB)			
Description	Average ratio of bad points to total of the cross-correlation trace.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f7.2	Y
Range	0 <= xavpct <= 1			

3.2.918. xcoef

Table(s)	ATTENCOEF (STATIC)			
Description	Constant coefficient in the distance correction formula.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	any valid floating point value			

3.2.919. xcor

Table(s)	TIMEFREQ (REB)			
Description	For timefreq, xcor is the zero lag cross-correlation between the three pairs of time-frequency matrices.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f9.4	Y
Range	0 <= xcor <= 1			

3.2.920. ycoef

Table(s)	ATTENCOEF (STATIC)			
Description	Geometrical spreading coefficient in the distance correction formula.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	any valid floating point value			

3.2.921. *zavcep*

Table(s)	TIMEFREQ (REB)			
Description	Average maximum value in the two-dimensional cepstrum of the vertical component traces.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f7.2	Y
Range	zavcep >= 0			

3.2.922. *zavcor*

Table(s)	TIMEFREQ (REB)			
Description	Average autocorrelation along the time axis across all frequencies excluding randomized points of the vertical component traces.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f7.2	Y
Range	zavcor >= 0			

3.2.923. *zavpct*

Table(s)	TIMEFREQ (REB)			
Description	Average ratio of bad points to total of the vertical component traces.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		NOT ALLOWED	f7.2	Y
Range	0 <= zavpct <= 1			

3.2.924. *zcoef*

Table(s)	ATTENCOEF (STATIC)			
Description	Attenuation coefficient in the distance correction formula.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)		-999.0	f7.2	Y
Range	any valid floating point value			

3.2.925. *zrcr_delfreq*

Table(s)	INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB)			
Description	The estimated standard deviation in zrcr_freq.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	Hertz	–1.0	f7.2	Y
Range	zcr_delfreq > 0.0			

3.2.926. zrcr_freq

Table(s)	INFRA_FEATURES (IDCX), INFRA_FEATURES (LEB), INFRA_FEATURES (REB)			
Description	Frequency of the arrival as estimated from the zero-crossing rate of the traditional beam-formed waveform data in the time interval defined by coinc_time and coinc_dur.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(24)	Hertz	–1.0	f7.2	Y
Range	zcr_freq > 0.0			

3.3. S/H/I Trigger Descriptions

3.3.1. DATAREADY_TO_PRODTRACK

Table	DATAREADY
Type	BEFORE EACH ROW
Event	INSERT
Trigger body	DECLARE -- site_time: EST for CMR, GMT at the Vienna IDC site_time VARCHAR(4) := 'GMT'; -- select_string: Information always selected into table prodtrack -- at CMR, will resolve to: SELECT distinct pc.prodid, -1, :new.dataid, -- -1, 'NEW', NEW_TIME(SYSDATE,'EST','GMT') select_string VARCHAR(1000) := 'defaultvalue'; -- generic strings are modified in mkstring_generic.sql -- note that these are not fully formed sql statements! -- Note by CT, 16 July 2003: -- This trigger requires the GLOBAL TEMPORARY table -- idcx.arrival_sta_trigger. -- Dropping this table will invalidate the trigger. GET_ARRIVAL_DAY_RANGE_string VARCHAR(10000) := 'default-value'; GET_ARRIVAL_DAY_STA_string VARCHAR(10000) := 'default-value'; GET_ARRIVAL_INST_RANGE_string VARCHAR(10000) := 'default-value'; GET_ARRIVAL_INST_STA_string VARCHAR(10000) := 'default-value'; GET_ARRIVAL_TIME_STA_string VARCHAR(10000) := 'default-value'; GET_ARRIVAL_TIME_RANGE_string VARCHAR(10000) := 'default-value'; JD_TO_TIME_RANGE_string VARCHAR(10000) := 'default-value'; ORID_JOIN_string VARCHAR(10000) := 'defaultvalue'; ORIG_LIMITS_string VARCHAR(10000) := 'default-value'; TIME_JOIN_CYCLE_string VARCHAR(10000) := 'default-value'; TIME_JOIN_DAILY_string VARCHAR(10000) := 'default-value'; TIME_JOIN_INSTANT_string VARCHAR(10000) := 'default-

	value'; DETECT_DAY_string VARCHAR(10000) := 'defaultvalue'; DETECTION_TIME_string VARCHAR(10000) := 'default- value'; PC_DAILY_string VARCHAR(10000) := 'default- value'; PC_INSTANT_string VARCHAR(10000) := 'defaultvalue'; PC_TIME_string VARCHAR(10000) := 'default- value'; STA_JOIN_DET_string VARCHAR(10000) := 'default- value'; STA_REG_JOIN_DET_string VARCHAR(10000) := 'default- value'; NO_SURPRESS_EMPTY_string VARCHAR(10000) := 'default- value'; UPDATE_TIME_CYCLE_string VARCHAR(10000) := 'default- value'; UPDATE_TIME_INSTANT_string VARCHAR(10000) := 'default- value'; -- these hold new values in row, used to construct query strings new_dataid NUMBER(10) := 0; new_tablename VARCHAR2(24) := 'defaultvalue'; new_account VARCHAR2(24) := 'defaultvalue'; new_tagname VARCHAR2(12) := 'defaultvalue'; new_tagid NUMBER(10) := 0; new_tagid2 NUMBER(10) := 0; new_data_info VARCHAR2(24) := 'defaultvalue'; -- These strings hold the final sql queries, and are modi- fied in -- the files mkstring_origin.sql and mkstring_other.sql origin_jdate_string_1 VARCHAR(30000) := 'default- value'; origin_jdate_string_2 VARCHAR(30000) := 'default- value'; origin_orid_string_1 VARCHAR(30000) := 'default- value'; origin_time_inst_string_1 VARCHAR(30000) := 'default- value'; origin_time_inst_string_2 VARCHAR(30000) := 'default- value'; origin_time_string_1 VARCHAR(30000) := 'default- value'; origin_time_string_2 VARCHAR(30000) := 'default- value'; arrival_jdate_string VARCHAR(30000) := 'default- value'; arrival_arid_string VARCHAR(30000) := 'default- value';

	`` arrival_time_string_1 VARCHAR(30000) := 'default- value'; arrival_time_string_2 VARCHAR(30000) := 'default- value'; arrival_time_inst_string_1 VARCHAR(30000) := 'default- value'; arrival_time_inst_string_2 VARCHAR(30000) := 'default- value'; wfdisc_wfid_string VARCHAR(30000) := 'default- value'; wftag_jdate_string VARCHAR(30000) := 'default- value'; wftag_orid_string VARCHAR(30000) := 'defaultvalue'; fileproduct_string VARCHAR(30000) := 'default- value'; evchar_string VARCHAR(30000) := 'default- value'; -- Lines added by CT on 16-JUL-2003 -- Start modification delete_temp_table VARCHAR(30000) := 'de- faultvalue'; insert_day_string VARCHAR(30000) := 'de- faultvalue'; insert_time_string VARCHAR(30000) := 'de- faultvalue'; -- End modification BEGIN new_dataid := :new.dataid; new_tablename := :new.tablename; new_account := :new.account; new_tagname := :new.tagname; new_tagid := :new.tagid; new_tagid2 := :new.tagid2; new_data_info := :new.data_info; -- modify select_string select_string:= 'SELECT distinct pc.prodid,... ```

3.3.2. FILEPRODUCT_NULL_LDDATE

Table	FILEPRODUCT
Type	BEFORE EACH ROW
Event	INSERT
Trigger body	BEGIN :new.lddate := sysdate; END;

3.3.3. FILEPRODUCT_TO_DATAREADY

Table	FILEPRODUCT
Type	AFTER EACH ROW
Event	INSERT
Trigger body	`DECLARE` `  Id         NUMBER(10);` `BEGIN` `    SELECT keyvalue into Id from lastid` `        where keyname = 'dataid'` `        for update of lastid.keyvalue;` `    INSERT into dataready` `        SELECT` `        lastid.keyvalue+1,` `        'fileproduct',` `        f.prodtype,` `        'fpid',` `        :new.fpid,` `        -1,` `        :new.sta,` `        'n',` `        :new.lddate` `        FROM` `        FPDescription f, lastid lastid` `        WHERE` `        f.typeid=:new.typeid` `         AND` `        lastid.keyname = 'dataid';` `    UPDATE lastid set keyvalue = keyvalue + 1` `        where keyname = 'dataid';` `END;`

3.3.4. LASTID_CHECKS

Table	LASTID
Type	BEFORE EACH ROW
Event	UPDATE
Trigger body	`DECLARE msg VARCHAR2(4000);` `  BEGIN` `    :new.LDDATE := SYSDATE;` `    IF :new.keyvalue<=:old.keyvalue THEN` `      msg             :='New keyvalue '||:new.keyvalue||' for` `'||:new.keyname||' is less than previous one ' || :old.key-` `value;` `      raise_application_error(-20003, msg);` `    END IF;` `    IF :new.keyname<>:old.keyname THEN` `      msg            :='Keyname value ?|:old.keyvalue|? could` `not be changed to '||:new.keyname;` `      raise_application_error(-20004, msg);`

	` END IF;` `END;`

3.3.5. WFDISC_ENDTIME

Table	WFDISC
Type	AFTER EACH ROW
Event	INSERT OR UPDATE
Trigger body	(see below)

```
DECLARE
PRAGMA AUTONOMOUS_TRANSACTION;
Station VARCHAR2(16);
MaxTime FLOAT(53);
BEGIN
 --- the internal commits require the PRAGMA AUTONOMOUS_TRANS-
ACTION
 BEGIN  -- first block
   SELECT net into Station FROM "STANET" WHERE sta = :new.sta;
   EXCEPTION
     WHEN NO_DATA_FOUND THEN
       raise_application_error(-20001, 'Station '||:new.sta||'
not in stanet!');
 END; --first block
 BEGIN -- second block, other no data exception
    SELECT time into MaxTime FROM "TIMESTAMP"
           WHERE procclass = 'DLTRIGGER' and procname = Sta-
tion;
    IF :new.endtime > MaxTime THEN
       UPDATE "TIMESTAMP"
             SET time = :new.endtime
             WHERE procclass = 'DLTRIGGER' and procname = Sta-
tion;
       COMMIT; -- *MUST* commit autonomous transaction here
    END IF;
   EXCEPTION
     WHEN NO_DATA_FOUND THEN
        INSERT INTO "TIMESTAMP"
            VALUES ('DLTRIGGER', Station, :new.endtime, sys-
date);
        COMMIT; -- *MUST* commit autonomous transaction here
too
 END; -- second block
 -- Do *NOT* catch the "OTHERS" exception here, or the excep-
tion raised by
 -- raise_application_error() is caught here and the trigger
succeeds
 -- (the transaction in not rolled back), which is definitely
not what
 -- you want!!
END;
```

3.3.6. *WFDISC_NVIAR_ENDTIME*

Table	WFDISC
Type	AFTER EACH ROW
Event	INSERT OR UPDATE
Trigger body	`DECLARE` `Station VARCHAR2(16);` `MaxTime FLOAT(53);` `BEGIN` `    SELECT time into MaxTime FROM timestamp` `            WHERE procclass = 'DLTRIGGER' and procname =` `'NVIAR';` `    IF :new.endtime > MaxTime THEN` `        UPDATE timestamp` `                SET time = :new.endtime` `                WHERE procclass = 'DLTRIGGER' and procname =` `'NVIAR';` `    END IF;` `END;`

3.4. S/H/I Index Descriptions

Table name	Index name	Unique	Index columns
AFFILIATION	AFFNETXX	No	net
	AFFSTAX	Yes	sta, net
	PK_AFFILIATION	Yes	net, sta
AFFILIATION_SUB	PK_AFFILIATION_SUB	Yes	offdate, net, sta
ALLOCATE_HOUR	ALLOCATE_HOURX	Yes	jdate, hour, action
	PK_ALLOCATE_HOUR	Yes	jdate, hour, action
ALLOW_RESID	ALLOWPHASEX	No	phase, statype
	PK_ALLOW_RESID	Yes	phase, mindelta, sta-type
AMP3C	AMP3CARIDX	No	arid
	AMP3C_LDDATEX	No	lddate
	PK_AMP3C	Yes	arid, rid
AMPDESCRIPT	PK_AMPDESCRIPT	Yes	amptype
AMPLITUDE	AMPARIDX	No	arid
	AMPLDDATEX	No	lddate
	AMPLITUDE_LDDATEX	No	lddate
	AMPPARIDX	No	parid
	AMP_PARID_ARID_X	No	parid, arid
	PK_AMPLITUDE	Yes	ampid
APMA	APMA_LDDATEX	No	lddate
	PK_APMA	No	arid
ARCH_DATA_TYPE	PK_ARCH_DATA_TYPE	Yes	archid
ARRIVAL	ARRIVAL_ARID_COMMID_X	Yes	arid, commid
	ARRIVAL_LDDATEX	No	lddate
	ARSTASSX	No	stassid
	ARSTTIMEX	No	sta, time
	ARTIMEX	No	time
	PK_ARRIVAL	Yes	arid
ASSOC	ASSARIDX	No	arid, arid
	ASSOCX	Yes	orid, arid
	ASSOC_LDDATEX	No	lddate
ASSOC_TEMP_GA	ASSOC_TEMP_GAX	Yes	arid, orid
	ATGORIDX	No	orid
ATTENCOEF	PK_ATTENCOEF	Yes	attenid, sta, ratiotype, chan

Table name	Index name	Unique	Index columns
CEPPKS	CEPPKS_LDDATEX	No	lddate
	PK_CEPPKS	Yes	orid, sta, pkqf
CHANNAME	PK_CHANNAME	Yes	stream, extern_sta, extern_chan, revision
CHAN_GROUPS	PK_CHAN_GROUPS	Yes	class, name, sta, chan, ondate, offdate
COLORDISC	COLORDISC_PK	Yes	colormapid
COMPLEXITY	COMPLEXITY_LDDATEX	No	lddate
	COMPLORIDX	No	orid
	PK_COMPLEXITY	Yes	orid, sta, phase
DATAREADY	DATAREADY_LDDATEX	No	lddate
	DRTAGIDX	No	tagid
	PK_DATAREADY	Yes	dataid
DATAUSER	PK_DATAUSER	Yes	userid
DERVDISC	DERVDISC_PK	Yes	dervid
	DERV_STAX	No	sta, time
DETECTION	DETLDDATEX	No	lddate
	DETTIMEX	No	time
	PK_DETECTION	Yes	arid
DISCARD	DISCARDEVIDX	No	evid
	DISCARD_LDDATEX	No	lddate
	PK_DISCARD	Yes	evid, reason, lddate
DLMAN	DLMANX	Yes	dlid
DSEISGRID	PK_DSEISGRID	Yes	grdname, icell
DSEISINDEX	PK_DSEISINDEX	Yes	grdname
EVCHAR_PROD	EVCHAR_PROD_LDDATEX	No	lddate
	PK_EVCHAR_PROD	Yes	prodid, orid
EVENT	EVENT_LDDATEX	No	lddate
	PK_EVENT	Yes	evid
EVENT_CONTROL	EVNTCTRLEVIDX	No	evid
	PK_EVENT_CONTROL	Yes	orid
EVSC_HYDRO	PK_EVSC_HYDRO	No	orid, sta
EVSC_PROD	EVSC_PROD_ORIDX	No	orid
	PK_EVSC_PROD	Yes	prodid, orid
EVSC_REGIONAL	PK_EVSC_REGIONAL	No	orid, sta, chan
FDSNCHAN	FDSNCHAN_PK	Yes	mapid
FILEPRODUCT	FILEPROD_CHANX	No	chan

Table name	Index name	Unique	Index columns
	FILEPROD_DFILEX	No	dfile
	FILEPROD_ENDTIMEX	No	endtime
	FILEPROD_LDDATEX	No	lddate
	FILEPROD_TID	No	typeid, sta
	FILEPROD_TIMEX	No	time
	PK_FILEPRODUCT	Yes	fpid
FORBEAMAUX	PK_FORBEAMAUX	Yes	sta, chan
FPDESCRIPTION	PK_FPDESCRIPTION	Yes	typeid
FTPFAILED	PK_FTPFAILED	No	msgid
FTPLOGIN	FTPLOGIN_PK	Yes	ftp_address
GA_TAG	GAIDX	No	id, state
GREGION	GREGGRNAMEX	No	grname
	PK_GREGION	Yes	grn
HYDRO_ARR_GROUP	PK_HYDRO_ARR_GROUP	Yes	hydro_id
HYDRO_ASSOC	HYDRO_ASSOC_ARIDX	No	arid, hydro_id
	HYDRO_ASSOC_HIDX	No	hydro_id, arid
HYDRO_FEATURES	HYDARIDX	No	arid
	HYDRO_FEATURES_LDDATEX	No	lddate
	PK_HYDRO_FEATURES	Yes	arid, high_cut, low_cut
INFRA_FEATURES	INFRAARIDX	No	arid
	INFRA_FEATURES_LDDATEX	No	lddate
	PK_INFRA_FEATURES	No	arid
INSTRUMENT	PK_INSTRUMENT	Yes	inid
INTERVAL	INCLANASTAMO	No	class, name, state, moddate
	INCLASSX	No	class, name, endtime
	INENDX	No	endtime
	INMODX	No	moddate
	PK_INTERVAL	No	intvlid
IN_EVENT_CONTROL	IN_EVENT_CONTROLX	Yes	orid
LASTID	LASTIDX	Yes	keyname
MAPCOLOR	MAPCOLOR_PK	Yes	mapid, colormapid
MAPDISC	MAPDISC_PK	Yes	mapid
MAPOVER	MAPOVER_PK	Yes	mapid, overlayid
MAPPOINT	MAPPOINT_PK	Yes	lat, lon, mptype
MSGAUX	MGSXMSGIDX	No	msgid

Table name	Index name	Unique	Index columns
	MSGAUX_LDDATEX	No	lddate
	PK_MSGAUX	Yes	msgid, msgrow, state_count
MSGDATATYPE	MSGDATATYPE_LDDATEX	No	lddate
	MSGTYPMSGIDX	No	msgid
	PK_MSGDATATYPE	Yes	msgid, foff
MSGDEST	MSGDEST_LDDATEX	No	lddate
	MSGDSTMSGIDZ	No	msgid
	MSGDSTSTATX	No	status
	PK_MSGDEST	Yes	msgdid
MSGDISC	MSGDISC_ITIMEX	No	itime
	MSGDISC_LDDATEX	No	lddate
	MSGIDATEX	No	idate
	MSGINTIDX	No	intid
	MSGSTATX	No	status
	PK_MSGDISC	Yes	msgid
NA_VALUE	PK_NA_VALUE	Yes	attribute
NETMAG	NETMAG_LDDATEX	No	lddate
	NMORIDX	No	orid
	PK_NETMAG	Yes	magid
NETWORK	PK_NETWORK	Yes	net
ORIGERR	ORIGERR_LDDATEX	No	lddate
	PK_ORIGERR	Yes	orid
ORIGERR_TEMP_GA	ORIGERR_TEMP_GAX	Yes	orid
ORIGIN	ANLOG_JDATEX	No	jdate
	EVIDX	Yes	evid
	ORIGIN_LDDATEX	No	lddate
	ORTIMEX	No	time
	PK_ORIGIN	Yes	orid
ORIGIN_TEMP_GA	ORIGIN_TEMP_GAX	Yes	orid
	OTGTIMEX	No	time
OUTAGE	OTGSTAX	No	sta, chan, time
	OTGTIMEX	No	time
	PK_OUTAGE	Yes	otgid
OVERLAYDISC	OVERLAYDISC_PK	Yes	overlayid
PARRIVAL	PAREVIDX	No	evid
	PARREVIDX	No	evid

Table name	Index name	Unique	Index columns
	PARRIVALX	Yes	parid
	PARRIVAL_LDDATEX	No	lddate
	PARRORIDX	No	orid
	PK_PARRIVAL	Yes	parid
PARTICIPATION	PK_PARTICIPATION	Yes	net, sta, arid, sta, begin_date
PMCC_FEATURES	PK_PARTICIPATION	Yes	net, sta, arid, sta, begin_date
	PMCC_FEAT_ARIX	No	arid
PMCC_RECIPE	PMCC_RECIPE_PK	Yes	pmccrecid
PROBLEM	PK_PROBLEM	Yes	prid
PROBLEMLOG	PK_PROBLEMLOG	Yes	plid
PROBLEMMAIL	PK_PROBLEMMAIL	Yes	procclass, login
PRODTRACK	INMSGIDX	No	msgid
	INPRODIDX	No	prodid
	INSTATUSX	No	status
	PRODTRACK_LDDATEX	No	lddate
	PRODTRACK_PK	Yes	prodid, dataid, msgid
PRODUCTCRITERIA	PRODCRITX	Yes	prodid
PRODUCTTYPEEVPARS	PK_PRODUCTTYPEEVPARS	No	prodid
PRODUCTTYPEEVSC	PK_PRODUCTTYPEEVSC	Yes	prodid
PRODUCTTYPEORIGIN	PK_PRODUCTTYPEORIGIN	Yes	prodid
PRODUCTTYPESTA	PK_PRODUCTTYPESTA	Yes	prodid, sta, chan
QCCHANINT	QCCHANINT_PK	Yes	qcchanintid
	QCCHANINT_QCNETINTID_IDX	No	qcnetintid
QCDEFPARAM	QCDEFPARAM_PK	Yes	qcdefparamid
QCDEFSET	QCDEFSET_PK	Yes	qcdefsetid
QCMASK	QCMASK_PK	Yes	qcmaskid
	QCMASK_QCCHANINTID_IDX	No	qcchanintid
QCNETINT	QCENDTIMEX	No	endtime
	QCNETINT_AN_T_ET_IDX	No	aff_net, time, endtime
	QCNETINT_PK	Yes	qcnetintid
QCRULEPARAM	QCRULEPARAM_PK	Yes	qcruleparamid
QCRULESET	QCRULESET_PK	Yes	qcrulesetid
QCSTATS	QCSTATSIDX	No	qcstatsid
	QCSTATS_ENDSTCHNX	No	endtime, sta, chan

Table name	Index name	Unique	Index columns
	QCSTATS_LDDATEX	No	lddate
	QCSTATS_TIMEX	No	time
REGCOEF	PK_REGCOEF	Yes	rcoefid, rcoeftype
REMARK	PK_REMARK	Yes	commid, lineno
	REMARKX	Yes	commid, lineno
	REMARK_LDDATEX	No	lddate
REQUEST	PK_REQUEST	Yes	reqid
	REQENDX	No	end_time
	REQMODX	No	modtime
	REQSTATEX	No	state
	REQSTENDX	No	start_time, end_time
	REQUEST_LDDATEX	No	lddate
REVAUDIT	PK_REVAUDIT	No	revid
	REVTAGNDX	No	revtagid1, revtagname1
RULESET	RULESETSN	Yes	sta, offdate, name
	RULESET_PK	Yes	sta, ondate, regexp
SEISGRID	PK_SEISGRID	Yes	grdname, icell
	SEISGRIDX	Yes	icell
SEISINDEX	PK_SEISINDEX	Yes	grdname
SENSOR	PK_SENSOR	Yes	sta, chan, time, end-time
	SENSSTAX	No	sta, chan
SITE	PK_SITE	Yes	sta, ondate
	SITESTAX	No	sta
SITEAUX	PK_SITEAUX	Yes	sta, chan, time
SITECHAN	PK_SITECHAN	Yes	sta, chan, ondate
	SITECHANX	Yes	chanid
	STCSTAX	No	sta, chan
SITEPOLL	PK_SITEPOLL	Yes	sta, net, chan
SITE_ADDRESS	PK_SITE_ADDRESS	Yes	sta
SPLP	PK_SPLP	Yes	orid, sta
	SPLPORIDX	No	orid
	SPLP_LDDATEX	No	lddate
SPVAR	PK_SPVAR	Yes	arid, fmin, fmax
	SPVAR_LDDATEX	No	lddate
SREGION	PK_SREGION	Yes	srn
STAMAG	PK_STAMAG	Yes	magid, ampid, sta

Table name	Index name	Unique	Index columns
	SMAMPIDX	No	ampid
	SMARIDX	No	arid
	SMMAGIDX	No	magid, sta
	SMORIDX	No	orid
	SM_ARID_COMMID_X	No	arid, commid
	STAMAG_LDDATEX	No	lddate
STANET	PK_STANET	Yes	net, sta
	STANETSTAX	Yes	sta
STASSOC	PK_STASSOC	No	stassid
	STASSOC_LDDATEX	No	lddate
	STASSTIMEX	No	time
SUBS	PK_SUBS	Yes	userid, prodid
SUBSUSER	PK_SUBSUSER	Yes	userid
THIRDMOM	PK_THIRDMOM	Yes	arid
TIMEFREQ	PK_TIMEFREQ	Yes	orid, sta
TIMESTAMP	TIMESTAMP_PK	Yes	procclass, procname
WEIGHTS	PK_WEIGHTS	Yes	phase, statype, net
WFAUX	WFAUXX	Yes	wfid
WFCONV	PK_WFCONV	Yes	sta, chan
WFDISC	PK_WFDISC	Yes	wfid
	WFDIRX	No	dir, dfile
	WFDISC_LDDATEX	No	lddate
	WFSTAX	No	sta, time, endtime, chan
	WFTIMEX	No	time
	WF_TIME_ENDTIME_IDX	No	time, endtime
WFTAG	PK_WFTAG	Yes	tagname, tagid, wfid
	WFTTAGIDX	No	tagid
	WFTWFIDX	No	wfid
XTAG	XTAGTHATIDNDX	Yes	thatid

3.5. S/H/I Synonym Descriptions

Schema	**Synonym**	**Table**	**Table Owner**
IDCX	AFFILIATION	AFFILIATION	STATIC
	ATTENCOEF	ATTENCOEF	STATIC
	CHANNAME	CHANNAME	STATIC
	CHAN_GROUPS	CHAN_GROUPS	STATIC
	CHAN_GROUPS_AUXWF	CHAN_GROUPS_AUXWF	STATIC
	FORBEAMAUX	FORBEAMAUX	STATIC
	INSTRUMENT	INSTRUMENT	STATIC
	NETWORK	NETWORK	STATIC
	PARTICIPATION	PARTICIPATION	STATIC
	REGCOEF	REGCOEF	STATIC
	RULESET	RULESET	STATIC
	SENSOR	SENSOR	STATIC
	SITE	SITE	STATIC
	SITEAUX	SITEAUX	STATIC
	SITECHAN	SITECHAN	STATIC
	STANET	STANET	STATIC
LEB	AFFILIATION	AFFILIATION	STATIC
	AMPDESCRIPT	AMPDESCRIPT	IDCX
	BEAMAUX	BEAMAUX	STATIC
	BREGION_DEF	BREGION_DEF	STATIC
	BREGION_TAB	BREGION_TAB	STATIC
	DERVDISC	DERVDISC	IDCX
	DSEISGRID	DSEISGRID	STATIC
	DSEISINDEX	DSEISINDEX	STATIC
	GREGION	GREGION	STATIC
	IADR_WFTAG	WFTAG	IDCX
	INSTRUMENT	INSTRUMENT	STATIC
	IN_ASSOC	ASSOC	SEL3
	IN_HYDRO_ARR_GROUP	HYDRO_ARR_GROUP	IDCX
	IN_HYDRO_ASSOC	HYDRO_ASSOC	IDCX
	IN_NETMAG	NETMAG	SEL3
	IN_ORIGERR	ORIGERR	SEL3
	IN_ORIGIN	ORIGIN	SEL3
	IN_PARRIVAL	PARRIVAL	SEL3

Schema	Synonym	Table	Table Owner
	IN_STAMAG	STAMAG	SEL3
	LASTID	LASTID	IDCX
	MSGDISC	MSGDISC	IDCX
	NA_VALUE	NA_VALUE	IDCX
	NETWORK	NETWORK	STATIC
	OUT_AMPLITUDE	AMPLITUDE	LEB
	OUT_ARRIVAL	ARRIVAL	LEB
	OUT_ASSOC	ASSOC	LEB
	OUT_EVENT_CONTROL	EVENT_CONTROL	LEB
	OUT_HYDRO_ARR_GROUP	HYDRO_ARR_GROUP	LEB
	OUT_HYDRO_ASSOC	HYDRO_ASSOC	LEB
	OUT_HYDRO_FEATURES	HYDRO_FEATURES	LEB
	OUT_INFRA_FEATURES	INFRA_FEATURES	LEB
	OUT_NETMAG	NETMAG	LEB
	OUT_ORIGERR	ORIGERR	LEB
	OUT_ORIGIN	ORIGIN	LEB
	OUT_PARRIVAL	PARRIVAL	LEB
	OUT_STAMAG	STAMAG	LEB
	PARTICIPATION	PARTICIPATION	STATIC
	PHASOR_DIST_DEPTH_RANGES	PHASOR_DIST_DEPTH_RANGES	STATIC
	PMCC_FEATURES	PMCC_FEATURES	IDCX
	REQUEST	REQUEST	IDCX
	SEISGRID	SEISGRID	STATIC
	SEISINDEX	SEISINDEX	STATIC
	SENSOR	SENSOR	STATIC
	SITE	SITE	STATIC
	SITEAUX	SITEAUX	STATIC
	SITECHAN	SITECHAN	STATIC
	SREGION	SREGION	STATIC
	STATION_PHASE_RELY	STATION_PHASE_RELY	STATIC
	WEIGHTS	WEIGHTS	STATIC
	WFDISC	WFDISC	IDCX
	WFTAG	WFTAG	SEL3
REB	AFFILIATION	AFFILIATION	STATIC
	AMPDESCRIPT	AMPDESCRIPT	IDCX
	BEAMAUX	BEAMAUX	STATIC

Schema	Synonym	Table	Table Owner
	DSEISGRID	DSEISGRID	STATIC
	DSEISINDEX	DSEISINDEX	STATIC
	GREGION	GREGION	STATIC
	INSTRUMENT	INSTRUMENT	STATIC
	LASTID	LASTID	IDCX
	NA_VALUE	NA_VALUE	IDCX
	NETWORK	NETWORK	STATIC
	PARTICIPATION	PARTICIPATION	STATIC
	SEISGRID	SEISGRID	STATIC
	SEISINDEX	SEISINDEX	STATIC
	SENSOR	SENSOR	STATIC
	SITE	SITE	STATIC
	SITEAUX	SITEAUX	STATIC
	SITECHAN	SITECHAN	STATIC
	SREGION	SREGION	STATIC
	WFDISC	WFDISC	IDCX
SEGMENT	AFFILIATION	AFFILIATION	STATIC
	ARRIVAL	ARRIVAL	REB
	ASSOC	ASSOC	REB
	INSTRUMENT	INSTRUMENT	STATIC
	NETWORK	NETWORK	STATIC
	ORIGERR	ORIGERR	REB
	ORIGIN	ORIGIN	REB
	PARTICIPATION	PARTICIPATION	STATIC
	SENSOR	SENSOR	STATIC
	SITE	SITE	STATIC
	SITEAUX	SITEAUX	STATIC
	SITECHAN	SITECHAN	STATIC
	STANET	STANET	STATIC
SEL1	AFFILIATION	AFFILIATION	STATIC
	AMP3C	AMP3C	IDCX
	AMPDESCRIPT	AMPDESCRIPT	IDCX
	AMPLITUDE	AMPLITUDE	IDCX
	APMA	APMA	IDCX
	ARRIVAL	ARRIVAL	IDCX
	ASSOC_STAPRO	ASSOC	IDCX
	BEAMAUX	BEAMAUX	STATIC

Schema	**Synonym**	**Table**	**Table Owner**
	DETECTION	DETECTION	IDCX
	GREGION	GREGION	STATIC
	HYDRO_ARR_GROUP	HYDRO_ARR_GROUP	IDCX
	HYDRO_ASSOC	HYDRO_ASSOC	IDCX
	HYDRO_FEATURES	HYDRO_FEATURES	IDCX
	INFRA_FEATURES	INFRA_FEATURES	IDCX
	INSTRUMENT	INSTRUMENT	STATIC
	INTERVAL	INTERVAL	IDCX
	LASTID	LASTID	IDCX
	NA_VALUE	NA_VALUE	IDCX
	NETWORK	NETWORK	STATIC
	ORIGERR_STAPRO	ORIGERR	IDCX
	ORIGIN_STAPRO	ORIGIN	IDCX
	PARTICIPATION	PARTICIPATION	STATIC
	REQUEST	REQUEST	IDCX
	SENSOR	SENSOR	STATIC
	SITE	SITE	STATIC
	SITEAUX	SITEAUX	STATIC
	SITECHAN	SITECHAN	STATIC
	SREGION	SREGION	STATIC
	STASSOC	STASSOC	IDCX
	WFDISC	WFDISC	IDCX
SEL2	AFFILIATION	AFFILIATION	STATIC
	AMP3C	AMP3C	IDCX
	AMPDESCRIPT	AMPDESCRIPT	IDCX
	AMPLITUDE	AMPLITUDE	IDCX
	APMA	APMA	IDCX
	ARRIVAL	ARRIVAL	IDCX
	ASSOC_STAPRO	ASSOC	IDCX
	BEAMAUX	BEAMAUX	STATIC
	DERVDISC	DERVDISC	IDCX
	DETECTION	DETECTION	IDCX
	GA_TAG	GA_TAG	SEL1
	GREGION	GREGION	STATIC
	HYDRO_ARR_GROUP	HYDRO_ARR_GROUP	IDCX
	HYDRO_ASSOC	HYDRO_ASSOC	IDCX
	HYDRO_FEATURES	HYDRO_FEATURES	IDCX

Schema	Synonym	Table	Table Owner
	INFRA_FEATURES	INFRA_FEATURES	IDCX
	INSTRUMENT	INSTRUMENT	STATIC
	INTERVAL	INTERVAL	IDCX
	LASTID	LASTID	IDCX
	NA_VALUE	NA_VALUE	IDCX
	NETWORK	NETWORK	STATIC
	ORIGERR_STAPRO	ORIGERR	IDCX
	ORIGIN_STAPRO	ORIGIN	IDCX
	PARTICIPATION	PARTICIPATION	STATIC
	PMCC_FEATURES	PMCC_FEATURES	IDCX
	PMCC_RECIPE	PMCC_RECIPE	IDCX
	REQUEST	REQUEST	IDCX
	SENSOR	SENSOR	STATIC
	SITE	SITE	STATIC
	SITEAUX	SITEAUX	STATIC
	SITECHAN	SITECHAN	STATIC
	SREGION	SREGION	STATIC
	STASSOC	STASSOC	IDCX
	WFDISC	WFDISC	IDCX
SEL3	AFFILIATION	AFFILIATION	STATIC
	AMP3C	AMP3C	IDCX
	AMPDESCRIPT	AMPDESCRIPT	IDCX
	AMPLITUDE	AMPLITUDE	IDCX
	APMA	APMA	IDCX
	ARRIVAL	ARRIVAL	IDCX
	ASSOC_STAPRO	ASSOC	IDCX
	BEAMAUX	BEAMAUX	STATIC
	DERVDISC	DERVDISC	IDCX
	DETECTION	DETECTION	IDCX
	GA_TAG	GA_TAG	SEL1
	GREGION	GREGION	STATIC
	HYDRO_ARR_GROUP	HYDRO_ARR_GROUP	IDCX
	HYDRO_ASSOC	HYDRO_ASSOC	IDCX
	HYDRO_FEATURES	HYDRO_FEATURES	IDCX
	INFRA_FEATURES	INFRA_FEATURES	IDCX
	INSTRUMENT	INSTRUMENT	STATIC
	INTERVAL	INTERVAL	IDCX

Schema	**Synonym**	**Table**	**Table Owner**
	LASTID	LASTID	IDCX
	NA_VALUE	NA_VALUE	IDCX
	NETWORK	NETWORK	STATIC
	ORIGERR_STAPRO	ORIGERR	IDCX
	ORIGIN_STAPRO	ORIGIN	IDCX
	PARTICIPATION	PARTICIPATION	STATIC
	PMCC_FEATURES	PMCC_FEATURES	IDCX
	PMCC_RECIPE	PMCC_RECIPE	IDCX
	REQUEST	REQUEST	IDCX
	SENSOR	SENSOR	STATIC
	SITE	SITE	STATIC
	SITEAUX	SITEAUX	STATIC
	SITECHAN	SITECHAN	STATIC
	SREGION	SREGION	STATIC
	STASSOC	STASSOC	IDCX
	WFDISC	WFDISC	IDCX
STATIC	LASTID	LASTID	IDCX
	NA_VALUE	NA_VALUE	IDCX

3.6. S/H/I Foreign Key Descriptions

No foreign keys found for SHI.

4. RADIONUCLIDE ENTITY RELATIONSHIPS

4.1. Overview

This chapter contains entity-relationship diagrams that illustrate the relationships between database tables for the radionuclide database schema according to conventions described in section 1.6.

4.2. Radionuclide Tables

Figures 24 through 38 illustrate the relationships among the various tables in the radionuclide (RN) database. In the following figures, a table is linked by either a single or double arrow. A single arrow indicates that a single record exists in the relationship to the table from where the record came. A double arrow indicates that one or more records exist in the relationship. For example, a single GARDS_SAMPLE_STATUS record exists for each GARDS_SAMPLE_DATA record. However, multiple GARDS_NUCL_IDED records are related to each GARDS_SAMPLE_DATA record.

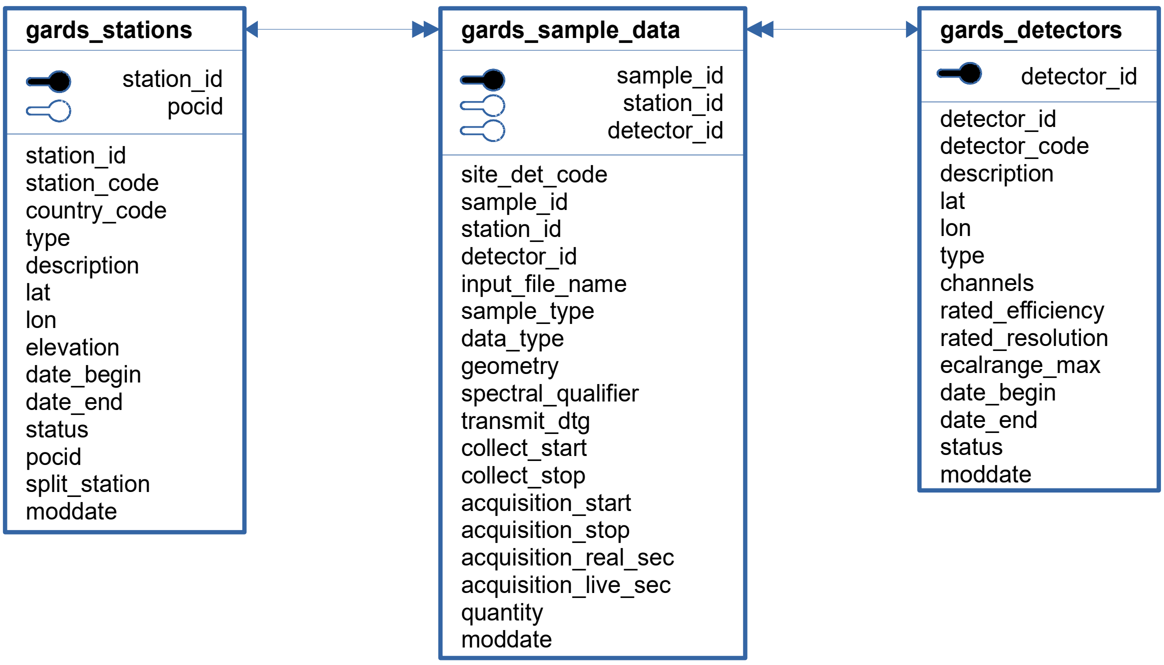


Figure 24: Radionuclide equipment

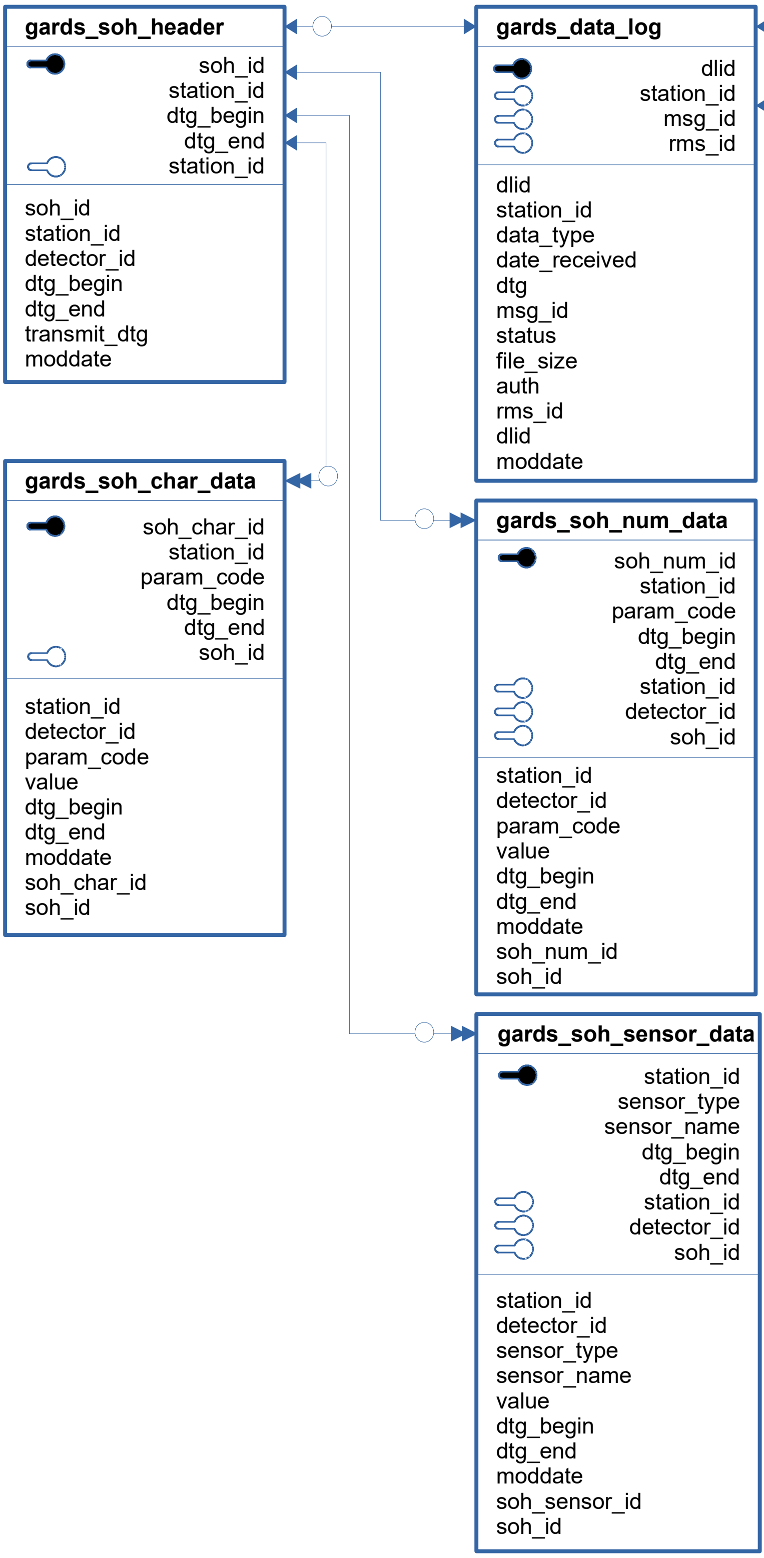


Figure 25: Raw sensor data

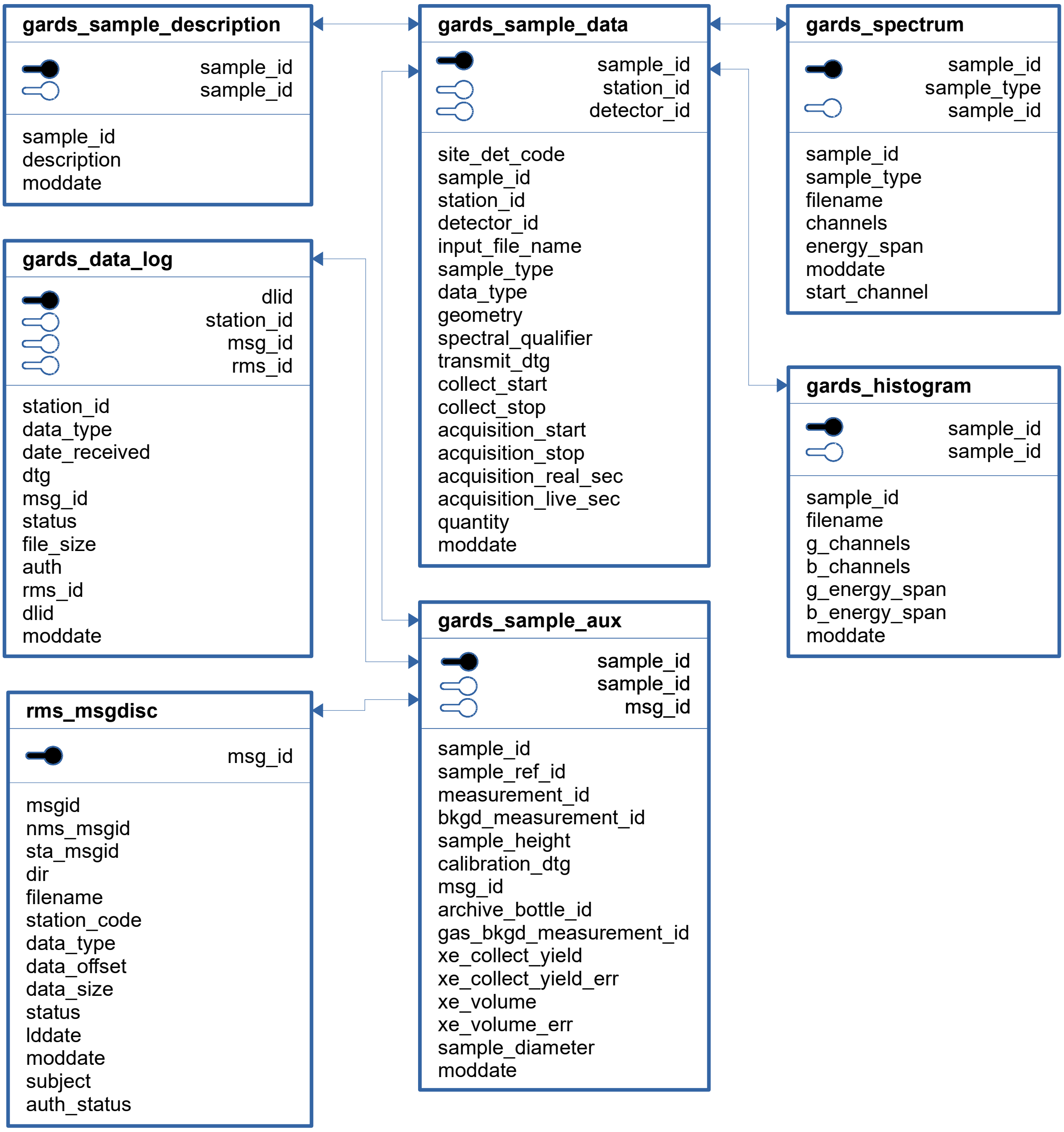


Figure 26: Sample information and pulse height data

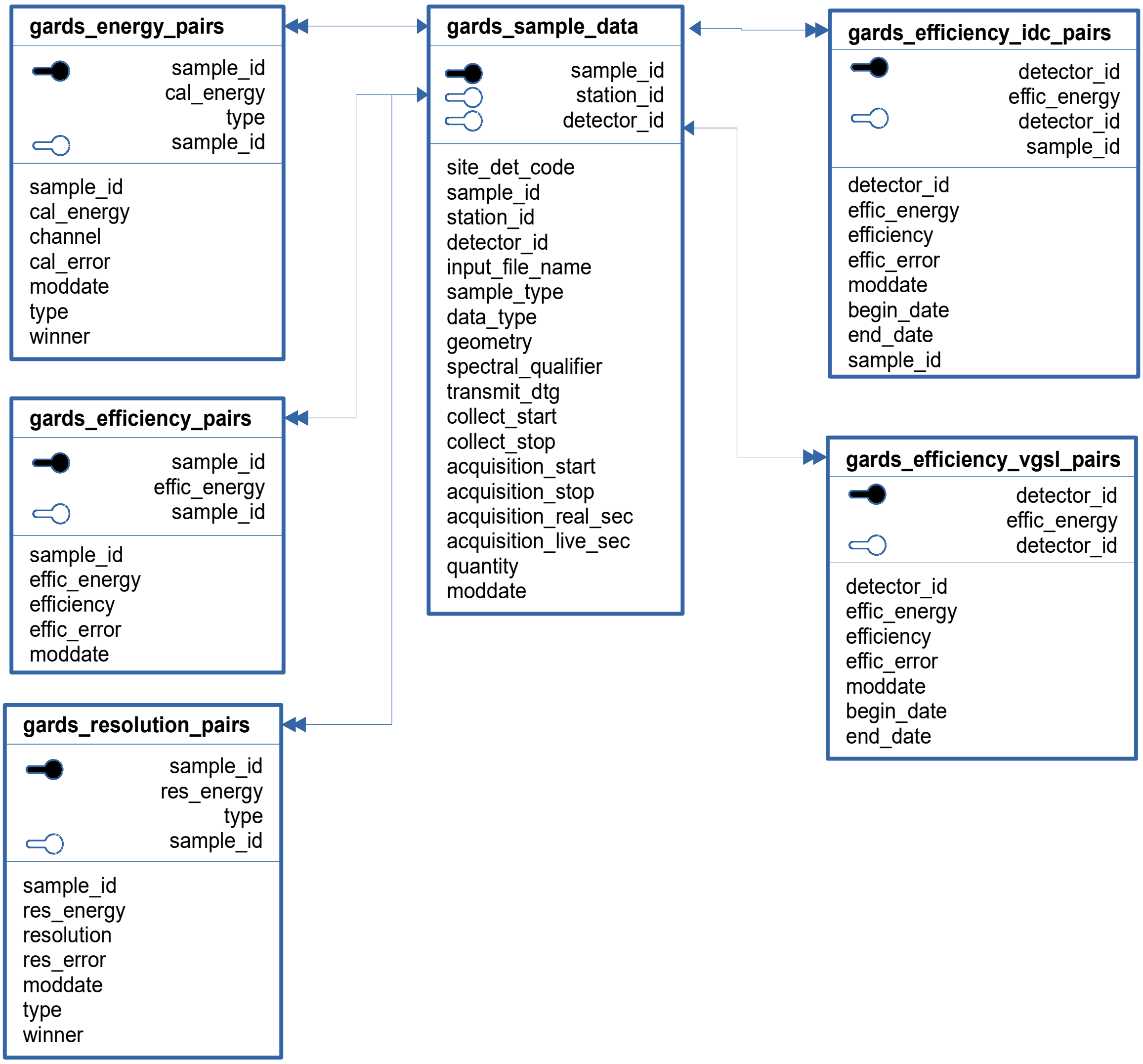


Figure 27: Gamma calibration pairs

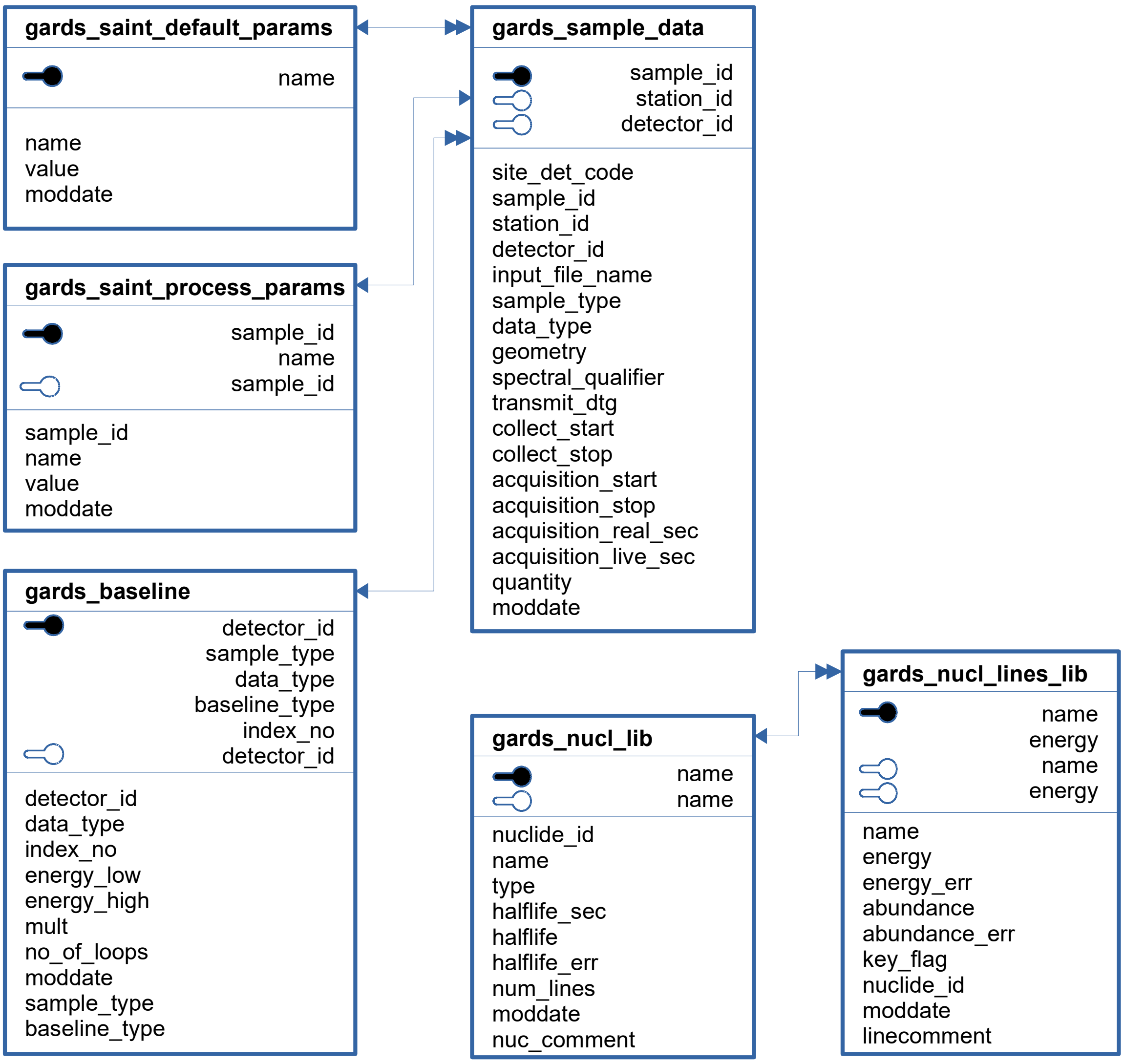


Figure 28: Processing parameters and nuclear data for gamma spectra

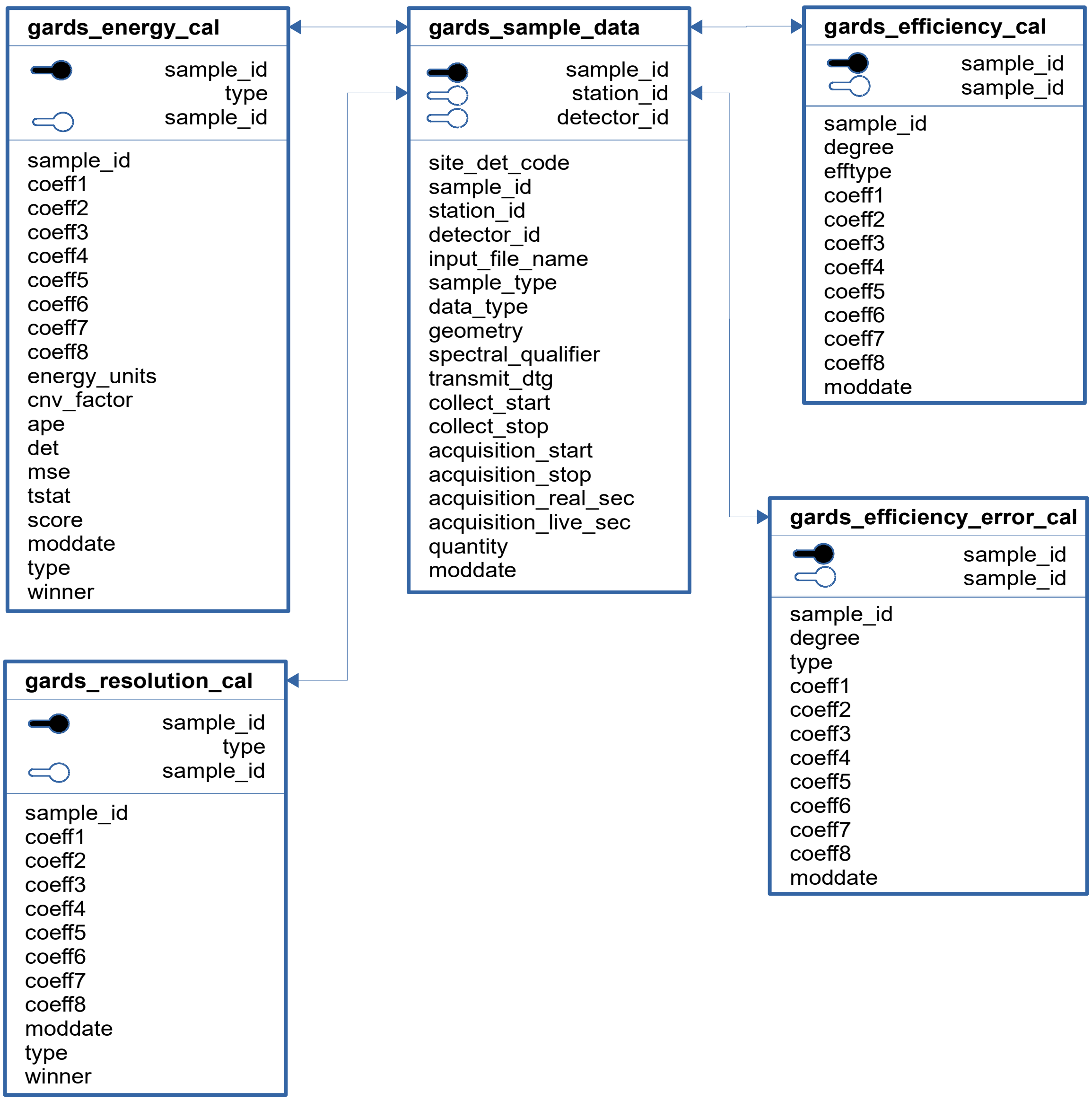


Figure 29: Calculated gamma calibration data

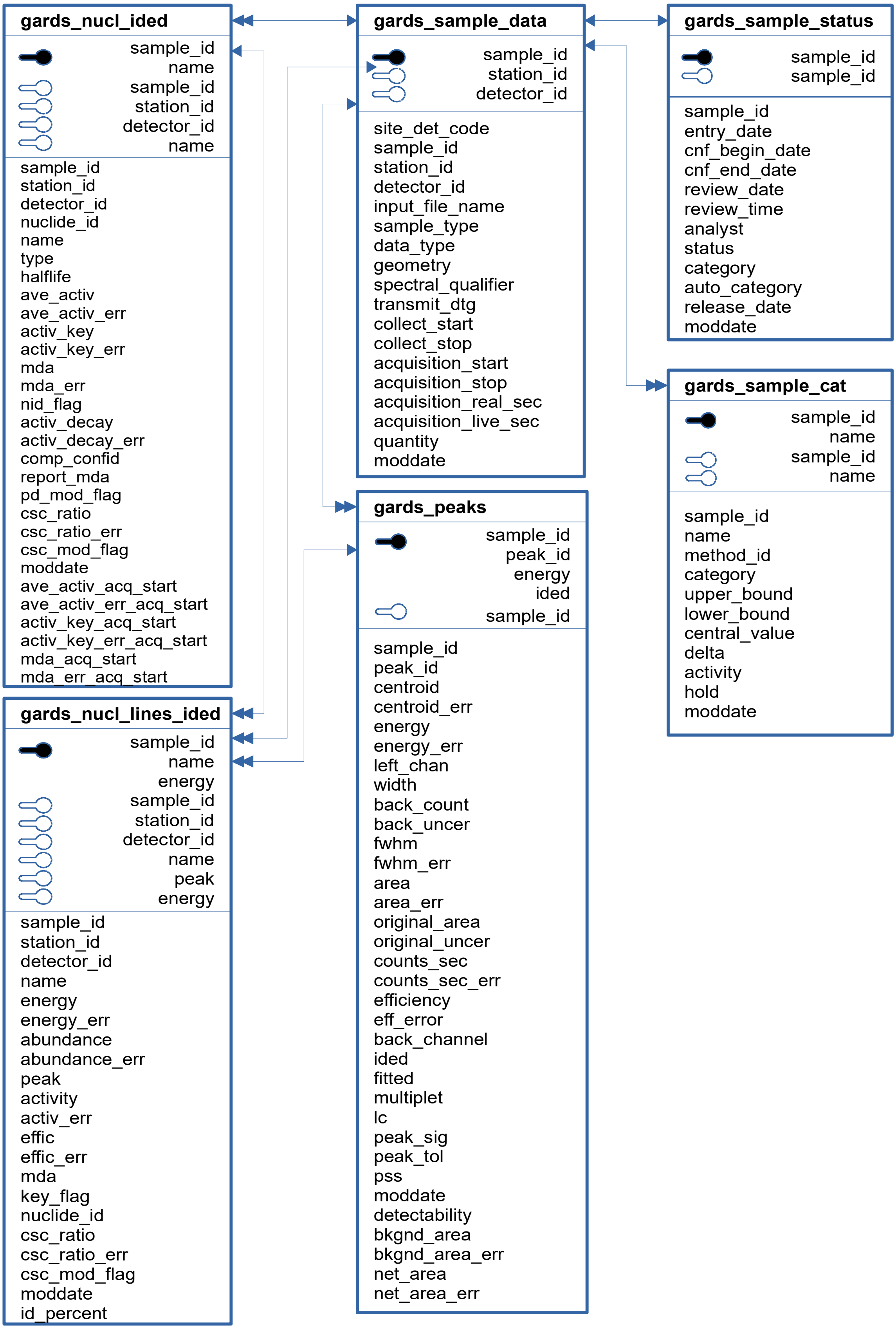


Figure 30: Results and categorization data for particulate gamma spectra

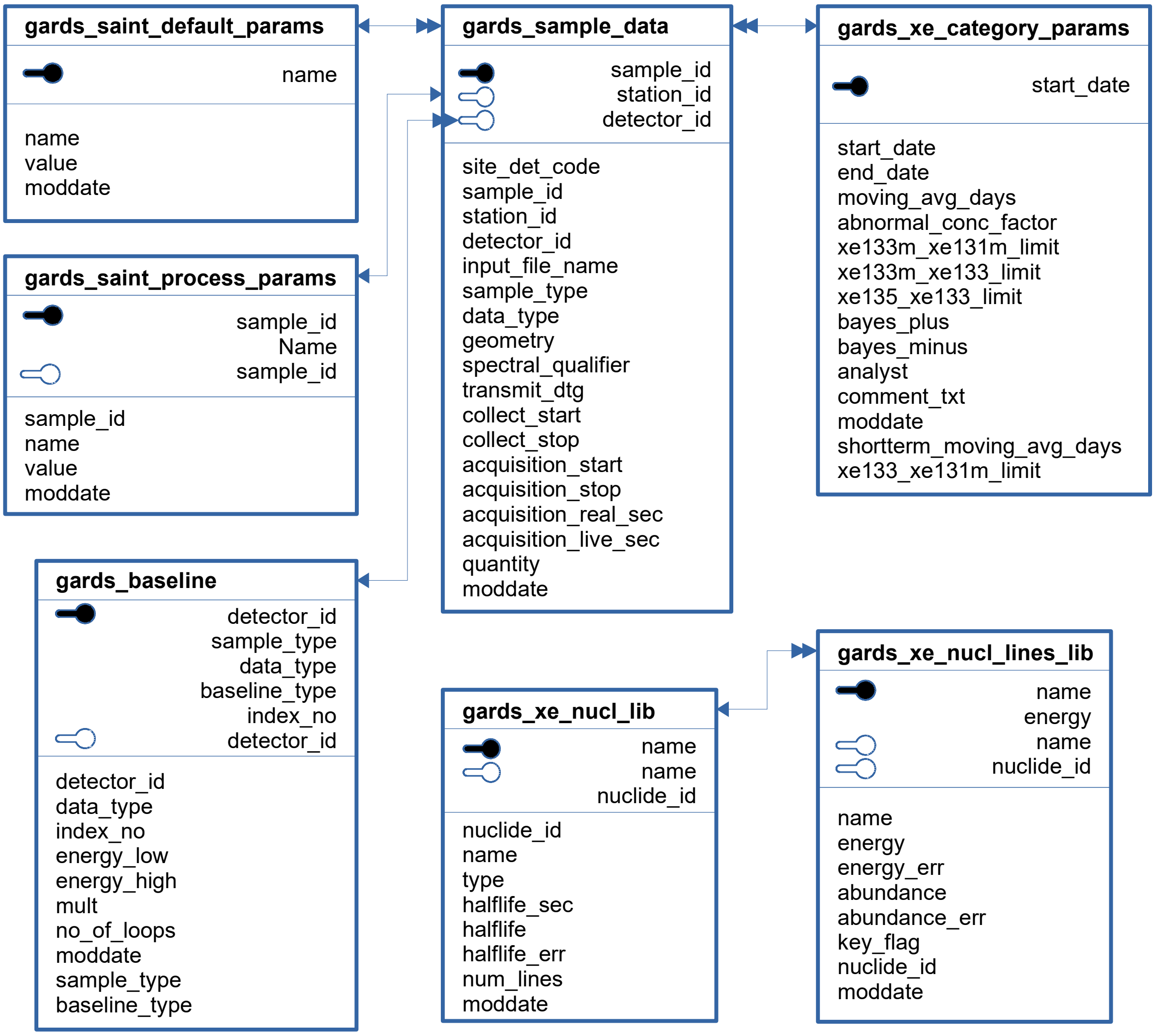


Figure 31: Processing parameters and nuclear data for SPALAX gamma spectra

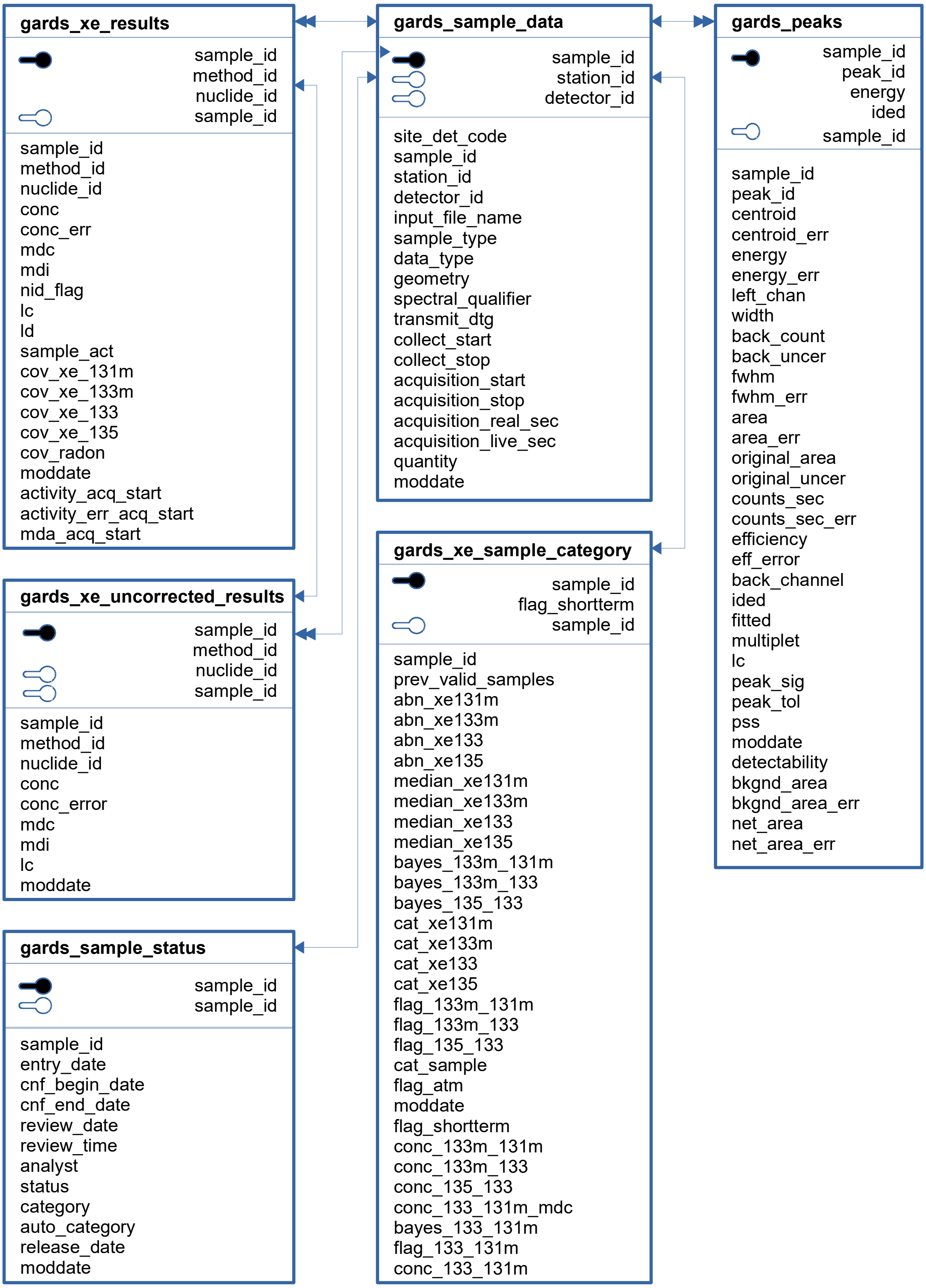


Figure 32: Results and categorization data for SPALAX gamma spectra

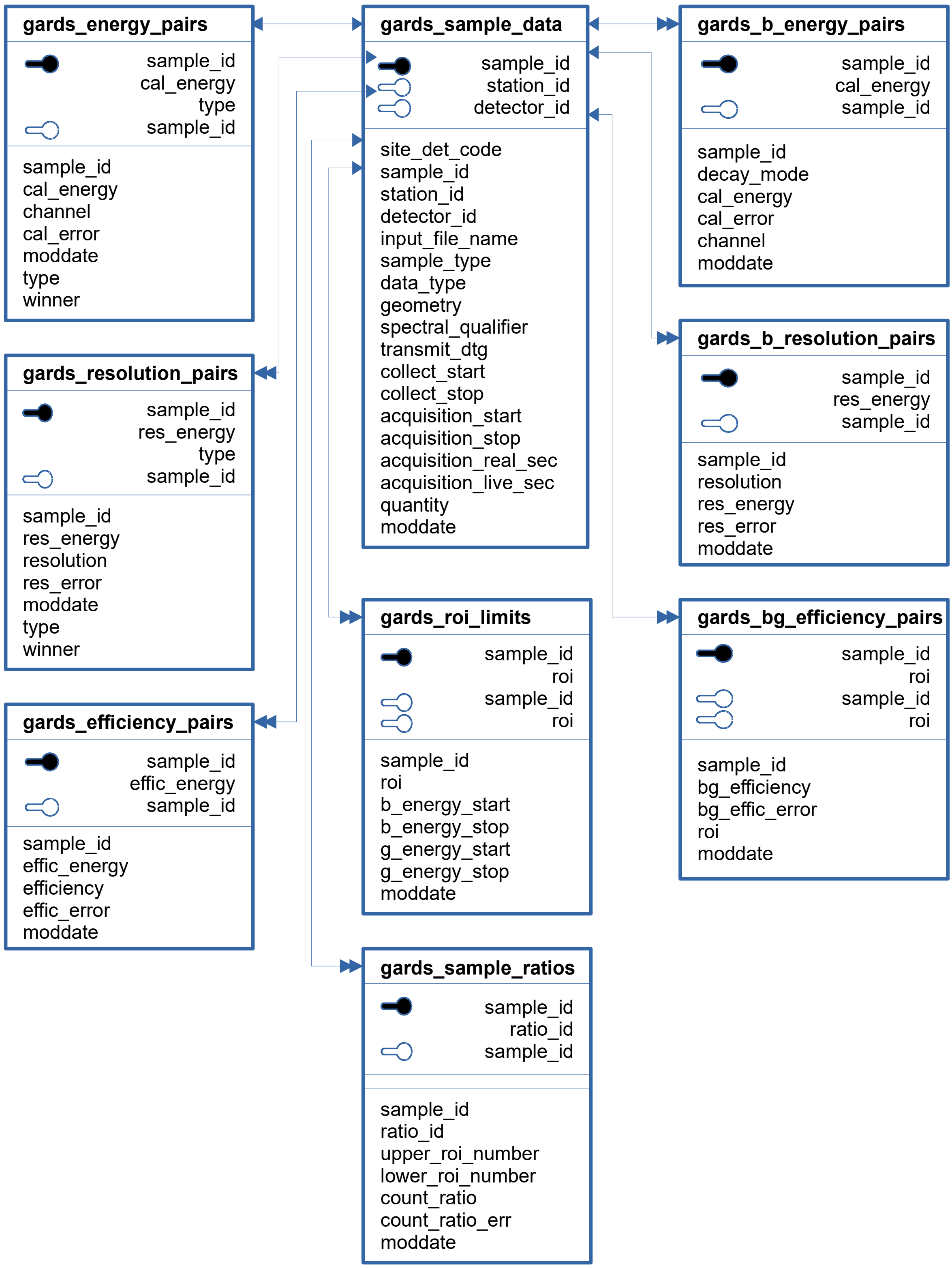


Figure 33: Beta-Gamma calibration pairs

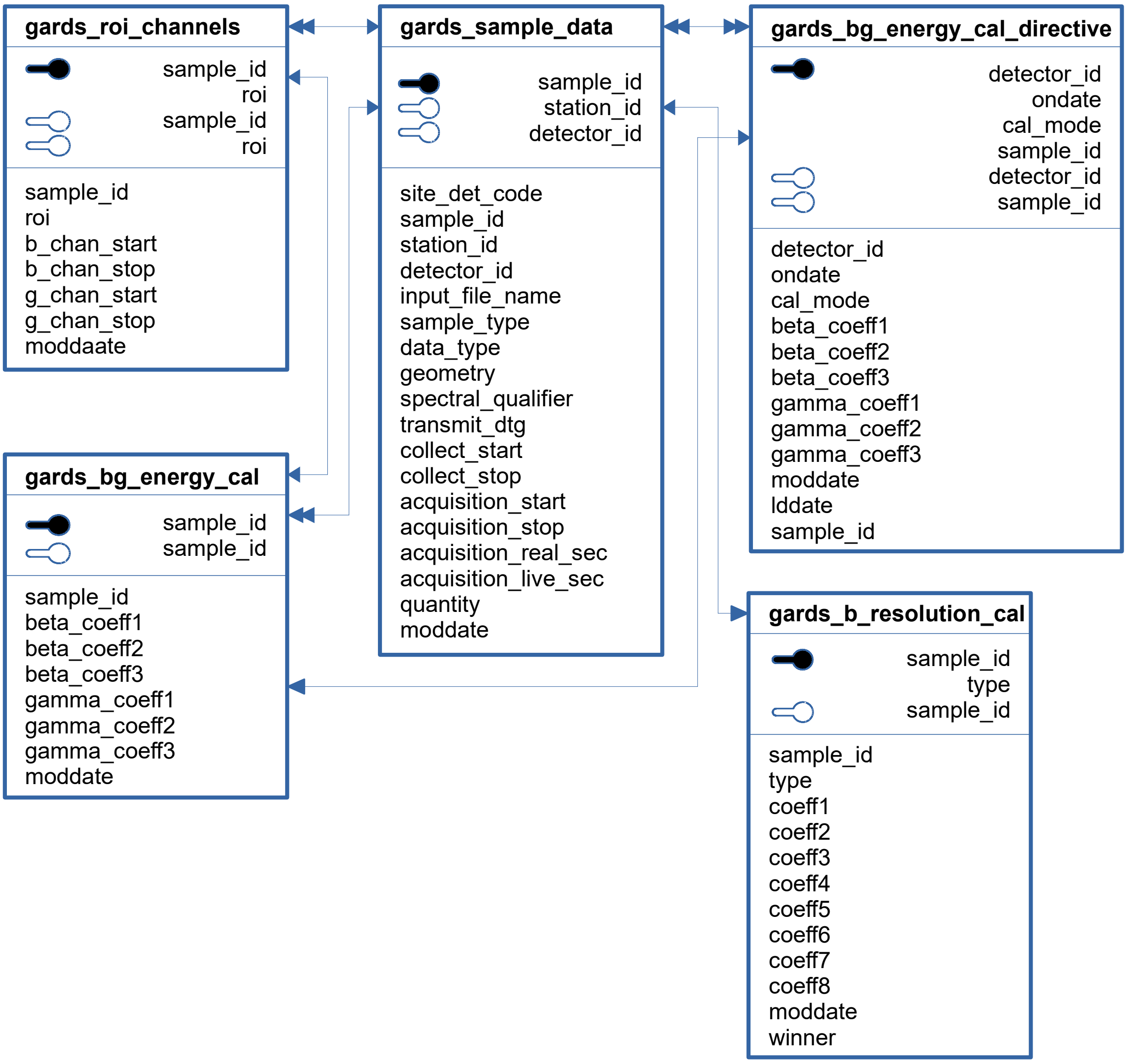


Figure 34: Calculated beta-gamma calibration data

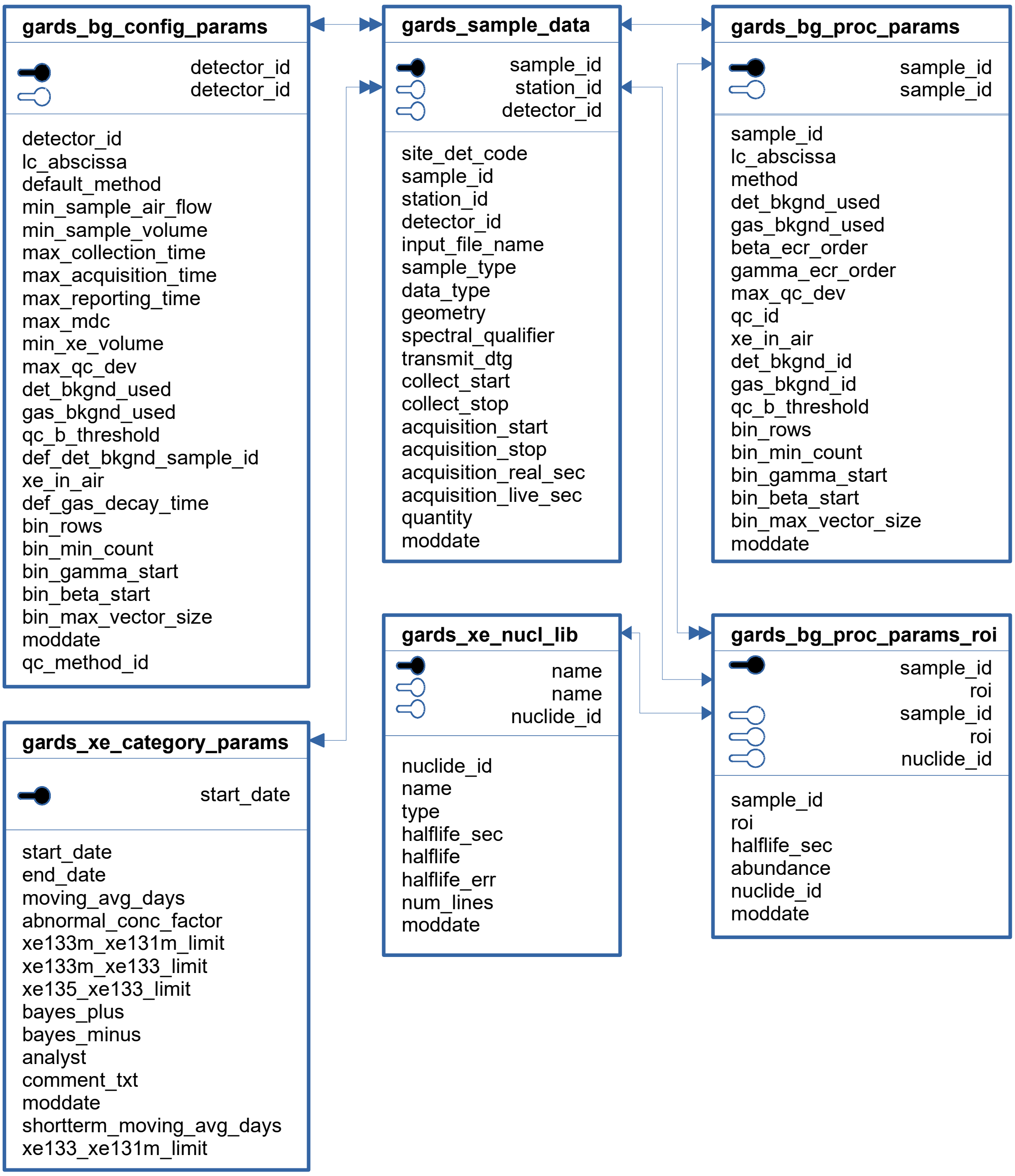


Figure 35: Processing parameters and nuclear data for SAUNA beta-gamma coincidence spectra

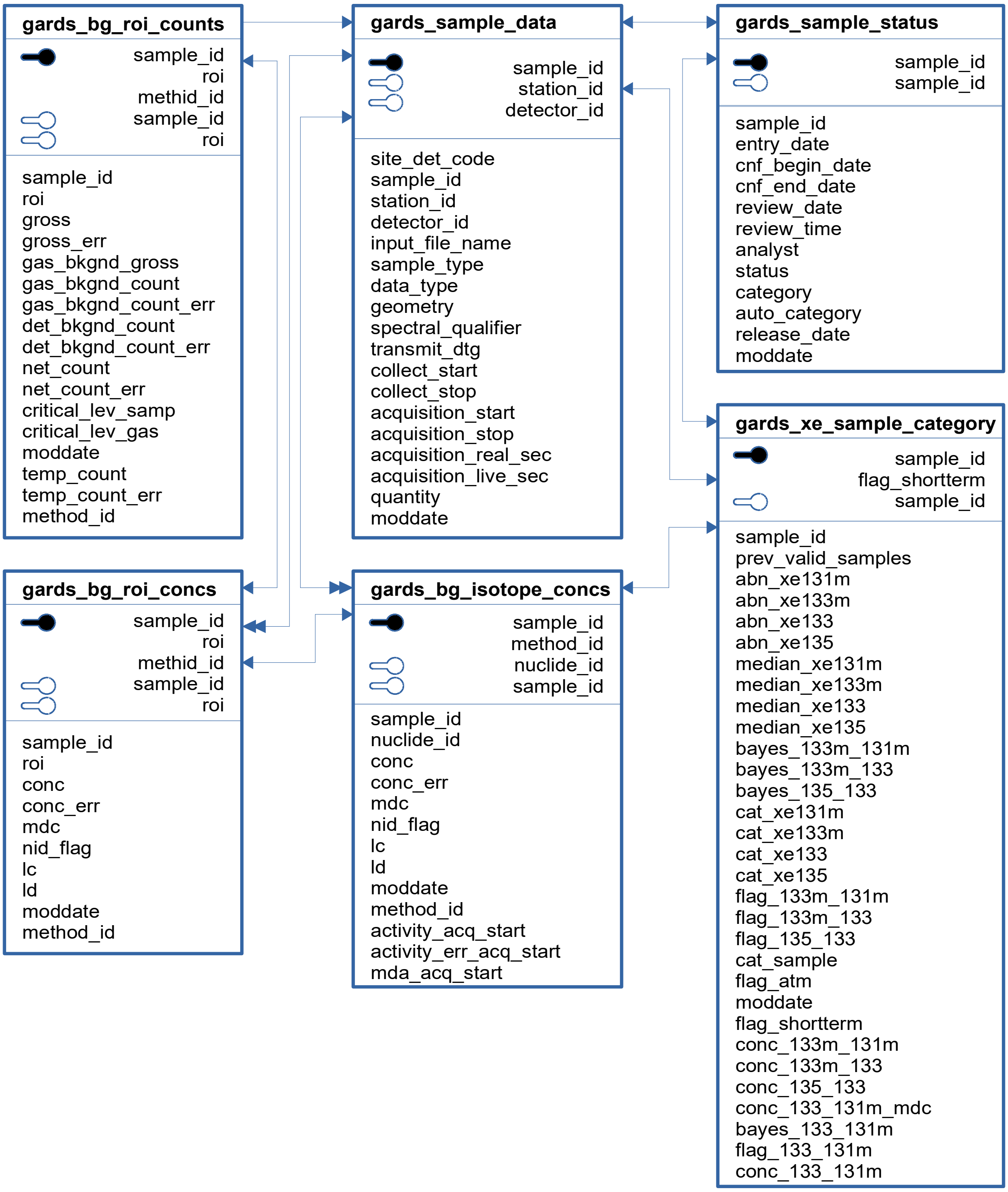


Figure 36: Results and categorization data of beta-gamma coincidence spectra

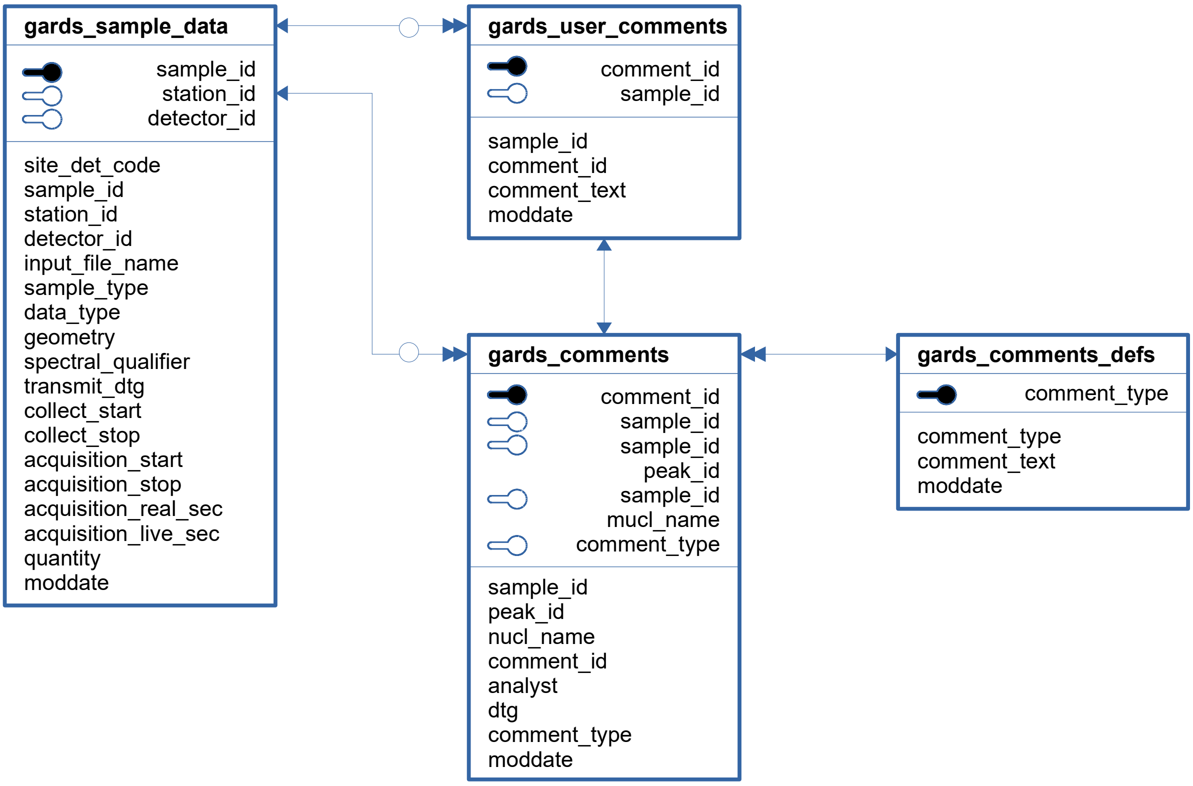


Figure 37: Analyst comment data

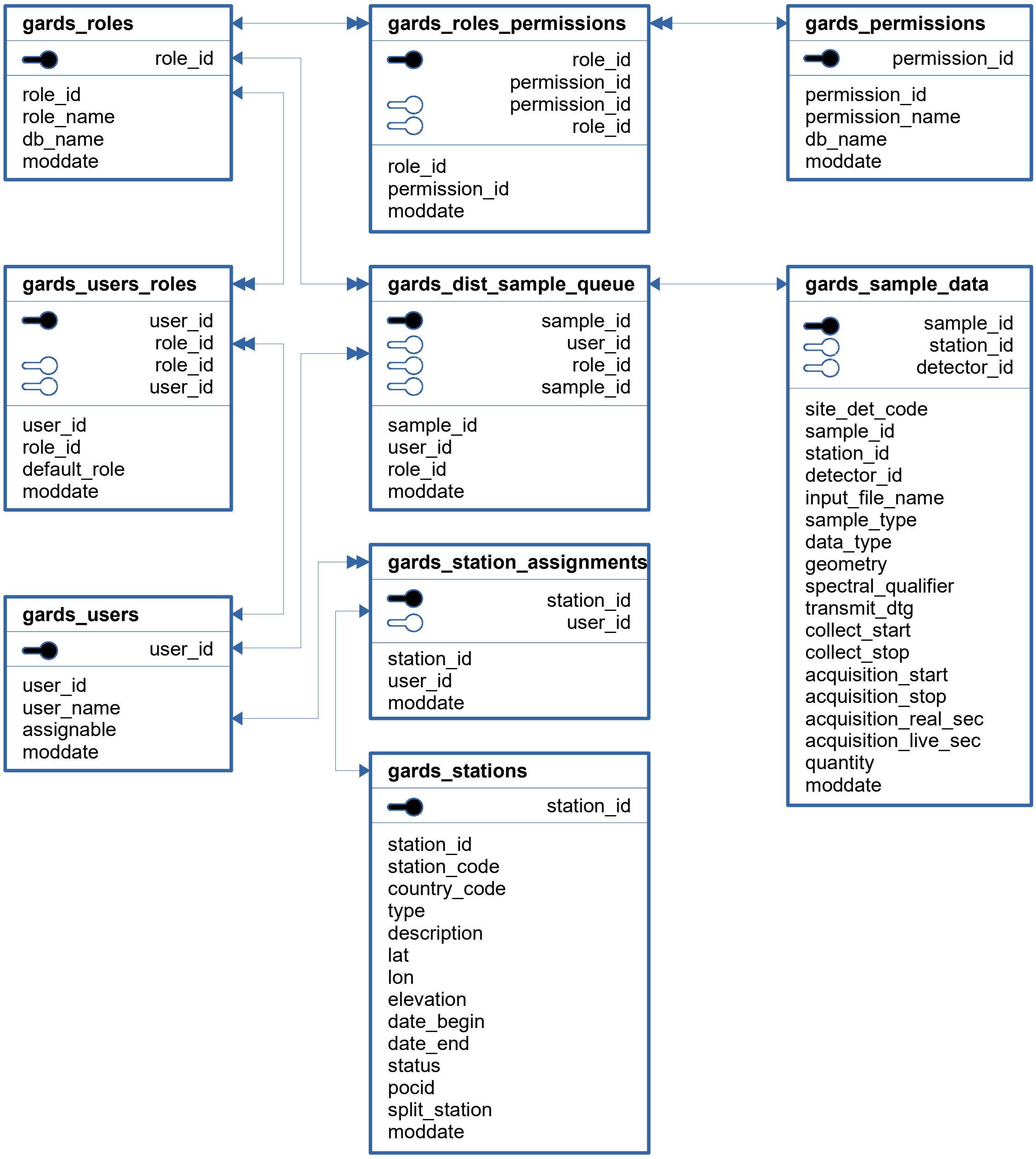


Figure 38: Multiple analyst review data

5. RADIONUCLIDE OBJECTS DESCRIPTION

5.1. Radionuclide Table Descriptions

5.1.1. GARDS_ALERTS

Owner(s)	RMSAUTO
Description	The gards_alerts table contains data describing radionuclide alert messages.

Pk/Fk/I	Column	Storage type	Description	Nullable
I	station_id	*number*	Station identifier	N
	station_code	*char(5)*	Station code	Y
I	dtg	*date*	Transmit date and time	N
I	alert_type	*varchar2(20)*	Alert type	N
	moddate	*date*	Date/time at which the row was last modified	N
PI	alert_id	*number*	Unique alert identifier	N
	alert_text	*clob(4000)*	Alert message text	N

Primary key	PK_ALERTS(alert_id)
Triggers	ALERTS_S_I, ALERTS_B_I_U

5.1.2. GARDS_AUTO_SAMPLE_CAT

Owner(s)	RMSAUTO
Description	The gards_auto_sample_cat table contains original categorization values from automatic processing.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	name	*varchar2(8)*	Nuclide name	N
	method_id	*number*	Method identifier	Y
	category	*number*	Categorization level	Y
	upper_bound	*number*	Upper limit of the amount of a nuclide that can be acceptably found	Y
	lower_bound	*number*	Lower limit of the amount of a nuclide that can be acceptably found	Y
	central_value	*number*	Current estimate of the level of the random process	Y
	delta	*number*	Value of a variable used in bounds estimation (EWMA algorithm)	Y

	activity	*number*	Activity concentration	Y
	hold	*number*	Flag for holding current sample from being used in the history for categorizing sub-sequent samples (0 = use; 1 = skip)	Y
	moddate	*date*	Date/time at which the row was last modi-fied	Y

Primary key	PK_AUTOSAMPCAT(sample_id, name)
Foreign keys	FK_SID_AUTOSAMPCAT(sample_id, GARDS_SAMPLE_DATA)
Triggers	AUTO_SAMPLE_CAT_B_I_U, GARDS_SAMPLE_CAT_I_U_D

5.1.3. GARDS_AUX_LIB

Owner(s)	RMSMAN
Description	The gards_aux_lib table provides additional radionuclide information that is used in the parent-daughter calculation.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	name	*varchar2(8)*	Nuclide name	N
	branch_ratio	*number*	Percentage of decays to a given decay path	Y
	chain_id	*number*	Decay chain index	Y
	chain_pos	*number*	Position in the decay chain	Y
	halflife_act	*varchar2(23)*	Half-life	Y
	halflife_act_err	*varchar2(23)*	Uncertainty of half-life	Y
	moddate	*date*	Date/time at which the row was last modi-fied	Y

Primary key	PK_GARDS_AUX_LIB(name)
Triggers	AUX_LIB_B_I_U

5.1.4. GARDS_AUX_LINES_LIB

Owner(s)	RMSMAN
Description	The gards_aux_lines_lib table provides additional radionuclide energy line informa-tion that is used in the parent-daughter calculation.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	name	*varchar2(8)*	Nuclide name	N
PI	energy	*number*	Energy of the decay line	N
PI	abundance_act	*number*	Emission intensity per disintegration	N
	abundance_act_er r	*number*	Uncertainty of the abundance_act	Y
	line_comment	*varchar2(500)*	Comment associated with the decay line	Y

	line_type	*varchar2(8)*	Type of the decay line	Y
	reference	*varchar2(8)*	Reference for line properties	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_AUX_LINS_LIB(name, energy, abundance_act)
Triggers	AUX_LINES_LIB_B_I_U

5.1.5. GARDS_BASELINE

Owner(s)	RMSAUTO, RMSMAN
Description	The GARDS_BASELINE table contains default and detector specific parameters of the baseline algorithm (Smoothing-Lawn Mover)

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	detector_id	*number*	Detector identifier	N
PI	data_type	*char(1)*	Data type of the spectrum	N
PI	index_no	*number*	Index of the energy bin	N
	energy_low	*number*	Lower energy of the bin	Y
	energy_high	*number*	Higher energy of the bin	Y
	mult	*number*	Multiplicand in the baseline formula	N
	mult	*number*	Multiplicand in the baseline formula	Y
	no_of_loops	*number*	Number of loops for this bin of the baseline calculation	N
	moddate	*date*	Date/time at which the row was last modified	Y
PI	sample_type	*char(1)*	Sample type	N
PI	baseline_type	*char(1)*	Baseline type (G,B)	N

Primary key	PK_GARDS_BASELINE(detector_id, sample_type, data_type, baseline_type, index_no)
Triggers	BASELINE_B_I_U

5.1.6. GARDS_BG_CONFIG_PARAMS

Owner(s)	RMSMAN
Description	The gards_bg_config_params table holds detector specific configuration parameters for beta-gamma coincidence analysis.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	detector_id	*number*	Detector identifier	N
	lc_abscissa	*float(126)*	Abscissas of the normal distribution corresponding to a predefined confidence level for	Y

			estimating the critical level	
	default_method	*number*	Default method identifier	Y
	min_sample_air_flow	*float(126)*	Minimum air flow accepted for sampling	Y
	min_sample_volume	*float(126)*	Minimum sample volume accepted for collection	Y
	max_collection_time	*number*	Maximum duration accepted for collection	Y
	max_acquisition_time	*number*	Maximum duration accepted for acquisition	Y
	max_reporting_time	*number*	Maximum duration accepted for reporting	Y
	max_mdc	*float(126)*	Maximum MDC value	Y
	min_xe_volume	*float(126)*	Minimum xenon volume	Y
	max_qc_dev	*number*	Maximum deviation of the quality check (integer)	Y
	det_bkgnd_used	*number*	Flag indicating whether the detector background measurement is used in the sample spectrum analysis	Y
	gas_bkgnd_used	*number*	Flag indicating whether the gas background measurement is used in the sample spectrum analysis	Y
	qc_b_threshold	*number*	Threshold for channels in the histogram used when calculating beta and gamma spectra	Y
	def_det_bkgnd_sample_id	*number*	Default detector background sample	Y
	xe_in_air	*float(126)*	Volume of stable xenon (ml) in the 1 m3 air	Y
	def_gas_decay_time	*number*	Default gas decay time	Y
	bin_rows	*number*	Number of rows to merge in binning	Y
	bin_min_count	*number*	Minimum counts in each bin	Y
	bin_gamma_start	*number*	The gamma start offset in histogram	Y
	bin_beta_start	*number*	The beta start offset in histogram	Y
	bin_max_vector_size	*number*	Maximum size for the bin vector	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	qc_method_id	*number*	QC analysis method ID	Y
	interference_used	*number*	Flag indicating whether the interference corrections are used in the sample spectrum analysis	Y

Primary key	PK_GARDS_BG_CONFIG_PARAMS(detector_id)
Foreign keys	FK_BG_CONFIG_PARAMS(detector_id, GARDS_DETECTORS)
Triggers	BG_CONFIG_PARAMS_B_I_U

5.1.7. GARDS_BG_DETECTOR_STD_SPECTRA

Owner(s)	RMSAUTO
Description	The gards_bg_detector_std_spectra tables holds the relation between a detector and standard spectra for the standard spectra method (SSM). (Note: the SSM is not used in the current IDC analysis.)

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	detector_id	*number*	Detector identifier	N
PI	sample_id	*number*	Sample identifier	N
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_BG_DETECTOR_STD_SPEC(detector_id, sample_id)
Triggers	BG_DET_STD_SPECTRA_B_I_U

5.1.8. GARDS_BG_EFFICIENCY_PAIRS

Owner(s)	RMSAUTO
Description	The gards_bg_efficiency_pairs table contains detection efficiencies of beta gamma coincidences in the associated ROIs as specified in the PHD.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
	bg_efficiency	*number*	Detection efficiency of b-g coincidence event	Y
	bg_effic_error	*number*	Uncertainty of bg_efficiency	Y
PI	roi	*number*	ROI identifier	N
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_BG_EFFICIENCY_PAIRS(sample_id, roi)
Foreign keys	FK_BG_EFFICIENCY_PAIRS(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_EFFICIENCY_PAIRS_B_I_U, GARDS_BG_EFFIC_PRS_I_U_D

5.1.9. GARDS_BG_EFFICIENCY_PAIRS

Owner(s)	RMSMAN
Description	The gards_bg_efficiency_pairs table contains detection efficiencies of beta gamma coincidences in the associated ROIs as specified in the PHD.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	bg_efficiency	*number*	Detection efficiency of b-g coincidence event	Y
	bg_effic_error	*number*	Uncertainty of bg_efficiency	Y
PI	roi	*number*	ROI identifier	N
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_BG_EFFICIENCY_PAIRS(sample_id, roi)
Foreign keys	FK_BG_EFFICIENCY_PAIRS(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_EFFICIENCY_PAIRS_B_I_U

5.1.10. GARDS_BG_ENERGY_CAL

Owner(s)	RMSAUTO
Description	The GARDS_BG_ENERGY_CAL table holds coefficients of linear or quadratic polynomials of beta and gamma energy calibrations that is used in the spectrum analysis.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	beta_coeff1	*number*	Zero order coefficient of the beta energy calibration	Y
	beta_coeff2	*number*	First order coefficient of the beta energy calibration	Y
	beta_coeff3	*number*	Second order coefficient of the beta energy calibration	Y
	gamma_coeff1	*number*	Zero order coefficient of the gamma energy calibration	Y
	gamma_coeff2	*number*	First order coefficient of the gamma energy calibration	Y
	gamma_coeff3	*number*	Second order coefficient of the gamma energy calibration	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_BG_EN_CAL(sample_id)
Foreign keys	FK_BG_EN_CAL_SID(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_ENERGY_CAL_B_I_U, GARDS_BG_ENERGY_CAL_I_U_D

5.1.11. GARDS_BG_ENERGY_CAL

Owner(s)	RMSMAN
Description	The GARDS_BG_ENERGY_CAL table holds coefficients of linear or quadratic polynomials of beta and gamma energy calibrations that is used in the spectrum analysis.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	beta_coeff1	*number*	Zero order coefficient of the beta energy calibration	Y
	beta_coeff2	*number*	First order coefficient of the beta energy calibration	Y
	beta_coeff3	*number*	Second order coefficient of the beta energy calibration	Y
	gamma_coeff1	*number*	Zero order coefficient of the gamma energy calibration	Y
	gamma_coeff2	*number*	First order coefficient of the gamma energy calibration	Y
	gamma_coeff3	*number*	Second order coefficient of the gamma energy calibration	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_BG_EN_CAL(sample_id)
Foreign keys	FK_BG_EN_CAL_SID(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_ENERGY_CAL_B_I_U

5.1.12. GARDS_BG_ENERGY_CAL_DIRECTIVE

Owner(s)	RMSMAN
Description	The GARDS_BG_ENERGY_CAL_DIRECTIVE table holds detector specific coefficients of linear or quadratic polynomials of beta and gamma energy calibrations, determined by calibration modes.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	detector_id	*number*	Detector identifier	N
PI	ondate	*number(8,0)*	Julian start date	N
PI	cal_mode	*char(1)*	Calibration mode	N
	beta_coeff1	*number*	Zero order coefficient of the beta energy calibration	Y
	beta_coeff2	*number*	First order coefficient of the beta energy calibration	Y
	beta_coeff3	*number*	Second order coefficient of the beta energy	Y

			calibration	
	gamma_coeff1	*number*	First order coefficient of the gamma energy calibration	Y
	gamma_coeff2	*number*	Second order coefficient of the gamma energy calibration	Y
	gamma_coeff3	*number*	Second order coefficient of the gamma energy calibration	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	lddate	*date*	Load date	Y
PI	sample_id	*number*	Sample identifier	N

Primary key	SYS_C008707817(detector_id, ondate, cal_mode, sample_id)
Foreign keys	FK_BG_EN_CAL_DIR_DETID(detector_id, GARDS_DETECTORS)
Triggers	BG_ENERGY_CAL_DIR_B_I_U

5.1.13. GARDS_BG_ENERGY_CAL_ORIG

Owner(s)	RMSAUTO
Description	The GARDS_BG_ENERGY_CAL_ORIG table holds coefficients of linear or quadratic polynomials of beta and gamma energy calibrations that are used in the original automatic analysis.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	beta_coeff1	*number*	Zero order coefficient of the beta energy calibration	Y
	beta_coeff2	*number*	First order coefficient of the beta energy calibration	Y
	beta_coeff3	*number*	Second order coefficient of the beta energy calibration	Y
	gamma_coeff1	*number*	Zero order coefficient of the gamma energy calibration	Y
	gamma_coeff2	*number*	First order coefficient of the gamma energy calibration	Y
	gamma_coeff3	*number*	Second order coefficient of the gamma energy calibration	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_BG_EN_CAL_ORIG(sample_id)
Foreign keys	FK_BG_EN_CAL_ORIG_SID(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_ENERGY_CAL_ORIG_B_I_U, GARDS_BG_ENERGY_CAL_ORIG_I_U_D

5.1.14. GARDS_BG_ENERGY_CAL_ORIG

Owner(s)	RMSMAN
Description	The GARDS_BG_ENERGY_CAL_ORIG table holds coefficients of linear or quadratic polynomials of beta and gamma energy calibrations that are used in the original automatic analysis.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	beta_coeff1	*number*	Zero order coefficient of the beta energy calibration	Y
	beta_coeff2	*number*	First order coefficient of the beta energy calibration	Y
	beta_coeff3	*number*	Second order coefficient of the beta energy calibration	Y
	gamma_coeff1	*number*	Zero order coefficient of the gamma energy calibration	Y
	gamma_coeff2	*number*	First order coefficient of the gamma energy calibration	Y
	gamma_coeff3	*number*	Second order coefficient of the gamma energy calibration	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_BG_EN_CAL_ORIG(sample_id)
Foreign keys	FK_BG_EN_CAL_ORIG_SID(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_ENERGY_CAL_ORIG_B_I_U

5.1.15. GARDS_BG_ISOTOPE_CONCS

Owner(s)	RMSAUTO
Description	The GARDS_BG_ISOTOPE_CONCS contains activity and activity concentration results of xenon isotopes by beta gamma coincidence analysis.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	nuclide_id	*number*	Nuclide identifier	N
	conc	*float(126)*	Activity concentration	Y
	conc_err	*float(126)*	Uncertainty of the activity concentration	Y
	mdc	*float(126)*	Minimum detectable concentration	Y
	nid_flag	*number*	Flag of whether the xenon isotope is detected or not	Y
	lc	*float(126)*	Critical level in activity concentration	Y
	ld	*float(126)*	Detection limit in activity concentration	Y

	moddate	*date*	Date/time at which the row was last modified	Y
PI	method_id	*number*	Method identifier	N
	activity_acq_start	*float(126)*	Activity at the start of acquisition	Y
	activity_err_acq_start	*float(126)*	Uncertainty of the activity at the start of acquisition	Y
	mda_acq_start	*float(126)*	Minimum detectable activity at the start of acquisition	Y

Primary key	PK_GARDS_BG_ISOTOPE_CONCS(sample_id, nuclide_id, method_id)
Foreign keys	FK_BG_ISOTOPE_CONCS(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_ISOTOPE_CONCS_B_I_U, GARDS_BG_ISOTOPE_CONCS_I_U_D

5.1.16. GARDS_BG_ISOTOPE_CONCS

Owner(s)	RMSMAN
Description	The GARDS_BG_ISOTOPE_CONCS contains activity and activity concentration results of xenon isotopes by beta gamma coincidence analysis.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	nuclide_id	*number*	Nuclide identifier	N
	conc	*float(126)*	Activity concentration	Y
	conc_err	*float(126)*	Uncertainty of the activity concentration	Y
	mdc	*float(126)*	Minimum detectable concentration	Y
	nid_flag	*number*	Flag of whether the xenon isotope is detected or not	Y
	lc	*float(126)*	Critical level in activity concentration	Y
	ld	*float(126)*	Detection limit in activity concentration	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	method_id	*number*	Method identifier	N
	activity_acq_start	*float(126)*	Activity at the start of acquisition	Y
	activity_err_acq_start	*float(126)*	Uncertainty of the activity at the start of acquisition	Y
	mda_acq_start	*float(126)*	Minimum detectable activity at the start of acquisition	Y

Primary key	PK_GARDS_BG_ISOTOPE_CONCS(sample_id, nuclide_id, method_id)
Foreign keys	FK_BG_ISOTOPE_CONCS(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_ISOTOPE_CONCS_B_I_U

5.1.17. GARDS_BG_PROC_PARAMS

Owner(s)	RMSMAN
Description	The gards_bg_proc_params table holds spectrum specific parameters of beta-gamma processing.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	lc_abscissa	*float(126)*	Abscissas of the normal distribution corresponding to a predefined confidence level for estimating the critical level	Y
	method	*number*	Method identifier	Y
	det_bkgnd_used	*number*	Flag indicating whether the detector background measurement is used in the sample spectrum analysis	Y
	gas_bkgnd_used	*number*	Flag indicating whether the gas background measurement is used in the sample spectrum analysis	Y
	beta_ecr_order	*number*	Order of the beta energy calibration function	Y
	gamma_ecr_order	*number*	Order of the gamma energy calibration function	Y
	max_qc_dev	*number*	Maximum deviation of the quality check (integer)	Y
	qc_id	*number*	Unique quality control identifier	Y
	xe_in_air	*float(126)*	Volume of stable xenon (ml) in the 1 m3 air	Y
	det_bkgnd_id	*number*	Unique identifier for the gas background used in the calculation	Y
	gas_bkgnd_id	*number*	Unique gas background identifier	Y
	qc_b_threshold	*number*	The value that is used to mask the gamma spectrum in QC control of the spectrum	Y
	bin_rows	*number*	Number of rows to merge in binning	Y
	bin_min_count	*number*	Minimum counts in each bin	Y
	bin_gamma_start	*number*	The gamma start offset in histogram	Y
	bin_beta_start	*number*	The beta start offset in histogram	Y
	bin_max_vector_size	*number*	Maximum size for the bin vector	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	interference_used	*number*	Flag indicating whether the interference corrections are used in the sample spectrum analysis	Y

Primary key	PK_GARDS_BG_PROC_PARAMS(sample_id)
Foreign keys	FK_BG_PROC_PARAMS(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_PROC_PARAMS_B_I_U

5.1.18. GARDS_BG_PROC_PARAMS

Owner(s)	RMSAUTO
Description	The gards_bg_proc_params table holds spectrum specific parameters of beta-gamma processing.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
	lc_abscissa	*float(126)*	Abscissas of the normal distribution corresponding to a predefined confidence level for estimating the critical level	Y
	method	*number*	Method identifier	Y
	det_bkgnd_used	*number*	Flag indicating whether the detector background measurement is used in the sample spectrum analysis	Y
	gas_bkgnd_used	*number*	Flag indicating whether the gas background measurement is used in the sample spectrum analysis	Y
	beta_ecr_order	*number*	Order of the beta energy calibration function	Y
	gamma_ecr_order	*number*	Order of the gamma energy calibration function	Y
	max_qc_dev	*number*	Maximum deviation of the quality check (integer)	Y
	qc_id	*number*	Unique quality control identifier	Y
	xe_in_air	*float(126)*	Volume of stable xenon (ml) in the 1 m3 air	Y
	det_bkgnd_id	*number*	Unique identifier for the gas background used in the calculation	Y
	gas_bkgnd_id	*number*	Unique gas background identifier	Y
	qc_b_threshold	*number*	The value that is used to mask the gamma spectrum in QC control of the spectrum	Y
	bin_rows	*number*	Number of rows to merge in binning	Y
	bin_min_count	*number*	Minimum counts in each bin	Y
	bin_gamma_start	*number*	The gamma start offset in histogram	Y
	bin_beta_start	*number*	The beta start offset in histogram	Y
	bin_max_vector_size	*number*	Maximum size for the bin vector	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	interference_used	*number*	Flag indicating whether the interference cor-	Y

			rections are used in the sample spectrum analysis	

Primary key	PK_GARDS_BG_PROC_PARAMS(sample_id)
Foreign keys	FK_BG_PROC_PARAMS(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_PROC_PARAMS_B_I_U, GARDS_BG_PROC_PARAMS_I_U_D

5.1.19. GARDS_BG_PROC_PARAMS_ROI

Owner(s)	RMSMAN
Description	The GARDS_BG_PROC_PARAMS_ROI contains regions of interest (ROIs) of beta gamma processing.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	roi	*number*	ROI identifier	N
	halflife_sec	*number*	Half-life in seconds	Y
	abundance	*float(126)*	Emission intensity per disintegration	Y
	nuclide_id	*number*	Nuclide identifier	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_PROC_PARAMS_ROI(sample_id, roi)
Foreign keys	FK_BG_PROC_PARAMS_ROI(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_PROC_PARAMS_ROI_B_I_U

5.1.20. GARDS_BG_PROC_PARAMS_ROI

Owner(s)	RMSAUTO
Description	The GARDS_BG_PROC_PARAMS_ROI contains regions of interest (ROIs) of beta gamma processing.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	roi	*number*	ROI identifier	N
	halflife_sec	*number*	Half-life in seconds	Y
	abundance	*float(126)*	Emission intensity per disintegration	Y
	nuclide_id	*number*	Nuclide identifier	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_PROC_PARAMS_ROI(sample_id, roi)
Foreign keys	FK_BG_PROC_PARAMS_ROI(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_PROC_PARAMS_ROI_B_I_U, GARDS_BG_PROC_PARAMS_ROI_I_U_D

5.1.21. GARDS_BG_QC_RESULT

Owner(s)	RMSAUTO
Description	Holds results of beta gamma quality control (QC) processing.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
	amplitude	*float(126)*	Amplitude of QC peak	Y
	fwhm	*float(126)*	Full width at half maximum	Y
	centroid	*float(126)*	Centroid energy of QC peak	Y
	offset	*float(126)*	Noise offset in QC spectrum	Y
	slope	*float(126)*	Noise slope in QC spectrum	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_BG_QC_RESULT(sample_id)
Foreign keys	FK_BG_QC_RESULT(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_QC_RESULT_B_I_U, GARDS_BG_QC_RESULT_I_U_D

5.1.22. GARDS_BG_QC_RESULT

Owner(s)	RMSMAN
Description	Holds results of beta gamma quality control (QC) processing.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
	amplitude	*float(126)*	Amplitude of QC peak	Y
	fwhm	*float(126)*	Full width at half maximum	Y
	centroid	*float(126)*	Centroid energy of QC peak	Y
	offset	*float(126)*	Noise offset in QC spectrum	Y
	slope	*float(126)*	Noise slope in QC spectrum	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_BG_QC_RESULT(sample_id)
Foreign keys	FK_BG_QC_RESULT(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_QC_RESULT_B_I_U

5.1.23. GARDS_BG_ROI_CONCS

Owner(s)	RMSMAN
Description	The GARDS_BG_ROI_CONCS contains ROI specific activity and activity concentration results by beta gamma coincidence analysis.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	roi	*number*	ROI identifier	N
	conc	*float(126)*	Activity concentration	Y
	conc_err	*float(126)*	Uncertainty of the activity concentration	Y
	mdc	*float(126)*	Minimum detectable concentration	Y
	nid_flag	*number*	Flag of whether the xenon isotope is detected or not	Y
	lc	*float(126)*	Critical level in activity concentration	Y
	ld	*float(126)*	Detection limit in activity concentration	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	method_id	*number(38,0)*	Method identifier	N

Primary key	PK_GARDS_BG_ROI_CONCS(sample_id, roi, method_id)
Foreign keys	FK_BG_ROI_CONCS(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_ROI_CONCS_B_I_U

5.1.24. GARDS_BG_ROI_CONCS

Owner(s)	RMSAUTO
Description	The GARDS_BG_ROI_CONCS contains ROI specific activity and activity concentration results by beta gamma coincidence analysis.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	roi	*number*	ROI identifier	N
	conc	*float(126)*	Activity concentration	Y
	conc_err	*float(126)*	Uncertainty of the activity concentration	Y
	mdc	*float(126)*	Minimum detectable concentration	Y
	nid_flag	*number*	Flag of whether the xenon isotope is detected or not	Y
	lc	*float(126)*	Critical level in activity concentration	Y
	ld	*float(126)*	Detection limit in activity concentration	Y
	moddate	*date*	Date/time at which the row was last modified	Y

PI	method_id	*number(38,0)*	Method identifier	N

Primary key	PK_GARDS_BG_ROI_CONCS(sample_id, roi, method_id)
Foreign keys	FK_BG_ROI_CONCS(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_ROI_CONCS_B_I_U, GARDS_BG_ROI_CONCS_I_U_D

5.1.25. GARDS_BG_ROI_COUNTS

Owner(s)	RMSAUTO
Description	The GARDS_BG_ROI_COUNTS contains ROI specific net count results by beta gamma coincidence analysis.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	roi	*number*	ROI identifier	N
	gross	*number*	Gross number of counts in the sample spectrum	Y
	gross_err	*number*	Uncertainty of the gross number of counts in the sample spectrum	Y
	gas_bkgnd_gross	*number*	Gross number of counts in the gas background spectrum	Y
	gas_bkgnd_count	*number*	Net number of counts in the gas background spectrum	Y
	gas_bkgnd_count_err	*number*	Uncertainty of the net number of counts in the gas background spectrum	Y
	det_bkgnd_count	*number*	Gross number of counts in the detector background spectrum	Y
	det_bkgnd_count_err	*number*	Uncertainty of the gross number of counts in the detector background spectrum	Y
	net_count	*number*	Net number of counts in the ROI	Y
	net_count_err	*number*	Uncertainty of the net number of counts in the ROI	Y
	critical_lev_samp	*number*	Critical level in counts in the sample spectrum	Y
	critical_lev_gas	*number*	Critical level in counts in the gas background spectrum	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	temp_count	*number*	Net number of counts in the ROI by subtracting the detector background and interference corrections	Y
	temp_count_err	*number*	Uncertainty of the net number of counts in the ROI by subtracting the detector background and interference corrections	Y

PI	method_id	*number(38,0)*	Method identifier	N

Primary key	PK_GARDS_BG_ROI_COUNTS(sample_id, roi, method_id)
Foreign keys	FK_BG_ROI_COUNTS(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_ROI_COUNTS_B_I_U, GARDS_BG_ROI_COUNTS_I_U_D

5.1.26. GARDS_BG_ROI_COUNTS

Owner(s)	RMSMAN
Description	The GARDS_BG_ROI_COUNTS contains ROI specific net count results by beta gamma coincidence analysis.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	roi	*number*	ROI identifier	N
	gross	*number*	Gross number of counts in the sample spectrum	Y
	gross_err	*number*	Uncertainty of the gross number of counts in the sample spectrum	Y
	gas_bkgnd_gross	*number*	Gross number of counts in the gas background spectrum	Y
	gas_bkgnd_count	*number*	Net number of counts in the gas background spectrum	Y
	gas_bkgnd_count_err	*number*	Uncertainty of the net number of counts in the gas background spectrum	Y
	det_bkgnd_count	*number*	Gross number of counts in the detector background spectrum	Y
	det_bkgnd_count_err	*number*	Uncertainty of the gross number of counts in the detector background spectrum	Y
	net_count	*number*	Net number of counts in the ROI	Y
	net_count_err	*number*	Uncertainty of the net number of counts in the ROI	Y
	critical_lev_samp	*number*	Critical level in counts in the sample spectrum	Y
	critical_lev_gas	*number*	Critical level in counts in the gas background spectrum	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	temp_count	*number*	Net number of counts in the ROI by subtracting the detector background and interference corrections	Y
	temp_count_err	*number*	Uncertainty of the net number of counts in the ROI by subtracting the detector background and interference corrections	Y

PI	method_id	*number(38,0)*	Method identifier	N

Primary key	PK_GARDS_BG_ROI_COUNTS(sample_id, roi, method_id)
Foreign keys	FK_BG_ROI_COUNTS(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_ROI_COUNTS_B_I_U

5.1.27. GARDS_BG_STD_SPECTRA

Owner(s)	RMSAUTO
Description	The gards_bg_std_spectra table holds standard spectra for the SSM. (Note: The SSM is not used in the current IDC analysis.)

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	number_of_decays	*number*	Number of decays for this standard spectra	Y
	nuclide_id	*number*	Nuclide identifier	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_BG_STD_SPECTRA(sample_id)
Foreign keys	FK_BG_STD_SPECTRA(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_STD_SPECTRA_B_I_U

5.1.28. GARDS_BG_STD_SPECTRA_RESULT

Owner(s)	RMSMAN
Description	The gards_bg_std_spectra_result table holds results by the SSM. (Note: The SSM is not used in the current IDC analysis.)

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	std_spectra_id	*number*	Identifier for the standard spectra	N
	gamma_coeff1	*float(126)*	Zero order coefficient of the gamma energy calibration	Y
	gamma_coeff2	*float(126)*	First order coefficient of the gamma energy calibration	Y
	gamma_coeff3	*float(126)*	Second order coefficient of the gamma energy calibration	Y
	beta_coeff1	*float(126)*	Zero order coefficient of the beta energy calibration	Y
	beta_coeff2	*float(126)*	First order coefficient of the beta energy calibration	Y
	beta_coeff3	*float(126)*	Second order coefficient of the beta energy	Y

			calibration	
	estimate	*float(126)*	Estimate	Y
	error	*float(126)*	Uncertainty of the estimate	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_BG_STD_SPECTRA_RESULT(sample_id, std_spectra_id)
Foreign keys	FK_BG_STD_SPECTRA_RESULT(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_STD_SPECTRA_RESULT_B_I_U

5.1.29. GARDS_BG_STD_SPECTRA_RESULT

Owner(s)	RMSAUTO
Description	The gards_bg_std_spectra_result table holds results by the SSM. (Note: The SSM is not used in the current IDC analysis.)

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	std_spectra_id	*number*	Identifier for the standard spectra	N
	gamma_coeff1	*float(126)*	Zero order coefficient of the gamma energy calibration	Y
	gamma_coeff2	*float(126)*	First order coefficient of the gamma energy calibration	Y
	gamma_coeff3	*float(126)*	Second order coefficient of the gamma energy calibration	Y
	beta_coeff1	*float(126)*	Zero order coefficient of the beta energy calibration	Y
	beta_coeff2	*float(126)*	First order coefficient of the beta energy calibration	Y
	beta_coeff3	*float(126)*	Second order coefficient of the beta energy calibration	Y
	estimate	*float(126)*	Estimate	Y
	error	*float(126)*	Uncertainty of the estimate	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_BG_STD_SPECTRA_RESULT(sample_id, std_spectra_id)
Foreign keys	FK_BG_STD_SPECTRA_RESULT(sample_id, GARDS_SAMPLE_DATA)
Triggers	BG_STD_SPECTRA_RESULT_B_I_U, BG_STD_SPECTRA_RESULT_I_U_D

5.1.30. GARDS_B_ENERGY_PAIRS

Owner(s)	RMSAUTO

Description	The gards_b_energy_pairs table contains beta energy calibration pairs.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	decay_mode	*char(1)*	Decay type	Y
PI	cal_energy	*number*	Beta energy	N
	cal_error	*number*	Uncertainty of the centroid channel	Y
	channel	*number*	Peak centroid channel	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_B_ENERGY_PAIRS(sample_id, cal_energy, type)
Foreign keys	FK_B_ENERGY_PAIRS(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_B_ENRGY_PRS_INSERT, B_ENERGY_PAIRS_B_I_U

5.1.31. GARDS_B_ENERGY_PAIRS

Owner(s)	RMSMAN
Description	The gards_b_energy_pairs table contains beta energy calibration pairs.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	decay_mode	*char(1)*	Decay type	Y
PI	cal_energy	*number*	Beta energy	N
	cal_error	*number*	Uncertainty of the centroid channel	Y
	channel	*number*	Peak centroid channel	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_B_ENERGY_PAIRS(sample_id, cal_energy, type)
Foreign keys	FK_B_ENERGY_PAIRS(sample_id, GARDS_SAMPLE_DATA)
Triggers	B_ENERGY_PAIRS_B_I_U

5.1.32. GARDS_B_ENERGY_PAIRS_ORIG

Owner(s)	RMSAUTO

Description	The gards_b_energy_pairs_orig table contains original beta energy calibration pairs as specified in the PHD.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
	decay_mode	*char(1)*	Decay type	Y
PI	cal_energy	*number*	Beta energy	N
	cal_error	*number*	Uncertainty of the centroid channel	Y
	channel	*number*	Peak centroid channel	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_B_ENERGY_PAIRS_ORIG(sample_id, cal_energy, type)
Foreign keys	FK_B_ENERGY_PAIRS_ORIG(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_B_ENRGY_PRS_ORG_I_U_D, B_ENERGY_PAIRS_ORIG_B_I_U

5.1.33. GARDS_B_ENERGY_PAIRS_ORIG

Owner(s)	RMSMAN
Description	The gards_b_energy_pairs_orig table contains original beta energy calibration pairs as specified in the PHD.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
	decay_mode	*char(1)*	Decay type	Y
PI	cal_energy	*number*	Beta energy	N
	cal_error	*number*	Uncertainty of the centroid channel	Y
	channel	*number*	Peak centroid channel	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_B_ENERGY_PAIRS_ORIG(sample_id, cal_energy, type)
Foreign keys	FK_B_ENERGY_PAIRS_ORIG(sample_id, GARDS_SAMPLE_DATA)
Triggers	B_ENERGY_PAIRS_ORIG_B_I_U

5.1.34. GARDS_B_RESOLUTION_CAL

Owner(s)	RMSAUTO
Description	The gards_b_resolution_cal table contains beta resolution calibration coefficients calculated during analysis.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	type	*char(8)*	Calibration type	N
	coeff1	*number*	zero order coefficient	Y
	coeff2	*number*	First order coefficient	Y
	coeff3	*number*	Second order coefficient	Y
	coeff4	*number*	Third order coefficient	Y
	coeff5	*number*	Fourth order coefficient	Y
	coeff6	*number*	Fifth order coefficient	Y
	coeff7	*number*	Sixth order coefficient	Y
	coeff8	*number*	Seventh order coefficient	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_B_RESOLUTION_CAL(sample_id, type)
Foreign keys	FK_GARDS_B_RESOLUTION_CAL(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_B_RESOLUTION_CAL_B_I_U, GARDS_B_RESOLUTION_CAL_I_U_D

5.1.35. GARDS_B_RESOLUTION_CAL

Owner(s)	RMSMAN
Description	The gards_b_resolution_cal table contains beta resolution calibration coefficients calculated during analysis.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	type	*char(8)*	Calibration type	N
	coeff1	*number*	zero order coefficient	Y
	coeff2	*number*	First order coefficient	Y
	coeff3	*number*	Second order coefficient	Y
	coeff4	*number*	Third order coefficient	Y
	coeff5	*number*	Fourth order coefficient	Y
	coeff6	*number*	Fifth order coefficient	Y

	coeff7	*number*	Sixth order coefficient	Y
	coeff8	*number*	Seventh order coefficient	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_B_RESOLUTION_CAL(sample_id, type)
Foreign keys	FK_GARDS_B_RESOLUTION_CAL(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_B_RESOLUTION_CAL_B_I_U

5.1.36. GARDS_B_RESOLUTION_PAIRS

Owner(s)	RMSMAN
Description	The gards_b_resolution_pairs table contains beta resolution calibration pairs.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	resolution	*number*	Beta resolution (FWHM)	Y
PI	res_energy	*number*	Beta energy	N
	res_error	*number*	Uncertainty of the resolution	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_B_RESOLUTION_PAIRS(sample_id, res_energy, type)
Foreign keys	FK_B_RESOLUTION_PAIRS(sample_id, GARDS_SAMPLE_DATA)
Triggers	B_RESOLUTION_PAIRS_B_I_U

5.1.37. GARDS_B_RESOLUTION_PAIRS

Owner(s)	RMSAUTO
Description	The gards_b_resolution_pairs table contains beta resolution calibration pairs.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	resolution	*number*	Beta resolution (FWHM)	Y
PI	res_energy	*number*	Beta energy	N
	res_error	*number*	Uncertainty of the resolution	Y
	moddate	*date*	Date/time at which the row was last modi-	Y

			fied	
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_B_RESOLUTION_PAIRS(sample_id, res_energy, type)
Foreign keys	FK_B_RESOLUTION_PAIRS(sample_id, GARDS_SAMPLE_DATA)
Triggers	B_RESOLUTION_PAIRS_B_I_U, GARDS_B_RES_PAIRS_I_U_D

5.1.38. GARDS_B_RESOLUTION_PAIRS_ORIG

Owner(s)	RMSMAN
Description	The gards_b_resolution_pairs_orig table contains original beta resolution calibration pairs as specified in the PHD.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	resolution	*number*	Beta resolution (FWHM)	Y
PI	res_energy	*number*	Beta energy	N
	res_error	*number*	Uncertainty of the resolution	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_B_RESOLUTION_PAIRS_O(sample_id, res_energy, type)
Foreign keys	FK_B_RESOLUTION_PAIRS_ORIG(sample_id, GARDS_SAMPLE_DATA)
Triggers	B_RESOLUTION_PAIRS_ORIG_B_I_U

5.1.39. GARDS_B_RESOLUTION_PAIRS_ORIG

Owner(s)	RMSAUTO
Description	The gards_b_resolution_pairs_orig table contains original beta resolution calibration pairs as specified in the PHD.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	resolution	*number*	Beta resolution (FWHM)	Y
PI	res_energy	*number*	Beta energy	N
	res_error	*number*	Uncertainty of the resolution	Y
	moddate	*date*	Date/time at which the row was last modified	Y

PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_B_RESOLUTION_PAIRS_O(sample_id, res_energy, type)
Foreign keys	FK_B_RESOLUTION_PAIRS_ORIG(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_B_RES_PRS_ORIG_I_U_D, B_RESOLUTION_PAIRS_ORIG_B_I_U

5.1.40. GARDS_CAT_CRITERIA_TESTS

Owner(s)	RMSMAN
Description	The gards_cat_criteria_tests table contains an optional list of category criteria tests. The column active_flag is set to 0 if the test should not be run. A trigger updates the moddate column when any modification is made to another column.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	test_id	*number*	Unique identifier	N
I	test_code	*varchar2(24)*	Unique test code identifier string	Y
	test_name	*varchar2(48)*	Test name label for display	Y
	lower_limit	*number*	Lower limit bound of the test	Y
	upper_limit	*number*	Upper limit bound of the test	Y
	units	*varchar2(16)*	Units of test bounds	Y
	active_flag	*number*	0 if test is inactive	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_CAT_CRIT_TEST_ID(test_id)
Triggers	CAT_CRITERIA_B_I_U

5.1.41. GARDS_CAT_TEMPLATE

Owner(s)	RMSMAN
Description	The gards_cat_template table contains categorization initialization information for typical nuclides. (Note: It is obsoleted.)

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	station_id	*number*	Station identifier	N
PFI	detector_id	*number*	Detector identifier	N
PI	name	*varchar2(8)*	Nuclide name	N
	method_id	*number*	Method identifier	Y
	method_type	*number*	Method type	Y
	init_begin_date	*date*	Initialization date	Y

	init_end_date	*date*	Decommissioning date	Y
PI	begin_date	*date*	Initialization date	N
	end_date	*date*	Decommissioning date	Y
	analyst	*varchar2(30)*	Name of the analyst who generated the statistics	Y
	comment_text	*varchar2(256)*	Comment on the filter	Y
	upper_bound	*number*	Upper limit of the amount of a nuclide that can be acceptably found	Y
	lower_bound	*number*	Lower limit of the amount of a nuclide that can be acceptably found	Y
	central_value	*number*	Current estimate of the level of the random process	Y
	delta	*number*	Value of a variable used in bounds estimation (EWMA algorithm)	Y
	abscissa	*number*	Acceptable number of standard deviations	Y
	dev_tolerance	*number*	Tolerance	Y
	num_samples	*number*	Number of samples used to collect the average and define the standard deviation (RDC algorithm)	Y
	alpha	*number*	Value of a variable used in bounds estimation	Y
	gamma	*number*	Value of a variable used in bounds estimation	Y
	tstat	*number*	Value of a variable used in bounds estimation	Y
	xform	*number*	Code for transform function applied to measurement data	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_CAT_TEMPLATE(station_id, detector_id, name, begin_date)
Foreign keys	FK_DETECTOR(detector_id, GARDS_DETECTORS), FK_STATION(station_id, GARDS_STATIONS)
Triggers	CAT_TEMPLATE_B_I_U

5.1.42. GARDS_CODES

Owner(s)	RMSMAN
Description	The gards_codes table contains codes for items used in radionuclide monitoring system.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	type	*varchar2(15)*	Category of code	N

PI	code	*char(5)*	Code symbol	N
	description	*varchar2(40)*	Code explanation	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_CODES(type, code)
Indexes	PK_GARDS_CODES(type, code)
Triggers	CODES_B_I_U

5.1.43. GARDS_COMMENTS

Owner(s)	RMSAUTO
Description	The gards_comments table contains automated analysis and interactive review comments related to peaks in the gards_peaks table and nuclides in tables of gards_nucl_ided and/or gards_nucl_lines_ided.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
FI	sample_id	*number*	Sample identifier	Y
	peak_id	*number*	Peak identifier	Y
	nucl_name	*varchar2(8)*	Nuclide name	Y
PI	comment_id	*number*	Comment identifier	N
I	analyst	*varchar2(30)*	Name of the analyst who reviewed the sample	Y
	dtg	*date*	Entry date and time	Y
	comment_type	*number*	Comment code	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_COMMENTS(comment_id)
Foreign keys	FK_COMMENTS(sample_id, GARDS_SAMPLE_DATA)
Slaves	GARDS_USER_COMMENTS
Triggers	GARDS_COMMENTS_I_U_D, COMMENTS_B_I_U

5.1.44. GARDS_COMMENTS

Owner(s)	RMSMAN
Description	The gards_comments table contains automated analysis and interactive review comments related to peaks in the gards_peaks table and nuclides in tables of gards_nucl_ided and/or gards_nucl_lines_ided.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
FI	sample_id	*number*	Sample identifier	Y
	peak_id	*number*	Peak identifier	Y

	nucl_name	*varchar2(8)*	Nuclide name	Y
PI	comment_id	*number*	Comment identifier	N
I	analyst	*varchar2(30)*	Name of the analyst who reviewed the sample	Y
	dtg	*date*	Entry date and time	Y
	comment_type	*number*	Comment code	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_COMMENTS(comment_id)
Foreign keys	FK_COMMENTS(sample_id, GARDS_SAMPLE_DATA)
Slaves	GARDS_USER_COMMENTS
Triggers	COMMENTS_B_I_U

5.1.45. GARDS_COMMENTS_DEFS

Owner(s)	RMSMAN
Description	The gards_comments_defs table contains predefined comments for automated analysis and interactive review.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	comment_type	*number*	Comment code	N
	comment_text	*varchar2(256)*	Comment text	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	comment_category	*varchar2(10)*	Comment category	Y

Primary key	PK_COMMENTS_DEF(comment_type)
Triggers	COMMENTS_DEFS_B_I_U

5.1.46. GARDS_CSC_MODCOEFF_LIB

Owner(s)	RMSMAN
Description	The gards_csc_modcoeff_lib table contains the cascade summing ratios. (Note: It is obsoleted.)

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	detector_id	*number*	Detector identifier	N
PI	name	*varchar2(8)*	Nuclide name	N
	name_d	*varchar2(8)*	Daughter nuclide name	Y
PI	energy	*number*	Energy of the decay line	N
	abundance	*number*	Emission intensity per disintegration	Y

	app_abundance	*number*	Apparent abundance	Y
	app_abundance_err	*number*	Absolute error in apparent abundance	Y
	csc_ratio	*number*	Multiplier of the cascade summing correction	Y
	csc_ratio_err	*number*	Uncertainty in csc_ratio	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_CSC_MODCOEFF(detector_id, name, energy)
Foreign keys	FK_CSC_MODCFF_LIB(detector_id, GARDS_DETECTORS)
Triggers	CSC_MODCOEFF_LIB_B_I_U

5.1.47. GARDS_DATA_LOG

Owner(s)	RMSAUTO
Description	The gards_data_log table contains data describing radionuclide data messages received.

Pk/Fk/I	Column	Storage type	Description	Nullable
I	station_id	*number*	Station identifier	Y
I	data_type	*varchar2(10)*	Type of the data message	Y
	date_received	*date*	Date that sample was received	Y
I	dtg	*date*	Transmit date and time	Y
I	msg_id	*number*	Message identifier	Y
I	status	*char(1)*	Status	Y
	file_size	*number*	Size of data file in bytes	Y
	auth	*number*	Authentication status of the associated message	Y
I	rms_id	*number*	Internal identifier for message	Y
PI	dlid	*number*	Unique data log identifier	N
I	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_DATA_LOG(dlid)
Triggers	DATA_LOG_B_I_U

5.1.48. GARDS_DBROLE_OWNER

Owner(s)	RMSMAN
Description	The gards_dbrole_owner table contains information to determine the database user that owns the RMS roles.

Pk/Fk/I	Column	Storage type	Description	Nullable
	owner	*varchar2(12)*	Name of database user who owns the RMS roles for the MAR tool	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Triggers	DBROLE_OWNER_B_I_U

5.1.49. GARDS_DETECTORS

Owner(s)	RMSMAN
Description	The gards_detectors table contains detector characteristics.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	detector_id	*number*	Detector identifier	N
I	detector_code	*varchar2(9)*	Detector code	Y
	description	*varchar2(80)*	Detector description	Y
	lat	*number*	Latitude (degrees)	Y
	lon	*number*	Longitude (degrees)	Y
	type	*varchar2(6)*	Detector type	Y
	channels	*number*	Number of channels in spectrum	Y
	rated_efficiency	*number*	Rated efficiency of detector	Y
	rated_resolution	*number*	Rated resolution of detector	Y
	ecal_range_max	*number*	Maximum detector calibration energy (keV)	Y
	date_begin	*date*	Initialization date	Y
	date_end	*date*	Decommissioning date	Y
	status	*varchar2(2)*	Status of detector, if Y then data from this detector are automatically processed if N then they are not automatically processed	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_DETECTORS(detector_id)
Slaves	GARDS_PROC_PARAMS_TEMPLATE, GARDS_BG_CONFIG_PARAMS, GARDS_UPDATE_REFLINES, GARDS_UPDATE_PARAMS_TEMPLATE, GARDS_CAT_TEMPLATE, GARDS_EFFICIENCY_VGSL_PAIRS, GARDS_QC-PARAMS, GARDS_QCTARGETS, GARDS_STADET, GARDS_IRF, GARDS_BG_ENERGY_CAL_DIRECTIVE, GARDS_CSC_MODCOEFF_LIB, GARDS_XE_PROC_PARAMS_TEMPLATE
Triggers	DETECTORS_B_I_U

5.1.50. GARDS_DIST_SAMPLE_QUEUE

Owner(s)	RMSMAN

Description	The gards_dist_sample_queue table contains a list of sample id that are assigned to users.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	user_id	*number*	User identifier	Y
	role_id	*number*	Role identifier	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_DIST_SAMPLE_QUEUE(sample_id)
Foreign keys	FK_DIST_SAMPLE_QUEUE(sample_id, GARDS_SAMPLE_DATA)
Triggers	DIST_SAMPLE_QUEUE_B_I_U

5.1.51. GARDS_EFFICIENCY_CAL

Owner(s)	RMSMAN
Description	The gards_efficiency_cal table contains fitting coefficients of spectrum specific gamma efficiency calibration in log-log scale.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	degree	*number*	Polynomial degree of the efficiency equation	Y
	efftype	*char(8)*	Efficiency type	Y
	coeff1	*number*	zero order coefficient	Y
	coeff2	*number*	First order coefficient	Y
	coeff3	*number*	Second order coefficient	Y
	coeff4	*number*	Third order coefficient	Y
	coeff5	*number*	Fourth order coefficient	Y
	coeff6	*number*	Fifth order coefficient	Y
	coeff7	*number*	Sixth order coefficient	Y
	coeff8	*number*	Seventh order coefficient	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_EFFICIENCY_CAL(sample_id)
Foreign keys	FK_EFFICIENCY_CAL(sample_id, GARDS_SAMPLE_DATA)
Triggers	EFFICIENCY_CAL_B_I_U

5.1.52. GARDS_EFFICIENCY_CAL

Owner(s)	RMSAUTO

Description	The gards_efficiency_cal table contains fitting coefficients of spectrum specific gamma efficiency calibration in log-log scale.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	degree	*number*	Polynomial degree of the efficiency equation	Y
	efftype	*char(8)*	Efficiency type	Y
	coeff1	*number*	zero order coefficient	Y
	coeff2	*number*	First order coefficient	Y
	coeff3	*number*	Second order coefficient	Y
	coeff4	*number*	Third order coefficient	Y
	coeff5	*number*	Fourth order coefficient	Y
	coeff6	*number*	Fifth order coefficient	Y
	coeff7	*number*	Sixth order coefficient	Y
	coeff8	*number*	Seventh order coefficient	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_EFFICIENCY_CAL(sample_id)
Foreign keys	FK_EFFICIENCY_CAL(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_EFFICIENCY_CAL_I_U_D, EFFICIENCY_CAL_B_I_U

5.1.53. GARDS_EFFICIENCY_ERROR_CAL

Owner(s)	RMSAUTO
Description	The gards_efficiency_error_cal table contains gamma efficiency errors that are computed for the spectrum in case of the EMP configuration.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	degree	*number*	Polynomial degree of the efficiency equation	Y
PI	type	*char(8)*	Uncertainty type	N
	coeff1	*number*	Uncertainty of the zero order coefficient	Y
	coeff2	*number*	Uncertainty of the first order coefficient	Y
	coeff3	*number*	Uncertainty of the second order coefficient	Y
	coeff4	*number*	Uncertainty of the third order coefficient	Y
	coeff5	*number*	Uncertainty of the fourth order coefficient	Y
	coeff6	*number*	Uncertainty of the fifth order coefficient	Y
	coeff7	*number*	Uncertainty of the sixth order coefficient	Y
	coeff8	*number*	Uncertainty of the seventh order coefficient	Y

	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_EFFICIENCY_ERROR_CAL(sample_id, type)
Foreign keys	FK_EFFICIENCY_ERROR_CAL(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_EFFICIENCY_ERR_CAL_I_U_D, EFFICIENCY_ERR_CAL_B_I_U

5.1.54. GARDS_EFFICIENCY_ERROR_CAL

Owner(s)	RMSMAN
Description	The gards_efficiency_error_cal table contains gamma efficiency errors that are computed for the spectrum in case of the EMP configuration.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	degree	*number*	Polynomial degree of the efficiency equation	Y
PI	type	*char(8)*	Uncertainty type	N
	coeff1	*number*	Uncertainty of the zero order coefficient	Y
	coeff2	*number*	Uncertainty of the first order coefficient	Y
	coeff3	*number*	Uncertainty of the second order coefficient	Y
	coeff4	*number*	Uncertainty of the third order coefficient	Y
	coeff5	*number*	Uncertainty of the fourth order coefficient	Y
	coeff6	*number*	Uncertainty of the fifth order coefficient	Y
	coeff7	*number*	Uncertainty of the sixth order coefficient	Y
	coeff8	*number*	Uncertainty of the seventh order coefficient	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_EFFICIENCY_ERROR_CAL(sample_id, type)
Foreign keys	FK_EFFICIENCY_ERROR_CAL(sample_id, GARDS_SAMPLE_DATA)
Triggers	EFFICIENCY_ERROR_CAL_B_I_U

5.1.55. GARDS_EFFICIENCY_IDC_PAIRS

Owner(s)	RMSAUTO
Description	The gards_efficiency_idc_pairs table contains gamma efficiency pairs calculated by the IDC analysis software.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	detector_id	*number*	Detector identifier	N
PI	station_id	*number*	Station identifier	N
PI	effic_energy	*number*	Gamma energy	N

	efficiency	*number*	Efficiency	N
	effic_error	*number*	Uncertainty of the efficiency	N
PI	begin_date	*date*	Initialization date	N
	end_date	*date*	Decommissioning date	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	sample_id	*number*	Sample identifier	Y

Primary key	PK_GARDS_EFF_IDC_PAIRS(detector_id, station_id, begin_date, effic_energy)
Triggers	EFFICIENCY_IDC_PAIRS_B_I_U, EFFICIENCY_IDC_PAIRS_I_U_D

5.1.56. GARDS_EFFICIENCY_IDC_PAIRS

Owner(s)	RMSMAN
Description	The gards_efficiency_idc_pairs table contains gamma efficiency pairs calculated by the IDC analysis software.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	detector_id	*number*	Detector identifier	N
PI	station_id	*number*	Station identifier	N
PI	effic_energy	*number*	Gamma energy	N
	efficiency	*number*	Efficiency	N
	effic_error	*number*	Uncertainty of the efficiency	N
PI	begin_date	*date*	Initialization date	N
	end_date	*date*	Decommissioning date	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	sample_id	*number*	Sample identifier	Y

Primary key	PK_GARDS_EFF_IDC_PAIRS(detector_id, station_id, begin_date, effic_energy)
Triggers	EFFICIENCY_IDC_PAIRS_B_I_U

5.1.57. GARDS_EFFICIENCY_PAIRS

Owner(s)	RMSAUTO
Description	The gards_efficiency_pairs table contains gamma efficiency pairs as specified in the PHD.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	effic_energy	*number*	Gamma energy	N
	efficiency	*number*	Efficiency	Y

	effic_error	*number*	Uncertainty of the efficiency	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_EFFICIENCY_PAIRS(sample_id, effic_energy)
Foreign keys	FK_EFFICIENCY_PAIRS(sample_id, GARDS_SAMPLE_DATA)
Triggers	EFFICIENCY_PAIRS_B_I_U, GARDS_EFFICIENCY_PAIRS_I_U_D

5.1.58. GARDS_EFFICIENCY_PAIRS

Owner(s)	RMSMAN
Description	The gards_efficiency_pairs table contains gamma efficiency pairs as specified in the PHD.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	effic_energy	*number*	Gamma energy	N
I	efficiency	*number*	Efficiency	Y
	effic_error	*number*	Uncertainty of the efficiency	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_EFFICIENCY_PAIRS(sample_id, effic_energy)
Foreign keys	FK_EFFICIENCY_PAIRS(sample_id, GARDS_SAMPLE_DATA)
Triggers	EFFICIENCY_PAIRS_B_I_U

5.1.59. GARDS_EFFICIENCY_VGSL_PAIRS

Owner(s)	RMSMAN
Description	The GARDS_EFFICIENCY_VGSL_PAIRS table contains detector specific efficiency pairs simulated by Monte-Carlo method

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	detector_id	*number*	Detector identifier	N
PI	effic_energy	*number*	Gamma energy	N
	efficiency	*number*	Efficiency	Y
	effic_error	*number*	Uncertainty of the efficiency	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	begin_date	*date*	Initialization date	N
PI	end_date	*date*	Decommissioning date	N

Primary key	PK_GARDS_EFF_VGSL_PAIRS(detector_id, begin_date, end_date, effic_energy)
Foreign keys	FK_EFFICIENCY_VGSL_PAIRS(detector_id, GARDS_DETECTORS)
Triggers	EFF_VGSL_PAIRS_B_I_U

5.1.60. GARDS_ENERGY_CAL

Owner(s)	RMSAUTO
Description	The gards_energy_cal table contains energy calibration coefficients associated with the spectrum analysis.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
	coeff1	*number*	zero order coefficient	Y
	coeff2	*number*	First order coefficient	Y
	coeff3	*number*	Second order coefficient	Y
	coeff4	*number*	Third order coefficient	Y
	coeff5	*number*	Fourth order coefficient	Y
	coeff6	*number*	Fifth order coefficient	Y
	coeff7	*number*	Sixth order coefficient	Y
	coeff8	*number*	Seventh order coefficient	Y
	energy_units	*char(3)*	Energy units	Y
	cnv_factor	*number*	Conversion to keV	Y
	ape	*number*	Average prediction error	Y
	det	*number*	Determinant of the weighted design matrix, a measure of the spread of fitted data points and the error in the fitted points	Y
	mse	*number*	Mean-squared error of the fit, a measure of how large the residuals are	Y
	tstat	*number*	Percentage point of the t-statistic for Type I error with a probability set to 99%	Y
	score	*number*	Score used when comparing this ECR to other ECRs, a measure of both the ape and determinant	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y
PI	type	*char(8)*	Calibration type	N

Primary key	PK_GARDS_ENERGY_CAL(sample_id, type)
Foreign keys	FK_ENERGY_CAL(sample_id, GARDS_SAMPLE_DATA)
Triggers	ENERGY_CAL_B_I_U, GARDS_ENERGY_CAL_I_U_D

5.1.61. GARDS_ENERGY_CAL

Owner(s)	RMSMAN
Description	The gards_energy_cal table contains energy calibration coefficients associated with the spectrum analysis.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	coeff1	*number*	zero order coefficient	Y
	coeff2	*number*	First order coefficient	Y
	coeff3	*number*	Second order coefficient	Y
	coeff4	*number*	Third order coefficient	Y
	coeff5	*number*	Fourth order coefficient	Y
	coeff6	*number*	Fifth order coefficient	Y
	coeff7	*number*	Sixth order coefficient	Y
	coeff8	*number*	Seventh order coefficient	Y
	energy_units	*char(3)*	Energy units	Y
	cnv_factor	*number*	Conversion to keV	Y
	ape	*number*	Average prediction error	Y
	det	*number*	Determinant of the weighted design matrix, a measure of the spread of fitted data points and the error in the fitted points	Y
	mse	*number*	Mean-squared error of the fit, a measure of how large the residuals are	Y
	tstat	*number*	Percentage point of the t-statistic for Type I error with a probability set to 99%	Y
	score	*number*	Score used when comparing this ECR to other ECRs, a measure of both the ape and determinant	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_ENERGY_CAL(sample_id, type)
Foreign keys	FK_ENERGY_CAL(sample_id, GARDS_SAMPLE_DATA)
Triggers	ENERGY_CAL_B_I_U

5.1.62. GARDS_ENERGY_CAL_COV

Owner(s)	RMSMAN
Description	The GARDS_ENERGY_CAL_COV table contains the covariance table for each

	coefficient of the energy calibration for a given sample_id

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number(22,0)*	Sample identifier	N
PI	row_index	*number(10,0)*	Row index	N
PI	col_index	*number(10,0)*	Column index	N
	moddate	*date*	Date/time at which the row was last modified	Y
	coeff	*float(126)*	Calibration coefficient	Y
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_ENERGY_CAL_COV(sample_id, type, row_index, col_index)
Foreign keys	FK_ENERGY_CAL_COV(sample_id, GARDS_SAMPLE_DATA)
Triggers	ENERGY_CAL_COV_B_I_U

5.1.63. GARDS_ENERGY_CAL_COV

Owner(s)	RMSAUTO
Description	The GARDS_ENERGY_CAL_COV table contains the covariance table for each coefficient of the energy calibration for a given sample_id

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number(22,0)*	Sample identifier	N
PI	row_index	*number(10,0)*	Row index	N
PI	col_index	*number(10,0)*	Column index	N
	moddate	*date*	Date/time at which the row was last modified	Y
	coeff	*float(126)*	Calibration coefficient	Y
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_ENERGY_CAL_COV(sample_id, type, row_index, col_index)
Foreign keys	FK_ENERGY_CAL_COV(sample_id, GARDS_SAMPLE_DATA)
Triggers	ENERGY_CAL_COV_B_I_U, GARDS_ENERGY_CAL_COV_I_U_D

5.1.64. GARDS_ENERGY_CAL_ORIG

Owner(s)	RMSAUTO
Description	The gards_energy_cal_orig table contains original energy calibration associated with the spectrum (calculated using the channel-energy pair data).

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	coeff1	*number*	zero order coefficient	Y
	coeff2	*number*	First order coefficient	Y
	coeff3	*number*	Second order coefficient	Y
	coeff4	*number*	Third order coefficient	Y
	coeff5	*number*	Fourth order coefficient	Y
	coeff6	*number*	Fifth order coefficient	Y
	coeff7	*number*	Sixth order coefficient	Y
	coeff8	*number*	Seventh order coefficient	Y
	energy_units	*char(3)*	Energy units	Y
	cnv_factor	*number*	Conversion to keV	Y
	ape	*number*	Average prediction error	Y
	det	*number*	Determinant of the weighted design matrix, a measure of the spread of fitted data points and the error in the fitted points	Y
	mse	*number*	Mean-squared error of the fit, a measure of how large the residuals are	Y
	tstat	*number*	Percentage point of the t-statistic for Type I error with a probability set to 99%	Y
	score	*number*	Score used when comparing this ECR to other ECRs, a measure of both the ape and determinant	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y
PI	type	*char(8)*	Calibration type	N

Primary key	PK_GARDS_ENERGY_CAL_ORIG(sample_id, type)
Foreign keys	FK_ENERGY_CAL_ORIG(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_ENERGY_CAL_ORIG_I_U_D, ENERGY_CAL_ORIG_B_I_U

5.1.65. GARDS_ENERGY_CAL_ORIG

Owner(s)	RMSMAN
Description	The gards_energy_cal_orig table contains original energy calibration associated with the spectrum (calculated using the channel-energy pair data).

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N

	coeff1	*number*	zero order coefficient	Y
	coeff2	*number*	First order coefficient	Y
	coeff3	*number*	Second order coefficient	Y
	coeff4	*number*	Third order coefficient	Y
	coeff5	*number*	Fourth order coefficient	Y
	coeff6	*number*	Fifth order coefficient	Y
	coeff7	*number*	Sixth order coefficient	Y
	coeff8	*number*	Seventh order coefficient	Y
	energy_units	*char(3)*	Energy units	Y
	cnv_factor	*number*	Conversion to keV	Y
	ape	*number*	Average prediction error	Y
	det	*number*	Determinant of the weighted design matrix, a measure of the spread of fitted data points and the error in the fitted points	Y
	mse	*number*	Mean-squared error of the fit, a measure of how large the residuals are	Y
	tstat	*number*	Percentage point of the t-statistic for Type I error with a probability set to 99%	Y
	score	*number*	Score used when comparing this ECR to other ECRs, a measure of both the ape and determinant	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_ENERGY_CAL_ORIG(sample_id, type)
Foreign keys	FK_ENERGY_CAL_ORIG(sample_id, GARDS_SAMPLE_DATA)
Triggers	ENERGY_CAL_ORIG_B_I_U

5.1.66. GARDS_ENERGY_PAIRS

Owner(s)	RMSMAN
Description	The gards_energy_pairs table contains gamma energy calibration pairs.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	cal_energy	*number*	Gamma energy	N
	channel	*number*	Peak centroid channel	Y
	cal_error	*number*	Uncertainty of the centroid channel	Y
	moddate	*date*	Date/time at which the row was last modi-	Y

			fied	
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_ENERGY_PAIRS(sample_id, cal_energy, type)
Foreign keys	FK_ENERGY_PAIRS(sample_id, GARDS_SAMPLE_DATA)
Triggers	ENERGY_PAIRS_B_I_U

5.1.67. GARDS_ENERGY_PAIRS

Owner(s)	RMSAUTO
Description	The gards_energy_pairs table contains gamma energy calibration pairs.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	cal_energy	*number*	Gamma energy	N
	channel	*number*	Peak centroid channel	Y
	cal_error	*number*	Uncertainty of the centroid channel	Y
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	type	*char(8)*	Calibration type	N

Primary key	PK_GARDS_ENERGY_PAIRS(sample_id, cal_energy, type)
Foreign keys	FK_ENERGY_PAIRS(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_ENERGY_PAIRS_I_U_D, ENERGY_PAIRS_B_I_U

5.1.68. GARDS_ENERGY_PAIRS_ORIG

Owner(s)	RMSAUTO
Description	The gards_energy_pairs_orig table contains original gamma energy calibration pairs specified in the PHD.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	cal_energy	*number*	Gamma energy	N
	channel	*number*	Peak centroid channel	Y
	cal_error	*number*	Uncertainty of the centroid channel	Y
	moddate	*date*	Date/time at which the row was last modified	Y

	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y
PI	type	*char(8)*	Calibration type	N

Primary key	PK_GARDS_ENERGY_PAIRS_ORIG(sample_id, cal_energy, type)
Foreign keys	FK_ENERGY_PAIRS_ORIG(sample_id, GARDS_SAMPLE_DATA)
Triggers	ENERGY_PAIRS_ORIG_B_I_U, GARDS_ENERGY_PAIRS_ORIG_I_U_D

5.1.69. GARDS_ENERGY_PAIRS_ORIG

Owner(s)	RMSMAN
Description	The gards_energy_pairs_orig table contains original gamma energy calibration pairs specified in the PHD.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	cal_energy	*number*	Gamma energy	N
	channel	*number*	Peak centroid channel	Y
	cal_error	*number*	Uncertainty of the centroid channel	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_ENERGY_PAIRS_ORIG(sample_id, cal_energy, type)
Foreign keys	FK_ENERGY_PAIRS_ORIG(sample_id, GARDS_SAMPLE_DATA)
Triggers	ENERGY_PAIRS_ORIG_B_I_U

5.1.70. GARDS_ENVIRONMENT

Owner(s)	RMSAUTO
Description	The gards_environment table contains atmospheric conditions and related sample information. This table is applicable to PHDs sent in IMS1.0 format or earlier. It does not apply to messages in IMS2.0 format or later.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
	flow_rate	*number*	Flow rate through filter (m3/h)	Y
	pressure	*number*	Outside pressure (mbar)	Y
	temperature	*number*	Outside temperature (degrees Celsius)	Y
	end_env_time	*date*	End date of environment data	Y
	end_env_time_se	*number*	End time of environment data (seconds)	Y

	c			
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_ENVIRONMENT(sample_id)
Foreign keys	FK_ENVIRONMENT(sample_id, GARDS_SAMPLE_DATA)
Triggers	ENVIRONMENT_B_I_U

5.1.71. GARDS_FLAGS

Owner(s)	RMSAUTO
Description	The gards_flags table contains the name and thresholds for each of the tests run during rms_DBflags.

Pk/Fk/I	Column	Storage type	Description	Nullable
	flag_id	*number(8,0)*	Flag identifier	Y
	name	*varchar2(32)*	Name of the event screening test	Y
	threshold	*number*	Value against which the results in the test column are compared	Y
	units	*varchar2(16)*	Units of test bounds	Y
	test	*varchar2(8)*	Calculated result of the test	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Triggers	FLAGS_B_I_U

5.1.72. GARDS_FLAGS

Owner(s)	RMSMAN
Description	The gards_flags table contains the name and thresholds for each of the tests run during rms_DBflags.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	flag_id	*number(8,0)*	Flag identifier	N
	name	*varchar2(32)*	Name of the event screening test	Y
	threshold	*number*	Value against which the results in the test column are compared	Y
	units	*varchar2(16)*	Units of test bounds	Y
	test	*varchar2(8)*	Calculated result of the test	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	SYS_C0028368(flag_id)
Indexes	SYS_C0028368(flag_id)
Triggers	FLAGS_B_I_U

5.1.73. GARDS_FPE

Owner(s)	RMSAUTO
Description	The gards_fpe table contains one record for each sample associated with a fission product event.

Pk/Fk/I	Column	Storage type	Description	Nullable
	fpid	*number*	Fission product identifier	Y
	revid	*number*	Revision number	Y
	dtg	*date*	Entry date and time	Y
FI	sample_id	*number*	Sample identifier	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Foreign keys	FK_FPE(sample_id, GARDS_SAMPLE_DATA)
Indexes	FPE_NDX(sample_id)
Triggers	FPE_B_I_U

5.1.74. GARDS_FPE

Owner(s)	RMSMAN
Description	The gards_fpe table contains one record for each sample associated with a fission product event.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	fpid	*number*	Fission product identifier	N
	revid	*number*	Revision number	Y
	dtg	*date*	Entry date and time	Y
FI	sample_id	*number*	Sample identifier	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	GARDS_FPE_PK(fpid)
Foreign keys	FK_FPE(sample_id, GARDS_SAMPLE_DATA)
Indexes	PK_GARDS_FPE(fpid), FPE_NDX(sample_id)
Triggers	FPE_B_I_U

5.1.75. GARDS_HISTOGRAM

Owner(s)	RMSAUTO
Description	The gards_histogram table contains the pulse height data of the beta-gamma coincidence spectrum, e. g. the counts in each beta-gamma energy channel within a 2-D matrix format.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	filename	*varchar2(256)*	Name of the file containing the histogram data	Y
	g_channels	*number*	Number of gamma channels in histogram	Y
	b_channels	*number*	Number of beta channels in histogram	Y
	g_energy_span	*number*	Gamma energy span of detector calibration (keV)	Y
	b_energy_span	*number*	Beta energy span of detector calibration (keV)	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_HISTOGRAM(sample_id)
Foreign keys	FK_HISTOGRAM(sample_id, GARDS_SAMPLE_DATA)
Triggers	HISTOGRAM_B_I_U

5.1.76. GARDS_INTERVAL

Owner(s)	RMSAUTO
Description	The gards_interval table contains data used to update RMS data workflow.

Pk/Fk/I	Column	Storage type	Description	Nullable
	class	*varchar2(16)*	Station name	Y
	name	*varchar2(16)*	Detector/system name	Y
	start_time	*float(53)*	Start time of the period	Y
	end_time	*float(53)*	End time of the period	Y
	state	*varchar2(16)*	Specific activity of detector/system	Y
I	moddate	*date*	Date/time at which the row was last modified	Y
I	lddate	*date*	Load date	Y
I	intvlid	*number*	Unique interval identifier	Y

Triggers	INTERVAL_B_I_U, INTERVAL_S_I

5.1.77. GARDS_IRF

Owner(s)	RMSMAN
Description	The gards_irf table contains the isotope response function, summing corrections as a function of the energy for a given Nuclide and a given Detector, which is determined by Monte-Carlo method normally.

Pk/Fk/I	Column	Storage type	Description	Nullable
FI	detector_id	*number*	Detector identifier	N
	energy	*number*	Gamma energy	Y
	irf	*number*	Isotope response function	Y
	irf_error	*number*	Uncertainty of the isotope response function	Y
	nuclide_name	*varchar2(8)*	Nuclide name	Y
	sum_corr	*number*	Summing cascade correction factor	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	begin_date	*date*	Initialization date	Y
	end_date	*date*	Decommissioning date	Y

Foreign keys	FK_IRF(detector_id, GARDS_DETECTORS)
Indexes	IRF_NDX(detector_id)
Triggers	IRF_B_I_U

5.1.78. GARDS_LAB_CATEGORY_DESCRIPTION

Owner(s)	RMSMAN
Description	The gards_lab_category_description table describes the different sample categories that can be sent to the IDC.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	lab_sample_category	*varchar2(2)*	Report sample category	N
	description	*varchar2(256)*	Description of the lab_sample_category	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_LAB_CATEGORY_DESCRIPTION(lab_sample_category)
Triggers	LAB_CAT_DESC_B_I_U

5.1.79. GARDS_MDAS2REPORT

Owner(s)	RMSMAN
Description	The GARDS_MDAS2REPORT table contains the list of nuclides which have their minimum detectable activities reported in radionuclide reports

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	name	*varchar2(8)*	Nuclide name	N
P	type	*varchar2(16)*	Nuclide type	Y
	mda_min	*number*	Minimum of the minimum detectable activities	Y
	mda_max	*number*	Maximum of the minimum detectable activities	Y
PI	sample_type	*varchar2(2)*	Sample type	N
	dtg_begin	*date*	Begin date and time	Y
	dtg_end	*date*	End date and time	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_MDAS2REPORT(name, sample_type)

5.1.80. GARDS_MET_DATA

Owner(s)	RMSAUTO
Description	The gards_met_data table contains station local meteorological data.

Pk/Fk/I	Column	Storage type	Description	Nullable
FI	station_id	*number*	Station identifier	Y
	ave_humidity	*number*	Average humidity (percent relative humidity)	Y
	ave_out_temp	*number*	Average outside temperature (deg. C)	Y
	ave_pressure	*number*	Average atmospheric pressure.	Y
	ave_wind_dir	*number*	Average wind direction (degrees from North)	Y
	ave_wind_speed	*number*	Average wind speed (km/h)	Y
	total_rainfall	*number*	Total rainfall (mm)	Y
I	start_time	*date*	Start time of the period	Y
I	end_time	*date*	End time of the period	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	met_id	*number*	Unique meteorological data identifier	N
F	met_group_id	*number*	MET group identifier	Y

Primary key	PK_GARDS_MET_DATA(met_id)
Foreign keys	FK_MET_GROUP_ID_MET_HEADER(met_group_id, GARDS_MET_HEADER), FK_MET_DATA(station_id, GARDS_STATIONS)
Triggers	MET_DATA_B_I_U, MET_DATA_S_I

5.1.81. GARDS_MET_HEADER

Owner(s)	RMSAUTO
Description	The gards_met_header table contains the header information for MET messages.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	met_group_id	*number*	MET group identifier	N
FI	station_id	*number*	Station identifier	Y
I	start_time	*date*	Start time of the period	Y
I	end_time	*date*	End time of the period	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_MET_HEADER(met_group_id)
Foreign keys	FK_MET_HEADER(station_id, GARDS_STATIONS)
Slaves	GARDS_MET_DATA
Triggers	MET_HEADER_B_I_U, MET_HEADER_S_I

5.1.82. GARDS_NIC

Owner(s)	RMSAUTO
Description	Obsolete according to /ops/software/rn/doc/documentation/rnpipeline/DevLAN_OG-RN.3.3.doc

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	sample_id	*number*		N
	station_id	*number*		Y
PI	name	*varchar2(8)*		N
	dtg	*date*		Y
	category	*number*		Y
	central_value	*number*		Y
	del	*number*		Y
	upper_lim	*number*		Y
	lower_lim	*number*		Y
PI	sample_status	*varchar2(1)*		N
	activity	*number*		Y
	hold	*number*		Y
	moddate	*date*		Y

Primary key	PK_GARDS_NIC(sample_id, name, sample_status)
Indexes	PK_GARDS_NIC(sample_id, name, sample_status)

5.1.83. GARDS_NIC

Owner(s)	RMSMAN
Description	Obsolete according to /ops/software/rn/doc/documentation/rnpipeline/DevLAN_OG-RN.3.3.doc

Pk/Fk/I	Column	Storage type	Description	Nullable
	sample_id	*number*		Y
	station_id	*number*		Y
	name	*varchar2(8)*		Y
	dtg	*date*		Y
	category	*number*		Y
	central_value	*number*		Y
	del	*number*		Y
	upper_lim	*number*		Y
	lower_lim	*number*		Y
	sample_status	*varchar2(1)*		Y
	activity	*number*		Y
	hold	*number*		Y
	moddate	*date*		Y

5.1.84. GARDS_NIC_INIT

Owner(s)	RMSMAN
Description	Obsolete according to /ops/software/rn/doc/documentation/rnpipeline/DevLAN_OG-RN.3.3.doc

Pk/Fk/I	Column	Storage type	Description	Nullable
	station_id	*number*		Y
	name	*varchar2(8)*		Y
	analyst	*varchar2(30)*		Y
	rec_begin	*date*		Y
	rec_end	*date*		Y
	init_begin	*date*		Y
	init_end	*date*		Y
	alpha	*number*		Y
	gamma	*number*		Y
	xform	*number*		Y
	tstat	*number*		Y
	central_value	*number*		Y

	del	*number*		Y
	upper_lim	*number*		Y
	lower_lim	*number*		Y
	comments	*varchar2(256)*		Y
	hold	*number*		Y
	init_detector_id	*number*		Y

5.1.85. GARDS_NOTIFY

Owner(s)	RMSAUTO
Description	The gards_notify table contains contact information for specific events. When the event occurs a message is automatically sent to the email_addr of the specified recipient(s).

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	event	*varchar2(10)*	Type of occurrence	N
PI	email_addr	*varchar2(80)*	Recipient email addresses	N
	desciption	*varchar2(80)*	General description of occurrence	Y
PI	dtg_begin	*date*	Begin date and time	N
	dtg_end	*date*	End date and time	Y
	poc_id	*number*	Point of contact identifier	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	description	*varchar2(80)*	General description of occurrence	Y

Primary key	PK_GARDS_NOTIFY(event, email_addr, dtg_begin)
Triggers	NOTIFY_B_I_U

5.1.86. GARDS_NOTIFY

Owner(s)	RMSMAN
Description	The gards_notify table contains contact information for specific events. When the event occurs a message is automatically sent to the email_addr of the specified recipient(s).

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	event	*varchar2(10)*	Type of occurrence	N
PI	email_addr	*varchar2(80)*	Recipient email addresses	N
	desciption	*varchar2(80)*	General description of occurrence	Y
PI	dtg_begin	*date*	Begin date and time	N
	dtg_end	*date*	End date and time	Y

FI	poc_id	*number*	Point of contact identifier	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_NOTIFY(event, email_addr, dtg_begin)
Foreign keys	FK_NOTIFY_POC(poc_id, GARDS_POC)
Indexes	NOTIFY_NDX(poc_id), PK_GARDS_NOTIFY(event, email_addr, dtg_begin)
Triggers	NOTIFY_B_I_U

5.1.87. GARDS_NUCL2QUANTIFY

Owner(s)	RMSMAN
Description	The gards_nucl2quantify table contains natural radionuclides to be quantified in radionuclide reports for particulates.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	name	*varchar2(8)*	Nuclide name	N
PI	dtg_begin	*date*	Begin date and time	N
	dtg_end	*date*	End date and time	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_NUCL2QUANTIFY(name, dtg_begin)
Triggers	NUCL2QUANTIFY_B_I_U

5.1.88. GARDS_NUCL_IDED

Owner(s)	RMSMAN
Description	The gards_nucl_ided table contains information regarding nuclides identified.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	station_id	*number*	Station identifier	Y
	detector_id	*number*	Detector identifier	Y
I	nuclide_id	*number*	Nuclide identifier	Y
PI	name	*varchar2(8)*	Nuclide name	N
	type	*varchar2(16)*	Nuclide type	Y
	halflife	*varchar2(23)*	Half-life	Y
	ave_activ	*number*	Average activity concentration	Y
	ave_activ_err	*number*	Uncertainty of the average activity concentration	Y
	activ_key	*number*	Activity concentration of the key line	Y

	activ_key_err	*number*	Uncertainty of the activity concentration	Y
	mda	*number*	Minimum detectable activity concentration	Y
	mda_err	*number*	Uncertainty of the minimum detectable activity concentration	Y
	nid_flag	*number*	Flag of whether the nuclide was detected or not	Y
	activ_decay	*number*	Activity decay factor	Y
	activ_decay_err	*number*	Uncertainty of activity decay factor	Y
	comp_confid	*number*	Computed confidence index	Y
	report_mda	*number*	Indicator of whether MDA is to be reported	Y
	pd_mod_flag	*number*	Flag indicating whether or not the nuclide's activity was modified by the parent/daughter calculation.	Y
	csc_ratio	*number*	Multiplier of the cascade summing correction	Y
	csc_ratio_err	*number*	Uncertainty in csc_ratio	Y
	csc_mod_flag	*number*	Flag indicating if the cascade summing correction is performed	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	ave_activ_acq_start	*number*	Average activity at the start of acquisition	Y
	ave_activ_err_acq_start	*number*	Uncertainty of the average activity at the start of acquisition	Y
	activ_key_acq_start	*number*	Activity of the key line at the start of acquisition	Y
	activ_key_err_acq_start	*number*	Uncertainty of the activity of the key line at the start of acquisition	Y
	mda_acq_start	*number*	Minimum detectable activity at the start of acquisition	Y
	mda_err_acq_start	*number*	Uncertainty of the minimum detectable activity at the start of acquisition	Y

Primary key	PK_NUCL_IDED(sample_id, name)
Foreign keys	FK_NUCL_IDED(sample_id, GARDS_SAMPLE_DATA)
Slaves	GARDS_NUCL_IDED_ORIG
Triggers	NUCL_IDED_B_I_U

5.1.89. GARDS_NUCL_IDED

Owner(s)	RMSAUTO
Description	The gards_nucl_ided table contains information regarding nuclides identified.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	station_id	*number*	Station identifier	Y
	detector_id	*number*	Detector identifier	Y
I	nuclide_id	*number*	Nuclide identifier	Y
PI	name	*varchar2(8)*	Nuclide name	N
	type	*varchar2(16)*	Nuclide type	Y
	halflife	*varchar2(23)*	Half-life	Y
	ave_activ	*number*	Average activity concentration	Y
	ave_activ_err	*number*	Uncertainty of the average activity concentration	Y
	activ_key	*number*	Activity concentration of the key line	Y
	activ_key_err	*number*	Uncertainty of the activity concentration	Y
	mda	*number*	Minimum detectable activity concentration	Y
	mda_err	*number*	Uncertainty of the minimum detectable activity concentration	Y
	nid_flag	*number*	Flag of whether the nuclide was detected or not	Y
	activ_decay	*number*	Activity decay factor	Y
	activ_decay_err	*number*	Uncertainty of activity decay factor	Y
	comp_confid	*number*	Computed confidence index	Y
	report_mda	*number*	Indicator of whether MDA is to be reported	Y
	pd_mod_flag	*number*	Flag indicating whether or not the nuclide's activity was modified by the parent/daughter calculation.	Y
	csc_ratio	*number*	Multiplier of the cascade summing correction	Y
	csc_ratio_err	*number*	Uncertainty in csc_ratio	Y
	csc_mod_flag	*number*	Flag indicating if the cascade summing correction is performed	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	ave_activ_acq_start	*number*	Average activity at the start of acquisition	Y
	ave_activ_err_acq_start	*number*	Uncertainty of the average activity at the start of acquisition	Y
	activ_key_acq_start	*number*	Activity of the key line at the start of acquisition	Y
	activ_key_err_acq_start	*number*	Uncertainty of the activity of the key line at the start of acquisition	Y
	mda_acq_start	*number*	Minimum detectable activity at the start of acquisition	Y

	mda_err_acq_start	*number*	Uncertainty of the minimum detectable activity at the start of acquisition	Y

Primary key	PK_NUCL_IDED(sample_id, name)
Foreign keys	FK_NUCL_IDED(sample_id, GARDS_SAMPLE_DATA)
Slaves	GARDS_NUCL_IDED_ORIG
Triggers	NUCL_IDED_B_I_U, UPDATE_NUCL_ORIG_I_U_D, GARDS_NUCL_IDED_I_U_D

5.1.90. GARDS_NUCL_IDED_ORIG

Owner(s)	RMSAUTO
Description	The gards_nucl_ided_orig table contains information regarding nuclides identified during automated analysis.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
	station_id	*number*	Station identifier	Y
	detector_id	*number*	Detector identifier	Y
I	nuclide_id	*number*	Nuclide identifier	Y
PFI	name	*varchar2(8)*	Nuclide name	N
	type	*varchar2(16)*	Nuclide type	Y
	halflife	*varchar2(23)*	Half-life	Y
	ave_activ	*number*	Average activity concentration	Y
	ave_activ_err	*number*	Uncertainty of the average activity concentration	Y
	activ_key	*number*	Activity concentration of the key line	Y
	activ_key_err	*number*	Uncertainty of the activity concentration	Y
	mda	*number*	Minimum detectable activity concentration	Y
	mda_err	*number*	Uncertainty of the minimum detectable activity concentration	Y
	nid_flag	*number*	Flag of whether the nuclide was detected or not	Y
	activ_decay	*number*	Activity decay factor	Y
	activ_decay_err	*number*	Uncertainty of activity decay factor	Y
	comp_confid	*number*	Computed confidence index	Y
	report_mda	*number*	Indicator of whether MDA is to be reported	Y
	pd_mod_flag	*number*	Flag indicating whether or not the nuclide's activity was modified by the parent/daughter calculation.	Y
	csc_ratio	*number*	Multiplier of the cascade summing correction	Y

	csc_ratio_err	*number*	Uncertainty in csc_ratio	Y
	csc_mod_flag	*number*	Flag indicating if the cascade summing correction is performed	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	ave_activ_acq_start	*number*	Average activity at the start of acquisition	Y
	ave_activ_err_acq_start	*number*	Uncertainty of the average activity at the start of acquisition	Y
	activ_key_acq_start	*number*	Activity of the key line at the start of acquisition	Y
	activ_key_err_acq_start	*number*	Uncertainty of the activity of the key line at the start of acquisition	Y
	mda_acq_start	*number*	Minimum detectable activity at the start of acquisition	Y
	mda_err_acq_start	*number*	Uncertainty of the minimum detectable activity at the start of acquisition	Y

Primary key	PK_NUCL_IDED_ORIG(sample_id, name)
Foreign keys	FK_SID_NUCLIDEID(sample_id, GARDS_NUCL_IDED), FK_SID_NUCLIDEID(name, GARDS_NUCL_IDED), FK_NUCL_IDED_ORIG(sample_id, GARDS_SAMPLE_DATA)
Triggers	NUCL_IDED_ORIG_B_I_U, GARDS_NUCL_IDED_ORIG_I_U_D

5.1.91. GARDS_NUCL_IDED_ORIG

Owner(s)	RMSMAN
Description	The gards_nucl_ided_orig table contains information regarding nuclides identified during automated analysis.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	station_id	*number*	Station identifier	Y
	detector_id	*number*	Detector identifier	Y
I	nuclide_id	*number*	Nuclide identifier	Y
PI	name	*varchar2(8)*	Nuclide name	N
	type	*varchar2(16)*	Nuclide type	Y
	halflife	*varchar2(23)*	Half-life	Y
	ave_activ	*number*	Average activity concentration	Y
	ave_activ_err	*number*	Uncertainty of the average activity concentration	Y
	activ_key	*number*	Activity concentration of the key line	Y
	activ_key_err	*number*	Uncertainty of the activity concentration	Y

	mda	*number*	Minimum detectable activity concentration	Y
	mda_err	*number*	Uncertainty of the minimum detectable activity concentration	Y
	nid_flag	*number*	Flag of whether the nuclide was detected or not	Y
	activ_decay	*number*	Activity decay factor	Y
	activ_decay_err	*number*	Uncertainty of activity decay factor	Y
	comp_confid	*number*	Computed confidence index	Y
	report_mda	*number*	Indicator of whether MDA is to be reported	Y
	pd_mod_flag	*number*	Flag indicating whether or not the nuclide's activity was modified by the parent/daughter calculation.	Y
	csc_ratio	*number*	Multiplier of the cascade summing correction	Y
	csc_ratio_err	*number*	Uncertainty in csc_ratio	Y
	csc_mod_flag	*number*	Flag indicating if the cascade summing correction is performed	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	ave_activ_acq_start	*number*	Average activity at the start of acquisition	Y
	ave_activ_err_acq_start	*number*	Uncertainty of the average activity at the start of acquisition	Y
	activ_key_acq_start	*number*	Activity of the key line at the start of acquisition	Y
	activ_key_err_acq_start	*number*	Uncertainty of the activity of the key line at the start of acquisition	Y
	mda_acq_start	*number*	Minimum detectable activity at the start of acquisition	Y
	mda_err_acq_start	*number*	Uncertainty of the minimum detectable activity at the start of acquisition	Y

Primary key	PK_NUCL_IDED_ORIG(sample_id, name)
Foreign keys	FK_NUCL_IDED_ORIG(sample_id, GARDS_SAMPLE_DATA)
Triggers	NUCL_IDED_ORIG_B_I_U

5.1.92. GARDS_NUCL_LIB

Owner(s)	RMSMAN
Description	The gards_nucl_lib table contains the nuclide library used in the analysis of particulate spectra.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**

	nuclide_id	*number*	Nuclide identifier	Y
PI	name	*varchar2(8)*	Nuclide name	N
	type	*varchar2(16)*	Nuclide type	Y
	halflife_sec	*number*	Half-life in seconds	Y
	halflife	*varchar2(23)*	Half-life	Y
	halflife_err	*varchar2(23)*	Uncertainty of half-life	Y
	num_lines	*number*	Number of decay lines in library	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	nuc_comment	*varchar2(1500)*	Nuclide comment	Y

Primary key	PK_GARDS_NUCL_LIB(name)
Triggers	NUCL_LIB_B_I_U

5.1.93. GARDS_NUCL_LIB_ARCHIVE

Owner(s)	RMSMAN
Description	The GARDS_NUCL_LIB_ARCHIVE contains the nuclide library archived.

Pk/Fk/I	Column	Storage type	Description	Nullable
	nuclide_id	*number*	Nuclide identifier	Y
PI	name	*varchar2(8)*	Nuclide name	N
	type	*varchar2(16)*	Nuclide type	Y
	halflife_sec	*number*	Half-life in seconds	Y
	halflife	*varchar2(23)*	Half-life	Y
	halflife_err	*varchar2(23)*	Uncertainty of half-life	Y
	num_lines	*number*	Number of decay lines in library	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	nuc_comment	*varchar2(1500)*	Nuclide comment	Y
PI	begin_date	*date*	Initialization date	N
	end_date	*date*	Decommissioning date	Y

Primary key	PK_ARCH_NUCL_LIB(name, begin_date)

5.1.94. GARDS_NUCL_LINES_IDED

Owner(s)	RMSAUTO
Description	The gards_nucl_lines_ided table contains information regarding energy lines identified.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	Y
	station_id	*number*	Station identifier	Y
	detector_id	*number*	Detector identifier	Y
I	name	*varchar2(8)*	Nuclide name	Y
	energy	*number*	Energy of the peak	Y
	energy_err	*number*	Uncertainty of the energy	Y
	abundance	*number*	Emission intensity per disintegration	Y
	abundance_err	*number*	Uncertainty of the abundance	Y
PI	peak	*number*	Peak identifier	Y
	activity	*number*	Activity concentration	Y
	activ_err	*number*	Uncertainty of the activity concentration	Y
	effic	*number*	Efficiency at the energy	Y
	effic_err	*number*	Uncertainty of the efficiency	Y
	mda	*number*	Minimum detectable activity concentration	Y
	key_flag	*number*	Key line indicator	Y
PI	nuclide_id	*number*	Nuclide identifier	Y
	csc_ratio	*number*	Multiplier of the cascade summing correction	Y
	csc_ratio_err	*number*	Uncertainty in csc_ratio	Y
	csc_mod_flag	*number*	Flag indicating if the cascade summing correction is performed	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	id_percent	*number*	Nuclide percentage	Y

Primary key	PK_GARDS_NUCL_LINES_IDED(sample_id, nuclide_id, peak)
Foreign keys	FK_NUCL_LINES_IDED(sample_id, GARDS_SAMPLE_DATA)
Slaves	GARDS_NUCL_LINES_IDED_ORIG
Triggers	UPDATE_NUCL_ORIG_LINES_I_U_D, GARDS_NUCL_LINES_IDED_I_U_D, NUCL_LINES_IDED_B_I_U

5.1.95. GARDS_NUCL_LINES_IDED

Owner(s)	RMSMAN
Description	The gards_nucl_lines_ided table contains information regarding energy lines identified.

Pk/Fk/I	Column	Storage type	Description	Nullable
FI	sample_id	*number*	Sample identifier	Y

	station_id	*number*	Station identifier	Y
	detector_id	*number*	Detector identifier	Y
I	name	*varchar2(8)*	Nuclide name	Y
I	energy	*number*	Energy of the peak	Y
	energy_err	*number*	Uncertainty of the energy	Y
	abundance	*number*	Emission intensity per disintegration	Y
	abundance_err	*number*	Uncertainty of the abundance	Y
I	peak	*number*	Peak identifier	Y
	activity	*number*	Activity concentration	Y
	activ_err	*number*	Uncertainty of the activity concentration	Y
	effic	*number*	Efficiency at the energy	Y
	effic_err	*number*	Uncertainty of the efficiency	Y
	mda	*number*	Minimum detectable activity concentration	Y
	key_flag	*number*	Key line indicator	Y
	nuclide_id	*number*	Nuclide identifier	Y
	csc_ratio	*number*	Multiplier of the cascade summing correction	Y
	csc_ratio_err	*number*	Uncertainty in csc_ratio	Y
	csc_mod_flag	*number*	Flag indicating if the cascade summing correction is performed	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	id_percent	*number*	Nuclide percentage	Y

Foreign keys	FK_NUCL_LINES_IDED(sample_id, GARDS_SAMPLE_DATA)
Slaves	GARDS_NUCL_LINES_IDED_ORIG
Triggers	NUCL_LINES_IDED_B_I_U

5.1.96. GARDS_NUCL_LINES_IDED_ORIG

Owner(s)	RMSAUTO
Description	The gards_nucl_lines_ided_orig table contains information regarding energy lines identified during automated analysis.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	Y
	station_id	*number*	Station identifier	Y
	detector_id	*number*	Detector identifier	Y
PI	name	*varchar2(8)*	Nuclide name	Y
PI	energy	*number*	Energy of the peak	Y

	energy_err	*number*	Uncertainty of the energy	Y
	abundance	*number*	Emission intensity per disintegration	Y
	abundance_err	*number*	Uncertainty of the abundance	Y
PFI	peak	*number*	Peak identifier	Y
	activity	*number*	Activity concentration	Y
	activ_err	*number*	Uncertainty of the activity concentration	Y
	effic	*number*	Efficiency	Y
	effic_err	*number*	Uncertainty of the efficiency	Y
	mda	*number*	Minimum detectable activity concentration	Y
	key_flag	*number*	Key line indicator	Y
FI	nuclide_id	*number*	Nuclide identifier	Y
	csc_ratio	*number*	Multiplier of the cascade summing correction	Y
	csc_ratio_err	*number*	Uncertainty in csc_ratio	Y
	csc_mod_flag	*number*	Flag indicating if the cascade summing correction is performed	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	id_percent	*number*	Nuclide percentage	Y

Primary key	PK_GARDS_NUCL_LINES_IDED_ORIG(sample_id, name, energy, peak)
Foreign keys	FK_SID_ET_AL(nuclide_id, GARDS_NUCL_LINES_IDED), FK_NUCL_LINES_IDED_ORIG(sample_id, GARDS_SAMPLE_DATA), FK_SID_ET_AL(peak, GARDS_NUCL_LINES_IDED), FK_SID_ET_AL(sample_id, GARDS_NUCL_LINES_IDED)
Triggers	GARDS_NCL_LNS_IDD_ORG_I_U_D, NUCL_LINES_IDED_ORIG_B_I_U

5.1.97. GARDS_NUCL_LINES_IDED_ORIG

Owner(s)	RMSMAN
Description	The gards_nucl_lines_ided_orig table contains information regarding energy lines identified during automated analysis.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	station_id	*number*	Station identifier	Y
	detector_id	*number*	Detector identifier	Y
PI	name	*varchar2(8)*	Nuclide name	N
PI	energy	*number*	Energy of the peak	N
	energy_err	*number*	Uncertainty of the energy	Y
	abundance	*number*	Emission intensity per disintegration	Y

	abundance_err	*number*	Uncertainty of the abundance	Y
PI	peak	*number*	Peak identifier	N
	activity	*number*	Activity concentration	Y
	activ_err	*number*	Uncertainty of the activity concentration	Y
	effic	*number*	Efficiency	Y
	effic_err	*number*	Uncertainty of the efficiency	Y
	mda	*number*	Minimum detectable activity concentration	Y
	key_flag	*number*	Key line indicator	Y
	nuclide_id	*number*	Nuclide identifier	Y
	csc_ratio	*number*	Multiplier of the cascade summing correction	Y
	csc_ratio_err	*number*	Uncertainty in csc_ratio	Y
	csc_mod_flag	*number*	Flag indicating if the cascade summing correction is performed	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	id_percent	*number*	Nuclide percentage	Y

Primary key	PK_GARDS_NUCL_LINES_IDED_ORIG(sample_id, name, energy, peak)
Foreign keys	FK_NUCL_LINES_IDED_ORIG(sample_id, GARDS_SAMPLE_DATA)
Triggers	NUCL_LINES_IDED_ORIG_B_I_U

5.1.98. GARDS_NUCL_LINES_LIB

Owner(s)	RMSMAN
Description	The gards_nucl_lines_lib table contains the nuclide library regarding energy lines.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	name	*varchar2(8)*	Nuclide name	N
PI	energy	*number*	Energy of the decay line	N
	energy_err	*number*	Uncertainty of the energy	Y
	abundance	*number*	Emission intensity per disintegration	Y
	abundance_err	*number*	Uncertainty of the abundance	Y
	key_flag	*number*	Key line indicator	Y
	nuclide_id	*number*	Nuclide identifier	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	linecomment	*varchar2(1500)*	Comment associated with the decay line	Y

Primary key	PK_GARDS_NUCL_LINES_LIB(name, energy)
Triggers	NUCL_LINES_LIB_B_I_U

5.1.99. GARDS_NUCL_LINES_LIB_ARCHIVE

Owner(s)	RMSMAN
Description	The GARDS_NUCL_LINES_LIB_ARCHIVE contains the archived nuclide library regarding energy lines.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	name	*varchar2(8)*	Nuclide name	N
PI	energy	*number*	Energy of the decay line	N
	energy_err	*number*	Uncertainty of the energy	Y
	abundance	*number*	Emission intensity per disintegration	Y
	abundance_err	*number*	Uncertainty of the abundance	Y
	key_flag	*number*	Key line indicator	Y
	nuclide_id	*number*	Nuclide identifier	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	linecomment	*varchar2(1500)*	Comment associated with the decay line	Y
PI	begin_date	*date*	Initialization date	N
	end_date	*date*	Decommissioning date	Y

Primary key	PK_ARCH_NUCL_LINES_LIB(name, energy, begin_date)

5.1.100. GARDS_PEAKS

Owner(s)	RMSAUTO
Description	The gards_peaks table contains information regarding peaks identified.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	peak_id	*number*	Peak identifier	N
	centroid	*number*	Peak centroid	Y
	centroid_err	*number*	Uncertainty of the peak centroid.	Y
	energy	*number*	Energy of the peak	Y
	energy_err	*number*	Uncertainty of the energy	Y
	left_chan	*number*	Left channel of the peak	Y
	width	*number*	Width of the peak	Y
	back_count	*number*	Continuum background counts	Y

	back_uncer	*number*	Uncertainty of the continuum background counts	Y
	fwhm	*number*	Full width at half maximum	Y
	fwhm_err	*number*	Uncertainty of full width at half maximum	Y
	area	*number*	Peak area (counts)	Y
	area_err	*number*	Uncertainty of the peak area (counts)	Y
	original_area	*number*	Original peak area (counts)	Y
	original_uncer	*number*	Uncertainty of the original peak area (counts)	Y
	counts_sec	*number*	Counts per second	Y
	counts_sec_err	*number*	Uncertainty of the counts per second	Y
	efficiency	*number*	Efficiency	Y
	eff_error	*number*	Uncertainty of the efficiency	Y
	back_channel	*number*	Number of the average background counts per channel	Y
	ided	*number*	Peak identification indicator	Y
	fitted	*number*	Peak fit indicator	Y
	multiplet	*number*	Multiplet peak indicator	Y
	lc	*number*	Critical level for the peak	Y
	peak_sig	*number*	Peak significance	Y
	peak_tol	*number*	Peak energy tolerance	Y
	pss	*number*	Peak search significance parameter	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	detectability	*number*	Peak detectability	Y
	bkgnd_area	*number*	Background area	Y
	bkgnd_area_err	*number*	Uncertainty of the background area	Y
	net_area	*number*	Net area	Y
	net_area_err	*number*	Uncertainty of the net area	Y

Primary key	PK_GARDS_PEAKS(sample_id, peak_id)
Foreign keys	FK_PEAKS(sample_id, GARDS_SAMPLE_DATA)
Indexes	PEAKS_NDX(sample_id, peak_id)
Slaves	GARDS_PEAKS_ORIG
Triggers	UPDATE_PEAKS_ORIG_I_U_D, GARDS_PEAKS_I_U_D, PEAKS_B_I_U

5.1.101. GARDS_PEAKS

Owner(s)	RMSMAN
Description	The gards_peaks table contains information regarding peaks identified.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	peak_id	*number*	Peak identifier	N
	centroid	*number*	Peak centroid	Y
	centroid_err	*number*	Uncertainty of the peak centroid.	Y
I	energy	*number*	Energy of the peak	Y
	energy_err	*number*	Uncertainty of the energy	Y
	left_chan	*number*	Left channel of the peak	Y
	width	*number*	Width of the peak	Y
	back_count	*number*	Continuum background counts	Y
	back_uncer	*number*	Uncertainty of the continuum background counts	Y
	fwhm	*number*	Full width at half maximum	Y
	fwhm_err	*number*	Uncertainty of full width at half maximum	Y
	area	*number*	Peak area (counts)	Y
	area_err	*number*	Uncertainty of the peak area (counts)	Y
	original_area	*number*	Original peak area (counts)	Y
	original_uncer	*number*	Uncertainty of the original peak area (counts)	Y
	counts_sec	*number*	Counts per second	Y
	counts_sec_err	*number*	Uncertainty of the counts per second	Y
	efficiency	*number*	Efficiency	Y
	eff_error	*number*	Uncertainty of the efficiency	Y
	back_channel	*number*	Number of the average background counts per channel	Y
I	ided	*number*	Peak identification indicator	Y
	fitted	*number*	Peak fit indicator	Y
	multiplet	*number*	Multiplet peak indicator	Y
	lc	*number*	Critical level for the peak	Y
	peak_sig	*number*	Peak significance	Y
	peak_tol	*number*	Peak energy tolerance	Y
	pss	*number*	Peak search significance parameter	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	detectability	*number*	Peak detectability	Y
	bkgnd_area	*number*	Background area	Y
	bkgnd_area_err	*number*	Uncertainty of the background area	Y
	net_area	*number*	Net area	Y

	net_area_err	*number*	Uncertainty of the net area	Y

Primary key	PK_GARDS_PEAKS(sample_id, peak_id)
Foreign keys	FK_PEAKS(sample_id, GARDS_SAMPLE_DATA)
Indexes	PK_GARDS_PEAKS(sample_id, peak_id), PEAKS_NDX(sample_id, peak_id, energy, ided)
Slaves	GARDS_PEAKS_ORIG
Triggers	PEAKS_B_I_U

5.1.102. GARDS_PEAKS_ORIG

Owner(s)	RMSMAN
Description	The gards_peaks_orig table contains information regarding peaks identified during automatic analysis.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	peak_id	*number*	Peak identifier	N
	centroid	*number*	Peak centroid	Y
	centroid_err	*number*	Uncertainty of the peak centroid.	Y
I	energy	*number*	Energy of the peak	Y
	energy_err	*number*	Uncertainty of the energy	Y
	left_chan	*number*	Left channel of the peak	Y
	width	*number*	Width of the peak	Y
	back_count	*number*	Continuum background counts	Y
	back_uncer	*number*	Uncertainty of the continuum background counts	Y
	fwhm	*number*	Full width at half maximum	Y
	fwhm_err	*number*	Uncertainty of full width at half maximum	Y
	area	*number*	Peak area (counts)	Y
	area_err	*number*	Uncertainty of the peak area (counts)	Y
	original_area	*number*	Original peak area (counts)	Y
	original_uncer	*number*	Uncertainty of the original peak area (counts)	Y
	counts_sec	*number*	Counts per second	Y
	counts_sec_err	*number*	Uncertainty of the counts per second	Y
	efficiency	*number*	Efficiency	Y
	eff_error	*number*	Uncertainty of the efficiency	Y
	back_channel	*number*	Number of the average background counts per channel	Y
I	ided	*number*	Peak identification indicator (0 or 1)	Y

	fitted	*number*	Peak fit indicator	Y
	multiplet	*number*	Multiplet peak indicator	Y
	lc	*number*	Critical level for the peak	Y
	peak_sig	*number*	Peak significance	Y
	peak_tol	*number*	Peak energy tolerance	Y
	pss	*number*	Peak search significance parameter	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	detectability	*number*	Peak detectability	Y

Primary key	PK_GARDS_PEAKS_ORIG(sample_id, peak_id)
Foreign keys	FK_PEAKS_ORIG(sample_id, GARDS_SAMPLE_DATA)
Triggers	PEAKS_ORIG_B_I_U

5.1.103. GARDS_PEAKS_ORIG

Owner(s)	RMSAUTO
Description	The gards_peaks_orig table contains information regarding peaks identified during automatic analysis.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PFI	peak_id	*number*	Peak identifier	N
	centroid	*number*	Peak centroid	Y
	centroid_err	*number*	Uncertainty of the peak centroid.	Y
I	energy	*number*	Energy of the peak	Y
	energy_err	*number*	Uncertainty of the energy	Y
	left_chan	*number*	Left channel of the peak	Y
	width	*number*	Width of the peak	Y
	back_count	*number*	Continuum background counts	Y
	back_uncer	*number*	Uncertainty of the continuum background counts	Y
	fwhm	*number*	Full width at half maximum	Y
	fwhm_err	*number*	Uncertainty of full width at half maximum	Y
	area	*number*	Peak area (counts)	Y
	area_err	*number*	Uncertainty of the peak area (counts)	Y
	original_area	*number*	Original peak area (counts)	Y
	original_uncer	*number*	Uncertainty of the original peak area (counts)	Y
	counts_sec	*number*	Counts per second	Y

	counts_sec_err	*number*	Uncertainty of the counts per second	Y
	efficiency	*number*	Efficiency	Y
	eff_error	*number*	Uncertainty of the efficiency	Y
	back_channel	*number*	Number of the average background counts per channel	Y
I	ided	*number*	Peak identification indicator (0 or 1)	Y
	fitted	*number*	Peak fit indicator	Y
	multiplet	*number*	Multiplet peak indicator	Y
	lc	*number*	Critical level for the peak	Y
	peak_sig	*number*	Peak significance	Y
	peak_tol	*number*	Peak energy tolerance	Y
	pss	*number*	Peak search significance parameter	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	detectability	*number*	Peak detectability	Y

Primary key	PK_GARDS_PEAKS_ORIG(sample_id, peak_id)
Foreign keys	FK_PEAKS_ORIG(sample_id, GARDS_SAMPLE_DATA), FK_SID_PEAKID(sample_id, GARDS_PEAKS), FK_SID_PEAKID(peak_id, GARDS_PEAKS)
Triggers	GARDS_PEAKS_ORIG_I_U_D, PEAKS_ORIG_B_I_U

5.1.104. GARDS_PERMISSIONS

Owner(s)	RMSMAN
Description	The gards_permissions table contains a list of permissions.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	permission_id	*number*	Permission identifier	N
	permission_name	*varchar2(30)*	Permission name.	N
	db_name	*varchar2(35)*	Database name	N
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_PERMISSIONS(permission_id)
Slaves	GARDS_ROLES_PERMISSIONS
Triggers	PERMISSIONS_B_I_U

5.1.105. GARDS_POC

Owner(s)	RMSMAN
Description	The gards_poc table contains information points of contact (POC) for radionuclide

	monitoring system.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	pocid	*number*	Point of contact identifier	N
	email_address	*varchar2(50)*	Email address of point of contact	Y
	first_name	*varchar2(20)*	First name of point of contact	Y
	last_name	*varchar2(50)*	Last name of point of contact	Y
	telephone	*varchar2(20)*	Telephone number of point of contact	Y
	address	*varchar2(500)*	Address of point of contact	Y
	additional_info	*varchar2(500)*	Additional information for point of contact	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_POC(pocid)
Indexes	PK_POC(pocid)
Slaves	GARDS_NOTIFY
Triggers	POC_B_I_U

5.1.106. GARDS_PROCESSING_ERRORS

Owner(s)	RMSMAN
Description	The gards_processing_errors table contains sample information, if applicable, and message information for RMS messages that have failed processing.

Pk/Fk/I	Column	Storage type	Description	Nullable
	rms_id	*number*	Internal identifier for message	Y
	sample_ref_id	*varchar2(32)*	Sample reference identification	Y
	msg_id	*number*	Message identifier	Y
	filename	*varchar2(512)*	Input data filename	Y
	station_code	*varchar2(5)*	Station code	Y
	detector_code	*varchar2(9)*	Detector code	Y
	data_type	*varchar2(12)*	Type of the data message	Y
	error_text	*varchar2(2048)*	Text associated with the error	Y
	entry_date	*date*	Date entered into the IDC database	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Triggers	PROCESSING_ERRORS_B_I_U

5.1.107. GARDS_PROC_PARAMS_TEMPLATE

Owner(s)	RMSMAN
Description	The gards_proc_params_template table is a template data record that contains parameters used by Automatic Analysis process software for peak search and nuclide identification. These parameters are used unless overridden at the command line. (Note: not used)

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	station_id	*number*	Station identifier	N
PFI	detector_id	*number*	Detector identifier	N
	sample_type	*varchar2(2)*	Sample type	Y
PI	data_type	*char(1)*	Data type of the spectrum	N
PI	spectral_qualifier	*varchar2(5)*	Indicator of full or preliminary spectrum	N
	begin_date	*date*	Initialization date	Y
	end_date	*date*	Decommissioning date	Y
	do_back	*number*	Background subtraction indicator	Y
	back_data_type	*char(1)*	Spectral type of the detector background	Y
	nuclide_lib	*varchar2(96)*	Nuclide library to be used during analysis	Y
	mda_level	*number*	MDA confidence factor (percent)	Y
	nid_confid	*number*	NID confidence factor (percent)	Y
	squant_err	*number*	Uncertainty of sample quantity	Y
	buildtype	*varchar2(8)*	Flag indicating activity or concentration calculations	Y
	peak_sense	*number*	Peak search sensitivity	Y
	peak_start	*number*	Peak search start (keV)	Y
	peak_end	*number*	Peak search end (keV)	Y
	fwhm_mult_width	*number*	Number of FWHMs to search to determine multiplets	Y
	left_fwhm_lim	*number*	Left ROI FWHM limit	Y
	right_fwhm_lim	*number*	Right ROI FWHM limit	Y
	back_chan	*number*	Number of continuous channels	Y
	back_type	*varchar2(6)*	Background type: LINEAR or STEP	Y
	fit_singlets	*number*	Fit singlets flag	Y
	crit_level	*number*	Critical level indicator	Y
	fix_fwhm	*number*	Fixed FWHM during peak search flag	Y
	area_reject	*number*	Indicator of whether or not to reject peaks with zero area indicator	Y
	mdc_width	*number*	Baseline width used for MDA calculation	Y
	lc_abscissa	*number*	Abscissas of the normal distribution corresponding to a predefined confidence level for	Y

			estimating the critical level	
	do_pd_calc	*number*	Flag indicates if the parent/daughter calculations should be run	Y
	do_csc	*number*	Flag to turn off cascade summing correction	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_PROC_PARAMS_TEMPLATE(station_id, detector_id, data_type, spectral_qualifier)
Foreign keys	FK_PPTEMPL_DET(detector_id, GARDS_DETECTORS), FK_PPTEMPL_STA(station_id, GARDS_STATIONS)
Triggers	PROC_PARAMS_TEMPLATE_B_I_U

5.1.108. GARDS_PRODUCT

Owner(s)	RMSAUTO
Description	The gards_product table temporarily stores radionuclide reviewed products, baseline and SCAC information for quality assurance purposes.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	foff	*number*	Offset into the data file (bytes)	Y
	dsize	*number*	Size of data file in bytes	Y
	dir	*varchar2(256)*	Full path to the data file	Y
	dfile	*varchar2(32)*	Name of file containing the data	Y
	author	*varchar2(30)*	User name	Y
PI	revision	*number*	Revision identifier	N
PI	typeid	*number*	Unique type identifier	N
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_RMSMAN_GARDS_PRODUCT(sample_id, typeid, revision)
Foreign keys	FK_PRODUCT(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_PRODUCT_I_U_D, PRODUCT_B_I_U

5.1.109. GARDS_PRODUCT

Owner(s)	RMSMAN
Description	The gards_product table temporarily stores radionuclide reviewed products, baseline and SCAC information for quality assurance purposes.

Pk/Fk/I	Column	Storage type	Description	Nullable
FI	sample_id	*number*	Sample identifier	Y

	foff	*number*	Offset into the data file (bytes)	Y
	dsize	*number*	Size of data file in bytes	Y
	dir	*varchar2(256)*	Full path to the data file	Y
	dfile	*varchar2(32)*	Name of file containing the data	Y
	author	*varchar2(30)*	User name	Y
	revision	*number*	Revision identifier	Y
	typeid	*number*	Unique type identifier	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Foreign keys	FK_PRODUCT(sample_id, GARDS_SAMPLE_DATA)
Triggers	PRODUCT_B_I_U

5.1.110. GARDS_QAT_CONFIG

Owner(s)	RMSMAN
Description	The gards_qat_config table contains q_time and t_time used by rms_QAT_auto. (Note: there is only one record in the database.)

Pk/Fk/I	Column	Storage type	Description	Nullable
	t_time	*number*	Number of minutes after gards_sample_status.entry_date that rms_QAT_auto waits before releasing a sample	Y
	min_t_time	*number*	Minimum allowable value for t_time	Y
	max_t_time	*number*	Maximum allowable value for t_time	Y
	q_time	*number*	Number of minutes after gards_sample_status.review_date that rms_QAT_auto waits before releasing a sample	Y
	poll_time	*number*	Number of minutes rms_QAT sleeps between each database poll	Y
	allow_release	*number*	Flag indicating whether or not release is permitted	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Triggers	QAT_CONFIG_B_I_U

5.1.111. GARDS_QAT_NOTIFY

Owner(s)	RMSMAN
Description	The gards_qat_notify table contains comments created by rms_QAT. (Note: not available)

Pk/Fk/I	Column	Storage type	Description	Nullable
	sample_id	*number*	Sample identifier	N
	comment_type	*number*	Comment code	Y
	comment_text	*varchar2(2048)*	Comment text	Y
	nucl_name	*varchar2(8)*	Nuclide name	Y
	energy	*number*	Gamma energy	Y
	dtg	*date*	Date time group for QAT comment notification	Y
	author	*varchar2(30)*	User name	Y
	recipient_list	*varchar2(128)*	List of recipients for QAT comment notification	Y
	moddate	*date*	Date/time at which the row was last modified	Y

5.1.112. GARDS_QAT_QUERY_FILTER

Owner(s)	RMSMAN
Description	Gards_qat_query_filter (Note: to be added.)

Pk/Fk/I	Column	Storage type	Description	Nullable
	user_id	*number*	User identifier	Y
	min_sample_id	*number*	QAT user query, lower boundary for the sample id	Y
	max_sample_id	*number*	QAT user query, upper boundary for the sample id	Y
	status_list	*varchar2(128)*	Comma-separated list of statuses	Y
	station_list	*varchar2(1024)*	Comma-separated list of stations	Y
	include_stations	*number*	Flag to include or exclude stations	Y
	category_list	*varchar2(32)*	Comma-separated list of categories	Y
	review_cat	*number*	Review category	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Triggers	QAT_QUERY_FILTER_B_I_U

5.1.113. GARDS_QCHISTORY

Owner(s)	RMSAUTO
Description	The gards_qchistory table contains output messages from quality control tests for each sample.

Pk/Fk/I	Column	Storage type	Description	Nullable
	station_id	*number*	Station identifier	Y
	detector_id	*number*	Detector identifier	Y
PFI	sample_id	*number*	Sample identifier	N
PI	state	*varchar2(128)*	Text results of quality control hypothesis tests	N
	lddate	*date*	Load date	Y

Primary key	PK_GARDS_QCHISTORY(sample_id, state)
Foreign keys	FK_QCHISTORY(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_QCHISTORY_I_U_D

5.1.114. GARDS_QCHISTORY

Owner(s)	RMSMAN
Description	The gards_qchistory table contains output messages from quality control tests for each sample.

Pk/Fk/I	Column	Storage type	Description	Nullable
	station_id	*number*	Station identifier	Y
	detector_id	*number*	Detector identifier	Y
PFI	sample_id	*number*	Sample identifier	N
PI	state	*varchar2(128)*	Text results of quality control hypothesis tests	N
	lddate	*date*	Load date	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_QCHISTORY(sample_id, state)
Foreign keys	FK_QCHISTORY(sample_id, GARDS_SAMPLE_DATA)
Triggers	QCHISTORY_B_I_U

5.1.115. GARDS_QCPARAMS

Owner(s)	RMSMAN
Description	The gards_qcparams table contains parameters for quality control processes.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	detector_id	*number*	Detector identifier	N
	gainchange	*number*	Gain first difference tolerance	Y
	sdmult	*number*	Location test standard deviation multiplier	Y
	width_adj	*number*	Peak width standard deviation inflation	Y

			factor	
	area_adj	*number*	Peak area standard deviation inflation factor	Y
	etol	*number*	Energy tolerance used to match peaks with energies (keV)	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_QCPARAMS(detector_id)
Foreign keys	FK_QCPARAMS_DET(detector_id, GARDS_DETECTORS)
Triggers	QCPARAMS_B_I_U

5.1.116. GARDS_QCTARGETS

Owner(s)	RMSMAN
Description	The gards_qctargets table contains detector-specific target values for the quality control width and area tests.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	station_id	*number*	Station identifier	N
PFI	detector_id	*number*	Detector identifier	N
	dtg	*date*	Decay correction reference date	Y
PI	name	*varchar2(8)*	Nuclide name	N
PI	energy	*number*	Gamma energy	N
	muwidth	*number*	Target width for each nuclide line energy (keV)	Y
	muarea	*number*	Target area for each nuclide line energy (counts)	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_QCTARGETS(name, detector_id, station_id, energy)
Foreign keys	FK_QCTARGS_STA(station_id, GARDS_STATIONS), FK_QCTARGS_DET(detector_id, GARDS_DETECTORS)
Triggers	QCTARGETS_B_I_U

5.1.117. GARDS_QC_RESULTS

Owner(s)	RMSAUTO
Description	Contains the result of QC performed for the given sample_id

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number(22,0)*	Sample identifier	N
PI	test_name	*varchar2(32)*	Quality control test name	N

	flag	*char(1)*	Quality control flag	Y
	qc_comment	*varchar2(255)*	Quality control comments	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_QC_RESULTS(sample_id, test_name)
Foreign keys	FK_QC_RESULTS(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_QC_RESULTS_I_U_D, QC_RESULTS_B_I_U

5.1.118. GARDS_QC_RESULTS

Owner(s)	RMSMAN
Description	Contains the result of QC performed for the given sample_id

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number(22,0)*	Sample identifier	N
PI	test_name	*varchar2(32)*	Quality control test name	N
	flag	*char(1)*	Quality control flag	Y
	qc_comment	*varchar2(255)*	Quality control comments	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_QC_RESULTS(sample_id, test_name)
Foreign keys	FK_QC_RESULTS(sample_id, GARDS_SAMPLE_DATA)
Triggers	QC_RESULTS_B_I_U

5.1.119. GARDS_QUERY_RESULTS

Owner(s)	RMSMAN
Description	The gards_query_results table contains output of a user-initiated query from the event screening tool. This table is purged at the end of the request.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
	rqst_id	*number*	Unique query identifier	Y
	rqst_string	*varchar2(100)*	Output of the user query	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Triggers	QUERY_RESULTS_B_I_U

5.1.120. GARDS_QUERY_RESULTS

Owner(s)	RMSAUTO

Description	The gards_query_results table contains output of a user-initiated query from the event screening tool. This table is purged at the end of the request.

Pk/Fk/I	Column	Storage type	Description	Nullable
	rqst_id	*number*	Unique query identifier	Y
	rqst_string	*varchar2(100)*	Output of the user query	Y
	moddate	*date*	Date/time at which the row was last modified	Y

5.1.121. GARDS_RECEIPT_LOG

Owner(s)	RMSAUTO
Description	(Note: Seems obsoleted, newest DTG date from 2001, no reference in RN software)

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	pocid	*number*	Point of contact identifier	N
PI	subid	*number*	Subscription id of obsolete table?	N
PI	prodid	*number*	Product id of obsolete table?	N
	type	*varchar2(5)*	Acknowledgment type of obsolete table?	Y
	dtg	*date*	Transmit date and time	Y
	kb_sent	*number*	Transmitted data size of obsolete table	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_RECEIPT_LOG(pocid, subid, prodid)

5.1.122. GARDS_REFLINE_MASTER

Owner(s)	RMSMAN
Description	The gards_refline_master table contains energy lines to be used for updating energy and resolution calibration based on peaks in the spectrum itself.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	refpeak_energy	*number*	Reference energy of the decay line	N
PI	data_type	*char(1)*	Data type of the spectrum	N
PI	spectral_qualifier	*varchar2(5)*	Indicator of full or preliminary spectrum	N
	calibration_type	*varchar2(3)*	Calibration type	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_RMSMAN_GARDS_REFLINE_MASTER(refpeak_energy, data_type, spectral_qualifier)
Triggers	REFLINE_MASTER_B_I_U

5.1.123. GARDS_RELEVANT_NUCLIDES

Owner(s)	RMSMAN
Description	The gards_relevant_nuclides table contains the list of CTBT relevant nuclides.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	name	*varchar2(8)*	Nuclide name	N
P	type	*varchar2(16)*	Nuclide type	Y
PI	sample_type	*char(1)*	Sample type	N
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_RMSMAN_GARDS_RELEVANT_NUCL(name, sample_type)
Triggers	RELEVANT_NUCLIDES_B_I_U

5.1.124. GARDS_RESOLUTION_CAL

Owner(s)	RMSMAN
Description	The gards_resolution_cal table contains resolution calibration coefficients calculated during analysis.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	coeff1	*number*	zero order coefficient	Y
	coeff2	*number*	First order coefficient	Y
	coeff3	*number*	Second order coefficient	Y
	coeff4	*number*	Third order coefficient	Y
	coeff5	*number*	Fourth order coefficient	Y
	coeff6	*number*	Fifth order coefficient	Y
	coeff7	*number*	Sixth order coefficient	Y
	coeff8	*number*	Seventh order coefficient	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_RESOLUTION_CAL(sample_id, type)
Foreign keys	FK_RESOLUTION_CAL(sample_id, GARDS_SAMPLE_DATA)
Triggers	RESOLUTION_CAL_B_I_U

5.1.125. GARDS_RESOLUTION_CAL

Owner(s)	RMSAUTO
Description	The gards_resolution_cal table contains resolution calibration coefficients calculated during analysis.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
	coeff1	*number*	zero order coefficient	Y
	coeff2	*number*	First order coefficient	Y
	coeff3	*number*	Second order coefficient	Y
	coeff4	*number*	Third order coefficient	Y
	coeff5	*number*	Fourth order coefficient	Y
	coeff6	*number*	Fifth order coefficient	Y
	coeff7	*number*	Sixth order coefficient	Y
	coeff8	*number*	Seventh order coefficient	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y
PI	type	*char(8)*	Calibration type	N

Primary key	PK_GARDS_RESOLUTION_CAL(sample_id, type)
Foreign keys	FK_RESOLUTION_CAL(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_RESOLUTION_CAL_I_U_D, RESOLUTION_CAL_B_I_U

5.1.126. GARDS_RESOLUTION_CAL_COV

Owner(s)	RMSMAN
Description	The GARDS_RESOLUTION_CAL_COV table contains the covariance table for each coefficient of the resolution calibration from a given sample_id

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number(22,0)*	Sample identifier	N
PI	row_index	*number(10,0)*	Row index	N
PI	col_index	*number(10,0)*	Column index	N
	moddate	*date*	Date/time at which the row was last modified	Y

	coeff	*float(126)*	Calibration coefficient	Y
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_RESOLUTION_CAL_COV(sample_id, type, row_index, col_index)
Foreign keys	FK_RESOLUTION_CAL_COV(sample_id, GARDS_SAMPLE_DATA)
Triggers	RESOLUTION_CAL_COV_B_I_U

5.1.127. GARDS_RESOLUTION_CAL_COV

Owner(s)	RMSAUTO
Description	The GARDS_RESOLUTION_CAL_COV table contains the covariance table for each coefficient of the resolution calibration from a given sample_id

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number(22,0)*	Sample identifier	N
PI	row_index	*number(10,0)*	Row index	N
PI	col_index	*number(10,0)*	Column index	N
	moddate	*date*	Date/time at which the row was last modified	Y
	coeff	*float(126)*	Calibration coefficient	Y
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_RESOLUTION_CAL_COV(sample_id, type, row_index, col_index)
Foreign keys	FK_RESOLUTION_CAL_COV(sample_id, GARDS_SAMPLE_DATA)
Triggers	RESOLUTION_CAL_COV_B_I_U, GARDS_RESOLUTION_CAL_COV_I_U_D

5.1.128. GARDS_RESOLUTION_CAL_ORIG

Owner(s)	RMSMAN
Description	The gards_resolution_cal_orig table contains the original resolution calibration coefficients calculated associated with spectral PHD.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number(8,0)*	Sample identifier	N
	coeff1	*number(8,0)*	zero order coefficient	Y
	coeff2	*number(8,0)*	First order coefficient	Y
	coeff3	*number(8,0)*	Second order coefficient	Y
	coeff4	*number(8,0)*	Third order coefficient	Y

	coeff5	*number(8,0)*	Fourth order coefficient	Y
	coeff6	*number(8,0)*	Fifth order coefficient	Y
	coeff7	*number(8,0)*	Sixth order coefficient	Y
	coeff8	*number(8,0)*	Seventh order coefficient	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_RESOLUTION_CAL_ORIG(sample_id, type)
Foreign keys	FK_RESOLUTION_CAL_ORIG(sample_id, GARDS_SAMPLE_DATA)
Triggers	RESOLUTION_CAL_ORIG_B_I_U

5.1.129. GARDS_RESOLUTION_CAL_ORIG

Owner(s)	RMSAUTO
Description	The gards_resolution_cal_orig table contains the original resolution calibration coefficients calculated associated with spectral PHD.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number(8,0)*	Sample identifier	N
	coeff1	*number(8,0)*	zero order coefficient	Y
	coeff2	*number(8,0)*	First order coefficient	Y
	coeff3	*number(8,0)*	Second order coefficient	Y
	coeff4	*number(8,0)*	Third order coefficient	Y
	coeff5	*number(8,0)*	Fourth order coefficient	Y
	coeff6	*number(8,0)*	Fifth order coefficient	Y
	coeff7	*number(8,0)*	Sixth order coefficient	Y
	coeff8	*number(8,0)*	Seventh order coefficient	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y
PI	type	*char(8)*	Calibration type	N

Primary key	PK_GARDS_RESOLUTION_CAL_ORIG(sample_id, type)
Foreign keys	FK_RESOLUTION_CAL_ORIG(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_RES_CAL_ORIG_I_U_D, RESOLUTION_CAL_ORIG_B_I_U

5.1.130. GARDS_RESOLUTION_PAIRS

Owner(s)	RMSMAN
Description	The gards_resolution_pairs table contains resolution calibration pairs information calculated during analysis.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	res_energy	*number*	Gamma energy	N
	resolution	*number*	Resolution	Y
	res_error	*number*	Uncertainty of the resolution	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_RESOLUTION_PAIRS(sample_id, res_energy, type)
Foreign keys	FK_RESOLUTION_PAIRS(sample_id, GARDS_SAMPLE_DATA)
Triggers	RESOLUTION_PAIRS_B_I_U

5.1.131. GARDS_RESOLUTION_PAIRS

Owner(s)	RMSAUTO
Description	The gards_resolution_pairs table contains resolution calibration pairs information calculated during analysis.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	res_energy	*number*	Gamma energy	N
	resolution	*number*	Resolution	Y
	res_error	*number*	Uncertainty of the resolution	Y
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	type	*char(8)*	Calibration type	N

Primary key	PK_GARDS_RESOLUTION_PAIRS(sample_id, res_energy, type)
Foreign keys	FK_RESOLUTION_PAIRS(sample_id, GARDS_SAMPLE_DATA)
Triggers	RESOLUTION_PAIRS_B_I_U, GARDS_RESOLUTION_PAIRS_I_U_D

5.1.132. GARDS_RESOLUTION_PAIRS_ORIG

Owner(s)	RMSAUTO
Description	The gards_resolution_pairs_orig table contains the original resolution calibration pairs information associated with spectral PHD.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	res_energy	*number*	Gamma energy	N
	resolution	*number*	Resolution	Y
	res_error	*number*	Uncertainty of the resolution	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y
PI	type	*char(8)*	Calibration type	N

Primary key	PK_GARDS_RESOLUTION_PAIRS_ORIG(sample_id, res_energy, type)
Foreign keys	FK_RESOLUTION_PAIRS_ORIG(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_RES_PAIRS_ORIG_I_U_D, RESOLUTION_PAIRS_ORIG_B_I_U

5.1.133. GARDS_RESOLUTION_PAIRS_ORIG

Owner(s)	RMSMAN
Description	The gards_resolution_pairs_orig table contains the original resolution calibration pairs information associated with spectral PHD.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	res_energy	*number*	Gamma energy	N
	resolution	*number*	Resolution	Y
	res_error	*number*	Uncertainty of the resolution	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PI	type	*char(8)*	Calibration type	N
	winner	*char(1)*	Flag indicating whether the calibration type is used (Y) or not (N)	Y

Primary key	PK_GARDS_RESOLUTION_PAIRS_ORIG(sample_id, res_energy, type)
Foreign keys	FK_RESOLUTION_PAIRS_ORIG(sample_id, GARDS_SAMPLE_DATA)
Triggers	RESOLUTION_PAIRS_ORIG_B_I_U

5.1.134. GARDS_RLR

Owner(s)	RMSAUTO
Description	The gards_rlr table contains the data related to a Radionuclide Laboratory Report (RLR) message.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	rlr_id	*number*	Unique RLR identifier	N
	station_id	*number*	Station identifier	Y
	lab_id	*number*	Unique laboratory identifier	Y
	lab_detector_id	*number*	Unique laboratory detector identifier	Y
	orig_sample_ref_id	*varchar2(32)*	Original/entire sample reference identification	Y
	split_sample_ref_id	*varchar2(32)*	Split sample reference identification	Y
	report_type	*varchar2(3)*	Report type	Y
	lab_sample_category	*varchar2(2)*	Report sample category	Y
	report_number	*number*	Report number	Y
	priority_level	*varchar2(10)*	Priority level (Urgent or Routine)	Y
	collect_start	*date*	Collection start date and time	Y
	collect_stop	*date*	Collection stop date and time	Y
	entry_date	*date*	Date entered into the IDC database	Y
	test_date	*date*	Test completion date at lab	Y
	transmit_date	*date*	Transmit date and time	Y
	filename	*varchar2(256)*	Input data filename	Y
	lab_receipt_date	*date*	Date of sample receipts at the laboratory	Y
	activity_date	*date*	Activity reference date	Y
	concentration_date	*date*	Concentration reference date	Y
	test_type	*varchar2(256)*	Type of test performed	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	RLRID_PK(rlr_id)
Indexes	RLRID_PK(rlr_id)
Slaves	GARDS_RLR_CONCLUSIONS, GARDS_RLR_OBJECTIVE, GARDS_RLR_RATIOS, GARDS_RLR_RESULTS, GARDS_RLR_SSREB
Triggers	GARDS_RLR_B_I_U

5.1.135. GARDS_RLR_CONCLUSIONS

Owner(s)	RMSAUTO
Description	The gards_rlr_conclusions table contains IDC findings, lab findings and comparisons of IDC and lab results.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	rlr_id	*number*	Unique RLR identifier	N
	idc_summary	*varchar2(2048)*	IDC findings	Y
	lab_summary	*varchar2(2048)*	Laboratory findings and conclusions	Y
	result_comparison	*varchar2(2048)*	Comparison of IDC and laboratory results	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_RLR_CONCLUSIONS(rlr_id)
Foreign keys	SYS_C0028565(rlr_id, GARDS_RLR)
Triggers	RLR_CONCLUSIONS_B_I_U

5.1.136. GARDS_RLR_OBJECTIVE

Owner(s)	RMSAUTO
Description	The gards_rlr_objective table contains the objectives of the lab analysis.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	rlr_id	*number*	Unique RLR identifier	N
	analysis_purpose	*varchar2(2048)*	Analysis purpose	Y
	tests_authorized	*varchar2(2048)*	Tests authorized	Y
	special_instructions	*varchar2(2048)*	Special instructions	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_RLR_OBJECTIVE(rlr_id)
Foreign keys	SYS_C0028566(rlr_id, GARDS_RLR)
Triggers	RLR_OBJECTIVE_B_I_U

5.1.137. GARDS_RLR_RATIOS

Owner(s)	RMSAUTO

Description	The gards_rlr_ratios table contains the nuclides activity ratios

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	rlr_id	*number*	Unique RLR identifier	N
PI	nuclide1	*varchar2(8)*	Nuclide 1	N
PI	nuclide2	*varchar2(8)*	Nuclide 2	N
PI	activity_ratio	*number*	Activity ratio of nuclide 1 to nuclide 2	N
	activity_ratio_err	*number*	Relative uncertainty of the activity ratio	Y
	reference_date	*date*	Reference date of the activity ratio	Y
	zero_date	*date*	Zero date	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_RLR_RATIOS(rlr_id, nuclide1, nuclide2, activity_ratio)
Foreign keys	SYS_C0028567(rlr_id, GARDS_RLR)
Triggers	RLR_RATIOS_B_I_U

5.1.138. GARDS_RLR_RESULTS

Owner(s)	RMSAUTO
Description	The gards_rlr_results table contains the results of tests conducted at the laboratory.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	rlr_id	*number*	Unique RLR identifier	N
PI	nuclide_name	*varchar2(8)*	Nuclide name	N
PI	activity	*number*	Activity at the start of acquisition	N
	activity_err	*number*	Relative uncertainty of the activity	Y
	activ_coverage_factor	*number*	Coverage factor	Y
	activ_confidence_level	*number*	Level of confidence	Y
	concentration	*number*	Concentration	Y
	concentration_err	*number*	Relative uncertainty of the activity concentration	Y
	conc_coverage_factor	*number*	Coverage factor	Y
	conc_confidence_level	*number*	Level of confidence	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_RLR_RESULTS(rlr_id, nuclide_name, activity)
Foreign keys	SYS_C0028568(rlr_id, GARDS_RLR)
Triggers	RLR_RESULTS_B_I_U

5.1.139. GARDS_RLR_SSREB

Owner(s)	RMSAUTO
Description	The gards_rlr_ssreb table contains the list of RLRs that have been added to their corresponding SSREB.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	rlr_id	*number*	Unique RLR identifier	N
PFI	sample_id	*number*	Sample identifier	N
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_RLR_SSREB(rlr_id, sample_id)
Foreign keys	SYS_C0028569(rlr_id, GARDS_RLR), SYS_C0028570(sample_id, GARDS_SAMPLE_DATA)
Triggers	RLR_SSREB_B_I_U

5.1.140. GARDS_RN_INTERVAL

Owner(s)	RMSAUTO
Description	Used for RN monitoring with Workflow

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
I	class	*varchar2(16)*	Workflow field indicating the station	N
I	name	*varchar2(16)*	Workflow field indicating the message type	N
	start_time	*float(126)*	Start time of the period	N
I	end_time	*float(126)*	End time of the period	N
I	state	*varchar2(16)*	Workflow field indicating the status	N
PI	intvlid	*number*	Unique interval identifier	N
I	refid	*number(10,0)*	Workflow field indicating the sample id	N
I	refidtype	*varchar2(16)*	Workflow field indicating whether it is an input interval, PHD, SOH	N
I	moddate	*date*	Date/time at which the row was last modified	N
	lddate	*date*	Load date	N
	station_code	*varchar2(5)*	Station code	Y

Primary key	PK_RN_INTERVAL(intvlid)
Triggers	RN_INTERVAL_S_I

5.1.141. GARDS_ROI_CHANNELS

Owner(s)	RMSAUTO
Description	The gards_roi_channels table contains the ROI boundaries in channel units.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	roi	*number*	ROI identifier	N
	b_chan_start	*number*	Beta boundary start channel	Y
	b_chan_stop	*number*	Beta boundary stop channel	Y
	g_chan_start	*number*	Gamma boundary start channel	Y
	g_chan_stop	*number*	Gamma boundary stop channel	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_ROI_CHANNELS(sample_id, roi)
Foreign keys	FK_ROI_CHANNELS(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_ROI_CHANNELS_I_U_D, ROI_CHANNELS_B_I_U

5.1.142. GARDS_ROI_CHANNELS

Owner(s)	RMSMAN
Description	The gards_roi_channels table contains the ROI boundaries in channel units.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	roi	*number*	ROI identifier	N
	b_chan_start	*number*	Beta boundary start channel	Y
	b_chan_stop	*number*	Beta boundary stop channel	Y
	g_chan_start	*number*	Gamma boundary start channel	Y
	g_chan_stop	*number*	Gamma boundary stop channel	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_ROI_CHANNELS(sample_id, roi)
Foreign keys	FK_ROI_CHANNELS(sample_id, GARDS_SAMPLE_DATA)
Triggers	ROI_CHANNELS_B_I_U

5.1.143. GARDS_ROI_CONCS

Owner(s)	RMSAUTO
Description	The gards_roi_concs table contains information regarding the concentration of each ROI. (Note: it is not used in the current IDC analysis.)

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	roi	*number*	ROI identifier	N
	activity	*number*	Activity concentration	Y
	activ_err	*number*	Uncertainty of the activity concentration	Y
	mda	*number*	Minimum detectable concentration	Y
	nid_flag	*number*	Flag of whether the xenon isotope is detected or not	Y
	report_mda	*number*	Indicator of whether MDA is to be reported	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_ROI_CONCS(sample_id, roi)
Foreign keys	FK_ROI_CONCS(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_ROI_CONCS_I_U_D, ROI_CONCS_B_I_U

5.1.144. GARDS_ROI_CONCS

Owner(s)	RMSMAN
Description	The gards_roi_concs table contains information regarding the concentration of each ROI. (Note: it is not used in the current IDC analysis.)

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	roi	*number*	ROI identifier	N
	activity	*number*	Activity concentration	Y
	activ_err	*number*	Uncertainty of the activity concentration	Y
	mda	*number*	Minimum detectable concentration	Y
	nid_flag	*number*	Flag of whether the xenon isotope is detected or not	Y
	report_mda	*number*	Indicator of whether MDA is to be reported	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_ROI_CONCS(sample_id, roi)
Foreign keys	FK_ROI_CONCS(sample_id, GARDS_SAMPLE_DATA)
Triggers	ROI_CONCS_B_I_U

5.1.145. GARDS_ROI_COUNTS

Owner(s)	RMSMAN
Description	The gards_roi_counts table contains information regarding the counts for each ROI. (Note: it is not used in the current IDC analysis.)

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	roi	*number*	ROI identifier	N
	gross	*number*	Gross number of counts in the ROI	Y
	gross_err	*number*	Uncertainty of the gross number of counts in the ROI	Y
	compton	*number*	Counts of Compton continuum background	Y
	compton_err	*number*	Uncertainty of Compton counts	Y
	interference	*number*	Counts from interference nuclides	Y
	interference_err	*number*	Uncertainty of interference (counts)	Y
	memory	*number*	Gas background counts	Y
	memory_err	*number*	Uncertainty of memory (counts)	Y
	detector_back	*number*	Detector background counts	Y
	detector_back_err	*number*	Uncertainty of detector_back (counts)	Y
	net	*number*	Counts in ROI after processing	Y
	net_err	*number*	Uncertainty of net (counts)	Y
	lc	*number*	Critical level (counts)	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_ROI_COUNTS(sample_id, roi)
Foreign keys	FK_ROI_COUNTS(sample_id, GARDS_SAMPLE_DATA)
Triggers	ROI_COUNTS_B_I_U

5.1.146. GARDS_ROI_COUNTS

Owner(s)	RMSAUTO
Description	The gards_roi_counts table contains information regarding the counts for each ROI. (Note: it is not used in the current IDC analysis.)

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N

PI	roi	*number*	ROI identifier	N
	gross	*number*	Gross number of counts in the ROI	Y
	gross_err	*number*	Uncertainty of the gross number of counts in the ROI	Y
	compton	*number*	Counts of Compton continuum background	Y
	compton_err	*number*	Uncertainty of Compton counts	Y
	interference	*number*	Counts from interference nuclides	Y
	interference_err	*number*	Uncertainty of interference (counts)	Y
	memory	*number*	Gas background counts	Y
	memory_err	*number*	Uncertainty of memory (counts)	Y
	detector_back	*number*	Detector background counts	Y
	detector_back_err	*number*	Uncertainty of detector_back (counts)	Y
	net	*number*	Counts in ROI after processing	Y
	net_err	*number*	Uncertainty of net (counts)	Y
	lc	*number*	Critical level (counts)	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_ROI_COUNTS(sample_id, roi)
Foreign keys	FK_ROI_COUNTS(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_ROI_COUNTS_I_U_D, ROI_COUNTS_B_I_U

5.1.147. GARDS_ROI_LIB

Owner(s)	RMSMAN
Description	The gards_roi_lib table contains the information between each ROI and specific nuclide. (Note: it is not used in the current IDC analysis.)

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	roi	*number*	ROI identifier	N
	name	*varchar2(8)*	Nuclide name	Y
	halflife	*varchar2(23)*	Half-life	Y
	halflife_err	*varchar2(23)*	Uncertainty of half-life	Y
	halflife_sec	*number*	Half-life in seconds	Y
	abundance	*number*	Emission intensity per disintegration	Y
	abundance_err	*number*	Uncertainty of the abundance	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_ROI_LIB(roi)
Triggers	ROI_LIB_B_I_U

5.1.148. GARDS_ROI_LIMITS

Owner(s)	RMSAUTO
Description	The gards_roi_limits table contains the ROI boundaries in energy units as specified in the PHD.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	roi	*number*	ROI identifier	N
	b_energy_start	*number*	Beta boundary start energy (keV)	Y
	b_energy_stop	*number*	Beta boundary stop energy (keV)	Y
	g_energy_start	*number*	Gamma boundary start energy (keV)	Y
	g_energy_stop	*number*	Gamma boundary stop energy (keV)	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_ROI_LIMITS(sample_id, roi)
Foreign keys	FK_ROI_LIMITS(sample_id, GARDS_SAMPLE_DATA)
Triggers	ROI_LIMITS_B_I_U, GARDS_ROI_LIMITS_I_U_D

5.1.149. GARDS_ROI_LIMITS

Owner(s)	RMSMAN
Description	The gards_roi_limits table contains the ROI boundaries in energy units as specified in the PHD.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	roi	*number*	ROI identifier	N
	b_energy_start	*number*	Beta boundary start energy (keV)	Y
	b_energy_stop	*number*	Beta boundary stop energy (keV)	Y
	g_energy_start	*number*	Gamma boundary start energy (keV)	Y
	g_energy_stop	*number*	Gamma boundary stop energy (keV)	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_ROI_LIMITS(sample_id, roi)
Foreign keys	FK_ROI_LIMITS(sample_id, GARDS_SAMPLE_DATA)
Triggers	ROI_LIMITS_B_I_U

5.1.150. GARDS_ROLES

Owner(s)	RMSMAN

Description	The gards_roles table contains the list of roles.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	role_id	*number*	Role identifier	N
	role_name	*varchar2(30)*	Role name	N
	db_name	*varchar2(35)*	Database name	N
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_ROLES(role_id)
Indexes	PK_ROLES(role_id)
Slaves	GARDS_USERS_ROLES, GARDS_ROLES_PERMISSIONS
Triggers	ROLES_B_I_U

5.1.151. GARDS_ROLES_PERMISSIONS

Owner(s)	RMSMAN
Description	The gards_roles_permissions table contains a mapping of which permissions are assigned to which roles.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	role_id	*number*	Role identifier	N
PFI	permission_id	*number*	Permission identifier	N
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_RMSMAN_GARDS_ROLES_PERM(role_id, permission_id)
Foreign keys	SYS_C0028509(permission_id, GARDS_PERMISSIONS), SYS_C0028510(role_id, GARDS_ROLES)
Triggers	ROLES_PERMISSIONS_B_I_U

5.1.152. GARDS_SAINT_DEFAULT_PARAMS

Owner(s)	RMSAUTO, RMSMAN
Description	The GARDS_DEFAULT_PARAMS table contains default processing parameters for HPGe spectra.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	name	*varchar2(40)*	Parameter name	N
	value	*varchar2(255)*	Parameter default setting	N
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_SAINT_DEFAULT_PARAMS(name)
Triggers	DEFAULT_PARAMS_B_I_U

5.1.153. GARDS_SAINT_PROCESS_PARAMS

Owner(s)	RMSMAN
Description	The GARDS_SAINT_PROCESS_PARAMS table contains spectrum specific processing parameters for HPGe spectra

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	name	*varchar2(40)*	Parameter name	N
	value	*varchar2(255)*	Parameter setting	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_SAINT_PROCESS_PARAMS(sample_id, name)
Foreign keys	FK_SAINT_PROC_PARAMS(sample_id, GARDS_SAMPLE_DATA)
Triggers	PROCESS_PARAMS_B_I_U

5.1.154. GARDS_SAINT_PROCESS_PARAMS

Owner(s)	RMSAUTO
Description	The GARDS_SAINT_PROCESS_PARAMS table contains spectrum specific processing parameters for HPGe spectra

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	name	*varchar2(40)*	Parameter name	N
	value	*varchar2(255)*	Parameter setting	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_SAINT_PROCESS_PARAMS(sample_id, name)
Foreign keys	FK_SAINT_PROC_PARAMS(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_SAINT_PROC_PAR_I_U_D, PROCESS_PARAMS_B_I_U

5.1.155. GARDS_SAMPLE (VIEW)

Owner(s)	RMSMAN
Description	The GARDS_SAMPLE is a view regarding the sample data and information related to sample analysis.

Pk/Fk/I	Column	Storage type	Description	Nullable

	site_det_code	*char(15)*	Station code concatenated with detector code	Y
	sample_id	*number*	Sample identifier	N
	station_id	*number*	Station identifier	Y
	station_code	*varchar2(5)*	Station code	Y
	detector_id	*number*	Detector identifier	Y
	detector_code	*varchar2(9)*	Detector code	Y
	input_file_name	*varchar2(255)*	Input data filename	Y
	sample_type	*char(1)*	Sample type	Y
	data_type	*char(1)*	Data type of the spectrum	Y
	geometry	*varchar2(17)*	Sample geometry	Y
	spectral_qualifier	*varchar2(5)*	Indicator of full or preliminary spectrum	Y
	transmit_dtg	*date*	Transmit date and time	Y
	collect_start	*date*	Collection start date and time	Y
	collect_stop	*date*	Collection stop date and time	Y
	acquisition_start	*date*	Acquisition start date and time	Y
	acquisition_stop	*date*	Acquisition stop date and time	Y
	acquisition_real_sec	*number*	Total time between the acquisition stop and acquisition start (seconds)	Y
	acquisition_live_sec	*number*	Active detection time (seconds)	Y
	quantity	*number*	Air volume sampled	Y
	entry_date	*date*	Date entered into the IDC database	Y
	cnf_begin_date	*date*	Date when last analysis began	Y
	cnf_end_date	*date*	Date when last analysis ended	Y
	review_date	*date*	Date sample was last reviewed	Y
	review_time	*number*	Amount of time to review sample (minutes)	Y
	analyst	*varchar2(30)*	Name of the analyst who reviewed the sample	Y
	status	*char(1)*	Current processing status of sample.	Y
	category	*number*	Categorization level	Y

SQL Body	`SELECT` `site_det_code,` `gards_sample_data.sample_id,` `gards_sample_data.station_id,` `station_code,` `gards_sample_data.detector_id,` `detector_code,` `input_file_name,` `sample_type,` `data_type,` `gards_sample_data.geometry,` `spectral_qualifier,` `transmit_dtg,` `collect_start,` `collect_stop,` `acquisition_start,` `acquisition_stop,` `acquisition_real_sec,` `acquisition_live_sec,` `quantity,` `entry_date,` `cnf_begin_date,` `cnf_end_date,` `review_date,` `review_time,` `analyst,` `gards_sample_status.status,` `category` `FROM` `gards_sample_data,gards_sample_status,gards_stations,gards_de-tectors` `WHERE` `gards_sample_data.sample_id = gards_sample_status.sample_id` `AND` `gards_sample_data.station_id= gards_stations.station_id` `AND` `gards_sample_data.detector_id = gards_detectors.de-tector_id`

5.1.156. GARDS_SAMPLE_AUX

Owner(s)	RMSAUTO
Description	The gards_sample_aux table contains auxiliary information related to raw sample data.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
I	sample_ref_id	*varchar2(32)*	Sample reference identification	N

I	measurement_id	*varchar2(31)*	Measurement identifier	N
	bkgd_measure-ment_id	*varchar2(31)*	Detector background measurement identifier	N
	sample_height	*number*	Height of sample (cm)	N
	calibration_dtg	*date*	Date of most recent calibration at detector site	Y
I	msg_id	*number*	Message identifier	N
	archive_bottle_id	*char(2)*	Unique identifier of the archive bottle in which the sample is stored	Y
	gas_bkgd_meas-urement_id	*varchar2(31)*	Gas background measurement identifier	N
	xe_collect_yield	*number*	Xenon collection yield of the system	N
	xe_collect_yield_err	*number*	Uncertainty of the xenon collection yield	N
	xe_volume	*number*	Xenon volume	N
	xe_volume_err	*number*	Uncertainty of the xenon volume	N
	sample_diameter	*number*	Diameter of the sample	N
	moddate	*date*	Date/time at which the row was last modi-fied	N

Primary key	PK_SAMPLE_AUX(sample_id)
Foreign keys	FK_SAMPLE_AUX(sample_id, GARDS_SAMPLE_DATA)
Triggers	SAMPLE_AUX_B_I_U

5.1.157. GARDS_SAMPLE_CAT

Owner(s)	RMSMAN
Description	The gards_sample_cat table contains nuclide categorization results for particulate samples.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	name	*varchar2(8)*	Nuclide name	N
PI	method_id	*number*	Method identifier	N
	category	*number*	Categorization level	Y
	upper_bound	*number*	Upper limit of the amount of a nuclide that can be acceptably found	Y
	lower_bound	*number*	Lower limit of the amount of a nuclide that can be acceptably found	Y
	central_value	*number*	Current estimate of the level of the random process	Y
	delta	*number*	Value of a variable used in bounds estima-tion (EWMA algorithm)	Y

	activity	*number*	Activity concentration of the nuclide detected.	Y
	hold	*number*	Flag for holding current sample from being used in the history for categorizing subsequent samples (0 = use; 1 = skip)	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_SAMPLE_CAT(sample_id, name, method_id)
Foreign keys	FK_SAMP_ID(sample_id, GARDS_SAMPLE_DATA)
Triggers	SAMPLE_CAT_B_I_U

5.1.158. GARDS_SAMPLE_CERT

Owner(s)	RMSAUTO
Description	The gards_sample_cert table contains the total activity and reference date from the source certificate of QCPHD and CALIBPHD messages.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
	quantity	*number*	Total activity of the source	Y
	assay_date	*date*	Date sample was assayed	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_SAMPLE_CERT(sample_id)
Foreign keys	FK_SAMPLE_CERT(sample_id, GARDS_SAMPLE_DATA)
Triggers	SAMPLE_CERT_B_I_U

5.1.159. GARDS_SAMPLE_CERT_LINES

Owner(s)	RMSAUTO
Description	The gards_sample_cert_lines table contains the nuclide data from the source certificate of QCPHD and CALIBPHD messages.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	nucl_name	*varchar2(8)*	Nuclide name	N
	halflife	*varchar2(23)*	Half-life	Y
PI	energy	*number*	Energy of the decay line	N
	activity	*number*	Activity at time of assay	Y
	error	*number*	Relative uncertainty of the activity	Y
	abundance	*number*	Emission intensity per disintegration	Y

	b_abundance	*number*	Emission intensity (%) of beta particle or conversion electron per disintegration of one nucleus	Y
PI	b_energy	*number*	Energy of conversion electron or maximum energy of beta particle (keV)	N
	decay_mode	*char(1)*	Decay type	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_SAMPLE_CERT_LINES(sample_id, nucl_name, energy, b_energy)
Foreign keys	FK_SAMPLE_CERT_LINES(sample_id, GARDS_SAMPLE_DATA)
Triggers	SAMPLE_CERT_LINES_B_I_U

5.1.160. GARDS_SAMPLE_DATA

Owner(s)	RMSMAN
Description	The gards_sample_data table contains the basic data of sample collection and spectrum acquisition in PHD messages.

Pk/Fk/I	Column	Storage type	Description	Nullable
	site_det_code	*char(15)*	Station code concatenated with detector code	Y
PI	sample_id	*number*	Sample identifier	N
I	station_id	*number*	Station identifier	Y
I	detector_id	*number*	Detector identifier	Y
	input_file_name	*varchar2(255)*	Input data filename	Y
I	sample_type	*char(1)*	Sample type	Y
I	data_type	*char(1)*	Data type of the spectrum	Y
	geometry	*varchar2(17)*	Sample geometry	Y
I	spectral_qualifier	*varchar2(5)*	Indicator of full or preliminary spectrum	Y
	transmit_dtg	*date*	Transmit date and time	Y
I	collect_start	*date*	Collection start date and time	Y
I	collect_stop	*date*	Collection stop date and time	Y
I	acquisition_start	*date*	Acquisition start date and time	Y
I	acquisition_stop	*date*	Acquisition stop date and time	Y
	acquisition_real_sec	*number*	Total time between the acquisition stop and acquisition start (seconds)	Y
	acquisition_live_sec	*number*	Active detection time (seconds)	Y
	quantity	*number*	Air volume sampled	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_SAMPLE_DATA(sample_id)
Triggers	SAMPLE_DATA_B_I_U, SAMPLE_DATA_INSERT

5.1.161. GARDS_SAMPLE_DATA

Owner(s)	RMSAUTO
Description	The gards_sample_data table contains the basic data of sample collection and spectrum acquisition in PHD messages.

Pk/Fk/I	Column	Storage type	Description	Nullable
	site_det_code	*char(15)*	Station code concatenated with detector code	Y
PI	sample_id	*number*	Sample identifier	N
I	station_id	*number*	Station identifier	Y
I	detector_id	*number*	Detector identifier	Y
	input_file_name	*varchar2(255)*	Input data filename	Y
I	sample_type	*char(1)*	Sample type	Y
I	data_type	*char(1)*	Data type of the spectrum	Y
	geometry	*varchar2(17)*	Sample geometry	Y
I	spectral_qualifier	*varchar2(5)*	Indicator of full or preliminary spectrum	Y
I	transmit_dtg	*date*	Transmit date and time	Y
	collect_start	*date*	Collection start date and time	Y
I	collect_stop	*date*	Collection stop date and time	Y
I	acquisition_start	*date*	Acquisition start date and time	Y
I	acquisition_stop	*date*	Acquisition stop date and time	Y
	acquisition_real_sec	*number*	Total time between the acquisition stop and acquisition start (seconds)	Y
	acquisition_live_sec	*number*	Active detection time (seconds)	Y
	quantity	*number*	Air volume sampled	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_SAMPLE_DATA(sample_id)
Triggers	SAMPLE_DATA_B_I_U, GARDS_SAMPLE_DATA_I_U_D

5.1.162. GARDS_SAMPLE_DESCRIPTION

Owner(s)	RMSAUTO
Description	The gards_sample_description table contains description and comment text as specified in a PHD file.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	description	*varchar2(512)*	Comments	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_SAMPLE_DESCRIPTION(sample_id)
Foreign keys	FK_SAMPLE_DESCRIPTION(sample_id, GARDS_SAMPLE_DATA)
Triggers	SAMPLE_DESCRIPTION_B_I_U

5.1.163. GARDS_SAMPLE_FLAGS

Owner(s)	RMSAUTO
Description	The gards_sample_flags table contains the results of the rms_DBflags analysis for each sample.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	flag_id	*number*	Flag identifier	N
	result	*number*	Indicator of whether or not the test passed	Y
	value	*number*	Threshold value used for the test	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_SAMPLE_FLAGS(sample_id, flag_id)
Foreign keys	FK_SAMPLE_FLAGS(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_SAMPLE_FLAGS_I_U_D, SAMPLE_FLAGS_B_I_U

5.1.164. GARDS_SAMPLE_FLAGS

Owner(s)	RMSMAN
Description	The gards_sample_flags table contains the results of the rms_DBflags analysis for each sample.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	flag_id	*number*	Flag identifier	N
	result	*number*	Indicator of whether or not the test passed	Y
	value	*number*	Threshold value used for the test	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_SAMPLE_FLAGS(sample_id, flag_id)
Foreign keys	FK_SAMPLE_FLAGS(sample_id, GARDS_SAMPLE_DATA)
Triggers	SAMPLE_FLAGS_B_I_U

5.1.165. GARDS_SAMPLE_PROC_PARAMS

Owner(s)	RMSMAN
Description	The gards_sample_proc_params table contains specific processing parameters to be used for a particular spectral analysis; the table contains a combination of values from gards_proc_params_template and values entered at the command line. (Note: it is not used in the current IDC analysis.)

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
	do_back	*number*	Background subtraction indicator	Y
	back_data_type	*char(1)*	Spectral type of the detector background	Y
	back_sample_id	*number*	Sample identifier for the sample used in background subtraction	Y
	nuclide_lib	*varchar2(96)*	Nuclide library to be used during analysis	Y
	energy_tol	*number*	Tolerance for nuclide identification	Y
	mda_level	*number*	MDA confidence factor (percent)	Y
	nid_confid	*number*	NID confidence factor (percent)	Y
	squant_err	*number*	Uncertainty of sample quantity	Y
	buildtype	*varchar2(8)*	Flag indicating activity or concentration cal-culations	Y
	peak_sense	*number*	Peak search sensitivity	Y
	peak_start	*number*	Peak search start (keV)	Y
	peak_end	*number*	Peak search end (keV)	Y
	fwhm_mult_widt h	*number*	Number of FWHMs to search to determine multiplets	Y
	left_fwhm_lim	*number*	Left ROI FWHM limit	Y
	right_fwhm_lim	*number*	Right ROI FWHM limit	Y
	back_chan	*number*	Number of continuous channels	Y
	back_type	*varchar2(6)*	Background type: LINEAR or STEP	Y
	fit_singlets	*number*	Fit singlets flag	Y
	crit_level	*number*	Critical level indicator	Y
	fix_fwhm	*number*	Fixed FWHM during peak search flag	Y
	area_reject	*number*	Indicator of whether or not to reject peaks with zero area indicator	Y
	mdc_width	*number*	Baseline width used for MDA calculation	Y
	lc_abscissa	*number*	Abscissas of the normal distribution corres-	Y

			ponding to a predefined confidence level for estimating the critical level	
	do_pd_calc	*number*	Flag indicates if the parent/daughter calculations should be run	Y
	do_csc	*number*	Flag to turn off cascade summing correction	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_SAMPLE_PROC_PARS(sample_id)
Foreign keys	FK_SAMPLE_PROC_PARAMS(sample_id, GARDS_SAMPLE_DATA)
Triggers	SAMPLE_PROC_PARAMS_B_I_U

5.1.166. GARDS_SAMPLE_PROC_PARAMS

Owner(s)	RMSAUTO
Description	The gards_sample_proc_params table contains specific processing parameters to be used for a particular spectral analysis; the table contains a combination of values from gards_proc_params_template and values entered at the command line. (Note: it is not used in the current IDC analysis.)

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	do_back	*number*	Background subtraction indicator	Y
	back_data_type	*char(1)*	Spectral type of the detector background	Y
	back_sample_id	*number*	Sample identifier for the sample used in background subtraction	Y
	nuclide_lib	*varchar2(96)*	Nuclide library to be used during analysis	Y
	energy_tol	*number*	Tolerance for nuclide identification	Y
	mda_level	*number*	MDA confidence factor (percent)	Y
	nid_confid	*number*	NID confidence factor (percent)	Y
	squant_err	*number*	Uncertainty of sample quantity	Y
	buildtype	*varchar2(8)*	Flag indicating activity or concentration calculations	Y
	peak_sense	*number*	Peak search sensitivity	Y
	peak_start	*number*	Peak search start (keV)	Y
	peak_end	*number*	Peak search end (keV)	Y
	fwhm_mult_width	*number*	Number of FWHMs to search to determine multiplets	Y
	left_fwhm_lim	*number*	Left ROI FWHM limit	Y
	right_fwhm_lim	*number*	Right ROI FWHM limit	Y
	back_chan	*number*	Number of continuous channels	Y
	back_type	*varchar2(6)*	Background type: LINEAR or STEP	Y

	fit_singlets	*number*	Fit singlets flag	Y
	crit_level	*number*	Critical level indicator	Y
	fix_fwhm	*number*	Fixed FWHM during peak search flag	Y
	area_reject	*number*	Indicator of whether or not to reject peaks with zero area indicator	Y
	mdc_width	*number*	Baseline width used for MDA calculation	Y
	lc_abscissa	*number*	Abscissas of the normal distribution corres-ponding to a predefined confidence level for estimating the critical level	Y
	do_pd_calc	*number*	Flag indicates if the parent/daughter calcula-tions should be run	Y
	do_csc	*number*	Flag to turn off cascade summing correction	Y
	moddate	*date*	Date/time at which the row was last modi-fied	Y

Primary key	PK_GARDS_SAMPLE_PROC_PARAMS(sample_id)
Foreign keys	FK_SAMPLE_PROC_PARAMS(sample_id, GARDS_SAMPLE_DATA)
Triggers	SAMPLE_PROC_PARAMS_B_I_U, GARDS_SAMPLE_PROC_PARAMS_I_U_D

5.1.167. GARDS_SAMPLE_RATIOS

Owner(s)	RMSAUTO
Description	The gards_sample_ratios table contains count ratios of a higher energy ROI to a lower energy ROI specified in the PHD.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	ratio_id	*varchar2(15)*	Ratio identifier	N
	upper_roi_num-ber	*number*	Upper ROI number	Y
	lower_roi_num-ber	*number*	Lower ROI number	Y
	count_ratio	*number*	Ratio of the upper ROI counts to lower ROI counts	Y
	count_ratio_err	*number*	Uncertainty of the ratio	Y
	moddate	*date*	Date/time at which the row was last modi-fied	Y

Primary key	PK_GARDS_SAMPLE_RATIOS(sample_id, ratio_id)
Foreign keys	FK_SAMPLE_RATIOS(sample_id, GARDS_SAMPLE_DATA)
Triggers	SAMPLE_RATIOS_B_I_U, GARDS_SAMPLE_RATIOS_I_U_D

5.1.168. GARDS_SAMPLE_RATIOS

Owner(s)	RMSMAN
Description	The gards_sample_ratios table contains count ratios of a higher energy ROI to a lower energy ROI specified in the PHD.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	ratio_id	*varchar2(15)*	Ratio identifier	N
	upper_roi_number	*number*	Upper ROI number	Y
	lower_roi_number	*number*	Lower ROI number	Y
	count_ratio	*number*	Ratio of the upper ROI counts to lower ROI counts	Y
	count_ratio_err	*number*	Uncertainty of the ratio	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_SAMPLE_RATIOS(sample_id, ratio_id)
Foreign keys	FK_SAMPLE_RATIOS(sample_id, GARDS_SAMPLE_DATA)
Triggers	SAMPLE_RATIOS_B_I_U

5.1.169. GARDS_SAMPLE_STATUS

Owner(s)	RMSAUTO
Description	The gards_sample_status table contains spectral processing status.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	entry_date	*date*	Date entered into the IDC database	Y
	cnf_begin_date	*date*	Date when last analysis began	Y
	cnf_end_date	*date*	Date when last analysis ended	Y
	review_date	*date*	Date sample was last reviewed	Y
	review_time	*number*	Amount of time to review sample (minutes)	Y
	analyst	*varchar2(30)*	Name of the analyst who reviewed the sample	Y
I	status	*char(1)*	Current processing status of sample.	Y
	category	*number*	Categorization level	Y
	auto_category	*number*	Sample categorization level after automated analysis	Y
	release_date	*date*	Release date	Y

	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_SAMPLE_STATUS(sample_id)
Foreign keys	FK_SAMPLE_STATUS(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_SAMPLE_STATUS_I_U_D, SAMPLE_STATUS_B_I_U

5.1.170. GARDS_SAMPLE_STATUS

Owner(s)	RMSMAN
Description	The gards_sample_status table contains spectral processing status.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
	entry_date	*date*	Date entered into the IDC database	Y
	cnf_begin_date	*date*	Date when last analysis began	Y
	cnf_end_date	*date*	Date when last analysis ended	Y
	review_date	*date*	Date sample was last reviewed	Y
	review_time	*number*	Amount of time to review sample (minutes)	Y
	analyst	*varchar2(30)*	Name of the analyst who reviewed the sample	Y
I	status	*char(1)*	Current processing status of sample.	Y
	category	*number*	Categorization level	Y
	auto_category	*number*	Sample categorization level after automated analysis	Y
	release_date	*date*	Release date	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_SAMPLE_STATUS(sample_id)
Foreign keys	FK_SAMPLE_STATUS(sample_id, GARDS_SAMPLE_DATA)
Triggers	SAMPLE_STATUS_UPDATE, SAMPLE_STATUS_B_I_U

5.1.171. GARDS_SAMPLE_TESTS

Owner(s)	RMSMAN
Description	The gards_sample_tests table contains thresholds for sample metrics as used interactively for checking the data quality according to the IDC review policy.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	test_id	*number*	Unique identifier	N
	station_id	*number*	Station identifier	Y

	sample_type	*char(1)*	Sample type	Y
	test_code	*varchar2(24)*	Unique test code identifier string	Y
	test_name	*varchar2(48)*	Test name label for display	Y
	lower_limit_green	*number*	Green flag lower limit	Y
	upper_limit_green	*number*	Green flag upper limit	Y
	lower_limit_yellow	*number*	Yellow flag lower limit	Y
	upper_limit_yellow	*number*	Yellow flag upper limit	Y
	units	*varchar2(16)*	Units of test bounds	Y
	active_flag	*number*	Boolean flag whether it is active	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_SAMPLE_TESTS(test_id)

5.1.172. GARDS_SAMPLE_UPDATE_PARAMS

Owner(s)	RMSAUTO
Description	The gards_sample_update_params table holds the actual parameters used for energy calibration updating during analysis. This table may contain a combination of defaults from gards_update_params_template and values from the command line. (Note: it is not used in the current IDC analysis.)

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
	mrp_used	*number*	Indicator of whether or not the Most Recent Prior (MRP) sample should be used	Y
	mrp_sample_id	*number*	The sample_id of the MRP sample to be used	Y
	gainshift	*number*	Gain change for matching, percent (typically 0.1)	Y
	zeroshift	*number*	Zero change for matching, channels (typically 1)	Y
	area_lim	*number*	Minimum peak area for inclusion in matching (counts)	Y
	use_weight	*number*	0/1 flag for use of weights in ECR updating (typically 1)	Y
	use_mult	*number*	0/1 flag for use of multiplets in ECR updating (typically 1)	Y
	f_linear	*number*	0/1 flag for forcing ECR to be first-order (typically 0)	Y

	bootstrap	*number*	0/1 flag for ignoring prior ECR/RER (typically 0)	Y
	min_lookup	*number*	Minimum library lookup tolerance, keV (typically 0.2)	Y
	rer_intercept	*number*	Default RER intercept (typically 1.2)	Y
	rer_slope	*number*	Default RER coeff (typically 0.03)	Y
	ecr_slope	*number*	Default ECR slope	Y
	do_reru	*number*	Flag that indicates if a resolution update was performed	Y
	rer_mrp_used	*number*	Indicates what RER was chosen during analysis	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_RMSMAN_GARDS_SAMPLE_UPD_PAR(sample_id)
Foreign keys	FK_SAMPLE_UPDATE_PARAMS(sample_id, GARDS_SAMPLE_DATA)
Triggers	SAMPLE_UPDATE_PARAMS_B_I_U, GARDS_SAMP_UPD_PRMS_I_U_D

5.1.173. GARDS_SAMPLE_UPDATE_PARAMS

Owner(s)	RMSMAN
Description	The gards_sample_update_params table holds the actual parameters used for energy calibration updating during analysis. This table may contain a combination of defaults from gards_update_params_template and values from the command line. (Note: it is not used in the current IDC analysis.)

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	mrp_used	*number*	Indicator of whether or not the Most Recent Prior (MRP) sample should be used	Y
	mrp_sample_id	*number*	The sample_id of the MRP sample to be used	Y
	gainshift	*number*	Gain change for matching, percent (typically 0.1)	Y
	zeroshift	*number*	Zero change for matching, channels (typically 1)	Y
	area_lim	*number*	Minimum peak area for inclusion in matching (counts)	Y
	use_weight	*number*	0/1 flag for use of weights in ECR updating (typically 1)	Y
	use_mult	*number*	0/1 flag for use of multiplets in ECR updating (typically 1)	Y
	f_linear	*number*	0/1 flag for forcing ECR to be first-order (typically 0)	Y

	bootstrap	*number*	0/1 flag for ignoring prior ECR/RER (typically 0)	Y
	min_lookup	*number*	Minimum library lookup tolerance, keV (typically 0.2)	Y
	rer_intercept	*number*	Default RER intercept (typically 1.2)	Y
	rer_slope	*number*	Default RER coeff (typically 0.03)	Y
	ecr_slope	*number*	Default ECR slope	Y
	do_reru	*number*	Flag that indicates if a resolution update was performed	Y
	rer_mrp_used	*number*	Indicates what RER was chosen during analysis	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_RMSMAN_GARDS_SAMPLE_UPD_PAR(sample_id)
Foreign keys	FK_SAMPLE_UPDATE_PARAMS(sample_id, GARDS_SAMPLE_DATA)
Triggers	SAMPLE_UPDATE_PARAMS_B_I_U

5.1.174. GARDS_SAMPLE_XE_PROC_PARAMS

Owner(s)	RMSAUTO
Description	The gards_sample_xe_proc_params table contains specific processing parameters to be used for a beta-gamma coincidence spectral analysis. (Note: it is not used in the current IDC analysis.)

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	roi	*number*	ROI identifier	N
	lc_abscissa	*number*	Abscissas of the normal distribution corresponding to a predefined confidence level for estimating the critical level	Y
	beta_ecr_order	*number*	Order of the beta energy calibration function	Y
	gamma_ecr_order	*number*	Order of the gamma energy calibration function	Y
	compton	*number*	Counts of Compton continuum background	Y
	det_back_used	*number*	Flag indicating whether the detector background is in use or not	Y
	gas_back_used	*number*	Flag indicating whether the gas background is in use or not	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_SAMPLE_XE_PROC_PARAMS(sample_id, roi)
Foreign keys	FK_SAMPLE_XE_PROC_PARAMS(sample_id, GARDS_SAMPLE_DATA)
Triggers	SAMPLE_XE_PROC_PARAMS_B_I_U, GARDS_SMPLE_XE_P_PRMS_I_U_D

5.1.175. GARDS_SAMPLE_XE_PROC_PARAMS

Owner(s)	RMSMAN
Description	The gards_sample_xe_proc_params table contains specific processing parameters to be used for a beta-gamma coincidence spectral analysis. (Note: it is not used in the current IDC analysis.)

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	roi	*number*	ROI identifier	N
	lc_abscissa	*number*	Abscissas of the normal distribution corresponding to a predefined confidence level for estimating the critical level	Y
	beta_ecr_order	*number*	Order of the beta energy calibration function	Y
	gamma_ecr_order	*number*	Order of the gamma energy calibration function	Y
	compton	*number*	Counts of Compton continuum background	Y
	det_back_used	*number*	Flag indicating whether the detector background is in use or not	Y
	gas_back_used	*number*	Flag indicating whether the gas background is in use or not	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_SAMPLE_XE_PROC_PARAMS(sample_id, roi)
Foreign keys	FK_SAMPLE_XE_PROC_PARAMS(sample_id, GARDS_SAMPLE_DATA)
Triggers	SAMPLE_XE_PROC_PARAMS_B_I_U

5.1.176. GARDS_SOH_CHAR_DATA

Owner(s)	RMSAUTO
Description	The gards_soh_char_data table contains the state of health (SOH) character data.

Pk/Fk/I	Column	Storage type	Description	Nullable
I	station_id	*number*	Station identifier	N
	detector_id	*number*	Detector identifier	Y
I	param_code	*number*	SOH parameter code	N
I	value	*varchar2(30)*	Value of the specified SOH parameter	N
I	dtg_begin	*date*	Begin date and time	N

I	dtg_end	*date*	End date and time	N
	moddate	*date*	Date/time at which the row was last modified	N
PI	soh_char_id	*number*	Unique state of health character data identifier	N
FI	soh_id	*number*	SOH identifier	N

Primary key	PK_CHAR_DATA(soh_char_id)
Foreign keys	FK_SOH_ID_CHAR_DATA(soh_id, GARDS_SOH_HEADER)
Triggers	SOH_CHAR_DATA_S_I, SOH_CHAR_DATA_B_I_U

5.1.177. GARDS_SOH_CODE

Owner(s)	RMSMAN
Description	The gards_soh_code table contains the state of health (SOH) parameter names and their codes.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	param	*varchar2(30)*	SOH parameter name	N
	param_code	*number*	SOH parameter code	Y
	param_display	*varchar2(30)*	Text of the parameter to be displayed in Trendvue	Y
	param_display_flag	*number*	Flag indicating whether or not a particular parameter is displayed	Y
	display_station	*number*	Flag indicating whether the parameter is associated with a station	Y
	display_detector	*number*	Flag indicating whether the parameter is associated with a detector	Y
	unit	*varchar2(32)*	Unit that the parameter is stored in	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_SOH_CODE(param)
Triggers	SOH_CODE_B_I_U

5.1.178. GARDS_SOH_EVALUATION

Owner(s)	RMSAUTO
Description	The GARDS_SOH_EVALUATION contains results of SOH data evaluated.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number(19,0)*	Sample identifier	N
	srid	*varchar2(32)*	Sample reference identification	N

	soh_status	*varchar2(1)*	Processing status	Y
	soh_flag	*varchar2(1)*	SOH flag	Y
	author	*varchar2(30)*	User name	Y
	user_comment	*varchar2(2048)*	Comment	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	lddate	*date*	Load date	Y

Primary key	PK_GSE(sample_id)
Foreign keys	FK_GSE_SID(sample_id, GARDS_SAMPLE_DATA)
Triggers	SOH_EVALUATION_B_I_U, SOH_EVALUATION_B_I, GARDS_SOH_EVALUATION_I_U_D

5.1.179. GARDS_SOH_EVALUATION

Owner(s)	RMSMAN
Description	The GARDS_SOH_EVALUATION contains results of SOH data evaluated.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number(19,0)*	Sample identifier	N
	srid	*varchar2(32)*	Sample reference identification	N
	soh_status	*varchar2(1)*	Processing status	Y
	soh_flag	*varchar2(1)*	SOH flag	Y
	author	*varchar2(30)*	User name	Y
	user_comment	*varchar2(2048)*	Comment	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	lddate	*date*	Load date	Y

Primary key	SYS_C002723457(sample_id)
Foreign keys	FK_BGE_SID(sample_id, GARDS_SAMPLE_DATA)
Triggers	SOH_EVALUATION_B_I_U

5.1.180. GARDS_SOH_HEADER

Owner(s)	RMSAUTO
Description	The gards_soh_header table contains the header information for SOH messages.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	soh_id	*number*	SOH identifier	N

FI	station_id	*number*	Station identifier	N
	detector_id	*number*	Detector identifier	Y
I	dtg_begin	*date*	Begin date and time	N
I	dtg_end	*date*	End date and time	N
	transmit_dtg	*date*	Transmit date and time	N
	moddate	*date*	Date/time at which the row was last modified	N

Primary key	PK_SOH_HEADER(soh_id)
Foreign keys	FK_SOH_HEADER(station_id, GARDS_STATIONS)
Slaves	GARDS_SOH_SENSOR_DATA, GARDS_SOH_CHAR_DATA, GARDS_SOH_NUM_DATA
Triggers	SOH_HEADER_B_I_U

5.1.181. GARDS_SOH_NUM_DATA

Owner(s)	RMSAUTO
Description	The gards_soh_num_data table contains the state of health (SOH) numerical data

Pk/Fk/I	Column	Storage type	Description	Nullable
I	station_id	*number*	Station identifier	N
I	detector_id	*number*	Detector identifier	Y
I	param_code	*number*	SOH parameter code	N
	value	*number*	Value of the specified SOH parameter	N
I	dtg_begin	*date*	Begin date and time	N
I	dtg_end	*date*	End date and time	N
	moddate	*date*	Date/time at which the row was last modified	N
PI	soh_num_id	*number*	State of health identifier	N
FI	soh_id	*number*	SOH identifier	N

Primary key	PK_NUM_DATA(soh_num_id)
Foreign keys	FK_SOH_ID_NUM_DATA(soh_id, GARDS_SOH_HEADER)
Triggers	SOH_NUM_DATA_B_I_U, SOH_NUM_DATA_S_I

5.1.182. GARDS_SOH_SENSOR_DATA

Owner(s)	RMSAUTO
Description	The gards_soh_sensor_data table contains the data of sensors

Pk/Fk/I	Column	Storage type	Description	Nullable
I	station_id	*number*	Station identifier	N

	detector_id	*number*	Detector identifier	Y
I	sensor_type	*varchar2(20)*	Sensor type	N
I	sensor_name	*varchar2(20)*	Unique sensor name to distinguish between sensors of the same type	N
	value	*number*	Value of the specified SOH parameter	N
I	dtg_begin	*date*	Begin date and time	N
I	dtg_end	*date*	End date and time	N
	moddate	*date*	Date/time at which the row was last modified	N
PI	soh_sensor_id	*number*	State of health sensor id	N
FI	soh_id	*number*	SOH identifier	N

Primary key	PK_SOH_SENSOR_DATA(soh_sensor_id)
Foreign keys	FK_SOH_ID_SENSOR_DATA(soh_id, GARDS_SOH_HEADER)
Triggers	SOH_SENSOR_DATA_S_I, SOH_SENSOR_DATA_B_I_U

5.1.183. GARDS_SPECTRUM

Owner(s)	RMSAUTO
Description	The gards_spectrum table contains information regarding the spectral data information reported in the PHD file.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	sample_type	*char(1)*	Sample type	N
	filename	*varchar2(256)*	Name of the file containing the spectrum data	Y
	channels	*number*	Number of channels in spectrum	Y
	energy_span	*number*	Total energy span of detector (keV)	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	start_channel	*number*	Start channel	Y

Primary key	PK_GARDS_SPECTRUM(sample_id, sample_type)
Foreign keys	FK_SPECTRUM(sample_id, GARDS_SAMPLE_DATA)
Triggers	SPECTRUM_B_I_U

5.1.184. GARDS_STADET

Owner(s)	RMSMAN
Description	The gards_stadet table contains a complete list of station/detector identifier code combinations. The entries in this table are generated via a trigger on the gards_sample_data table.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	station_id	*number*	Station identifier	N
PFI	detector_id	*number*	Detector identifier	N
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_STADET(station_id, detector_id)
Foreign keys	FK_STADET_STA(station_id, GARDS_STATIONS), FK_STADET_DET(detector_id, GARDS_DETECTORS)
Indexes	PK_STADET(station_id, detector_id), GARDS_STADET_DID_NDX(detector_id)
Triggers	STADET_B_I_U

5.1.185. GARDS_STATIONS

Owner(s)	RMSMAN
Description	The gards_stations table contains a station overview and station characteristics.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	station_id	*number*	Station identifier	N
I	station_code	*varchar2(5)*	Station code	Y
	country_code	*varchar2(2)*	Country code	Y
	type	*varchar2(6)*	Station type	Y
	description	*varchar2(40)*	Station description	Y
	lat	*number*	Latitude (degrees)	Y
	lon	*number*	Longitude (degrees)	Y
	elevation	*number*	Elevation (m)	Y
	date_begin	*date*	Initialization date	Y
	date_end	*date*	Decommissioning date	Y
	status	*varchar2(2)*	Status of station, if NULL then station is fully operational otherwise the status is I	Y
	pocid	*number*	Point of contact identifier	Y
	split_station	*number*	Flag indicating whether or not station is split	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_STATIONS(station_id)
Slaves	GARDS_PROC_PARAMS_TEMPLATE, GARDS_UPDATE_REFLINES, GARDS_MET_DATA, GARDS_MET_HEADER, GARDS_SOH_HEADER, GARDS_STATIONS_SCHEDULE, GARDS_QCTARGETS, GARDS_STADET, GARDS_CAT_TEMPLATE, GARDS_STATION_ASSIGNMENTS
Triggers	STATIONS_INSERT, STATIONS_B_I_U

5.1.186. GARDS_STATIONS_SCHEDULE

Owner(s)	RMSMAN
Description	The gards_stations_schedule table contains schedule descriptions for stations reporting to a data center.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	station_id	*number*	Station identifier	N
PI	begin_date	*date*	Initialization date	N
	end_date	*date*	Decommissioning date	Y
PI	code	*char(5)*	Code symbol SCHEDULE as found in the gards_codes table. SF_GP for full sample grace period or SPHDF for full sample PHD	N
	temporal_value	*number*	Expected station schedule period	Y
	temporal_unit	*char(5)*	Units for schedule period - currently only the value DAYS is supported	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_RMSMAN_GARDS_STATIONS_SCHED(station_id, code, begin_date)
Foreign keys	FK_STA_SCHEDULE_STAID(station_id, GARDS_STATIONS)
Triggers	STATIONS_SCHEDULE_B_I_U

5.1.187. GARDS_STATION_ASSIGNMENTS

Owner(s)	RMSMAN
Description	The gards_station_assignments table contains a mapping of which stations are assigned to which users.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	station_id	*number*	Station identifier	N
FI	user_id	*number*	User identifier	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_RMSMAN_GARDS_STATION_ASS(station_id)
Foreign keys	FK_STA_ASSIGN_STAID(station_id, GARDS_STATIONS), FK_STA_ASSIGN_USRID(user_id, GARDS_USERS)
Triggers	STATION_ASSIGNMENTS_B_I_U

5.1.188. GARDS_STATUS_HISTORY

Owner(s)	RMSMAN
Description	The gards_status_history table contains a list of changes in gards_sample_status for

	the reviewed spectrum.

Pk/Fk/I	Column	Storage type	Description	Nullable
FI	sample_id	*number*	Sample identifier	Y
	user_name	*varchar2(30)*	User name	Y
	old_status	*char(1)*	Sample status before change	Y
	new_status	*char(1)*	Sample status after change	Y
	dtg	*date*	Entry date and time	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Foreign keys	FK_STATUS_HISTORY(sample_id, GARDS_SAMPLE_DATA)
Triggers	STATUS_HISTORY_B_I_U

5.1.189. GARDS_TOTAL_EFFIC

Owner(s)	RMSAUTO
Description	The gards_total_effic table contains the total efficiency data as specified in the PHD.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	effic_energy	*number*	Gamma energy	N
	efficiency	*number*	Efficiency	Y
	effic_error	*number*	Uncertainty of the efficiency	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_TOTAL_EFFIC(sample_id, effic_energy)
Foreign keys	FK_TOTAL_EFFIC(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_TOTAL_EFFIC_I_U_D, TOTAL_EFFIC_B_I_U

5.1.190. GARDS_TOTAL_EFFIC

Owner(s)	RMSMAN
Description	The gards_total_effic table contains the total efficiency data as specified in the PHD.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
PI	effic_energy	*number*	Gamma energy	N
	efficiency	*number*	Efficiency	Y
	effic_error	*number*	Uncertainty of the efficiency	Y
	moddate	*date*	Date/time at which the row was last modi-	Y

			fied	

Primary key	PK_GARDS_TOTAL_EFFIC(sample_id, effic_energy)
Foreign keys	FK_TOTAL_EFFIC(sample_id, GARDS_SAMPLE_DATA)
Triggers	TOTAL_EFFIC_B_I_U

5.1.191. GARDS_TRENDVUE

Owner(s)	RMSAUTO, RMSMAN
Description	The gards_trendvue table contains the data produced by the Trendvue application and is purged at the end of each session. (Note: it is obsoleted.)

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
	session_id	*number*	Unique session identifier	Y
	date_value	*date*	Date of the Trendvue plot	Y
	num_value1	*number*	First plot value	Y
	num_value2	*number*	Second plot value	Y
	num_value3	*number*	Third plot value	Y
	num_value4	*number*	Fourth plot value	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Triggers	TRENDVUE_B_I_U

5.1.192. GARDS_UPDATE_PARAMS_TEMPLATE

Owner(s)	RMSMAN
Description	The gards_update_params_template table holds default parameters used for energy calibration updating during analysis; these values can be overridden at the command line.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	detector_id	*number*	Detector identifier	N
	gainshift	*number*	Gain change for matching, percent (typically 0.1)	Y
	zeroshift	*number*	Zero change for matching, channels (typically 1)	Y
	area_lim	*number*	Minimum peak area for inclusion in matching (counts)	Y
	use_weight	*number*	0/1 flag for use of weights in ECR updating (typically 1)	Y
	use_mult	*number*	0/1 flag for use of multiplets in ECR updating (typically 1)	Y
	f_linear	*number*	0/1 flag for forcing ECR to be first-order	Y

			(typically 0)	
	bootstrap	*number*	0/1 flag for ignoring prior ECR/RER (typically 0)	Y
	min_lookup	*number*	Minimum library lookup tolerance, keV (typically 0.2)	Y
	rer_intercept	*number*	Default RER intercept (typically 1.2)	Y
	rer_slope	*number*	Default RER slope (typically 0.03)	Y
	do_reru	*number*	Flag that indicates if a resolution update was performed	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_UPDATE_PAR_TEMPL(detector_id)
Foreign keys	FK_UPD_PARAMS_TMPL(detector_id, GARDS_DETECTORS)
Triggers	UPDATE_PARAMS_TEMPLATE_B_I_U

5.1.193. GARDS_UPDATE_REFLINES

Owner(s)	RMSMAN
Description	The gards_update_reflines table contains energies of reference lines used in ECR/ RER updating functions.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	station_id	*number*	Station identifier	N
PFI	detector_id	*number*	Detector identifier	N
PI	refpeak_energy	*number*	Reference energy of the decay line	N
PI	data_type	*char(1)*	Data type of the spectrum	N
PI	spectral_qualifier	*varchar2(5)*	Indicator of full or preliminary spectrum	N
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_UPDATE_REFLINES(station_id, detector_id, refpeak_energy, data_type, spectral_qualifier)
Foreign keys	FK_UPD_REFLINES_STA(station_id, GARDS_STATIONS), FK_UPD_REFLINES_DET(detector_id, GARDS_DETECTORS)
Triggers	UPDATE_REFLINES_B_I_U

5.1.194. GARDS_USERENV

Owner(s)	RMSMAN
Description	The gards_userenv table contains configurable environment variables used by the Automatic Processing software.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**

PI	name	*varchar2(40)*	Variable name	N
	value	*varchar2(256)*	Variable value	N
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_USERENV(name)
Triggers	USERENV_B_I_U

5.1.195. GARDS_USERS

Owner(s)	RMSMAN
Description	Contains details of radionuclide-related personnel.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	user_id	*number*	User identifier	N
	user_name	*varchar2(30)*	User name	N
	assignable	*number*	Indicator of whether or not the user can be assigned stations	N
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_USERS(user_id)
Indexes	PK_USERS(user_id)
Slaves	GARDS_USERS_ROLES, GARDS_STATION_ASSIGNMENTS
Triggers	GARDS_USER_DELETE, USERS_B_I_U

5.1.196. GARDS_USERS_ROLES

Owner(s)	RMSMAN
Description	The gards_users_roles table contains a mapping of which roles are assigned to which user.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	user_id	*number*	User identifier	N
PFI	role_id	*number*	Role identifier	N
	default_role	*number*	Integer representation of the default role name to be assigned to the user	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_USERS_ROLES(user_id, role_id)
Foreign keys	FK_USER_ID(user_id, GARDS_USERS), FK_ROLE_ID(role_id, GARDS_ROLES)
Triggers	USERS_ROLES_B_I_U

5.1.197. GARDS_USER_COMMENTS

Owner(s)	RMSMAN
Description	The gards_user_comments table contains the text associated with user-defined comments.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
FI	sample_id	*number*	Sample identifier	Y
PFI	comment_id	*number*	Comment identifier	N
	comment_text	*varchar2(2048)*	Comment text	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_USER_COMMENTS(comment_id)
Foreign keys	FK_USER_COMMENTS_SID(sample_id, GARDS_SAMPLE_DATA), FK_USER_COMMENTS(comment_id, GARDS_COMMENTS)
Triggers	USER_COMMENTS_B_I_U

5.1.198. GARDS_USER_COMMENTS

Owner(s)	RMSAUTO
Description	The gards_user_comments table contains the text associated with user-defined comments.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
FI	sample_id	*number*	Sample identifier	Y
PFI	comment_id	*number*	Comment identifier	N
	comment_text	*varchar2(2048)*	Comment text	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_USER_COMMENTS(comment_id)
Foreign keys	FK_USER_COMMENTS_SID(sample_id, GARDS_SAMPLE_DATA), FK_USER_COMMENTS(comment_id, GARDS_COMMENTS)
Triggers	USER_COMMENTS_B_I_U, GARDS_USER_COMMENTS_I_U_D

5.1.199. GARDS_XE_CATEGORY_PARAMS

Owner(s)	RMSMAN
Description	The GARDS_XE_CATEGORY_PARAMS contains parameters used for categorization of the noble gas sample.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**

PI	start_date	*date*	Initialization date	N
	end_date	*date*	Decommissioning date	Y
	moving_avg_days	*number*	Period of the inter-quartile algorithm used for abnormal threshold determination for noble gas sample categorization	Y
	abnormal_conc_factor	*number*	Factor used in the algorithm of the abnormal threshold	Y
	xe133m_xe131m_limit	*number*	Ratio limit of Xe-133m to Xe-131m	Y
	xe133m_xe133_limit	*number*	Ratio limit of Xe-133m to Xe-133	Y
	xe135_xe133_limit	*number*	Ratio limit of Xe-135 to Xe-133	Y
	bayes_plus	*number*	Percentile related to the upper bound of Bayesian ratio	Y
	bayes_minus	*number*	Percentile related to the lower bound of Bayesian ratio	Y
	analyst	*varchar2(30)*	Name of the analyst who reviewed the sample	Y
	comment_txt	*varchar2(300)*	Free-form user comments	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	shortterm_moving_avg_days	*number*	period in which the average activity concentration is determined for a short term abnormal threshold determination	Y
	xe133_xe131m_limit	*number*	Ratio limit of Xe-133 to Xe-131m	Y

Primary key	GARDS_XE_CAT_PAR_PK(start_date)

5.1.200. GARDS_XE_NUCL_LIB

Owner(s)	RMSMAN
Description	The gards_xe_nucl_lib table contains nuclide library for noble gas analysis.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
	nuclide_id	*number*	Nuclide identifier	Y
PI	name	*varchar2(8)*	Nuclide name	N
	type	*varchar2(16)*	Nuclide type	Y
	halflife_sec	*number*	Half-life in seconds	Y
	halflife	*varchar2(23)*	Half-life	Y
	halflife_err	*varchar2(23)*	Uncertainty of half-life	Y
	num_lines	*number*	Number of decay lines in library	Y

	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_XE_NUCL_LIB(name)
Triggers	XE_NUCL_LIB_B_I_U

5.1.201. GARDS_XE_NUCL_LINES_LIB

Owner(s)	RMSMAN
Description	The gards_xe_nucl_lines_lib table contains nuclide library of energy lines for noble gas analysis.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	name	*varchar2(8)*	Nuclide name	N
PI	energy	*number*	Energy of the decay line	N
	energy_err	*number*	Uncertainty of the energy	Y
	abundance	*number*	Emission intensity per disintegration	Y
	abundance_err	*number*	Uncertainty of the abundance	Y
	key_flag	*number*	Key line indicator	Y
	nuclide_id	*number*	Nuclide identifier	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_XE_NUCL_LINES_LIB(name, energy)
Triggers	XE_NUCL_LINES_LIB_B_I_U

5.1.202. GARDS_XE_PROC_PARAMS_TEMPLATE

Owner(s)	RMSMAN
Description	The gards_xe_proc_params_template table contains the information used for noble gas spectra analysis. (Note: it is not used in the current IDC analysis.)

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	detector_id	*number*	Detector identifier	N
PI	roi	*number*	ROI identifier	N
	lc_abscissa	*number*	Abscissas of the normal distribution corresponding to a predefined confidence level for estimating the critical level	Y
	beta_ecr_order	*number*	Order of the beta energy calibration function	Y
	gamma_ecr_order	*number*	Order of the gamma energy calibration function	Y
	compton	*number*	Counts of Compton continuum background	Y
	det_back_used	*number*	Flag indicating whether the detector back-	Y

			ground is in use or not	
	gas_back_used	*number*	Flag indicating whether the gas background is in use or not	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_XE_PROC_PARAMS_TEMP(detector_id, roi)
Foreign keys	XE_PPT_DET(detector_id, GARDS_DETECTORS)
Triggers	XE_PROC_PARAMS_TEMPLATE_B_I_U

5.1.203. GARDS_XE_REFLINE_MASTER

Owner(s)	RMSMAN
Description	The GARDS_XE_REFLINE_MASTER table contains the reference peak information for updating energy and resolution calibrations of HPGe based noble gas spectra (SPALAX).

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	refpeak_energy	*number*	Reference energy of the decay line	N
PI	data_type	*char(1)*	Data type of the spectrum	N
PI	spectral_qualifier	*varchar2(5)*	Indicator of full or preliminary spectrum	N
	calibration_type	*varchar2(3)*	Calibration type	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_GARDS_XE_REFLINE_MASTER(refpeak_energy, data_type, spectral_qualifier)
Triggers	XE_REFLINE_MASTER_B_I_U

5.1.204. GARDS_XE_RESULTS

Owner(s)	RMSAUTO
Description	The GARDS_XE_RESULTS table contains results of gamma spectrum analysis for noble gas systems with high resolution.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	method_id	*number*	Method identifier	N
PI	nuclide_id	*number*	Nuclide identifier	N
	conc	*float(126)*	Activity concentration	Y
	conc_err	*float(126)*	Uncertainty of the activity concentration	Y
	mdc	*float(126)*	Minimum detectable concentration	Y
	mdi	*float(126)*	Minimum detectable intensity for the meta-	Y

			stable radioxenon	
	nid_flag	*number*	Flag of whether the xenon isotope is detected or not	Y
	lc	*float(126)*	Critical level in activity concentration	Y
	ld	*float(126)*	Detection limit in activity concentration	Y
	sample_act	*float(126)*	Spectrum activity without decay	Y
	cov_xe_131m	*float(126)*	Covariance matrix line 1 for Xe-131m	Y
	cov_xe_133m	*float(126)*	Covariance matrix line 2 for Xe-133m	Y
	cov_xe_133	*float(126)*	Covariance matrix line 3 for Xe-133	Y
	cov_xe_135	*float(126)*	Covariance matrix line 4 for Xe-135	Y
	cov_radon	*float(126)*	Covariance matrix line 5 for radon	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	activity_acq_start	*float(126)*	Activity at the start of acquisition	Y
	activity_err_acq_start	*float(126)*	Uncertainty of the activity at the start of acquisition	Y
	mda_acq_start	*float(126)*	Minimum detectable activity at the start of acquisition	Y

Primary key	PK_GARDS_XE_RESULTS(sample_id, method_id, nuclide_id)
Foreign keys	FK_XE_RESULTS(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_XE_RESULTS_I_U_D, XE_RESULTS_B_I_U

5.1.205. GARDS_XE_RESULTS

Owner(s)	RMSMAN
Description	The GARDS_XE_RESULTS table contains results of gamma spectrum analysis for noble gas systems with high resolution.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	method_id	*number*	Method identifier	N
PI	nuclide_id	*number*	Nuclide identifier	N
	conc	*float(126)*	Activity concentration	Y
	conc_err	*float(126)*	Uncertainty of the activity concentration	Y
	mdc	*float(126)*	Minimum detectable concentration	Y
	mdi	*float(126)*	Minimum detectable intensity for the metastable radioxenon	Y
	nid_flag	*number*	Flag of whether the xenon isotope is detected or not	Y
	lc	*float(126)*	Critical level in activity concentration	Y

	ld	*float(126)*	Detection limit in activity concentration	Y
	sample_act	*float(126)*	Spectrum activity without decay	Y
	cov_xe_131m	*float(126)*	Covariance matrix line 1 for Xe-131m	Y
	cov_xe_133m	*float(126)*	Covariance matrix line 2 for Xe-133m	Y
	cov_xe_133	*float(126)*	Covariance matrix line 3 for Xe-133	Y
	cov_xe_135	*float(126)*	Covariance matrix line 4 for Xe-135	Y
	cov_radon	*float(126)*	Covariance matrix line 5 for radon	Y
	moddate	*date*	Date/time at which the row was last modified	Y
	activity_acq_start	*float(126)*	Activity at the start of acquisition	Y
	activity_err_acq_start	*float(126)*	Uncertainty of the activity at the start of acquisition	Y
	mda_acq_start	*float(126)*	Minimum detectable activity at the start of acquisition	Y

Primary key	PK_GARDS_XE_RESULTS(sample_id, method_id, nuclide_id)
Foreign keys	FK_XE_RESULTS(sample_id, GARDS_SAMPLE_DATA)
Triggers	XE_RESULTS_B_I_U

5.1.206. GARDS_XE_SAMPLE_CATEGORY

Owner(s)	RMSMAN
Description	The GARDS_XE_SAMPLE_CATEGORY contains results of categorization of the noble gas sample.

Pk/Fk/I	Column	Storage type	Description	Nullable
PFI	sample_id	*number*	Sample identifier	N
	prev_valid_samples	*number*	Number of the previous valid samples	Y
	abn_xe131m	*number*	Abnormal threshold of the activity concentration for Xe-131m	Y
	abn_xe133m	*number*	Abnormal threshold of the activity concentration for Xe-133m	Y
	abn_xe133	*number*	Abnormal threshold of the activity concentration for Xe-133	Y
	abn_xe135	*number*	Abnormal threshold of the activity concentration for Xe-135	Y
	median_xe131m	*number*	Median of the activity concentration for Xe-131m	Y
	median_xe133m	*number*	Median of the activity concentration for Xe-133m	Y
	median_xe133	*number*	Median of the activity concentration for Xe-133	Y

	median_xe135	*number*	Median of the activity concentration for Xe-135	Y
	bayes_133m_131m	*number*	Bayesian minus ratio of Xe-133m to Xe-131m	Y
	bayes_133m_133	*number*	Bayesian minus ratio of Xe-133m to Xe-133	Y
	bayes_135_133	*number*	Bayesian minus ratio of Xe-135 to Xe-133	Y
	cat_xe131m	*number*	Categorization level for Xe-131m	Y
	cat_xe133m	*number*	Categorization level for Xe-133m	Y
	cat_xe133	*number*	Categorization level for Xe-133	Y
	cat_xe135	*number*	Categorization level for Xe-135	Y
	flag_133m_131m	*number*	Flag whether or not the Bayesian minus ratio is above the limit for Xe-133m to Xe-131m	Y
	flag_133m_133	*number*	Flag whether or not the Bayesian minus ratio is above the limit for Xe-133m to Xe-133	Y
	flag_135_133	*number*	Flag whether or not the Bayesian minus ratio is above the limit for Xe-135 to Xe-133	Y
	cat_sample	*number*	Categorization level of the sample	Y
	flag_atm	*number*	Flag whether or not a known source would be detected in the sample, which is determined using ATM simulations.	Y
	moddate	*date*	Date/time at which the row was last modified	Y
PFI	flag_shortterm	*number*	Flag whether or not the categorization is determined using the short term approach	N
	conc_133m_131m	*number*	Ratio of activity concentrations for Xe-133m to Xe-131m	Y
	conc_133m_133	*number*	Ratio of activity concentrations for Xe-133m to Xe-133	Y
	conc_135_133	*number*	Ratio of activity concentrations for Xe-135 to Xe-133	Y
	conc_133_131m_mdc	*number*	Ratio of activity concentrations for Xe-133 to Xe-131m, where the Xe-131m MDC is used when Xe-131m is not detected.	Y
	bayes_133_131m	*number*	Bayesian minus ratio of Xe-133 to Xe-131m	Y
	flag_133_131m	*number*	Flag whether or not the Bayesian minus ratio is above the limit for Xe-133 to Xe-131m	Y
	conc_133_131m	*number*	Ratio of activity concentrations for Xe-133 to Xe-131m	Y

Primary key	PK_SAMPLE_ID(sample_id, flag_shortterm)
Foreign keys	FK_XESAMPLECAT(flag_shortterm, GARDS_XE_SAMPLE_CATEGORY), FK_XESAMPLECAT(sample_id, GARDS_XE_SAMPLE_CATEGORY)
Slaves	GARDS_XE_SAMPLE_CATEGORY

5.1.207. GARDS_XE_SAMPLE_CATEGORY

Owner(s)	RMSAUTO
Description	The GARDS_XE_SAMPLE_CATEGORY contains results of categorization of the noble gas sample.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	sample_id	*number*	Sample identifier	N
	prev_valid_samples	*number*	Number of the previous valid samples	Y
	abn_xe131m	*number*	Abnormal threshold of the activity concentration for Xe-131m	Y
	abn_xe133m	*number*	Abnormal threshold of the activity concentration for Xe-133m	Y
	abn_xe133	*number*	Abnormal threshold of the activity concentration for Xe-133	Y
	abn_xe135	*number*	Abnormal threshold of the activity concentration for Xe-135	Y
	median_xe131m	*number*	Median of the activity concentration for Xe-131m	Y
	median_xe133m	*number*	Median of the activity concentration for Xe-133m	Y
	median_xe133	*number*	Median of the activity concentration for Xe-133	Y
	median_xe135	*number*	Median of the activity concentration for Xe-135	Y
	bayes_133m_131m	*number*	Bayesian minus ratio of Xe-133m to Xe-131m	Y
	bayes_133m_133	*number*	Bayesian minus ratio of Xe-133m to Xe-133	Y
	bayes_135_133	*number*	Bayesian minus ratio of Xe-135 to Xe-133	Y
	cat_xe131m	*number*	Categorization level for Xe-131m	Y
	cat_xe133m	*number*	Categorization level for Xe-133m	Y
	cat_xe133	*number*	Categorization level for Xe-133	Y
	cat_xe135	*number*	Categorization level for Xe-135	Y
	flag_133m_131m	*number*	Flag whether or not the Bayesian minus ratio is above the limit for Xe-133m to Xe-131m	Y
	flag_133m_133	*number*	Flag whether or not the Bayesian minus ratio is above the limit for Xe-133m to Xe-133	Y
	flag_135_133	*number*	Flag whether or not the Bayesian minus ratio is above the limit for Xe-135 to Xe-133	Y
	cat_sample	*number*	Categorization level of the sample	Y
	flag_atm	*number*	Flag whether or not a known source would be detected in the sample, which is determ-	Y

			ined using ATM simulations.	
	moddate	*date*	Date/time at which the row was last modified	Y
PI	flag_shortterm	*number*	Flag whether or not the categorization is determined using the short term approach	N
	conc_133m_131m	*number*	Ratio of activity concentrations for Xe-133m to Xe-131m	Y
	conc_133m_133	*number*	Ratio of activity concentrations for Xe-133m to Xe-133	Y
	conc_135_133	*number*	Ratio of activity concentrations for Xe-135 to Xe-133	Y
	conc_133_131m_mdc	*number*	Ratio of activity concentrations for Xe-133 to Xe-131m, where the Xe-131m MDC is used when Xe-131m is not detected.	Y
	bayes_133_131m	*number*	Bayesian minus ratio of Xe-133 to Xe-131m	Y
	flag_133_131m	*number*	Flag whether or not the Bayesian minus ratio is above the limit for Xe-133 to Xe-131m	Y
	conc_133_131m	*number*	Ratio of activity concentrations for Xe-133 to Xe-131m	Y

Primary key	PK_SAMPLE_ID(sample_id, flag_shortterm)
Slaves	GARDS_XE_SAMPLE_CATEGORY
Triggers	GARDS_XE_SAMPLE_CATEGORY_I_U

5.1.208. GARDS_XE_UNCORRECTED_RESULTS

Owner(s)	RMSMAN
Description	Contains analysis results without decay corrections for the noble gas sample.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	method_id	*number*	Method identifier	N
PI	nuclide_id	*number*	Nuclide identifier	N
	conc	*number*	Activity concentration	Y
	conc_error	*number*	Uncertainty of the activity concentration	Y
	mdc	*number*	Minimum detectable concentration	Y
	mdi	*number*	Minimum detectable intensity for the metastable radioxenon	Y
	lc	*number*	Critical level in activity concentration	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_XE_UNCORRECTED_RESULTS(sample_id, method_id, nuclide_id)
Foreign keys	FK_XE_UNCORRECTED_RESULTS(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_XE_UNCORR_RES_A_I_U

5.1.209. GARDS_XE_UNCORRECTED_RESULTS

Owner(s)	RMSAUTO
Description	Contains analysis results without decay corrections for the noble gas sample.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PFI	sample_id	*number*	Sample identifier	N
PI	method_id	*number*	Method identifier	N
PI	nuclide_id	*number*	Nuclide identifier	N
	conc	*number*	Activity concentration	Y
	conc_error	*number*	Uncertainty of the activity concentration	Y
	mdc	*number*	Minimum detectable concentration	Y
	mdi	*number*	Minimum detectable intensity for the meta-stable radioxenon	Y
	lc	*number*	Critical level in activity concentration	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_XE_UNCORRECTED_RESULTS(sample_id, method_id, nuclide_id)
Foreign keys	FK_XE_UNCORRECTED_RESULTS(sample_id, GARDS_SAMPLE_DATA)
Triggers	GARDS_XE_UNCORR_RES_I_U_D, GARDS_XE_UNCORR_RES_A_I_U

5.1.210. NMS_RECEIVED_SOFAR

Owner(s)	RMSAUTO
Description	Helper table of RMS processing script to check new messages. It is a lookup table that stores latest nms_msgid fetched from acq.acq_msg table.

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
	nms_msgid	*number*	Message identifier	Y
	creation_time	*date*	Latest access time	Y

5.1.211. PIPELINE_CONTROL

Owner(s)	RMSMAN
Description	Control table for RN message processing. It holds configuration parameters needed to control the behaviour of the RnMessagesProcessor.pl program

Pk/Fk/I	Column	Storage type	Description	Nullable
	stop_acquisition	*char(1)*	Y to stop/exit program RnMessagesProcessor.pl	Y
	stop_pipeline	*char(1)*	Y to stop calling rms_pipeline but the program will continue read messages from acq.acq_msg table	Y
	max_running	*number*	Determines the maximum number of RUNNING massages that the program can handle at any time	Y
	sleep_time	*number*	Determines the sleep time in seconds before processing RECEIVED messages	Y
	instance_running	*char(1)*	Running flag	Y
	instance_info	*varchar2(30)*	Determines the current instance information	Y
	instance_time	*date*	Determines when the instance started	Y
	scan_msgtsd	*char(1)*	Scan flag	Y
	nms_pull_frequency	*number*	Time in seconds between reading RN messages from acq.acq_msg table	Y
	pull_method	*varchar2(15)*	Currently is DB	Y
	pull_host	*varchar2(15)*	Database name to be connected in order to read RN messages	Y
	pull_connection	*varchar2(30)*	User name and password for DB connection	Y
	pull_owner_or_queue	*varchar2(30)*	The user name who owns acq_msg table (default Acq)	Y

5.1.212. RMS_MSGDISC

Owner(s)	RMSAUTO
Description	The rms_msgdisc table holds information about new RN messages read from acq.ac_msg table and necessary related information needed by rms_pipeline script in order to process the RN messages. Also, it contains status of processing as well as authentication Status.

Pk/Fk/I	Column	Storage type	Description	Nullable
PI	msgid	*number*	Message identifier	N
	nms_msgid	*varchar2(50)*	Message identifier	Y
	sta_msgid	*varchar2(50)*	Message identifier	Y
	dir	*varchar2(100)*	Full path to the data file	Y
	filename	*varchar2(100)*	Input data filename	Y
	station_code	*varchar2(10)*	Station code	Y
	data_type	*varchar2(30)*	Type of the data message	Y
	data_offset	*number*	Offset of the data type within the RN message	Y

	data_size	*number*	Size of the data type in the RN message	Y
I	status	*varchar2(15)*	Status of the RN message. Values: SKIPPED, RECEIVED, QUEUED, RUNNING, L-RUNNING, DONE, PARTIAL_DONE or FAILED.	Y
I	lddate	*date*	Load date	Y
I	moddate	*date*	Date/time at which the row was last modified	Y
	subject	*varchar2(64)*	Subject of the RN message extracted of the mail header of the message	Y
	auth_status	*varchar2(50)*	Authentication status of the associated message	Y

Primary key	PK_RMS_MSGDISC(msgid)
Indexes	PK_RMS_MSGDISC(msgid), RMS_MSGDISC_NDX(status, msgid), RMS_MSGDISC_LDDATE_NDX(lddate), RMS_MSGDISC_MOD_NDX(moddate)

5.1.213. RN_LOGS

Owner(s)	RMSMAN
Description	Contains related info for analyst comments from rms_log

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	comment_id	*number*	Comment identifier	N
	analyst	*varchar2(15)*	Name of the analyst who reviewed the sample	Y
	sample_id	*number*	Sample identifier	Y
	station_code	*varchar2(20)*	Station code	Y
	comment_type	*number*	Comment code	Y
	severity	*number*	Severity level null, or between 1 and 4 for this analyst comment	Y
	ref_id	*number*	Reference to related analyst comment	Y
	ext_ref_id	*number*	External reference to related analyst comment, not used	Y
	comment_date	*date*	Date of issuing the analyst comment	Y
	begin_date	*date*	Initialization date	Y
	end_date	*date*	Decommissioning date	Y
	subject	*varchar2(50)*	Subject of the analyst comment	Y
	notify_list	*varchar2(50)*	List of notification recipients for this analyst comment.	Y
	moddate	*date*	Date/time at which the row was last modified	Y

Primary key	PK_RN_LOGS(comment_id)
Indexes	PK_RN_LOGS(comment_id)

5.1.214. RN_LOGS_TXT

Owner(s)	RMSMAN
Description	Contains analyst comments from rms_log

Pk/Fk/I	**Column**	**Storage type**	**Description**	**Nullable**
PI	comment_id	*number*	Comment identifier	N
	comment_text	*varchar2(4000)*	Comment text	Y

Primary key	PK_RN_LOGS_TXT(comment_id)
Indexes	PK_RN_LOGS_TXT(comment_id)

5.2. Radionuclide Column Descriptions

5.2.1. abn_xe131m

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Abnormal threshold of the activity concentration for Xe-131m			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mBq/m3		g8.5	Y
Range				

5.2.2. abn_xe133

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Abnormal threshold of the activity concentration for Xe-133			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mBq/m3		g8.5	Y
Range				

5.2.3. abn_xe133m

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Abnormal threshold of the activity concentration for Xe-133m			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mBq/m3		g8.5	Y
Range				

5.2.4. abn_xe135

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Abnormal threshold of the activity concentration for Xe-135			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mBq/m3		g8.5	Y
Range				

5.2.5. abnormal_conc_factor

Table(s)	GARDS_XE_CATEGORY_PARAMS (RMSMAN)
Description	Factor used in the algorithm of the abnormal threshold

Storage type	Unit	NA value	External	Nullable
number			g8.5	Y
Range				

5.2.6. *abscissa*

Table(s)	GARDS_CAT_TEMPLATE (RMSMAN)			
Description	Acceptable number of standard deviations away from the central_value where the amount of a nuclide may be found (RDC algorithm)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.7. *abundance*

Table(s)	GARDS_BG_PROC_PARAMS_ROI (RMSAUTO), GARDS_BG_PROC_PARAMS_ROI (RMSMAN)			
Description	Emission intensity (%) per disintegration			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)	percent		g8.5	Y
Range				

5.2.8. *abundance*

Table(s)	GARDS_CSC_MODCOEFF_LIB (RMSMAN), GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN), GARDS_NUCL_LINES_LIB (RMSMAN), GARDS_NUCL_LINES_LIB_ARCHIVE (RMSMAN), GARDS_ROI_LIB (RMSMAN), GARDS_SAMPLE_CERT_LINES (RMSAUTO), GARDS_XE_NUCL_LINES_LIB (RMSMAN)			
Description	Emission intensity (%) per disintegration			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	percent		g8.5	Y
Range				

5.2.9. *abundance_act*

Table(s)	GARDS_AUX_LINES_LIB (RMSMAN)			
Description	Emission intensity (%) per disintegration			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	percent		g8.5	N
Range				

5.2.10. *abundance_act_err*

Table(s)	GARDS_AUX_LINES_LIB (RMSMAN)			
Description	Uncertainty of the abundance_act			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	percent		g8.5	Y
Range				

5.2.11. *abundance_err*

Table(s)	GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN), GARDS_NUCL_LINES_LIB (RMSMAN), GARDS_NUCL_LINES_LIB_ARCHIVE (RMSMAN), GARDS_ROI_LIB (RMSMAN), GARDS_XE_NUCL_LINES_LIB (RMSMAN)			
Description	Uncertainty of the abundance			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	percent		g8.5	Y
Range				

5.2.12. *acquisition_live_sec*

Table(s)	GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_DATA (RMSAUTO), GARDS_SAMPLE_DATA (RMSMAN)			
Description	Active detection time (seconds)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	seconds		g8.5	Y
Range				

5.2.13. *acquisition_real_sec*

Table(s)	GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_DATA (RMSAUTO), GARDS_SAMPLE_DATA (RMSMAN)			
Description	Total time between the acquisition stop and acquisition start (seconds)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	seconds		g8.5	Y
Range				

5.2.14. *acquisition_start*

Table(s)	GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_DATA (RMSAUTO), GARDS_SAMPLE_DATA (RMSMAN)
Description	Acquisition start date and time

Storage type	Unit	NA value	External	Nullable
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.15. *acquisition_stop*

Table(s)	GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_DATA (RMSAUTO), GARDS_SAMPLE_DATA (RMSMAN)			
Description	Acquisition stop date and time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.16. *activ_confidence_level*

Table(s)	GARDS_RLR_RESULTS (RMSAUTO)			
Description	Level of confidence			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	percent		f5.2	Y
Range				

5.2.17. *activ_coverage_factor*

Table(s)	GARDS_RLR_RESULTS (RMSAUTO)			
Description	Coverage factor			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.18. *activ_decay*

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN)			
Description	Activity decay factor			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.19. *activ_decay_err*

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN)

Description	Uncertainty of activity decay factor			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.20. activ_err

Table(s)	GARDS_ROI_CONCS (RMSAUTO), GARDS_ROI_CONCS (RMSMAN)			
Description	Uncertainty of the activity concentration (mBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mBq/m3		g8.5	Y
Range				

5.2.21. activ_err

Table(s)	GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN)			
Description	Uncertainty of the activity concentration (uBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	uBq/m3		g8.5	Y
Range				

5.2.22. activ_key

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN)			
Description	Activity concentration of the key line (uBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	uBq/m3		g8.5	Y
Range				

5.2.23. activ_key_acq_start

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN)			
Description	Activity of the key line at the start of acquisition			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	uBq		g8.5	Y
Range				

5.2.24. activ_key_err

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN)			
Description	Uncertainty of the activity concentration (uBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	uBq/m3		g8.5	Y
Range				

5.2.25. activ_key_err_acq_start

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN)			
Description	Uncertainty of the activity of the key line at the start of acquisition			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	uBq		g8.5	Y
Range				

5.2.26. active_flag

Table(s)	GARDS_CAT_CRITERIA_TESTS (RMSMAN)			
Description	0 if test is inactive			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.27. active_flag

Table(s)	GARDS_SAMPLE_TESTS (RMSMAN)			
Description	Boolean flag whether it is active			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.28. activity

Table(s)	GARDS_RLR_RESULTS (RMSAUTO)			
Description	Activity at the start of acquisition			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	Bq		e11.4	N
Range				

5.2.29. activity

Table(s)	GARDS_SAMPLE_CERT_LINES (RMSAUTO)			
Description	Activity at time of assay			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	Bq		g8.5	Y
Range				

5.2.30. activity

Table(s)	GARDS_ROI_CONCS (RMSAUTO), GARDS_ROI_CONCS (RMSMAN)			
Description	Activity concentration (mBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mBq/m3		g8.5	Y
Range				

5.2.31. activity

Table(s)	GARDS_AUTO_SAMPLE_CAT (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN)			
Description	Activity concentration (uBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	uBq/m3		g8.5	Y
Range				

5.2.32. activity

Table(s)	GARDS_SAMPLE_CAT (RMSMAN)			
Description	Activity concentration of the nuclide detected (uBq/m3), related to gards_nucl_ided.activ_key			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	uBq/m3		g8.5	Y
Range				

5.2.33. activity

Table(s)	GARDS_NIC (RMSAUTO), GARDS_NIC (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number				Y
Range				

5.2.34. activity_acq_start

Table(s)	GARDS_BG_ISOTOPE_CONCS (RMSAUTO), GARDS_BG_ISOTOPE_CONCS (RMSMAN), GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN)			
Description	Activity at the start of acquisition (mBq)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)	mBq		g8.5	Y
Range				

5.2.35. activity_date

Table(s)	GARDS_RLR (RMSAUTO)			
Description	Activity reference date			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.36. activity_err

Table(s)	GARDS_RLR_RESULTS (RMSAUTO)			
Description	Relative uncertainty of the activity (%)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	percent		f5.2	Y
Range				

5.2.37. activity_err_acq_start

Table(s)	GARDS_BG_ISOTOPE_CONCS (RMSAUTO), GARDS_BG_ISOTOPE_CONCS (RMSMAN), GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN)			
Description	Uncertainty of the activity at the start of acquisition (mBq)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)	mBq		g8.5	Y
Range				

5.2.38. activity_ratio

Table(s)	GARDS_RLR_RATIOS (RMSAUTO)			
Description	Activity ratio of nuclide 1 to nuclide 2			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			f8.3	N
Range				

5.2.39. activity_ratio_err

Table(s)	GARDS_RLR_RATIOS (RMSAUTO)			
Description	Relative uncertainty of the activity ratio (%)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	percent		f5.2	Y
Range				

5.2.40. additional_info

Table(s)	GARDS_POC (RMSMAN)			
Description	Additional information for point of contact			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(500)			a500	Y
Range				

5.2.41. address

Table(s)	GARDS_POC (RMSMAN)			
Description	Additional information for a contact. This column includes information such as full name, title, company or university name, country, and so on.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(500)			a500	Y
Range				

5.2.42. alert_id

Table(s)	GARDS_ALERTS (RMSAUTO)			
Description	Unique alert identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.43. alert_text

Table(s)	GARDS_ALERTS (RMSAUTO)			
Description	Free text describing the alert			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
clob(4000)			a80	N
Range				

5.2.44. alert_type

Table(s)	GARDS_ALERTS (RMSAUTO)			
Description	Type of the alert (current alert types are ALERT_TEMP, ALERT_FLOW, ALERT_SYSTEM, and ALERT_UPS)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(20)		NOT ALLOWED	a20	N
Range	alert_type IN { ALERT_TEMP, ALERT_FLOW, ALERT_SYSTEM, ALERT_UPS }			

5.2.45. allow_release

Table(s)	GARDS_QAT_CONFIG (RMSMAN)			
Description	Flag indicating whether or not release is permitted			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.46. alpha

Table(s)	GARDS_CAT_TEMPLATE (RMSMAN)			
Description	Value of a variable used in bounds estimation			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.47. alpha

Table(s)	GARDS_NIC_INIT (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number				Y
Range				

5.2.48. amplitude

Table(s)	GARDS_BG_QC_RESULT (RMSAUTO), GARDS_BG_QC_RESULT (RMS-MAN)			
Description	Amplitude of QC peak			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)			g8.5	Y
Range				

5.2.49. *analysis_purpose*

Table(s)	GARDS_RLR_OBJECTIVE (RMSAUTO)			
Description	Analysis purpose			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2048)			a2048	Y
Range				

5.2.50. *analyst*

Table(s)	RN_LOGS (RMSMAN)			
Description	Name of the analyst who reviewed the sample			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)			a30	Y
Range				

5.2.51. *analyst*

Table(s)	GARDS_CAT_TEMPLATE (RMSMAN)			
Description	Name of the analyst who generated the statistics			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(30)			a30	Y
Range				

5.2.52. *analyst*

Table(s)	GARDS_COMMENTS (RMSAUTO), GARDS_COMMENTS (RMSMAN), GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_STATUS (RMSAUTO), GARDS_SAMPLE_STATUS (RMSMAN), GARDS_XE_CATEGORY_PARAMS (RMSMAN)			
Description	Name of the analyst who reviewed the sample			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(30)			a30	Y
Range				

5.2.53. *analyst*

Table(s)	GARDS_NIC_INIT (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(30)				Y
Range				

5.2.54. ape

Table(s)	GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMS-MAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO), GARDS_ENERGY_CAL_ORIG (RMSMAN)			
Description	Average prediction error, a measure of the average confidence interval for the calculated energy vs. channel regression (ECR) over the range of 100 keV			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.55. app_abundance

Table(s)	GARDS_CSC_MODCOEFF_LIB (RMSMAN)			
Description	Apparent abundance			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.56. app_abundance_err

Table(s)	GARDS_CSC_MODCOEFF_LIB (RMSMAN)			
Description	Absolute error in apparent abundance			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.57. archive_bottle_id

Table(s)	GARDS_SAMPLE_AUX (RMSAUTO)			
Description	Unique identifier of the archive bottle in which the sample is stored			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(2)			a2	Y
Range				

5.2.58. area

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Peak area (counts)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.59. area_adj

Table(s)	GARDS_QCPARAMS (RMSMAN)			
Description	Peak area standard deviation inflation factor			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.60. area_err

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Uncertainty of the peak area (counts)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.61. area_lim

Table(s)	GARDS_SAMPLE_UPDATE_PARAMS (RMSAUTO), GARDS_SAMPLE_UPDATE_PARAMS (RMSMAN), GARDS_UPDATE_PARAMS_TEMPLATE (RMSMAN)			
Description	Minimum peak area for inclusion in matching (counts)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.62. area_reject

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Indicator of whether or not to reject peaks with zero area indicator			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.63. assay_date

Table(s)	GARDS_SAMPLE_CERT (RMSAUTO)			
Description	Date sample was assayed			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y

Range	any valid ORACLE date

5.2.64. assignable

Table(s)	GARDS_USERS (RMSMAN)			
Description	Indicator of whether or not the user can be assigned stations: 1 = user can be assigned stations for review or 0 = user not to be assigned stations			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	N
Range				

5.2.65. auth

Table(s)	GARDS_DATA_LOG (RMSAUTO)			
Description	Authentication status of the associated message; 0 = not authenticated, 1 = authenticated.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range	auth IN { 0, 1 }			

5.2.66. auth_status

Table(s)	RMS_MSGDISC (RMSAUTO)			
Description	Authentication status of the associated message; 0 = not authenticated, 1 = authenticated. Authentication status of the RN message (extracted from acq.acq_message.AUTH STATUS)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(50)			i1	Y
Range	auth IN { 0, 1 }			

5.2.67. author

Table(s)	GARDS_PRODUCT (RMSAUTO), GARDS_PRODUCT (RMSMAN), GARDS_QAT_NOTIFY (RMSMAN), GARDS_SOH_EVALUATION (RMSAUTO), GARDS_SOH_EVALUATION (RMSMAN)			
Description	User name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(30)			a30	Y
Range				

5.2.68. auto_category

Table(s)	GARDS_SAMPLE_STATUS (RMSAUTO), GARDS_SAMPLE_STATUS (RMSMAN)

Description	Sample categorization level after automated analysis			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.69. ave_activ

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN)			
Description	Average activity concentration (uBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	uBq/m3		g8.5	Y
Range				

5.2.70. ave_activ_acq_start

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN)			
Description	Average activity at the start of acquisition			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	uBq		g8.5	Y
Range				

5.2.71. ave_activ_err

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN)			
Description	Uncertainty of the average activity concentration (uBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	uBq/m3		g8.5	Y
Range				

5.2.72. ave_activ_err_acq_start

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN)			
Description	Uncertainty of the average activity at the start of acquisition			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	uBq		g8.5	Y
Range				

5.2.73. ave_humidity

Table(s)	GARDS_MET_DATA (RMSAUTO)			
Description	Average humidity (percent relative humidity)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	percent		f8.3	Y
Range	0 < ave_humidity <= 100			

5.2.74. ave_out_temp

Table(s)	GARDS_MET_DATA (RMSAUTO)			
Description	Average outside temperature (deg. C)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	degrees C		f5.1	Y
Range				

5.2.75. ave_pressure

Table(s)	GARDS_MET_DATA (RMSAUTO)			
Description	Average atmospheric pressure.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	millibars		i4	Y
Range	0.0 <= ave_pressure			

5.2.76. ave_wind_dir

Table(s)	GARDS_MET_DATA (RMSAUTO)			
Description	Average wind direction (degrees from North)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	degrees (clockwise from North)		f6.1	Y
Range	0.0 <= ave_wind_dir <= 360.0			

5.2.77. ave_wind_speed

Table(s)	GARDS_MET_DATA (RMSAUTO)			
Description	Average wind speed (km/h)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	km/h		f5.1	Y
Range				

5.2.78. b_abundance

Table(s)	GARDS_SAMPLE_CERT_LINES (RMSAUTO)			
Description	Emission intensity (%) of beta particle or conversion electron per disintegration of one nucleus			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	percent		g8.5	Y
Range				

5.2.79. b_chan_start

Table(s)	GARDS_ROI_CHANNELS (RMSAUTO), GARDS_ROI_CHANNELS (RMS-MAN)			
Description	Beta boundary start channel			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.80. b_chan_stop

Table(s)	GARDS_ROI_CHANNELS (RMSAUTO), GARDS_ROI_CHANNELS (RMS-MAN)			
Description	Beta boundary start channel.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.81. b_channels

Table(s)	GARDS_HISTOGRAM (RMSAUTO)			
Description	Number of beta channels in histogram			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.82. b_energy

Table(s)	GARDS_SAMPLE_CERT_LINES (RMSAUTO)			
Description	Energy of conversion electron or maximum energy of beta particle (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	N
Range				

5.2.83. b_energy_span

Table(s)	GARDS_HISTOGRAM (RMSAUTO)			
Description	Beta energy span of detector calibration (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.84. b_energy_start

Table(s)	GARDS_ROI_LIMITS (RMSAUTO), GARDS_ROI_LIMITS (RMSMAN)			
Description	Beta boundary start energy (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.85. b_energy_stop

Table(s)	GARDS_ROI_LIMITS (RMSAUTO), GARDS_ROI_LIMITS (RMSMAN)			
Description	Beta boundary stop energy (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.86. back_chan

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Number of continuous channels			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.87. back_channel

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Number of the average background counts per channel			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.88. back_count

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Average number of the continuum background counts.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.89. back_data_type

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Spectral type of the detector background: Blank (B), or detector background (D)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)			a1	Y
Range	back_data_type IN {B, D}			

5.2.90. back_sample_id

Table(s)	GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Sample identifier for the sample used in background subtraction			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.91. back_type

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Background type: LINEAR or STEP			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)			a6	Y
Range				

5.2.92. back_uncer

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Uncertainty of the continuum background counts			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number			g8.5	Y
Range				

5.2.93. baseline_type

Table(s)	GARDS_BASELINE (RMSAUTO), GARDS_BASELINE (RMSMAN)			
Description	Baseline type regarding gamma (G) or beta (B) spectrum			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)			a1	N
Range				

5.2.94. bayes_133_131m

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Bayesian minus ratio of Xe-133 to Xe-131m			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.95. bayes_133m_131m

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Bayesian minus ratio of Xe-133m to Xe-131m			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.96. bayes_133m_133

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Bayesian minus ratio of Xe-133m to Xe-133			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.97. bayes_135_133

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)
Description	Bayesian minus ratio of Xe-135 to Xe-133

Storage type	Unit	NA value	External	Nullable
number			g8.5	Y
Range				

5.2.98. bayes_minus

Table(s)	GARDS_XE_CATEGORY_PARAMS (RMSMAN)			
Description	Percentile related to the lower bound of Bayesian ratio			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.99. bayes_plus

Table(s)	GARDS_XE_CATEGORY_PARAMS (RMSMAN)			
Description	Percentile related to the upper bound of Bayesian ratio			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.100. begin_date

Table(s)	GARDS_CAT_TEMPLATE (RMSMAN), GARDS_EFFICIENCY_IDC_PAIRS (RMSAUTO), GARDS_EFFICIENCY_IDC_PAIRS (RMSMAN), GARDS_EFFICIENCY_VGSL_PAIRS (RMSMAN), GARDS_NUCL_LIB_ARCHIVE (RMSMAN), GARDS_NUCL_LINES_LIB_ARCHIVE (RMSMAN), GARDS_STATIONS_SCHEDULE (RMSMAN)			
Description	Initialization date			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	N
Range	any valid ORACLE date			

5.2.101. begin_date

Table(s)	GARDS_IRF (RMSMAN), GARDS_PROC_PARAMS_TEMPLATE (RMS-MAN), RN_LOGS (RMSMAN)			
Description	Initialization date			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.102. *beta_coeff1*

Table(s)	GARDS_BG_STD_SPECTRA_RESULT (RMSAUTO), GARDS_BG_STD_SPECTRA_RESULT (RMSMAN)			
Description	Zero order coefficient of the beta energy calibration			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)			g8.5	Y
Range				

5.2.103. *beta_coeff1*

Table(s)	GARDS_BG_ENERGY_CAL (RMSAUTO), GARDS_BG_ENERGY_CAL (RMSMAN), GARDS_BG_ENERGY_CAL_DIRECTIVE (RMSMAN), GARDS_BG_ENERGY_CAL_ORIG (RMSAUTO), GARDS_BG_ENERGY_CAL_ORIG (RMSMAN)			
Description	Zero order coefficient of the beta energy calibration			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.104. *beta_coeff2*

Table(s)	GARDS_BG_STD_SPECTRA_RESULT (RMSAUTO), GARDS_BG_STD_SPECTRA_RESULT (RMSMAN)			
Description	First order coefficient of the beta energy calibration			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)			g8.5	Y
Range				

5.2.105. *beta_coeff2*

Table(s)	GARDS_BG_ENERGY_CAL (RMSAUTO), GARDS_BG_ENERGY_CAL (RMSMAN), GARDS_BG_ENERGY_CAL_DIRECTIVE (RMSMAN), GARDS_BG_ENERGY_CAL_ORIG (RMSAUTO), GARDS_BG_ENERGY_CAL_ORIG (RMSMAN)			
Description	First order coefficient of the beta energy calibration			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.106. *beta_coeff3*

Table(s)	GARDS_BG_STD_SPECTRA_RESULT (RMSAUTO), GARDS_BG_STD_SPECTRA_RESULT (RMSMAN)
Description	Second order coefficient of the beta energy calibration

Storage type	Unit	NA value	External	Nullable
float(126)			g8.5	Y
Range				

5.2.107. *beta_coeff3*

Table(s)	GARDS_BG_ENERGY_CAL (RMSAUTO), GARDS_BG_ENERGY_CAL (RMSMAN), GARDS_BG_ENERGY_CAL_DIRECTIVE (RMSMAN), GARDS_BG_ENERGY_CAL_ORIG (RMSAUTO), GARDS_BG_ENERGY_CAL_ORIG (RMSMAN)			
Description	Second order coefficient of the beta energy calibration			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.108. *beta_ecr_order*

Table(s)	GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN), GARDS_SAMPLE_XE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_XE_PROC_PARAMS (RMSMAN), GARDS_XE_PROC_PARAMS_TEMPLATE (RMSMAN)			
Description	Order of the beta energy calibration function			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.109. *bg_effic_error*

Table(s)	GARDS_BG_EFFICIENCY_PAIRS (RMSAUTO), GARDS_BG_EFFICIENCY_PAIRS (RMSMAN)			
Description	Uncertainty of bg_efficiency			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.110. *bg_efficiency*

Table(s)	GARDS_BG_EFFICIENCY_PAIRS (RMSAUTO), GARDS_BG_EFFICIENCY_PAIRS (RMSMAN)			
Description	Detection efficiency of b-g coincidence event			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.111. *bin_beta_start*

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN), GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN)			
Description	The beta start offset in histogram			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.112. *bin_gamma_start*

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN), GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN)			
Description	The gamma start offset in histogram			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.113. *bin_max_vector_size*

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN), GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN)			
Description	Maximum size for the bin vector			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.114. *bin_min_count*

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN), GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN)			
Description	Minimum counts in each bin			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.115. *bin_rows*

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN), GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN)

Description	Number of rows to merge in binning			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.116. bkgd_measurement_id

Table(s)	GARDS_SAMPLE_AUX (RMSAUTO)			
Description	Detector background measurement identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(31)			a31	N
Range				

5.2.117. bkgnd_area

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN)			
Description	Background area			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.118. bkgnd_area_err

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN)			
Description	Uncertainty of the background area			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.119. bootstrap

Table(s)	GARDS_SAMPLE_UPDATE_PARAMS (RMSAUTO), GARDS_SAMPLE_UPDATE_PARAMS (RMSMAN), GARDS_UPDATE_PARAMS_TEMPLATE (RMSMAN)			
Description	0/1 flag for ignoring prior ECR/RER (typically 0)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.120. branch_ratio

Table(s)	GARDS_AUX_LIB (RMSMAN)
Description	Percentage of decays to a given decay path

Storage type	Unit	NA value	External	Nullable
number	percent		g8.5	Y
Range				

5.2.121. *buildtype*

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Flag indicating activity or concentration calculations: activity (NONE), concentration (BUILD)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)			a8	Y
Range				

5.2.122. *cal_energy*

Table(s)	GARDS_B_ENERGY_PAIRS (RMSAUTO), GARDS_B_ENERGY_PAIRS (RMSMAN), GARDS_B_ENERGY_PAIRS_ORIG (RMSAUTO), GARDS_B_ENERGY_PAIRS_ORIG (RMSMAN)			
Description	Beta energy (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	N
Range				

5.2.123. *cal_energy*

Table(s)	GARDS_ENERGY_PAIRS (RMSAUTO), GARDS_ENERGY_PAIRS (RMSMAN), GARDS_ENERGY_PAIRS_ORIG (RMSAUTO), GARDS_ENERGY_PAIRS_ORIG (RMSMAN)			
Description	Gamma energy (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	N
Range				

5.2.124. *cal_error*

Table(s)	GARDS_B_ENERGY_PAIRS (RMSAUTO), GARDS_B_ENERGY_PAIRS (RMSMAN), GARDS_B_ENERGY_PAIRS_ORIG (RMSAUTO), GARDS_B_ENERGY_PAIRS_ORIG (RMSMAN), GARDS_ENERGY_PAIRS (RMSAUTO), GARDS_ENERGY_PAIRS (RMSMAN), GARDS_ENERGY_PAIRS_ORIG (RMSAUTO), GARDS_ENERGY_PAIRS_ORIG (RMSMAN)			
Description	Uncertainty of the centroid channel			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number			g8.5	Y
Range				

5.2.125. cal_mode

Table(s)	GARDS_BG_ENERGY_CAL_DIRECTIVE (RMSMAN)			
Description	Calibration mode used to determine the beta and gamma energy calibrations for the detectors			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)			a1	N
Range				

5.2.126. calibration_dtg

Table(s)	GARDS_SAMPLE_AUX (RMSAUTO)			
Description	Date of most recent calibration at detector site			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.127. calibration_type

Table(s)	GARDS_REFLINE_MASTER (RMSMAN), GARDS_XE_REFLINE_MASTER (RMSMAN)			
Description	Calibration type			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(3)			a3	Y
Range				

5.2.128. cat_sample

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Categorization level of the sample depending on the maximum level of four xenon isotopes			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.129. cat_xe131m

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)
Description	Categorization level for Xe-131m (=1, 2 and 3 for level A, B and C respectively)

Storage type	Unit	NA value	External	Nullable
number			i1	Y
Range				

5.2.130. cat_xe133

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Categorization level for Xe-133 (=1, 2 and 3 for level A, B and C respectively)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.131. cat_xe133m

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Categorization level for Xe-133m (=1, 2 and 3 for level A, B and C respectively)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.132. cat_xe135

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Categorization level for Xe-135 (=1, 2 and 3 for level A, B and C respectively)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.133. category

Table(s)	GARDS_AUTO_SAMPLE_CAT (RMSAUTO), GARDS_SAMPLE (RMS-MAN), GARDS_SAMPLE_CAT (RMSMAN), GARDS_SAMPLE_STATUS (RMSAUTO), GARDS_SAMPLE_STATUS (RMSMAN)			
Description	Categorization level			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.134. category

Table(s)	GARDS_NIC (RMSAUTO), GARDS_NIC (RMSMAN)

Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number				Y
Range				

5.2.135. category_list

Table(s)	GARDS_QAT_QUERY_FILTER (RMSMAN)			
Description	Comma-separated list of categories			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)			a1024	Y
Range				

5.2.136. central_value

Table(s)	GARDS_AUTO_SAMPLE_CAT (RMSAUTO), GARDS_CAT_TEMPLATE (RMSMAN), GARDS_SAMPLE_CAT (RMSMAN)			
Description	Current estimate of the level of the random process			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	uBq/m3		g8.5	Y
Range				

5.2.137. central_value

Table(s)	GARDS_NIC (RMSAUTO), GARDS_NIC (RMSMAN), GARDS_NIC_INIT (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number				Y
Range				

5.2.138. centroid

Table(s)	GARDS_BG_QC_RESULT (RMSAUTO), GARDS_BG_QC_RESULT (RMS-MAN)			
Description	Centroid energy of QC peak			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)	keV		g8.5	Y
Range				

5.2.139. centroid

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN),

	GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Peak centroid (channels)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.140. centroid_err

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Uncertainty of the peak centroid.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.141. chain_id

Table(s)	GARDS_AUX_LIB (RMSMAN)			
Description	Decay chain index			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.142. chain_pos

Table(s)	GARDS_AUX_LIB (RMSMAN)			
Description	Position in the decay chain			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.143. channel

Table(s)	GARDS_B_ENERGY_PAIRS (RMSAUTO), GARDS_B_ENERGY_PAIRS (RMSMAN), GARDS_B_ENERGY_PAIRS_ORIG (RMSAUTO), GARDS_B_ENERGY_PAIRS_ORIG (RMSMAN), GARDS_ENERGY_PAIRS (RMSAUTO), GARDS_ENERGY_PAIRS (RMS-MAN), GARDS_ENERGY_PAIRS_ORIG (RMSAUTO), GARDS_EN-ERGY_PAIRS_ORIG (RMSMAN)			
Description	Peak centroid channel			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.144. channels

Table(s)	GARDS_DETECTORS (RMSMAN), GARDS_SPECTRUM (RMSAUTO)			
Description	Number of channels in spectrum			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.145. class

Table(s)	GARDS_RN_INTERVAL (RMSAUTO)			
Description	Workflow field indicating the station			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)			a16	N
Range				

5.2.146. class

Table(s)	GARDS_INTERVAL (RMSAUTO)			
Description	Station name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)			a16	Y
Range				

5.2.147. cnf_begin_date

Table(s)	GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_STATUS (RMSAUTO), GARDS_SAMPLE_STATUS (RMSMAN)			
Description	Date when last analysis began			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.148. cnf_end_date

Table(s)	GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_STATUS (RMSAUTO), GARDS_SAMPLE_STATUS (RMSMAN)			
Description	Date when last analysis ended.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.149. cnv_factor

Table(s)	GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMS-MAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO), GARDS_ENERGY_CAL_ORIG (RMSMAN)			
Description	Conversion to keV			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.150. code

Table(s)	GARDS_STATIONS_SCHEDULE (RMSMAN)			
Description	Code symbol SCHEDULE as found in the gards_codes table. SF_GP for full sample grace period or SPHDF for full sample PHD			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(5)			a5	N
Range	code IN {SF_GP, SPHDF}			

5.2.151. code

Table(s)	GARDS_CODES (RMSMAN)			
Description	Code symbol.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(5)			a5	N
Range				

5.2.152. coeff

Table(s)	GARDS_ENERGY_CAL_COV (RMSAUTO), GARDS_ENERGY_CAL_COV (RMSMAN), GARDS_RESOLUTION_CAL_COV (RMSAUTO), GARDS_RESOLU-TION_CAL_COV (RMSMAN)			
Description	Calibration coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)			g8.5	Y
Range				

5.2.153. coeff1

Table(s)	GARDS_EFFICIENCY_ERROR_CAL (RMSAUTO), GARDS_EFFI-CIENCY_ERROR_CAL (RMSMAN)			
Description	Uncertainty of the zero order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number			g8.5	Y
Range				

5.2.154. coeff1

Table(s)	GARDS_B_RESOLUTION_CAL (RMSAUTO), GARDS_B_RESOLUTION_CAL (RMSMAN), GARDS_EFFICIENCY_CAL (RMSAUTO), GARDS_EFFICIENCY_CAL (RMSMAN), GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMSMAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO), GARDS_ENERGY_CAL_ORIG (RMSMAN), GARDS_RESOLUTION_CAL (RMSAUTO), GARDS_RESOLUTION_CAL (RMSMAN)			
Description	zero order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.155. coeff1

Table(s)	GARDS_RESOLUTION_CAL_ORIG (RMSAUTO), GARDS_RESOLUTION_CAL_ORIG (RMSMAN)			
Description	zero order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			g8.5	Y
Range				

5.2.156. coeff2

Table(s)	GARDS_B_RESOLUTION_CAL (RMSAUTO), GARDS_B_RESOLUTION_CAL (RMSMAN), GARDS_EFFICIENCY_CAL (RMSAUTO), GARDS_EFFICIENCY_CAL (RMSMAN), GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMSMAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO), GARDS_ENERGY_CAL_ORIG (RMSMAN), GARDS_RESOLUTION_CAL (RMSAUTO), GARDS_RESOLUTION_CAL (RMSMAN)			
Description	First order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.157. coeff2

Table(s)	GARDS_EFFICIENCY_ERROR_CAL (RMSAUTO), GARDS_EFFICIENCY_ERROR_CAL (RMSMAN)			
Description	Uncertainty of the first order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number			g8.5	Y
Range				

5.2.158. coeff2

Table(s)	GARDS_RESOLUTION_CAL_ORIG (RMSAUTO), GARDS_RESOLUTION_CAL_ORIG (RMSMAN)			
Description	First order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			g8.5	Y
Range				

5.2.159. coeff3

Table(s)	GARDS_B_RESOLUTION_CAL (RMSAUTO), GARDS_B_RESOLUTION_CAL (RMSMAN), GARDS_EFFICIENCY_CAL (RMSAUTO), GARDS_EFFICIENCY_CAL (RMSMAN), GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMSMAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO), GARDS_ENERGY_CAL_ORIG (RMSMAN), GARDS_RESOLUTION_CAL (RMSAUTO), GARDS_RESOLUTION_CAL (RMSMAN)			
Description	Second order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.160. coeff3

Table(s)	GARDS_EFFICIENCY_ERROR_CAL (RMSAUTO), GARDS_EFFICIENCY_ERROR_CAL (RMSMAN)			
Description	Uncertainty of the second order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.161. coeff3

Table(s)	GARDS_RESOLUTION_CAL_ORIG (RMSAUTO), GARDS_RESOLUTION_CAL_ORIG (RMSMAN)			
Description	Second order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			g8.5	Y
Range				

5.2.162. coeff4

Table(s)	GARDS_B_RESOLUTION_CAL (RMSAUTO), GARDS_B_RESOLUTION_CAL (RMSMAN), GARDS_EFFICIENCY_CAL (RMSAUTO), GARDS_EFFICIENCY_CAL (RMSMAN), GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMSMAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO), GARDS_ENERGY_CAL_ORIG (RMSMAN), GARDS_RESOLUTION_CAL (RMSAUTO), GARDS_RESOLUTION_CAL (RMSMAN)			
Description	Third order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.163. coeff4

Table(s)	GARDS_EFFICIENCY_ERROR_CAL (RMSAUTO), GARDS_EFFICIENCY_ERROR_CAL (RMSMAN)			
Description	Uncertainty of the third order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.164. coeff4

Table(s)	GARDS_RESOLUTION_CAL_ORIG (RMSAUTO), GARDS_RESOLUTION_CAL_ORIG (RMSMAN)			
Description	Third order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			g8.5	Y
Range				

5.2.165. coeff5

Table(s)	GARDS_B_RESOLUTION_CAL (RMSAUTO), GARDS_B_RESOLUTION_CAL (RMSMAN), GARDS_EFFICIENCY_CAL (RMSAUTO), GARDS_EFFICIENCY_CAL (RMSMAN), GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMSMAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO), GARDS_ENERGY_CAL_ORIG (RMSMAN), GARDS_RESOLUTION_CAL (RMSAUTO), GARDS_RESOLUTION_CAL (RMSMAN)			
Description	Fourth order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.166. coeff5

Table(s)	GARDS_EFFICIENCY_ERROR_CAL (RMSAUTO), GARDS_EFFICIENCY_ERROR_CAL (RMSMAN)			
Description	Uncertainty of the fourth order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.167. coeff5

Table(s)	GARDS_RESOLUTION_CAL_ORIG (RMSAUTO), GARDS_RESOLUTION_CAL_ORIG (RMSMAN)			
Description	Fourth order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			g8.5	Y
Range				

5.2.168. coeff6

Table(s)	GARDS_B_RESOLUTION_CAL (RMSAUTO), GARDS_B_RESOLUTION_CAL (RMSMAN), GARDS_EFFICIENCY_CAL (RMSAUTO), GARDS_EFFICIENCY_CAL (RMSMAN), GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMSMAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO), GARDS_ENERGY_CAL_ORIG (RMSMAN), GARDS_RESOLUTION_CAL (RMSAUTO), GARDS_RESOLUTION_CAL (RMSMAN)			
Description	Fifth order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.169. coeff6

Table(s)	GARDS_EFFICIENCY_ERROR_CAL (RMSAUTO), GARDS_EFFICIENCY_ERROR_CAL (RMSMAN)			
Description	Uncertainty of the fifth order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.170. coeff6

Table(s)	GARDS_RESOLUTION_CAL_ORIG (RMSAUTO), GARDS_RESOLUTION_CAL_ORIG (RMSMAN)

Description	Fifth order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			g8.5	Y
Range				

5.2.171. coeff7

Table(s)	GARDS_B_RESOLUTION_CAL (RMSAUTO), GARDS_B_RESOLUTION_CAL (RMSMAN), GARDS_EFFICIENCY_CAL (RMSAUTO), GARDS_EFFICIENCY_CAL (RMSMAN), GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMSMAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO), GARDS_ENERGY_CAL_ORIG (RMSMAN), GARDS_RESOLUTION_CAL (RMSAUTO), GARDS_RESOLUTION_CAL (RMSMAN)			
Description	Sixth order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.172. coeff7

Table(s)	GARDS_EFFICIENCY_ERROR_CAL (RMSAUTO), GARDS_EFFICIENCY_ERROR_CAL (RMSMAN)			
Description	Uncertainty of the sixth order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.173. coeff7

Table(s)	GARDS_RESOLUTION_CAL_ORIG (RMSAUTO), GARDS_RESOLUTION_CAL_ORIG (RMSMAN)			
Description	Sixth order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			g8.5	Y
Range				

5.2.174. coeff8

Table(s)	GARDS_B_RESOLUTION_CAL (RMSAUTO), GARDS_B_RESOLUTION_CAL (RMSMAN), GARDS_EFFICIENCY_CAL (RMSAUTO), GARDS_EFFICIENCY_CAL (RMSMAN), GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMSMAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO), GARDS_ENERGY_CAL_ORIG (RMSMAN), GARDS_RESOLUTION_CAL (RMSAUTO), GARDS_RESOLUTION_CAL (RMSMAN)

Description	Seventh order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.175. coeff8

Table(s)	GARDS_EFFICIENCY_ERROR_CAL (RMSAUTO), GARDS_EFFICIENCY_ERROR_CAL (RMSMAN)			
Description	Uncertainty of the seventh order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.176. coeff8

Table(s)	GARDS_RESOLUTION_CAL_ORIG (RMSAUTO), GARDS_RESOLUTION_CAL_ORIG (RMSMAN)			
Description	Seventh order coefficient			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			g8.5	Y
Range				

5.2.177. col_index

Table(s)	GARDS_ENERGY_CAL_COV (RMSMAN)			
Description	Column index			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)			i10	N
Range				

5.2.178. col_index

Table(s)	GARDS_ENERGY_CAL_COV (RMSAUTO), GARDS_RESOLUTION_CAL_COV (RMSAUTO), GARDS_RESOLUTION_CAL_COV (RMSMAN)			
Description	Column index			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)			i10	N
Range				

5.2.179. collect_start

Table(s)	GARDS_RLR (RMSAUTO), GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_DATA (RMSAUTO), GARDS_SAMPLE_DATA (RMS-MAN)			
Description	Collection start date and time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.180. collect_stop

Table(s)	GARDS_RLR (RMSAUTO), GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_DATA (RMSAUTO), GARDS_SAMPLE_DATA (RMS-MAN)			
Description	Collection stop date and time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.181. comment_category

Table(s)	GARDS_COMMENTS_DEFS (RMSMAN)			
Description	Comment category			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(10)			a10	Y
Range				

5.2.182. comment_date

Table(s)	RN_LOGS (RMSMAN)			
Description	Date of issuing the analyst comment			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date			a21	Y
Range				

5.2.183. comment_id

Table(s)	GARDS_COMMENTS (RMSAUTO), GARDS_COMMENTS (RMSMAN), GARDS_USER_COMMENTS (RMSAUTO), GARDS_USER_COMMENTS (RMSMAN), RN_LOGS (RMSMAN), RN_LOGS_TXT (RMSMAN)			
Description	Unique comment identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N

Range	

5.2.184. comment_text

Table(s)	GARDS_QAT_NOTIFY (RMSMAN), GARDS_USER_COMMENTS (RM-SAUTO), GARDS_USER_COMMENTS (RMSMAN)			
Description	Comment text related to the comment type and/or comment id			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2048)			a2048	Y
Range				

5.2.185. comment_text

Table(s)	GARDS_CAT_TEMPLATE (RMSMAN)			
Description	Comment on the filter			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(256)			a256	Y
Range				

5.2.186. comment_text

Table(s)	GARDS_COMMENTS_DEFS (RMSMAN)			
Description	Comment text related to the comment type and/or comment id			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(256)			a256	Y
Range				

5.2.187. comment_text

Table(s)	RN_LOGS_TXT (RMSMAN)			
Description	Comment text related to the comment type and/or comment id			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(4000)			a2048	Y
Range				

5.2.188. comment_txt

Table(s)	GARDS_XE_CATEGORY_PARAMS (RMSMAN)			
Description	Free-form user comments			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(300)			a300	Y
Range				

5.2.189. comment_type

Table(s)	GARDS_COMMENTS_DEFS (RMSMAN)			
Description	Comment code			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.190. comment_type

Table(s)	GARDS_COMMENTS (RMSAUTO), GARDS_COMMENTS (RMSMAN), GARDS_QAT_NOTIFY (RMSMAN), RN_LOGS (RMSMAN)			
Description	Comment code			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.191. comments

Table(s)	GARDS_NIC_INIT (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(256)				Y
Range				

5.2.192. comp_confid

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN)			
Description	Computed confidence index			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.193. compton

Table(s)	GARDS_ROI_COUNTS (RMSAUTO), GARDS_ROI_COUNTS (RMSMAN), GARDS_SAMPLE_XE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_XE_PROC_PARAMS (RMSMAN), GARDS_XE_PROC_PARAMS_TEMPLATE (RMSMAN)			
Description	Counts of Compton continuum background			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		i10	Y

Range	

5.2.194. compton_err

Table(s)	GARDS_ROI_COUNTS (RMSAUTO), GARDS_ROI_COUNTS (RMSMAN)			
Description	Uncertainty of Compton counts			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		i10	Y
Range				

5.2.195. conc

Table(s)	GARDS_BG_ISOTOPE_CONCS (RMSAUTO), GARDS_BG_ISOTOPE_CONCS (RMSMAN), GARDS_BG_ROI_CONCS (RMSAUTO), GARDS_BG_ROI_CONCS (RMSMAN), GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN)			
Description	Activity concentration (mBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)	mBq/m3		g8.5	Y
Range				

5.2.196. conc

Table(s)	GARDS_XE_UNCORRECTED_RESULTS (RMSAUTO), GARDS_XE_UNCORRECTED_RESULTS (RMSMAN)			
Description	Activity concentration (mBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mBq/m3		g8.5	Y
Range				

5.2.197. conc_133_131m

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Ratio of activity concentrations for Xe-133 to Xe-131m			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.198. conc_133_131m_mdc

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)
Description	Ratio of activity concentrations for Xe-133 to Xe-131m, where the Xe-131m

	MDC is used when Xe-131m is not detected.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.199. conc_133m_131m

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Ratio of activity concentrations for Xe-133m to Xe-131m			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.200. conc_133m_133

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Ratio of activity concentrations for Xe-133m to Xe-133			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.201. conc_135_133

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Ratio of activity concentrations for Xe-135 to Xe-133			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.202. conc_confidence_level

Table(s)	GARDS_RLR_RESULTS (RMSAUTO)			
Description	Level of confidence			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			f5.2	Y
Range				

5.2.203. conc_coverage_factor

Table(s)	GARDS_RLR_RESULTS (RMSAUTO)

Description	Coverage factor			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			f5.2	Y
Range				

5.2.204. conc_err

Table(s)	GARDS_BG_ISOTOPE_CONCS (RMSAUTO), GARDS_BG_ISOTOPE_CONCS (RMSMAN), GARDS_BG_ROI_CONCS (RMSAUTO), GARDS_BG_ROI_CONCS (RMSMAN), GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN)			
Description	Uncertainty of the activity concentration (mBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)	mBq/m3		g8.5	Y
Range				

5.2.205. conc_error

Table(s)	GARDS_XE_UNCORRECTED_RESULTS (RMSAUTO), GARDS_XE_UNCORRECTED_RESULTS (RMSMAN)			
Description	Uncertainty of the activity concentration (mBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mBq/m3		g8.5	Y
Range				

5.2.206. concentration

Table(s)	GARDS_RLR_RESULTS (RMSAUTO)			
Description	Concentration			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	Bq/m3		e11.4	Y
Range				

5.2.207. concentration_date

Table(s)	GARDS_RLR (RMSAUTO)			
Description	Concentration reference date			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.208. concentration_err

Table(s)	GARDS_RLR_RESULTS (RMSAUTO)			
Description	Relative uncertainty of the activity concentration (%)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	percent		f5.2	Y
Range				

5.2.209. count_ratio

Table(s)	GARDS_SAMPLE_RATIOS (RMSAUTO), GARDS_SAMPLE_RATIOS (RMSMAN)			
Description	Ratio of the upper ROI counts to lower ROI counts			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.210. count_ratio_err

Table(s)	GARDS_SAMPLE_RATIOS (RMSAUTO), GARDS_SAMPLE_RATIOS (RMSMAN)			
Description	Uncertainty of the ratio			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.211. country_code

Table(s)	GARDS_STATIONS (RMSMAN)			
Description	Country code			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2)			a2	Y
Range				

5.2.212. counts_sec

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Counts per second			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	cps		g8.5	Y
Range				

5.2.213. counts_sec_err

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Uncertainty of the counts per second			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	cps		g8.5	Y
Range				

5.2.214. cov_radon

Table(s)	GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN)			
Description	Covariance matrix line 5 for radon			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)			g8.5	Y
Range				

5.2.215. cov_xe_131m

Table(s)	GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN)			
Description	Covariance matrix line 1 for Xe-131m			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)			g8.5	Y
Range				

5.2.216. cov_xe_133

Table(s)	GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN)			
Description	Covariance matrix line 3 for Xe-133			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)			g8.5	Y
Range				

5.2.217. cov_xe_133m

Table(s)	GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN)			
Description	Covariance matrix line 2 for Xe-133m			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)			g8.5	Y
Range				

5.2.218. cov_xe_135

Table(s)	GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN)			
Description	Covariance matrix line 4 for Xe-135			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)			g8.5	Y
Range				

5.2.219. creation_time

Table(s)	NMS_RECEIVED_SOFAR (RMSAUTO)			
Description	Latest access time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date		a21	Y
Range				

5.2.220. crit_level

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Critical level indicator			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.221. critical_lev_gas

Table(s)	GARDS_BG_ROI_COUNTS (RMSAUTO), GARDS_BG_ROI_COUNTS (RMSMAN)			
Description	Critical level in counts in the gas background spectrum			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		g8.5	Y
Range				

5.2.222. critical_lev_samp

Table(s)	GARDS_BG_ROI_COUNTS (RMSAUTO), GARDS_BG_ROI_COUNTS (RMSMAN)			
Description	Critical level in counts in the sample spectrum			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		g8.5	Y
Range				

5.2.223. csc_mod_flag

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN), GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN)			
Description	Flag indicating if the cascade summing correction is performed: 1 = nuclide was modified, 0 = nuclide was not modified			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.224. csc_ratio

Table(s)	GARDS_CSC_MODCOEFF_LIB (RMSMAN), GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN), GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN)			
Description	Multiplier of the cascade summing correction to update active_key and mda			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.225. csc_ratio_err

Table(s)	GARDS_CSC_MODCOEFF_LIB (RMSMAN), GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN), GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN)			
Description	Uncertainty in csc_ratio			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.226. data_offset

Table(s)	RMS_MSGDISC (RMSAUTO)			
Description	Offset of the data type within the RN message			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y

Range	

5.2.227. data_size

Table(s)	RMS_MSGDISC (RMSAUTO)			
Description	Size of the data type in the RN message			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.228. data_type

Table(s)	GARDS_BASELINE (RMSAUTO), GARDS_BASELINE (RMSMAN), GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_REFLINE_MASTER (RMSMAN), GARDS_UPDATE_REFLINES (RMSMAN), GARDS_XE_REFLINE_MASTER (RMSMAN)			
Description	Data type of the spectrum: uncontaminated blank filter (B), calibration back-ground (C), detector background (D), quality control (Q), or sample (S).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)			a1	N
Range	data_type IN {B, C, D, Q, S}			

5.2.229. data_type

Table(s)	GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_DATA (RMSAUTO), GARDS_SAMPLE_DATA (RMSMAN)			
Description	Data type of the spectrum: uncontaminated blank filter (B), calibration back-ground (C), detector background (D), quality control (Q), or sample (S).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)			a1	Y
Range	data_type IN {B, C, D, Q, S}			

5.2.230. data_type

Table(s)	GARDS_DATA_LOG (RMSAUTO)			
Description	Type of the data message (current choices include: ALERT, MET, SOH, SPHD-B, SPHD-C, SPHD-D, SPHD-F, SPHD-P, SPHD-Q, SPHD-G)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(10)			a10	Y
Range	data_type IN { ALERT, MET, SOH, SPHD-B, SPHD-C, SPHD-D, SPHD-F, SPHD-P, SPHD-Q, SPHD-G }			

5.2.231. data_type

Table(s)	GARDS_PROCESSING_ERRORS (RMSMAN)

Description	Type of the data message (current choices include: MET, RMSSOH, SAMPLEPHD, QCPHD, GASBKGPHD, SPIKEPHD, DETBKGPHD, BLANKPHD, ALERT_FLOW, ALERT_TEMP, ALERT_UPS, ALERT_SYSTEM, …)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(12)			a12	Y
Range				

5.2.232. data_type

Table(s)	RMS_MSGDISC (RMSAUTO)			
Description	Type of the data message (current choices include: MET, RMSSOH, SAMPLEPHD, QCPHD, GASBKGPHD, SPIKEPHD, DETBKGPHD, BLANKPHD, ALERT_FLOW, ALERT_TEMP, ALERT_UPS, ALERT_SYSTEM, …)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(30)			a12	Y
Range				

5.2.233. date_begin

Table(s)	GARDS_DETECTORS (RMSMAN), GARDS_STATIONS (RMSMAN)			
Description	Initialization date			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.234. date_end

Table(s)	GARDS_DETECTORS (RMSMAN), GARDS_STATIONS (RMSMAN)			
Description	Decommissioning date			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.235. date_received

Table(s)	GARDS_DATA_LOG (RMSAUTO)			
Description	Date that sample was received			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.236. *date_value*

Table(s)	GARDS_TRENDVUE (RMSAUTO), GARDS_TRENDVUE (RMSMAN)			
Description	Date of the Trendvue plot			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.237. *db_name*

Table(s)	GARDS_PERMISSIONS (RMSMAN), GARDS_ROLES (RMSMAN)			
Description	Database name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(35)			a35	N
Range				

5.2.238. *decay_mode*

Table(s)	GARDS_B_ENERGY_PAIRS (RMSAUTO), GARDS_B_ENERGY_PAIRS (RMSMAN), GARDS_B_ENERGY_PAIRS_ORIG (RMSAUTO), GARDS_B_ENERGY_PAIRS_ORIG (RMSMAN), GARDS_SAMPLE_CERT_LINES (RMSAUTO)			
Description	Decay type: B = beta particle, C = conversion electron			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)			a1	Y
Range	decay_mode IN {B, C}			

5.2.239. *def_det_bkgnd_sample_id*

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN)			
Description	Default detector background sample			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.240. *def_gas_decay_time*

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN)			
Description	Default gas decay time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.241. default_method

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN)			
Description	Default method identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.242. default_role

Table(s)	GARDS_USERS_ROLES (RMSMAN)			
Description	Integer representation of the default role name to be assigned to the user			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.243. degree

Table(s)	GARDS_EFFICIENCY_CAL (RMSAUTO), GARDS_EFFICIENCY_CAL (RMSMAN), GARDS_EFFICIENCY_ERROR_CAL (RMSAUTO), GARDS_EFFICIENCY_ERROR_CAL (RMSMAN)			
Description	Polynomial degree of the efficiency equation			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.244. del

Table(s)	GARDS_NIC (RMSAUTO), GARDS_NIC (RMSMAN), GARDS_NIC_INIT (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number				Y
Range				

5.2.245. delta

Table(s)	GARDS_AUTO_SAMPLE_CAT (RMSAUTO), GARDS_CAT_TEMPLATE (RMSMAN), GARDS_SAMPLE_CAT (RMSMAN)			
Description	Value of a variable used in bounds estimation (EWMA algorithm)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.246. descsription

Table(s)	GARDS_NOTIFY (RMSAUTO), GARDS_NOTIFY (RMSMAN)			
Description	General description of occurrence			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(80)			a80	Y
Range				

5.2.247. description

Table(s)	GARDS_LAB_CATEGORY_DESCRIPTION (RMSMAN)			
Description	Description of the lab_sample_category			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(256)			a256	Y
Range				

5.2.248. description

Table(s)	GARDS_CODES (RMSMAN)			
Description	Description of the detector.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(40)			a40	Y
Range				

5.2.249. description

Table(s)	GARDS_STATIONS (RMSMAN)			
Description	Description of the station location			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(40)			a40	Y
Range				

5.2.250. description

Table(s)	GARDS_SAMPLE_DESCRIPTION (RMSAUTO)			
Description	Comments			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(512)			a512	Y
Range				

5.2.251. description

Table(s)	GARDS_DETECTORS (RMSMAN)

Description	Description of the code, detector, or station.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(80)			a80	Y
Range				

5.2.252. description

Table(s)	GARDS_NOTIFY (RMSAUTO)			
Description	General description of occurrence			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(80)			a80	Y
Range				

5.2.253. det

Table(s)	GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMS-MAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO), GARDS_ENERGY_CAL_ORIG (RMSMAN)			
Description	Determinant of the weighted design matrix, a measure of the spread of fitted data points and the error in the fitted points			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.254. det_back_used

Table(s)	GARDS_SAMPLE_XE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_XE_PROC_PARAMS (RMSMAN), GARDS_XE_PROC_PARAMS_TEMPLATE (RMSMAN)			
Description	Flag indicating whether the detector background is in use or not (1 = YES, 0 = NO)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.255. det_bkgnd_count

Table(s)	GARDS_BG_ROI_COUNTS (RMSAUTO), GARDS_BG_ROI_COUNTS (RMSMAN)			
Description	Gross number of counts in the detector background spectrum			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		g8.5	Y
Range				

5.2.256. det_bkgnd_count_err

Table(s)	GARDS_BG_ROI_COUNTS (RMSAUTO), GARDS_BG_ROI_COUNTS (RMSMAN)			
Description	Uncertainty of the gross number of counts in the detector background spectrum			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		g8.5	Y
Range				

5.2.257. det_bkgnd_id

Table(s)	GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN)			
Description	Unique identifier for the gas background used in the calculation			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.258. det_bkgnd_used

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN), GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN)			
Description	Flag indicating whether the detector background measurement is used in the sample spectrum analysis. 0 means not used, 1 indicates used.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range	det_bkgnd_used IN { 0,1}			

5.2.259. detectability

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Peak detectability			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			f9.6	Y
Range				

5.2.260. detector_back

Table(s)	GARDS_ROI_COUNTS (RMSAUTO), GARDS_ROI_COUNTS (RMSMAN)			
Description	Detector background counts			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		i10	Y

Range	

5.2.261. detector_back_err

Table(s)	GARDS_ROI_COUNTS (RMSAUTO), GARDS_ROI_COUNTS (RMSMAN)			
Description	Uncertainty of detector_back (counts)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		i10	Y
Range				

5.2.262. detector_code

Table(s)	GARDS_DETECTORS (RMSMAN), GARDS_PROCESSING_ERRORS (RMSMAN), GARDS_SAMPLE (RMSMAN)			
Description	Detector code parsed from import message			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(9)			a9	Y
Range				

5.2.263. detector_id

Table(s)	GARDS_BASELINE (RMSAUTO), GARDS_BASELINE (RMSMAN), GARDS_BG_CONFIG_PARAMS (RMSMAN), GARDS_BG_DETECTOR_STD_SPECTRA (RMSAUTO), GARDS_BG_ENERGY_CAL_DIRECTIVE (RMSMAN), GARDS_CAT_TEMPLATE (RMSMAN), GARDS_CSC_MODCOEFF_LIB (RMSMAN), GARDS_DETECTORS (RMSMAN), GARDS_EFFICIENCY_IDC_PAIRS (RMSAUTO), GARDS_EFFICIENCY_IDC_PAIRS (RMSMAN), GARDS_EFFICIENCY_VGSL_PAIRS (RMSMAN), GARDS_IRF (RMSMAN), GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_QCPARAMS (RMSMAN), GARDS_QCTARGETS (RMSMAN), GARDS_STADET (RMSMAN), GARDS_UPDATE_PARAMS_TEMPLATE (RMSMAN), GARDS_UPDATE_REFLINES (RMSMAN), GARDS_XE_PROC_PARAMS_TEMPLATE (RMSMAN)			
Description	Unique detector identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.264. detector_id

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN), GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN), GARDS_QCHISTORY

	(RMSAUTO), GARDS_QCHISTORY (RMSMAN), GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_DATA (RMSAUTO), GARDS_SAMPLE_DATA (RMSMAN), GARDS_SOH_CHAR_DATA (RMSAUTO), GARDS_SOH_HEADER (RMSAUTO), GARDS_SOH_NUM_DATA (RMSAUTO), GARDS_SOH_SENSOR_DATA (RMSAUTO)			
Description	Unique detector identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.265. dev_tolerance

Table(s)	GARDS_CAT_TEMPLATE (RMSMAN)			
Description	Tolerance			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.266. dfile

Table(s)	GARDS_PRODUCT (RMSAUTO), GARDS_PRODUCT (RMSMAN)			
Description	Name of file containing the data			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)			a32	Y
Range				

5.2.267. dir

Table(s)	RMS_MSGDISC (RMSAUTO)			
Description	Full path to the data file. Directory where the RN message is stored			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(100)			a100	Y
Range				

5.2.268. dir

Table(s)	GARDS_PRODUCT (RMSAUTO), GARDS_PRODUCT (RMSMAN)			
Description	Full path to the data file			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(256)			a100	Y
Range				

5.2.269. display_detector

Table(s)	GARDS_SOH_CODE (RMSMAN)			
Description	Flag indicating whether the parameter is associated with a detector			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.270. display_station

Table(s)	GARDS_SOH_CODE (RMSMAN)			
Description	Flag indicating whether the parameter is associated with a station			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.271. dlid

Table(s)	GARDS_DATA_LOG (RMSAUTO)			
Description	Unique data log identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.272. do_back

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Flag that indicates whether or not background subtraction should be performed: 1 = yes, 0 = no.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range	do_back IN {0,1}			

5.2.273. do_csc

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Flag that indicates whether or not cascade summing correction should be performed: 1 = yes, 0 = no.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y

Range	do_csc IN {0,1}			

5.2.274. do_pd_calc

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Flag indicates if the parent/daughter calculations should be run; 1 = run calculations, 0 = do not run calculations			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.275. do_reru

Table(s)	GARDS_SAMPLE_UPDATE_PARAMS (RMSAUTO), GARDS_SAMPLE_UPDATE_PARAMS (RMSMAN), GARDS_UPDATE_PARAMS_TEMPLATE (RMSMAN)			
Description	Flag that indicates if a resolution update was performed			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.276. dsize

Table(s)	GARDS_PRODUCT (RMSAUTO), GARDS_PRODUCT (RMSMAN)			
Description	Size of data file in bytes			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.277. dtg

Table(s)	GARDS_ALERTS (RMSAUTO)			
Description	Transmit date and time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	N
Range	any valid ORACLE date			

5.2.278. dtg

Table(s)	GARDS_QAT_NOTIFY (RMSMAN)			
Description	Date time group for QAT comment notification			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.279. dtg

Table(s)	GARDS_QCTARGETS (RMSMAN)			
Description	Decay correction reference date			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.280. dtg

Table(s)	GARDS_COMMENTS (RMSAUTO), GARDS_COMMENTS (RMSMAN), GARDS_FPE (RMSAUTO), GARDS_FPE (RMSMAN), GARDS_STATUS_HISTORY (RMSMAN)			
Description	Entry date and time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.281. dtg

Table(s)	GARDS_DATA_LOG (RMSAUTO), GARDS_RECEIPT_LOG (RMSAUTO)			
Description	Transmit date and time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.282. dtg

Table(s)	GARDS_NIC (RMSAUTO), GARDS_NIC (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date				Y
Range				

5.2.283. dtg_begin

Table(s)	GARDS_NOTIFY (RMSAUTO), GARDS_NOTIFY (RMSMAN), GARDS_NUCL2QUANTIFY (RMSMAN), GARDS_SOH_CHAR_DATA (RMSAUTO), GARDS_SOH_HEADER (RMSAUTO), GARDS_SOH_NUM_DATA (RMSAUTO), GARDS_SOH_SENSOR_DATA (RMSAUTO)

Description	Begin date and time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	N
Range	any valid ORACLE date			

5.2.284. dtg_begin

Table(s)	GARDS_MDAS2REPORT (RMSMAN)			
Description	Begin date and time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.285. dtg_end

Table(s)	GARDS_SOH_CHAR_DATA (RMSAUTO), GARDS_SOH_HEADER (RM-SAUTO), GARDS_SOH_NUM_DATA (RMSAUTO), GARDS_SOH_SENSOR_DATA (RMSAUTO)			
Description	End date and time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	N
Range	any valid ORACLE date			

5.2.286. dtg_end

Table(s)	GARDS_MDAS2REPORT (RMSMAN), GARDS_NOTIFY (RMSAUTO), GARDS_NOTIFY (RMSMAN), GARDS_NUCL2QUANTIFY (RMSMAN)			
Description	End date and time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.287. ecal_range_max

Table(s)	GARDS_DETECTORS (RMSMAN)			
Description	Maximum detector calibration energy (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.288. ecr_slope

Table(s)	GARDS_SAMPLE_UPDATE_PARAMS (RMSAUTO),

	GARDS_SAMPLE_UPDATE_PARAMS (RMSMAN)

Description	Default ECR slope			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			f8.3	Y
Range				

5.2.289. *eff_error*

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Uncertainty of the efficiency			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.290. *effic*

Table(s)	GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN)			
Description	Efficiency			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.291. *effic*

Table(s)	GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN)			
Description	Efficiency at the energy			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.292. *effic_energy*

Table(s)	GARDS_EFFICIENCY_IDC_PAIRS (RMSAUTO), GARDS_EFFICIENCY_IDC_PAIRS (RMSMAN), GARDS_EFFICIENCY_PAIRS (RMSAUTO), GARDS_EFFICIENCY_PAIRS (RMSMAN), GARDS_EFFICIENCY_VGSL_PAIRS (RMSMAN), GARDS_TOTAL_EFFIC (RMSAUTO), GARDS_TOTAL_EFFIC (RMS-MAN)			
Description	Gamma energy (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number	keV		g8.5	N
Range				

5.2.293. effic_err

Table(s)	GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN)			
Description	Uncertainty of the efficiency			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.294. effic_error

Table(s)	GARDS_EFFICIENCY_IDC_PAIRS (RMSAUTO), GARDS_EFFICIENCY_IDC_PAIRS (RMSMAN)			
Description	Uncertainty of the efficiency			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	N
Range				

5.2.295. effic_error

Table(s)	GARDS_EFFICIENCY_PAIRS (RMSAUTO), GARDS_EFFICIENCY_PAIRS (RMSMAN), GARDS_EFFICIENCY_VGSL_PAIRS (RMSMAN), GARDS_TOTAL_EFFIC (RMSAUTO), GARDS_TOTAL_EFFIC (RMS-MAN)			
Description	Uncertainty of the efficiency			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.296. efficiency

Table(s)	GARDS_EFFICIENCY_IDC_PAIRS (RMSAUTO), GARDS_EFFICIENCY_IDC_PAIRS (RMSMAN)			
Description	Efficiency			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	N
Range				

5.2.297. efficiency

Table(s)	GARDS_EFFICIENCY_PAIRS (RMSAUTO), GARDS_EFFICIENCY_PAIRS (RMSMAN), GARDS_EFFICIENCY_VGSL_PAIRS (RMSMAN), GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN), GARDS_TOTAL_EFFIC (RMSAUTO), GARDS_TOTAL_EFFIC (RMSMAN)			
Description	Efficiency			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.298. efftype

Table(s)	GARDS_EFFICIENCY_CAL (RMSAUTO), GARDS_EFFICIENCY_CAL (RMSMAN)			
Description	Efficiency type			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(8)			a8	Y
Range				

5.2.299. elevation

Table(s)	GARDS_STATIONS (RMSMAN)			
Description	Elevation (m)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	metres		f8.5	Y
Range				

5.2.300. email_addr

Table(s)	GARDS_NOTIFY (RMSAUTO), GARDS_NOTIFY (RMSMAN)			
Description	Recipient email addresses			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(80)			a80	N
Range				

5.2.301. email_address

Table(s)	GARDS_POC (RMSMAN)			
Description	Email address of point of contact			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(50)			a50	Y

Range	

5.2.302. end_date

Table(s)	GARDS_EFFICIENCY_VGSL_PAIRS (RMSMAN)			
Description	Decommissioning date			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	N
Range	any valid ORACLE date			

5.2.303. end_date

Table(s)	GARDS_CAT_TEMPLATE (RMSMAN), GARDS_EFFICIENCY_IDC_PAIRS (RMSAUTO), GARDS_EFFICIENCY_IDC_PAIRS (RMSMAN), GARDS_IRF (RMSMAN), GARDS_NUCL_LIB_ARCHIVE (RMSMAN), GARDS_NUCL_LINES_LIB_ARCHIVE (RMSMAN), GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_STATIONS_SCHEDULE (RMSMAN), GARDS_XE_CATEGORY_PARAMS (RMSMAN), RN_LOGS (RMSMAN)			
Description	Decommissioning date			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.304. end_env_time

Table(s)	GARDS_ENVIRONMENT (RMSAUTO)			
Description	End date of environment data			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date		NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.305. end_env_time_sec

Table(s)	GARDS_ENVIRONMENT (RMSAUTO)			
Description	End date of environmental data.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	seconds		g8.5	Y
Range				

5.2.306. end_time

Table(s)	GARDS_MET_DATA (RMSAUTO), GARDS_MET_HEADER (RMSAUTO)

Description	End time of the period			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.307. end_time

Table(s)	GARDS_RN_INTERVAL (RMSAUTO)			
Description	End time of the period			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)	Date	NOT ALLOWED	a21	N
Range	any valid ORACLE date			

5.2.308. end_time

Table(s)	GARDS_INTERVAL (RMSAUTO)			
Description	End time of the period			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.309. energy

Table(s)	GARDS_AUX_LINES_LIB (RMSMAN), GARDS_CSC_MODCOEFF_LIB (RMSMAN), GARDS_NUCL_LINES_LIB (RMSMAN), GARDS_NUCL_LINES_LIB_ARCHIVE (RMSMAN), GARDS_SAMPLE_CERT_LINES (RMSAUTO), GARDS_XE_NUCL_LINES_LIB (RMSMAN)			
Description	Energy of the decay line (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	N
Range				

5.2.310. energy

Table(s)	GARDS_NUCL_LINES_IDED_ORIG (RMSMAN)			
Description	Energy of the peak (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	N
Range				

5.2.311. *energy*

Table(s)	GARDS_QCTARGETS (RMSMAN)			
Description	Gamma energy (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	N
Range				

5.2.312. *energy*

Table(s)	GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Energy of the peak (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.313. *energy*

Table(s)	GARDS_IRF (RMSMAN), GARDS_QAT_NOTIFY (RMSMAN)			
Description	Gamma energy (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.314. *energy_err*

Table(s)	GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN), GARDS_NUCL_LINES_LIB (RMSMAN), GARDS_NUCL_LINES_LIB_ARCHIVE (RMSMAN), GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN), GARDS_XE_NUCL_LINES_LIB (RMSMAN)			
Description	Uncertainty of the energy (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.315. *energy_high*

Table(s)	GARDS_BASELINE (RMSAUTO), GARDS_BASELINE (RMSMAN)

Description	Higher energy of the bin			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.316. energy_low

Table(s)	GARDS_BASELINE (RMSAUTO), GARDS_BASELINE (RMSMAN)			
Description	Lower energy of the bin			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.317. energy_span

Table(s)	GARDS_SPECTRUM (RMSAUTO)			
Description	Total energy span of detector (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		f8.5	Y
Range				

5.2.318. energy_tol

Table(s)	GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Tolerance for nuclide identification			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.319. energy_units

Table(s)	GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMS-MAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO), GARDS_ENERGY_CAL_ORIG (RMSMAN)			
Description	Energy units			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(3)			a3	Y
Range	energy_units IN {MeV, keV}			

5.2.320. entry_date

Table(s)	GARDS_PROCESSING_ERRORS (RMSMAN), GARDS_RLR (RMSAUTO),

	GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_STATUS (RMSAUTO), GARDS_SAMPLE_STATUS (RMSMAN)			
Description	Date entered into the IDC database			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.321. error

Table(s)	GARDS_BG_STD_SPECTRA_RESULT (RMSAUTO), GARDS_BG_STD_SPECTRA_RESULT (RMSMAN)			
Description	Uncertainty of the estimate			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)			g8.5	Y
Range				

5.2.322. error

Table(s)	GARDS_SAMPLE_CERT_LINES (RMSAUTO)			
Description	Relative uncertainty of the activity (%)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	percent		f8.3	Y
Range				

5.2.323. error_text

Table(s)	GARDS_PROCESSING_ERRORS (RMSMAN)			
Description	Text associated with the error			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2048)			a20	Y
Range				

5.2.324. estimate

Table(s)	GARDS_BG_STD_SPECTRA_RESULT (RMSAUTO), GARDS_BG_STD_SPECTRA_RESULT (RMSMAN)			
Description	The estimate of (SpectraContribution * NumberOfDecays)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)			g8.5	Y
Range				

5.2.325. etol

Table(s)	GARDS_QCPARAMS (RMSMAN)			
Description	Energy tolerance used to match peaks with energies (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.326. event

Table(s)	GARDS_NOTIFY (RMSAUTO), GARDS_NOTIFY (RMSMAN)			
Description	Type of occurrence (choices are: ALERT, FISS_FOUND, NIC_SIG34, NIC_SIG5, QC_ERROR, QC_WARNING, RADOPSCAL, RMS_ADMIN)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(10)			a10	N
Range				

5.2.327. ext_ref_id

Table(s)	RN_LOGS (RMSMAN)			
Description	External reference to related analyst comment, not used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.328. f_linear

Table(s)	GARDS_SAMPLE_UPDATE_PARAMS (RMSAUTO), GARDS_SAMPLE_UPDATE_PARAMS (RMSMAN), GARDS_UPDATE_PARAMS_TEMPLATE (RMSMAN)			
Description	0/1 flag for forcing ECR to be first-order (typically 0)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.329. file_size

Table(s)	GARDS_DATA_LOG (RMSAUTO)			
Description	Size of data file in bytes			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.330. filename

Table(s)	RMS_MSGDISC (RMSAUTO)			
Description	Input data filename			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(100)			a100	Y
Range				

5.2.331. filename

Table(s)	GARDS_RLR (RMSAUTO)			
Description	Input data filename			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(256)			a100	Y
Range				

5.2.332. filename

Table(s)	GARDS_HISTOGRAM (RMSAUTO)			
Description	Name of the file containing the histogram data			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(256)			a256	Y
Range				

5.2.333. filename

Table(s)	GARDS_SPECTRUM (RMSAUTO)			
Description	Name of the file containing the spectrum data			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(256)			a256	Y
Range				

5.2.334. filename

Table(s)	GARDS_PROCESSING_ERRORS (RMSMAN)			
Description	Input data filename			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(512)			a100	Y
Range				

5.2.335. first_name

Table(s)	GARDS_POC (RMSMAN)

Description	First name of point of contact			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(20)			a20	Y
Range				

5.2.336. fit_singlets

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Fit singlets flag			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.337. fitted

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Peak fit indicator			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.338. fix_fwhm

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Fixed FWHM during peak search flag			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.339. flag

Table(s)	GARDS_QC_RESULTS (RMSAUTO), GARDS_QC_RESULTS (RMSMAN)			
Description	Quality control flag			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)			a1	Y
Range				

5.2.340. *flag_133_131m*

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Flag whether or not the Bayesian minus ratio is above the limit for Xe-133 to Xe-131m			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.341. *flag_133m_131m*

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Flag whether or not the Bayesian minus ratio is above the limit for Xe-133m to Xe-131m			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.342. *flag_133m_133*

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Flag whether or not the Bayesian minus ratio is above the limit for Xe-133m to Xe-133			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.343. *flag_135_133*

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Flag whether or not the Bayesian minus ratio is above the limit for Xe-135 to Xe-133			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.344. *flag_atm*

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)
Description	Flag whether or not a known source would be detected in the sample, which is

	determined using ATM simulations.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.345. flag_id

Table(s)	GARDS_SAMPLE_FLAGS (RMSAUTO), GARDS_SAMPLE_FLAGS (RMSMAN)			
Description	Flag identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.346. flag_id

Table(s)	GARDS_FLAGS (RMSMAN)			
Description	Flag identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			i10	N
Range				

5.2.347. flag_id

Table(s)	GARDS_FLAGS (RMSAUTO)			
Description	Flag identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			i10	Y
Range				

5.2.348. flag_shortterm

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Flag on the statistics range for abnormal threshold determination (1 for short term, 0 for long term)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	N
Range				

5.2.349. flow_rate

Table(s)	GARDS_ENVIRONMENT (RMSAUTO)

Description	Flow rate through filter (m3/h)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	m3/h		g8.5	Y
Range				

5.2.350. foff

Table(s)	GARDS_PRODUCT (RMSAUTO), GARDS_PRODUCT (RMSMAN)			
Description	Offset into the data file (bytes)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	Bytes		i10	Y
Range				

5.2.351. fpid

Table(s)	GARDS_FPE (RMSMAN)			
Description	Unique fission product identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.352. fpid

Table(s)	GARDS_FPE (RMSAUTO)			
Description	Unique fission product identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.353. fwhm

Table(s)	GARDS_BG_QC_RESULT (RMSAUTO), GARDS_BG_QC_RESULT (RMS-MAN)			
Description	Full width at half maximum			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)	keV		g8.5	Y
Range				

5.2.354. fwhm

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)
Description	Full width at half maximum

Storage type	Unit	NA value	External	Nullable
number	keV		g8.5	Y
Range				

5.2.355. *fwhm_err*

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Uncertainty of full width at half maximum			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.356. *fwhm_mult_width*

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Number of FWHMs to search to determine multiplets			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.357. *g_chan_start*

Table(s)	GARDS_ROI_CHANNELS (RMSAUTO), GARDS_ROI_CHANNELS (RMS-MAN)			
Description	Gamma boundary start channel			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.358. *g_chan_stop*

Table(s)	GARDS_ROI_CHANNELS (RMSAUTO), GARDS_ROI_CHANNELS (RMS-MAN)			
Description	Gamma boundary start channel.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.359. *g_channels*

Table(s)	GARDS_HISTOGRAM (RMSAUTO)

Description	Number of gamma channels in histogram			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.360. g_energy_span

Table(s)	GARDS_HISTOGRAM (RMSAUTO)			
Description	Number of gamma channels in histogram.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.361. g_energy_start

Table(s)	GARDS_ROI_LIMITS (RMSAUTO), GARDS_ROI_LIMITS (RMSMAN)			
Description	Gamma boundary start energy (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.362. g_energy_stop

Table(s)	GARDS_ROI_LIMITS (RMSAUTO), GARDS_ROI_LIMITS (RMSMAN)			
Description	Gamma boundary stop energy (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.363. gainchange

Table(s)	GARDS_QCPARAMS (RMSMAN)			
Description	Gain first difference tolerance			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.364. gainshift

Table(s)	GARDS_SAMPLE_UPDATE_PARAMS (RMSAUTO), GARDS_SAMPLE_UPDATE_PARAMS (RMSMAN), GARDS_UPDATE_PARAMS_TEMPLATE (RMSMAN)
Description	Gain change for matching, percent (typically 0.1)

Storage type	Unit	NA value	External	Nullable
number			f8.3	Y
Range				

5.2.365. gamma

Table(s)	GARDS_CAT_TEMPLATE (RMSMAN)			
Description	Value of a variable used in bounds estimation			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.366. gamma

Table(s)	GARDS_NIC_INIT (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number				Y
Range				

5.2.367. gamma_coeff1

Table(s)	GARDS_BG_STD_SPECTRA_RESULT (RMSAUTO), GARDS_BG_STD_SPECTRA_RESULT (RMSMAN)			
Description	Zero order coefficient of the gamma energy calibration			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)			g8.5	Y
Range				

5.2.368. gamma_coeff1

Table(s)	GARDS_BG_ENERGY_CAL_DIRECTIVE (RMSMAN)			
Description	First order coefficient of the gamma energy calibration			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.369. gamma_coeff1

Table(s)	GARDS_BG_ENERGY_CAL (RMSAUTO), GARDS_BG_ENERGY_CAL (RMSMAN), GARDS_BG_ENERGY_CAL_ORIG (RMSAUTO), GARDS_BG_ENERGY_CAL_ORIG (RMSMAN)
Description	Zero order coefficient of the gamma energy calibration

Storage type	Unit	NA value	External	Nullable
number			g8.5	Y
Range				

5.2.370. gamma_coeff2

Table(s)	GARDS_BG_STD_SPECTRA_RESULT (RMSAUTO), GARDS_BG_STD_SPECTRA_RESULT (RMSMAN)			
Description	First order coefficient of the gamma energy calibration			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)			g8.5	Y
Range				

5.2.371. gamma_coeff2

Table(s)	GARDS_BG_ENERGY_CAL (RMSAUTO), GARDS_BG_ENERGY_CAL (RMSMAN), GARDS_BG_ENERGY_CAL_ORIG (RMSAUTO), GARDS_BG_ENERGY_CAL_ORIG (RMSMAN)			
Description	First order coefficient of the gamma energy calibration			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.372. gamma_coeff2

Table(s)	GARDS_BG_ENERGY_CAL_DIRECTIVE (RMSMAN)			
Description	Second order coefficient of the gamma energy calibration			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.373. gamma_coeff3

Table(s)	GARDS_BG_STD_SPECTRA_RESULT (RMSAUTO), GARDS_BG_STD_SPECTRA_RESULT (RMSMAN)			
Description	Second order coefficient of the gamma energy calibration			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)			g8.5	Y
Range				

5.2.374. gamma_coeff3

Table(s)	GARDS_BG_ENERGY_CAL (RMSAUTO), GARDS_BG_ENERGY_CAL (RMSMAN), GARDS_BG_ENERGY_CAL_DIRECTIVE (RMSMAN),

	GARDS_BG_ENERGY_CAL_ORIG (RMSAUTO), GARDS_BG_ENERGY_CAL_ORIG (RMSMAN)			
Description	Second order coefficient of the gamma energy calibration			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.375. gamma_ecr_order

Table(s)	GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN), GARDS_SAMPLE_XE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_XE_PROC_PARAMS (RMSMAN), GARDS_XE_PROC_PARAMS_TEMPLATE (RMSMAN)			
Description	Order of the gamma energy calibration function			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.376. gas_back_used

Table(s)	GARDS_SAMPLE_XE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_XE_PROC_PARAMS (RMSMAN), GARDS_XE_PROC_PARAMS_TEMPLATE (RMSMAN)			
Description	Flag indicating whether the gas background is in use or not (1 = YES, 0 = NO)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.377. gas_bkgd_measurement_id

Table(s)	GARDS_SAMPLE_AUX (RMSAUTO)			
Description	Gas background measurement identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(31)			a31	N
Range				

5.2.378. gas_bkgnd_count

Table(s)	GARDS_BG_ROI_COUNTS (RMSAUTO), GARDS_BG_ROI_COUNTS (RMSMAN)			
Description	Net number of counts in the gas background spectrum			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		g8.5	Y

Range	

5.2.379. gas_bkgnd_count_err

Table(s)	GARDS_BG_ROI_COUNTS (RMSAUTO), GARDS_BG_ROI_COUNTS (RMSMAN)			
Description	Uncertainty of the net number of counts in the gas background spectrum			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		g8.5	Y
Range				

5.2.380. gas_bkgnd_gross

Table(s)	GARDS_BG_ROI_COUNTS (RMSAUTO), GARDS_BG_ROI_COUNTS (RMSMAN)			
Description	Gross number of counts in the gas background spectrum			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		g8.5	Y
Range				

5.2.381. gas_bkgnd_id

Table(s)	GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN)			
Description	Unique gas background identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.382. gas_bkgnd_used

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN), GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN)			
Description	Flag indicating whether the gas background measurement is used in the sample spectrum analysis. 0 means not used, 1 indicates used, 2 means used if the counts are above LC.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range	gas_bkgnd_used IN { 0,1,2}			

5.2.383. geometry

Table(s)	GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_DATA (RMSAUTO), GARDS_SAMPLE_DATA (RMSMAN)

Description	Sample geometry			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(17)			a17	Y
Range				

5.2.384. gross

Table(s)	GARDS_ROI_COUNTS (RMSAUTO), GARDS_ROI_COUNTS (RMSMAN)			
Description	Gross number of counts in the ROI			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		g8.5	Y
Range				

5.2.385. gross

Table(s)	GARDS_BG_ROI_COUNTS (RMSAUTO), GARDS_BG_ROI_COUNTS (RMSMAN)			
Description	Gross number of counts in the sample spectrum			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		g8.5	Y
Range				

5.2.386. gross_err

Table(s)	GARDS_ROI_COUNTS (RMSAUTO), GARDS_ROI_COUNTS (RMSMAN)			
Description	Uncertainty of the gross number of counts in the ROI			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		g8.5	Y
Range				

5.2.387. gross_err

Table(s)	GARDS_BG_ROI_COUNTS (RMSAUTO), GARDS_BG_ROI_COUNTS (RMSMAN)			
Description	Uncertainty of the gross number of counts in the sample spectrum			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		g8.5	Y
Range				

5.2.388. halflife

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG

	(RMSMAN), GARDS_NUCL_LIB (RMSMAN), GARDS_NUCL_LIB_ARCHIVE (RMSMAN), GARDS_ROI_LIB (RMS-MAN), GARDS_SAMPLE_CERT_LINES (RMSAUTO), GARDS_XE_NUCL_LIB (RMSMAN)			
Description	Half-life in seconds (S), hours (H), minutes (M), or years (Y)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(23)			a23	Y
Range				

5.2.389. halflife_act

Table(s)	GARDS_AUX_LIB (RMSMAN)			
Description	Half-life in seconds (S), hours (H), minutes (M), or years (Y)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(23)			a23	Y
Range				

5.2.390. halflife_act_err

Table(s)	GARDS_AUX_LIB (RMSMAN)			
Description	Uncertainty of half-life			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(23)			a23	Y
Range				

5.2.391. halflife_err

Table(s)	GARDS_NUCL_LIB (RMSMAN), GARDS_NUCL_LIB_ARCHIVE (RMS-MAN), GARDS_ROI_LIB (RMSMAN), GARDS_XE_NUCL_LIB (RMS-MAN)			
Description	Uncertainty of half-life			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(23)			a23	Y
Range				

5.2.392. halflife_sec

Table(s)	GARDS_BG_PROC_PARAMS_ROI (RMSAUTO), GARDS_BG_PROC_PARAMS_ROI (RMSMAN), GARDS_NUCL_LIB (RMSMAN), GARDS_NUCL_LIB_ARCHIVE (RMSMAN), GARDS_ROI_LIB (RMSMAN), GARDS_XE_NUCL_LIB (RMSMAN)			
Description	Half-life in seconds			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	seconds		g8.5	Y

Range	

5.2.393. *hold*

Table(s)	GARDS_AUTO_SAMPLE_CAT (RMSAUTO), GARDS_SAMPLE_CAT (RMSMAN)			
Description	Flag for holding current sample from being used in the history for categorizing subsequent samples (0 = use; 1 = skip)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.394. *hold*

Table(s)	GARDS_NIC (RMSAUTO), GARDS_NIC (RMSMAN), GARDS_NIC_INIT (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number				Y
Range				

5.2.395. *id_percent*

Table(s)	GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN)			
Description	Nuclide percentage			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	percent		f8.5	Y
Range				

5.2.396. *idc_summary*

Table(s)	GARDS_RLR_CONCLUSIONS (RMSAUTO)			
Description	IDC findings			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2048)			a2048	Y
Range				

5.2.397. *ided*

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)
Description	Peak identification indicator; 1 = peak was associated with a nuclide by the auto-

	mated analysis, 0 = peak was not associated with a nuclide by the automated analysis (not updated by the ROI interface)

Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.398. include_stations

Table(s)	GARDS_QAT_QUERY_FILTER (RMSMAN)			
Description	Flag to include or exclude stations			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.399. index_no

Table(s)	GARDS_BASELINE (RMSAUTO), GARDS_BASELINE (RMSMAN)			
Description	Index of the energy bin			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number		NOT ALLOWED	i10	N
Range				

5.2.400. init_begin

Table(s)	GARDS_NIC_INIT (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date				Y
Range				

5.2.401. init_begin_date

Table(s)	GARDS_CAT_TEMPLATE (RMSMAN)			
Description	Initialization date			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.402. init_detector_id

Table(s)	GARDS_NIC_INIT (RMSMAN)
Description	

Storage type	Unit	NA value	External	Nullable
number				Y
Range				

5.2.403. init_end

Table(s)	GARDS_NIC_INIT (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date				Y
Range				

5.2.404. init_end_date

Table(s)	GARDS_CAT_TEMPLATE (RMSMAN)			
Description	Decommissioning date			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.405. input_file_name

Table(s)	GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_DATA (RMSAUTO), GARDS_SAMPLE_DATA (RMSMAN)			
Description	Input data filename			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(255)			a100	Y
Range				

5.2.406. instance_info

Table(s)	PIPELINE_CONTROL (RMSMAN)			
Description	Determines the current instance information regarding RnMessagesProcessor.pl program. The instance info as follows: USER_ID@machine:ProcessId			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(30)			a30	Y
Range				

5.2.407. instance_running

Table(s)	PIPELINE_CONTROL (RMSMAN)
Description	Running flag: Y : There is a RUNNING instance. N or NULL : No thing is

	RUNNING			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)			a1	Y
Range				

5.2.408. instance_time

Table(s)	PIPELINE_CONTROL (RMSMAN)			
Description	Determines when the instance started			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date		a21	Y
Range				

5.2.409. interference

Table(s)	GARDS_ROI_COUNTS (RMSAUTO), GARDS_ROI_COUNTS (RMSMAN)			
Description	Counts from interference nuclides			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		i10	Y
Range				

5.2.410. interference_err

Table(s)	GARDS_ROI_COUNTS (RMSAUTO), GARDS_ROI_COUNTS (RMSMAN)			
Description	Uncertainty of interference (counts)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		i10	Y
Range				

5.2.411. interference_used

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN), GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN)			
Description	Flag indicating whether the interference corrections are used in the sample spectrum analysis. 0 means not used, 1 indicates used, 2 means used if counts are above LC.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range	interference_used IN { 0,1,2}			

5.2.412. *intvlid*

Table(s)	GARDS_RN_INTERVAL (RMSAUTO)			
Description	Unique interval identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.413. *intvlid*

Table(s)	GARDS_INTERVAL (RMSAUTO)			
Description	Unique interval identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.414. *irf*

Table(s)	GARDS_IRF (RMSMAN)			
Description	Isotope response function			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.415. *irf_error*

Table(s)	GARDS_IRF (RMSMAN)			
Description	Uncertainty of the isotope response function			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.416. *kb_sent*

Table(s)	GARDS_RECEIPT_LOG (RMSAUTO)			
Description	Transmitted data size of obsolete table			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.417. *key_flag*

Table(s)	GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED

	(RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN), GARDS_NUCL_LINES_LIB (RMSMAN), GARDS_NUCL_LINES_LIB_ARCHIVE (RMSMAN), GARDS_XE_NUCL_LINES_LIB (RMSMAN)			
Description	Key line indicator			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.418. lab_detector_id

Table(s)	GARDS_RLR (RMSAUTO)			
Description	Unique laboratory detector identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			a9	Y
Range				

5.2.419. lab_id

Table(s)	GARDS_RLR (RMSAUTO)			
Description	Unique laboratory identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			a5	Y
Range				

5.2.420. lab_receipt_date

Table(s)	GARDS_RLR (RMSAUTO)			
Description	Date of sample receipts at the laboratory			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.421. lab_sample_category

Table(s)	GARDS_LAB_CATEGORY_DESCRIPTION (RMSMAN)			
Description	Report sample category (A|B|C|D|E)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2)			a1	N
Range				

5.2.422. *lab_sample_category*

Table(s)	GARDS_RLR (RMSAUTO)			
Description	Report sample category (A|B|C|D|E)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2)			a1	Y
Range				

5.2.423. *lab_summary*

Table(s)	GARDS_RLR_CONCLUSIONS (RMSAUTO)			
Description	Laboratory findings and conclusions			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2048)			a2048	Y
Range				

5.2.424. *last_name*

Table(s)	GARDS_POC (RMSMAN)			
Description	Last name of point of contact			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(50)			a50	Y
Range				

5.2.425. *lat*

Table(s)	GARDS_DETECTORS (RMSMAN), GARDS_STATIONS (RMSMAN)			
Description	Latitude (degrees)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	degrees		f8.5	Y
Range				

5.2.426. *lc*

Table(s)	GARDS_BG_ISOTOPE_CONCS (RMSAUTO), GARDS_BG_ISOTOPE_CONCS (RMSMAN), GARDS_BG_ROI_CONCS (RMSAUTO), GARDS_BG_ROI_CONCS (RMSMAN), GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN)			
Description	Critical level in activity concentration (mBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)	mBq/m3		g8.5	Y
Range				

5.2.427. lc

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN), GARDS_ROI_COUNTS (RMSAUTO), GARDS_ROI_COUNTS (RMSMAN)			
Description	Critical level for the peak (counts)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		g8.5	Y
Range				

5.2.428. lc

Table(s)	GARDS_XE_UNCORRECTED_RESULTS (RMSAUTO), GARDS_XE_UNCORRECTED_RESULTS (RMSMAN)			
Description	Critical level in activity concentration (mBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mBq/m3		g8.5	Y
Range				

5.2.429. lc_abscissa

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN), GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN)			
Description	Abscissas of the normal distribution corresponding to a predefined confidence level for estimating the critical level, a value of 1.645 corresponds to a 95% confidence interval			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)			f8.5	Y
Range				

5.2.430. lc_abscissa

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN), GARDS_SAMPLE_XE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_XE_PROC_PARAMS (RMSMAN), GARDS_XE_PROC_PARAMS_TEMPLATE (RMSMAN)			
Description	Abscissas of the normal distribution corresponding to a predefined confidence level for estimating the critical level, a value of 1.645 corresponds to a 95% confidence interval			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			f8.5	Y
Range				

5.2.431. ld

Table(s)	GARDS_BG_ISOTOPE_CONCS (RMSAUTO), GARDS_BG_ISOTOPE_CONCS (RMSMAN), GARDS_BG_ROI_CONCS (RMSAUTO), GARDS_BG_ROI_CONCS (RMSMAN), GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN)			
Description	Detection limit in activity concentration (mBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)	mBq/m3		g8.5	Y
Range				

5.2.432. lddate

Table(s)	GARDS_RN_INTERVAL (RMSAUTO)			
Description	Load date. The date and time the record was inserted into the database.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	N
Range	any valid ORACLE date			

5.2.433. lddate

Table(s)	GARDS_BG_ENERGY_CAL_DIRECTIVE (RMSMAN), GARDS_INTERVAL (RMSAUTO), GARDS_QCHISTORY (RMSAUTO), GARDS_QCHISTORY (RMSMAN), GARDS_SOH_EVALUATION (RMSAUTO), GARDS_SOH_EVALUATION (RMSMAN), RMS_MSGDISC (RMSAUTO)			
Description	Load date. The date and time the record was inserted into the database.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.434. left_chan

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Left channel of the peak			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.435. left_fwhm_lim

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)
Description	Left ROI FWHM limit

Storage type	Unit	NA value	External	Nullable
number			g8.5	Y
Range				

5.2.436. line_comment

Table(s)	GARDS_AUX_LINES_LIB (RMSMAN)			
Description	Comment associated with the decay line			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(500)			a150	Y
Range				

5.2.437. line_type

Table(s)	GARDS_AUX_LINES_LIB (RMSMAN)			
Description	Type of the decay line			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)			a8	Y
Range				

5.2.438. linecomment

Table(s)	GARDS_NUCL_LINES_LIB (RMSMAN), GARDS_NUCL_LINES_LIB_ARCHIVE (RMSMAN)			
Description	Comment associated with the decay line			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1500)			a150	Y
Range				

5.2.439. lon

Table(s)	GARDS_DETECTORS (RMSMAN), GARDS_STATIONS (RMSMAN)			
Description	Longitude (degrees)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	degrees		f8.5	Y
Range				

5.2.440. lower_bound

Table(s)	GARDS_AUTO_SAMPLE_CAT (RMSAUTO), GARDS_CAT_TEMPLATE (RMSMAN), GARDS_SAMPLE_CAT (RMSMAN)			
Description	Lower limit of the amount of a nuclide that can be acceptably found			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number			g8.5	Y
Range				

5.2.441. lower_lim

Table(s)	GARDS_NIC (RMSAUTO), GARDS_NIC (RMSMAN), GARDS_NIC_INIT (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number				Y
Range				

5.2.442. lower_limit

Table(s)	GARDS_CAT_CRITERIA_TESTS (RMSMAN)			
Description	Lower limit bound of the test			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.443. lower_limit_green

Table(s)	GARDS_SAMPLE_TESTS (RMSMAN)			
Description	Green flag lower limit			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.444. lower_limit_yellow

Table(s)	GARDS_SAMPLE_TESTS (RMSMAN)			
Description	Yellow flag lower limit			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.445. lower_roi_number

Table(s)	GARDS_SAMPLE_RATIOS (RMSAUTO), GARDS_SAMPLE_RATIOS (RMSMAN)			
Description	Lower ROI number			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y

Range	

5.2.446. *max_acquisition_time*

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN)			
Description	Maximum duration accepted for acquisition			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	seconds		g8.5	Y
Range				

5.2.447. *max_collection_time*

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN)			
Description	Maximum duration accepted for collection			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	seconds		g8.5	Y
Range				

5.2.448. *max_mdc*

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN)			
Description	Maximum MDC value			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)	mBq/m3		g8.5	Y
Range				

5.2.449. *max_qc_dev*

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN), GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN)			
Description	Maximum deviation of the quality check (integer)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.450. *max_reporting_time*

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN)			
Description	Maximum duration accepted for reporting			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	seconds		g8.5	Y
Range				

5.2.451. max_running

Table(s)	PIPELINE_CONTROL (RMSMAN)			
Description	Determines the maximum number of RUNNING massages that the program can handle at any time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.452. max_sample_id

Table(s)	GARDS_QAT_QUERY_FILTER (RMSMAN)			
Description	QAT user query, upper boundary for the sample id			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.453. max_t_time

Table(s)	GARDS_QAT_CONFIG (RMSMAN)			
Description	Maximum allowable value for t_time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	Minutes		g8.5	Y
Range				

5.2.454. mda

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN), GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN)			
Description	Minimum detectable activity concentration (uBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	uBq/m3		g8.5	Y
Range				

5.2.455. mda

Table(s)	GARDS_ROI_CONCS (RMSAUTO), GARDS_ROI_CONCS (RMSMAN)			
Description	Minimum detectable concentration (mBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mBq/m3		g8.5	Y

Range	

5.2.456. *mda_acq_start*

Table(s)	GARDS_BG_ISOTOPE_CONCS (RMSAUTO), GARDS_BG_ISOTOPE_CONCS (RMSMAN), GARDS_XE_RESULTS (RM-SAUTO), GARDS_XE_RESULTS (RMSMAN)			
Description	Minimum detectable activity at the start of acquisition (mBq)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)	mBq		g8.5	Y
Range				

5.2.457. *mda_acq_start*

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN)			
Description	Minimum detectable activity at the start of acquisition			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	uBq		g8.5	Y
Range				

5.2.458. *mda_err*

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN)			
Description	Uncertainty of the minimum detectable activity concentration (uBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	uBq/m3		g8.5	Y
Range				

5.2.459. *mda_err_acq_start*

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN)			
Description	Uncertainty of the minimum detectable activity at the start of acquisition			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	uBq		g8.5	Y
Range				

5.2.460. *mda_level*

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN),

	GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	MDA confidence factor (percent)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	percent		f8.3	Y
Range				

5.2.461. mda_max

Table(s)	GARDS_MDAS2REPORT (RMSMAN)			
Description	Maximum of the minimum detectable activities			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mBq/m3		g8.5	Y
Range	mda >= 0.0			

5.2.462. mda_min

Table(s)	GARDS_MDAS2REPORT (RMSMAN)			
Description	Minimum of the minimum detectable activities			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mBq/m3		g8.5	Y
Range	mda >= 0.0			

5.2.463. mdc

Table(s)	GARDS_BG_ISOTOPE_CONCS (RMSAUTO), GARDS_BG_ISOTOPE_CONCS (RMSMAN), GARDS_BG_ROI_CONCS (RMSAUTO), GARDS_BG_ROI_CONCS (RMSMAN), GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN)			
Description	Minimum detectable concentration (mBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)	mBq/m3		g8.5	Y
Range				

5.2.464. mdc

Table(s)	GARDS_XE_UNCORRECTED_RESULTS (RMSAUTO), GARDS_XE_UNCORRECTED_RESULTS (RMSMAN)			
Description	Minimum detectable concentration (mBq/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mBq/m3		g8.5	Y
Range				

5.2.465. mdc_width

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Baseline width used for MDA calculation			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.466. mdi

Table(s)	GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN)			
Description	Minimum detectable intensity for metastable radioxenon (emissions/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)	emissions/m3		g8.5	Y
Range				

5.2.467. mdi

Table(s)	GARDS_XE_UNCORRECTED_RESULTS (RMSAUTO), GARDS_XE_UNCORRECTED_RESULTS (RMSMAN)			
Description	Minimum detectable intensity for metastable radioxenon (emissions/m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	emissions/m3		g8.5	Y
Range				

5.2.468. measurement_id

Table(s)	GARDS_SAMPLE_AUX (RMSAUTO)			
Description	Measurement identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(31)			a31	N
Range				

5.2.469. median_xe131m

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Median of the activity concentration for Xe-131m			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mBq/m3		g8.5	Y
Range				

5.2.470. median_xe133

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Median of the activity concentration for Xe-133			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mBq/m3		g8.5	Y
Range				

5.2.471. median_xe133m

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Median of the activity concentration for Xe-133m			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mBq/m3		g8.5	Y
Range				

5.2.472. median_xe135

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Median of the activity concentration for Xe-135			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mBq/m3		g8.5	Y
Range				

5.2.473. memory

Table(s)	GARDS_ROI_COUNTS (RMSAUTO), GARDS_ROI_COUNTS (RMSMAN)			
Description	Gas background counts			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		i10	Y
Range				

5.2.474. memory_err

Table(s)	GARDS_ROI_COUNTS (RMSAUTO), GARDS_ROI_COUNTS (RMSMAN)			
Description	Gas background (that is, "memory effect") counts.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		i10	Y
Range				

5.2.475. met_group_id

Table(s)	GARDS_MET_HEADER (RMSAUTO)			
Description	MET group identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.476. met_group_id

Table(s)	GARDS_MET_DATA (RMSAUTO)			
Description	MET group identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.477. met_id

Table(s)	GARDS_MET_DATA (RMSAUTO)			
Description	Unique meteorological data identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.478. method

Table(s)	GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN)			
Description	Method identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.479. method_id

Table(s)	GARDS_BG_ISOTOPE_CONCS (RMSAUTO), GARDS_BG_ISOTOPE_CONCS (RMSMAN), GARDS_SAMPLE_CAT (RMSMAN), GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN), GARDS_XE_UNCORRECTED_RESULTS (RMSAUTO), GARDS_XE_UNCORRECTED_RESULTS (RMSMAN)			
Description	Method identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N

Range	

5.2.480. method_id

Table(s)	GARDS_AUTO_SAMPLE_CAT (RMSAUTO), GARDS_CAT_TEMPLATE (RMSMAN)			
Description	Method identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.481. method_id

Table(s)	GARDS_BG_ROI_CONCS (RMSAUTO), GARDS_BG_ROI_CONCS (RMS-MAN), GARDS_BG_ROI_COUNTS (RMSAUTO), GARDS_BG_ROI_COUNTS (RMSMAN)			
Description	Method identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(38,0)			i10	N
Range				

5.2.482. method_type

Table(s)	GARDS_CAT_TEMPLATE (RMSMAN)			
Description	Method type			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.483. min_lookup

Table(s)	GARDS_SAMPLE_UPDATE_PARAMS (RMSAUTO), GARDS_SAMPLE_UPDATE_PARAMS (RMSMAN), GARDS_UPDATE_PARAMS_TEMPLATE (RMSMAN)			
Description	Minimum library lookup tolerance, keV (typically 0.2)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			f8.3	Y
Range				

5.2.484. min_sample_air_flow

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN)			
Description	Minimum air flow accepted for sampling			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

float(126)	m3/h		g8.5	Y
Range				

5.2.485. min_sample_id

Table(s)	GARDS_QAT_QUERY_FILTER (RMSMAN)			
Description	QAT user query, lower boundary for the sample id			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.486. min_sample_volume

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN)			
Description	Minimum sample volume accepted for collection			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)	m3		g8.5	Y
Range				

5.2.487. min_t_time

Table(s)	GARDS_QAT_CONFIG (RMSMAN)			
Description	Minimum allowable value for t_time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	Minutes		g8.5	Y
Range				

5.2.488. min_xe_volume

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN)			
Description	Minimum xenon volume			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)	cm3		g8.5	Y
Range				

5.2.489. moddate

Table(s)	GARDS_ALERTS (RMSAUTO), GARDS_RN_INTERVAL (RMSAUTO), GARDS_SAMPLE_AUX (RMSAUTO), GARDS_SOH_CHAR_DATA (RMSAUTO), GARDS_SOH_HEADER (RMSAUTO), GARDS_SOH_NUM_DATA (RMSAUTO), GARDS_SOH_SENSOR_DATA (RMSAUTO)
Description	Date/time at which the row was last modified

Storage type	Unit	NA value	External	Nullable
date	Date	NOT ALLOWED	a21	N
Range	any valid ORACLE date			

5.2.490. moddate

Table(s)	GARDS_AUTO_SAMPLE_CAT (RMSAUTO), GARDS_AUX_LIB (RMSMAN), GARDS_AUX_LINES_LIB (RMSMAN), GARDS_BASELINE (RMSAUTO), GARDS_BASELINE (RMSMAN), GARDS_BG_CONFIG_PARAMS (RMSMAN), GARDS_BG_DETECTOR_STD_SPECTRA (RMSAUTO), GARDS_BG_EFFICIENCY_PAIRS (RMSAUTO), GARDS_BG_EFFICIENCY_PAIRS (RMSMAN), GARDS_BG_ENERGY_CAL (RMSAUTO), GARDS_BG_ENERGY_CAL (RMSMAN), GARDS_BG_ENERGY_CAL_DIRECTIVE (RMSMAN), GARDS_BG_ENERGY_CAL_ORIG (RMSAUTO), GARDS_BG_ENERGY_CAL_ORIG (RMSMAN), GARDS_BG_ISOTOPE_CONCS (RMSAUTO), GARDS_BG_ISOTOPE_CONCS (RMSMAN), GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN), GARDS_BG_PROC_PARAMS_ROI (RMSAUTO), GARDS_BG_PROC_PARAMS_ROI (RMSMAN), GARDS_BG_QC_RESULT (RMSAUTO), GARDS_BG_QC_RESULT (RMSMAN), GARDS_BG_ROI_CONCS (RMSAUTO), GARDS_BG_ROI_CONCS (RMSMAN), GARDS_BG_ROI_COUNTS (RMSAUTO), GARDS_BG_ROI_COUNTS (RMSMAN), GARDS_BG_STD_SPECTRA (RMSAUTO), GARDS_BG_STD_SPECTRA_RESULT (RMSAUTO), GARDS_BG_STD_SPECTRA_RESULT (RMSMAN), GARDS_B_ENERGY_PAIRS (RMSAUTO), GARDS_B_ENERGY_PAIRS (RMSMAN), GARDS_B_ENERGY_PAIRS_ORIG (RMSAUTO), GARDS_B_ENERGY_PAIRS_ORIG (RMSMAN), GARDS_B_RESOLUTION_CAL (RMSAUTO), GARDS_B_RESOLUTION_CAL (RMSMAN), GARDS_B_RESOLUTION_PAIRS (RMSAUTO), GARDS_B_RESOLUTION_PAIRS (RMSMAN), GARDS_B_RESOLUTION_PAIRS_ORIG (RMSAUTO), GARDS_B_RESOLUTION_PAIRS_ORIG (RMSMAN), GARDS_CAT_CRITERIA_TESTS (RMSMAN), GARDS_CAT_TEMPLATE (RMSMAN), GARDS_CODES (RMSMAN), GARDS_COMMENTS (RMSAUTO), GARDS_COMMENTS (RMSMAN), GARDS_COMMENTS_DEFS (RMSMAN), GARDS_CSC_MODCOEFF_LIB (RMSMAN), GARDS_DATA_LOG (RMSAUTO), GARDS_DBROLE_OWNER (RMSMAN), GARDS_DETECTORS (RMSMAN), GARDS_DIST_SAMPLE_QUEUE (RMSMAN), GARDS_EFFICIENCY_CAL (RMSAUTO), GARDS_EFFICIENCY_CAL (RMSMAN), GARDS_EFFICIENCY_ERROR_CAL (RMSAUTO), GARDS_EFFICIENCY_ERROR_CAL (RMSMAN), GARDS_EFFICIENCY_IDC_PAIRS (RMSAUTO), GARDS_EFFICIENCY_IDC_PAIRS (RMSMAN), GARDS_EFFICIENCY_PAIRS (RMSAUTO), GARDS_EFFICIENCY_PAIRS (RMSMAN), GARDS_EFFICIENCY_VGSL_PAIRS (RMSMAN), GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMSMAN), GARDS_ENERGY_CAL_COV (RMSAUTO), GARDS_ENERGY_CAL_COV (RMSMAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO),

	GARDS_ENERGY_CAL_ORIG (RMSMAN), GARDS_ENERGY_PAIRS (RMSAUTO), GARDS_ENERGY_PAIRS (RMSMAN), GARDS_ENERGY_PAIRS_ORIG (RMSAUTO), GARDS_ENERGY_PAIRS_ORIG (RMSMAN), GARDS_ENVIRONMENT (RMSAUTO), GARDS_FLAGS (RMSAUTO), GARDS_FLAGS (RMS-MAN), GARDS_FPE (RMSAUTO), GARDS_FPE (RMSMAN), GARDS_HISTOGRAM (RMSAUTO), GARDS_INTERVAL (RMSAUTO), GARDS_IRF (RMSMAN), GARDS_LAB_CATEGORY_DESCRIPTION (RMSMAN), GARDS_MDAS2REPORT (RMSMAN), GARDS_MET_DATA (RMSAUTO), GARDS_MET_HEADER (RMSAUTO), GARDS_NOTIFY (RMSAUTO), GARDS_NOTIFY (RMSMAN), GARDS_NUCL2QUANTIFY (RMSMAN), GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN), GARDS_NUCL_LIB (RMS-MAN), GARDS_NUCL_LIB_ARCHIVE (RMSMAN), GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN), GARDS_NUCL_LINES_LIB (RMSMAN), GARDS_NUCL_LINES_LIB_ARCHIVE (RMSMAN), GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RM-SAUTO), GARDS_PEAKS_ORIG (RMSMAN), GARDS_PERMISSIONS (RMSMAN), GARDS_POC (RMSMAN), GARDS_PROCESSING_ERRORS (RMSMAN), GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_PRODUCT (RMSAUTO), GARDS_PRODUCT (RMSMAN), GARDS_QAT_CONFIG (RMSMAN), GARDS_QAT_NOTIFY (RMSMAN), GARDS_QAT_QUERY_FILTER (RMSMAN), GARDS_QCHISTORY (RMSMAN), GARDS_QCPARAMS (RMSMAN), GARDS_QCTARGETS (RMSMAN), GARDS_QC_RESULTS (RMSAUTO), GARDS_QC_RES-ULTS (RMSMAN), GARDS_QUERY_RESULTS (RMSAUTO), GARDS_QUERY_RESULTS (RMSMAN), GARDS_RECEIPT_LOG (RM-SAUTO), GARDS_REFLINE_MASTER (RMSMAN), GARDS_RELEV-ANT_NUCLIDES (RMSMAN), GARDS_RESOLUTION_CAL (RMSAUTO), GARDS_RESOLUTION_CAL (RMSMAN), GARDS_RESOLUTION_CAL_COV (RMSAUTO), GARDS_RESOLU-TION_CAL_COV (RMSMAN), GARDS_RESOLUTION_CAL_ORIG (RM-SAUTO), GARDS_RESOLUTION_CAL_ORIG (RMSMAN), GARDS_RES-OLUTION_PAIRS (RMSAUTO), GARDS_RESOLUTION_PAIRS (RMS-MAN), GARDS_RESOLUTION_PAIRS_ORIG (RMSAUTO), GARDS_RES-OLUTION_PAIRS_ORIG (RMSMAN), GARDS_RLR (RMSAUTO), GARDS_RLR_CONCLUSIONS (RMSAUTO), GARDS_RLR_OBJECTIVE (RMSAUTO), GARDS_RLR_RATIOS (RMSAUTO), GARDS_RLR_RES-ULTS (RMSAUTO), GARDS_RLR_SSREB (RMSAUTO), GARDS_ROI_CHANNELS (RMSAUTO), GARDS_ROI_CHANNELS (RMS-MAN), GARDS_ROI_CONCS (RMSAUTO), GARDS_ROI_CONCS (RMS-MAN), GARDS_ROI_COUNTS (RMSAUTO), GARDS_ROI_COUNTS (RMSMAN), GARDS_ROI_LIB (RMSMAN), GARDS_ROI_LIMITS (RM-SAUTO), GARDS_ROI_LIMITS (RMSMAN), GARDS_ROLES (RMS-MAN), GARDS_ROLES_PERMISSIONS (RMSMAN), GARDS_SAINT_DEFAULT_PARAMS (RMSAUTO), GARDS_SAINT_DE-FAULT_PARAMS (RMSMAN), GARDS_SAINT_PROCESS_PARAMS (RMSAUTO), GARDS_SAINT_PROCESS_PARAMS (RMSMAN), GARDS_SAMPLE_CAT (RMSMAN), GARDS_SAMPLE_CERT (RM-SAUTO), GARDS_SAMPLE_CERT_LINES (RMSAUTO),

	GARDS_SAMPLE_DATA (RMSAUTO), GARDS_SAMPLE_DATA (RMSMAN), GARDS_SAMPLE_DESCRIPTION (RMSAUTO), GARDS_SAMPLE_FLAGS (RMSAUTO), GARDS_SAMPLE_FLAGS (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN), GARDS_SAMPLE_RATIOS (RMSAUTO), GARDS_SAMPLE_RATIOS (RMSMAN), GARDS_SAMPLE_STATUS (RMSAUTO), GARDS_SAMPLE_STATUS (RMSMAN), GARDS_SAMPLE_TESTS (RMSMAN), GARDS_SAMPLE_UPDATE_PARAMS (RMSAUTO), GARDS_SAMPLE_UPDATE_PARAMS (RMSMAN), GARDS_SAMPLE_XE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_XE_PROC_PARAMS (RMSMAN), GARDS_SOH_CODE (RMSMAN), GARDS_SOH_EVALUATION (RMSAUTO), GARDS_SOH_EVALUATION (RMSMAN), GARDS_SPECTRUM (RMSAUTO), GARDS_STADET (RMSMAN), GARDS_STATIONS (RMSMAN), GARDS_STATIONS_SCHEDULE (RMSMAN), GARDS_STATION_ASSIGNMENTS (RMSMAN), GARDS_STATUS_HISTORY (RMSMAN), GARDS_TOTAL_EFFIC (RMSAUTO), GARDS_TOTAL_EFFIC (RMSMAN), GARDS_TRENDVUE (RMSAUTO), GARDS_TRENDVUE (RMSMAN), GARDS_UPDATE_PARAMS_TEMPLATE (RMSMAN), GARDS_UPDATE_REFLINES (RMSMAN), GARDS_USERENV (RMSMAN), GARDS_USERS (RMSMAN), GARDS_USERS_ROLES (RMSMAN), GARDS_USER_COMMENTS (RMSAUTO), GARDS_USER_COMMENTS (RMSMAN), GARDS_XE_CATEGORY_PARAMS (RMSMAN), GARDS_XE_NUCL_LIB (RMSMAN), GARDS_XE_NUCL_LINES_LIB (RMSMAN), GARDS_XE_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_XE_REFLINE_MASTER (RMSMAN), GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN), GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN), GARDS_XE_UNCORRECTED_RESULTS (RMSAUTO), GARDS_XE_UNCORRECTED_RESULTS (RMSMAN), RMS_MSGDISC (RMSAUTO), RN_LOGS (RMSMAN)
Description	Date/time at which the row was last modified

Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.491. moddate

Table(s)	GARDS_NIC (RMSAUTO), GARDS_NIC (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date				Y
Range				

5.2.492. moving_avg_days

Table(s)	GARDS_XE_CATEGORY_PARAMS (RMSMAN)

Description	Period of the inter-quartile algorithm used for abnormal threshold determination for noble gas sample categorization (365 days as default)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.493. mrp_sample_id

Table(s)	GARDS_SAMPLE_UPDATE_PARAMS (RMSAUTO), GARDS_SAMPLE_UPDATE_PARAMS (RMSMAN)			
Description	The sample_id of the MRP sample to be used			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.494. mrp_used

Table(s)	GARDS_SAMPLE_UPDATE_PARAMS (RMSAUTO), GARDS_SAMPLE_UPDATE_PARAMS (RMSMAN)			
Description	Column that lists the sample_id of the MRP sample in the event that the mrp_used flag has been set to 1.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.495. mse

Table(s)	GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMS-MAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO), GARDS_ENERGY_CAL_ORIG (RMSMAN)			
Description	Mean-squared error of the fit, a measure of how large the residuals are			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.496. msg_id

Table(s)	GARDS_SAMPLE_AUX (RMSAUTO)			
Description	Message identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.497. msg_id

Table(s)	GARDS_DATA_LOG (RMSAUTO), GARDS_PROCESSING_ERRORS (RMSMAN)			
Description	Message identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.498. msgid

Table(s)	RMS_MSGDISC (RMSAUTO)			
Description	Unique message identifier of the RN message. Generated by sequence rms_msg-discid_seq			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.499. muarea

Table(s)	GARDS_QCTARGETS (RMSMAN)			
Description	Target area for each nuclide line energy (counts)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.500. mult

Table(s)	GARDS_BASELINE (RMSMAN)			
Description	Multiplicand in the baseline formula			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number		NOT ALLOWED	i10	N
Range				

5.2.501. mult

Table(s)	GARDS_BASELINE (RMSAUTO)			
Description	Multiplicand in the baseline formula			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number		NOT ALLOWED	i10	Y
Range				

5.2.502. multiplet

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Multiplet peak indicator			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.503. muwidth

Table(s)	GARDS_QCTARGETS (RMSMAN)			
Description	Target width for each nuclide line energy (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.504. name

Table(s)	GARDS_RN_INTERVAL (RMSAUTO)			
Description	Workflow field indicating the message type			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)			a16	N
Range				

5.2.505. name

Table(s)	GARDS_INTERVAL (RMSAUTO)			
Description	Detector/system name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)			a16	Y
Range				

5.2.506. name

Table(s)	GARDS_FLAGS (RMSAUTO), GARDS_FLAGS (RMSMAN)			
Description	Name of the Event Screening test.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)			a32	Y
Range				

5.2.507. name

Table(s)	GARDS_SAINT_DEFAULT_PARAMS (RMSAUTO), GARDS_SAINT_DEFAULT_PARAMS (RMSMAN), GARDS_SAINT_PROCESS_PARAMS (RMSAUTO), GARDS_SAINT_PROCESS_PARAMS (RMSMAN)			
Description	Parameter name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(40)			a40	N
Range				

5.2.508. name

Table(s)	GARDS_USERENV (RMSMAN)			
Description	Variable name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(40)			a40	N
Range				

5.2.509. name

Table(s)	GARDS_AUTO_SAMPLE_CAT (RMSAUTO), GARDS_AUX_LIB (RMSMAN), GARDS_AUX_LINES_LIB (RMSMAN), GARDS_CAT_TEMPLATE (RMSMAN), GARDS_CSC_MODCOEFF_LIB (RMSMAN), GARDS_MDAS2REPORT (RMSMAN), GARDS_NUCL2QUANTIFY (RMSMAN), GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN), GARDS_NUCL_LIB (RMSMAN), GARDS_NUCL_LIB_ARCHIVE (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN), GARDS_NUCL_LINES_LIB (RMSMAN), GARDS_NUCL_LINES_LIB_ARCHIVE (RMSMAN), GARDS_QCTARGETS (RMSMAN), GARDS_RELEVANT_NUCLIDES (RMSMAN), GARDS_SAMPLE_CAT (RMSMAN), GARDS_XE_NUCL_LIB (RMSMAN), GARDS_XE_NUCL_LINES_LIB (RMSMAN)			
Description	Nuclide name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)			a8	N
Range				

5.2.510. name

Table(s)	GARDS_NIC (RMSAUTO)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)				N

Range	

5.2.511. name

Table(s)	GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_ROI_LIB (RMSMAN)			
Description	Nuclide name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)			a8	Y
Range				

5.2.512. name

Table(s)	GARDS_NIC (RMSMAN), GARDS_NIC_INIT (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)				Y
Range				

5.2.513. name_d

Table(s)	GARDS_CSC_MODCOEFF_LIB (RMSMAN)			
Description	Daughter nuclide name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)			a8	Y
Range				

5.2.514. net

Table(s)	GARDS_ROI_COUNTS (RMSAUTO), GARDS_ROI_COUNTS (RMSMAN)			
Description	Counts in ROI after processing			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		i10	Y
Range				

5.2.515. net_area

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN)			
Description	Net area			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.516. net_area_err

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN)			
Description	Uncertainty of the net area			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.517. net_count

Table(s)	GARDS_BG_ROI_COUNTS (RMSAUTO), GARDS_BG_ROI_COUNTS (RMSMAN)			
Description	Net number of counts in the ROI			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		g8.5	Y
Range				

5.2.518. net_count_err

Table(s)	GARDS_BG_ROI_COUNTS (RMSAUTO), GARDS_BG_ROI_COUNTS (RMSMAN)			
Description	Uncertainty of the net number of counts in the ROI			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		g8.5	Y
Range				

5.2.519. net_err

Table(s)	GARDS_ROI_COUNTS (RMSAUTO), GARDS_ROI_COUNTS (RMSMAN)			
Description	Uncertainty of net (counts)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		i10	Y
Range				

5.2.520. new_status

Table(s)	GARDS_STATUS_HISTORY (RMSMAN)			
Description	Sample status after change			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)			a1	Y
Range				

5.2.521. *nid_confid*

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	NID confidence factor (percent)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	percent		f8.3	Y
Range				

5.2.522. *nid_flag*

Table(s)	GARDS_BG_ISOTOPE_CONCS (RMSAUTO), GARDS_BG_ISOTOPE_CONCS (RMSMAN), GARDS_BG_ROI_CONCS (RMSAUTO), GARDS_BG_ROI_CONCS (RMSMAN), GARDS_ROI_CONCS (RMSAUTO), GARDS_ROI_CONCS (RMSMAN), GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN)			
Description	Flag of whether the xenon isotope is detected or not			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.523. *nid_flag*

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN)			
Description	Nuclide identification indicator. (0=nuclide was not identified by automatic analysis; 1=nuclide was identified by automatic analysis; -1=nuclide was initially identified by automatic analysis, but later rejected because the concentration was <0.0; 2= nuclide was initially identified by automatic analysis, but later removed by the Analyst).			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.524. *nms_msgid*

Table(s)	NMS_RECEIVED_SOFAR (RMSAUTO)			
Description	Message identifier. Maximum nms_msgid fetched from acq.acq_msg			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.525. *nms_msgid*

Table(s)	RMS_MSGDISC (RMSAUTO)			
Description	Corresponding nms_msgid from acq.acq_msg			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(50)			i10	Y
Range				

5.2.526. *nms_pull_frequency*

Table(s)	PIPELINE_CONTROL (RMSMAN)			
Description	Time in seconds between reading RN messages from acq.acq_msg table			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.527. *no_of_loops*

Table(s)	GARDS_BASELINE (RMSAUTO), GARDS_BASELINE (RMSMAN)			
Description	Number of loops for this bin of the baseline calculation			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number		NOT ALLOWED	i10	N
Range				

5.2.528. *notify_list*

Table(s)	RN_LOGS (RMSMAN)			
Description	List of notification recipients for this analyst comment.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(50)			a50	Y
Range				

5.2.529. *nuc_comment*

Table(s)	GARDS_NUCL_LIB (RMSMAN), GARDS_NUCL_LIB_ARCHIVE (RMS-MAN)			
Description	Nuclide comment			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1500)			a1500	Y
Range				

5.2.530. nucl_name

Table(s)	GARDS_SAMPLE_CERT_LINES (RMSAUTO)			
Description	Nuclide name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)			a8	N
Range				

5.2.531. nucl_name

Table(s)	GARDS_COMMENTS (RMSAUTO), GARDS_COMMENTS (RMSMAN), GARDS_QAT_NOTIFY (RMSMAN)			
Description	Nuclide name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)			a8	Y
Range				

5.2.532. nuclide1

Table(s)	GARDS_RLR_RATIOS (RMSAUTO)			
Description	Nuclide 1			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)			a8	N
Range				

5.2.533. nuclide2

Table(s)	GARDS_RLR_RATIOS (RMSAUTO)			
Description	Nuclide 2			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)			a8	N
Range				

5.2.534. nuclide_id

Table(s)	GARDS_BG_ISOTOPE_CONCS (RMSAUTO), GARDS_BG_ISOTOPE_CONCS (RMSMAN), GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN), GARDS_XE_UNCORRECTED_RESULTS (RMSAUTO), GARDS_XE_UNCORRECTED_RESULTS (RMSMAN)			
Description	Nuclide identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N

Range	

5.2.535. nuclide_id

Table(s)	GARDS_BG_PROC_PARAMS_ROI (RMSAUTO), GARDS_BG_PROC_PARAMS_ROI (RMSMAN), GARDS_BG_STD_SPECTRA (RMSAUTO), GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN), GARDS_NUCL_LIB (RMSMAN), GARDS_NUCL_LIB_ARCHIVE (RMSMAN), GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN), GARDS_NUCL_LINES_LIB (RMSMAN), GARDS_NUCL_LINES_LIB_ARCHIVE (RMSMAN), GARDS_XE_NUCL_LIB (RMSMAN), GARDS_XE_NUCL_LINES_LIB (RMSMAN)				
Description	Nuclide identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.536. nuclide_lib

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Nuclide library to be used during analysis			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(96)			a96	Y
Range				

5.2.537. nuclide_name

Table(s)	GARDS_RLR_RESULTS (RMSAUTO)			
Description	Nuclide name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)			a8	N
Range				

5.2.538. nuclide_name

Table(s)	GARDS_IRF (RMSMAN)			
Description	Nuclide name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)			a8	Y

Range	

5.2.539. num_lines

Table(s)	GARDS_NUCL_LIB (RMSMAN), GARDS_NUCL_LIB_ARCHIVE (RMS-MAN), GARDS_XE_NUCL_LIB (RMSMAN)			
Description	Number of decay lines in library			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.540. num_samples

Table(s)	GARDS_CAT_TEMPLATE (RMSMAN)			
Description	Number of samples used to collect the average and define the standard deviation (RDC algorithm)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.541. num_value1

Table(s)	GARDS_TRENDVUE (RMSAUTO), GARDS_TRENDVUE (RMSMAN)			
Description	First plot value.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			f8.3	Y
Range				

5.2.542. num_value2

Table(s)	GARDS_TRENDVUE (RMSAUTO), GARDS_TRENDVUE (RMSMAN)			
Description	Second plot value.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			f8.3	Y
Range				

5.2.543. num_value3

Table(s)	GARDS_TRENDVUE (RMSAUTO), GARDS_TRENDVUE (RMSMAN)			
Description	Third plot value.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			f8.3	Y
Range				

5.2.544. num_value4

Table(s)	GARDS_TRENDVUE (RMSAUTO), GARDS_TRENDVUE (RMSMAN)			
Description	Fourth plot value.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			f8.3	Y
Range				

5.2.545. number_of_decays

Table(s)	GARDS_BG_STD_SPECTRA (RMSAUTO)			
Description	Number of decays for this standard spectra			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.546. offset

Table(s)	GARDS_BG_QC_RESULT (RMSAUTO), GARDS_BG_QC_RESULT (RMS-MAN)			
Description	Noise offset in QC spectrum			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)			g8.5	Y
Range				

5.2.547. old_status

Table(s)	GARDS_STATUS_HISTORY (RMSMAN)			
Description	Sample status before change			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)			a1	Y
Range				

5.2.548. ondate

Table(s)	GARDS_BG_ENERGY_CAL_DIRECTIVE (RMSMAN)			
Description	Julian start date of the beta and gamma energy calibration			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			i8	N
Range				

5.2.549. *orig_sample_ref_id*

Table(s)	GARDS_RLR (RMSAUTO)			
Description	Original/entire sample reference identification			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)			a32	Y
Range				

5.2.550. *original_area*

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Original peak area (counts)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.551. *original_uncer*

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Uncertainty of the original peak area (counts)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.552. *owner*

Table(s)	GARDS_DBROLE_OWNER (RMSMAN)			
Description	Name of database user who owns the RMS roles for the MAR tool			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(12)			a12	Y
Range				

5.2.553. *param*

Table(s)	GARDS_SOH_CODE (RMSMAN)			
Description	SOH parameter name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(30)			a30	N
Range				

5.2.554. param_code

Table(s)	GARDS_SOH_CHAR_DATA (RMSAUTO), GARDS_SOH_NUM_DATA (RMSAUTO)			
Description	SOH parameter code			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.555. param_code

Table(s)	GARDS_SOH_CODE (RMSMAN)			
Description	SOH parameter code			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.556. param_display

Table(s)	GARDS_SOH_CODE (RMSMAN)			
Description	Parameter text to be displayed in Trendvue			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(30)			a30	Y
Range				

5.2.557. param_display_flag

Table(s)	GARDS_SOH_CODE (RMSMAN)			
Description	Flag indicating whether or not a particular parameter is displayed			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.558. pd_mod_flag

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN)			
Description	Flag indicating whether or not the nuclide's activity was modified by the parent/ daughter calculation. A value of 1= nuclide was modified, zero indicates that the nuclide was not modified.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y

Range	

5.2.559. peak

Table(s)	GARDS_NUCL_LINES_IDED_ORIG (RMSMAN)			
Description	Peak identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.560. peak

Table(s)	GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO)			
Description	Peak identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.561. peak_end

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Peak search end (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.562. peak_id

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Peak identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.563. peak_id

Table(s)	GARDS_COMMENTS (RMSAUTO), GARDS_COMMENTS (RMSMAN)			
Description	Peak identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number			i10	Y
Range				

5.2.564. peak_sense

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Peak search sensitivity			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.565. peak_sig

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Peak significance, e.g. peak area divided by Lc			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.566. peak_start

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Peak search start (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.567. peak_tol

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Peak energy tolerance; approximates the energy tolerance at a given peak			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.568. permission_id

Table(s)	GARDS_PERMISSIONS (RMSMAN), GARDS_ROLES_PERMISSIONS

	(RMSMAN)			
Description	Permission identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.569. permission_name

Table(s)	GARDS_PERMISSIONS (RMSMAN)			
Description	Permission name.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(30)			a30	N
Range				

5.2.570. poc_id

Table(s)	GARDS_NOTIFY (RMSAUTO), GARDS_NOTIFY (RMSMAN)			
Description	Point of contact identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.571. pocid

Table(s)	GARDS_POC (RMSMAN), GARDS_RECEIPT_LOG (RMSAUTO)			
Description	Point of contact identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.572. pocid

Table(s)	GARDS_STATIONS (RMSMAN)			
Description	Point of contact identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.573. poll_time

Table(s)	GARDS_QAT_CONFIG (RMSMAN)
Description	Number of minutes rms_QAT sleeps between each database poll

Storage type	Unit	NA value	External	Nullable
number	Minutes		g8.5	Y
Range				

5.2.574. pressure

Table(s)	GARDS_ENVIRONMENT (RMSAUTO)			
Description	Outside pressure (mbar)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mbar		i4	Y
Range				

5.2.575. prev_valid_samples

Table(s)	GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN)			
Description	Number of the previous valid samples			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.576. priority_level

Table(s)	GARDS_RLR (RMSAUTO)			
Description	Priority level (Urgent or Routine)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(10)			a7	Y
Range				

5.2.577. prodid

Table(s)	GARDS_RECEIPT_LOG (RMSAUTO)			
Description	Product id of obsolete table?			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.578. pss

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Peak search significance parameter			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number			g8.5	Y
Range				

5.2.579. pull_connection

Table(s)	PIPELINE_CONTROL (RMSMAN)			
Description	User name and password for DB connection			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(30)			a30	Y
Range				

5.2.580. pull_host

Table(s)	PIPELINE_CONTROL (RMSMAN)			
Description	Database name to be connected in order to read RN messages (ODB, TODB, or IDCDEV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)			a15	Y
Range				

5.2.581. pull_method

Table(s)	PIPELINE_CONTROL (RMSMAN)			
Description	Currently is DB			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)			a15	Y
Range				

5.2.582. pull_owner_or_queue

Table(s)	PIPELINE_CONTROL (RMSMAN)			
Description	The user name who owns acq_msg table (default Acq)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(30)			a30	Y
Range				

5.2.583. q_time

Table(s)	GARDS_QAT_CONFIG (RMSMAN)			
Description	Number of minutes after gards_sample_status.review_date that rms_QAT_auto waits before releasing a sample			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	Minutes		g8.5	Y

Range				

5.2.584. qc_b_threshold

Table(s)	GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN)			
Description	The value that is used to mask the gamma spectrum in QC control of the spectrum			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.585. qc_b_threshold

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN)			
Description	Threshold for channels in the histogram used when calculating beta and gamma spectra			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.586. qc_comment

Table(s)	GARDS_QC_RESULTS (RMSAUTO), GARDS_QC_RESULTS (RMSMAN)			
Description	Quality control comments			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(255)			a225	Y
Range				

5.2.587. qc_id

Table(s)	GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN)			
Description	Unique quality control identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.588. qc_method_id

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN)			
Description	QC analysis method ID - possible values (0,1,2,3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number			i10	Y
Range	{0,1,2,3}			

5.2.589. quantity

Table(s)	GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_DATA (RMSAUTO), GARDS_SAMPLE_DATA (RMSMAN)			
Description	Air volume sampled (m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	m3		f8.5	Y
Range				

5.2.590. quantity

Table(s)	GARDS_SAMPLE_CERT (RMSAUTO)			
Description	Total activity of the source			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	Bq		g8.5	Y
Range				

5.2.591. rated_efficiency

Table(s)	GARDS_DETECTORS (RMSMAN)			
Description	Efficiency of the detector relative to a standard 3 in. x 3 in. (7.62 cm x 7.62 cm) cylindrical NaI(Tl) detector at 1332 keV. The rated efficiency is usually supplied by the detector manufacturer.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.592. rated_resolution

Table(s)	GARDS_DETECTORS (RMSMAN)			
Description	Rated resolution of detector			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.593. ratio_id

Table(s)	GARDS_SAMPLE_RATIOS (RMSAUTO), GARDS_SAMPLE_RATIOS (RMSMAN)
Description	Ratio identifier

Storage type	Unit	NA value	External	Nullable
varchar2(15)			a15	N
Range				

5.2.594. rec_begin

Table(s)	GARDS_NIC_INIT (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date				Y
Range				

5.2.595. rec_end

Table(s)	GARDS_NIC_INIT (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date				Y
Range				

5.2.596. recipient_list

Table(s)	GARDS_QAT_NOTIFY (RMSMAN)			
Description	List of recipients for QAT comment notification			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(128)			a128	Y
Range				

5.2.597. ref_id

Table(s)	RN_LOGS (RMSMAN)			
Description	Reference to related analyst comment			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.598. reference

Table(s)	GARDS_AUX_LINES_LIB (RMSMAN)			
Description	Reference for line properties			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)			a8	Y

Range	

5.2.599. reference_date

Table(s)	GARDS_RLR_RATIOS (RMSAUTO)			
Description	Reference date of the activity ratio			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.600. refid

Table(s)	GARDS_RN_INTERVAL (RMSAUTO)			
Description	Workflow field indicating the sample id			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)			i10	N
Range				

5.2.601. refidtype

Table(s)	GARDS_RN_INTERVAL (RMSAUTO)			
Description	Workflow field indicating whether it is an input interval, PHD, SOH			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)			a16	N
Range				

5.2.602. refpeak_energy

Table(s)	GARDS_REFLINE_MASTER (RMSMAN), GARDS_UPDATE_REFLINES (RMSMAN), GARDS_XE_REFLINE_MASTER (RMSMAN)			
Description	Reference energy of the decay line			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	N
Range				

5.2.603. release_date

Table(s)	GARDS_SAMPLE_STATUS (RMSAUTO), GARDS_SAMPLE_STATUS (RMSMAN)			
Description	Release date			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.604. report_mda

Table(s)	GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN), GARDS_ROI_CONCS (RMSAUTO), GARDS_ROI_CONCS (RMSMAN)			
Description	Indicator of whether MDA is to be reported			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.605. report_number

Table(s)	GARDS_RLR (RMSAUTO)			
Description	Report number			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i2	Y
Range				

5.2.606. report_type

Table(s)	GARDS_RLR (RMSAUTO)			
Description	Report type. FIN=Final PRE=Preliminary.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(3)			a3	Y
Range				

5.2.607. rer_intercept

Table(s)	GARDS_SAMPLE_UPDATE_PARAMS (RMSAUTO), GARDS_SAMPLE_UPDATE_PARAMS (RMSMAN), GARDS_UPDATE_PARAMS_TEMPLATE (RMSMAN)			
Description	Default RER intercept (typically 1.2)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			f8.3	Y
Range				

5.2.608. rer_mrp_used

Table(s)	GARDS_SAMPLE_UPDATE_PARAMS (RMSAUTO), GARDS_SAMPLE_UPDATE_PARAMS (RMSMAN)			
Description	Indicates what RER was chosen during analysis			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y

Range	

5.2.609. rer_slope

Table(s)	GARDS_SAMPLE_UPDATE_PARAMS (RMSAUTO), GARDS_SAMPLE_UPDATE_PARAMS (RMSMAN), GARDS_UPDATE_PARAMS_TEMPLATE (RMSMAN)			
Description	Default RER intercept to be used during calculations.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			f8.3	Y
Range				

5.2.610. res_energy

Table(s)	GARDS_B_RESOLUTION_PAIRS (RMSAUTO), GARDS_B_RESOLUTION_PAIRS (RMSMAN), GARDS_B_RESOLUTION_PAIRS_ORIG (RMSAUTO), GARDS_B_RESOLUTION_PAIRS_ORIG (RMSMAN)			
Description	Beta energy (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	N
Range				

5.2.611. res_energy

Table(s)	GARDS_RESOLUTION_PAIRS (RMSAUTO), GARDS_RESOLUTION_PAIRS (RMSMAN), GARDS_RESOLUTION_PAIRS_ORIG (RMSAUTO), GARDS_RESOLUTION_PAIRS_ORIG (RMSMAN)			
Description	Gamma energy (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	N
Range				

5.2.612. res_error

Table(s)	GARDS_B_RESOLUTION_PAIRS (RMSAUTO), GARDS_B_RESOLUTION_PAIRS (RMSMAN), GARDS_B_RESOLUTION_PAIRS_ORIG (RMSAUTO), GARDS_B_RESOLUTION_PAIRS_ORIG (RMSMAN), GARDS_RESOLUTION_PAIRS (RMSAUTO), GARDS_RESOLUTION_PAIRS (RMSMAN), GARDS_RESOLUTION_PAIRS_ORIG (RMSAUTO), GARDS_RESOLUTION_PAIRS_ORIG (RMSMAN)			
Description	Uncertainty of the resolution (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y

Range	

5.2.613. resolution

Table(s)	GARDS_B_RESOLUTION_PAIRS (RMSAUTO), GARDS_B_RESOLUTION_PAIRS (RMSMAN), GARDS_B_RESOLUTION_PAIRS_ORIG (RMSAUTO), GARDS_B_RESOLUTION_PAIRS_ORIG (RMSMAN)			
Description	Beta resolution (FWHM)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.614. resolution

Table(s)	GARDS_RESOLUTION_PAIRS (RMSAUTO), GARDS_RESOLUTION_PAIRS (RMSMAN), GARDS_RESOLUTION_PAIRS_ORIG (RMSAUTO), GARDS_RESOLUTION_PAIRS_ORIG (RMSMAN)			
Description	Resolution (keV)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	keV		g8.5	Y
Range				

5.2.615. result

Table(s)	GARDS_SAMPLE_FLAGS (RMSAUTO), GARDS_SAMPLE_FLAGS (RMSMAN)			
Description	Indicator of whether or not the test passed			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.616. result_comparison

Table(s)	GARDS_RLR_CONCLUSIONS (RMSAUTO)			
Description	Comparison of IDC and laboratory results			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2048)			a2048	Y
Range				

5.2.617. revid

Table(s)	GARDS_FPE (RMSAUTO), GARDS_FPE (RMSMAN)
Description	Revision number

Storage type	Unit	NA value	External	Nullable
number			i10	Y
Range				

5.2.618. review_cat

Table(s)	GARDS_QAT_QUERY_FILTER (RMSMAN)			
Description	Review category			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.619. review_date

Table(s)	GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_STATUS (RMSAUTO), GARDS_SAMPLE_STATUS (RMSMAN)			
Description	Date sample was last reviewed			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.620. review_time

Table(s)	GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_STATUS (RMSAUTO), GARDS_SAMPLE_STATUS (RMSMAN)			
Description	Amount of time to review sample (minutes) (no longer automatically updated)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.621. revision

Table(s)	GARDS_PRODUCT (RMSAUTO)			
Description	Revision identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.622. revision

Table(s)	GARDS_PRODUCT (RMSMAN)			
Description	Revision identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number			i10	Y
Range				

5.2.623. *right_fwhm_lim*

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Right ROI FWHM limit			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.624. *rlr_id*

Table(s)	GARDS_RLR (RMSAUTO), GARDS_RLR_CONCLUSIONS (RMSAUTO), GARDS_RLR_OBJECTIVE (RMSAUTO), GARDS_RLR_RATIOS (RMSAUTO), GARDS_RLR_RESULTS (RMSAUTO), GARDS_RLR_SSREB (RMSAUTO)			
Description	Unique RLR identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.625. *rms_id*

Table(s)	GARDS_DATA_LOG (RMSAUTO), GARDS_PROCESSING_ERRORS (RMSMAN)			
Description	Internal identifier for message; either sample_id for PHDs, the rlr_id for RLRs, or the soh_id for SOHs			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.626. *roi*

Table(s)	GARDS_BG_EFFICIENCY_PAIRS (RMSAUTO), GARDS_BG_EFFICIENCY_PAIRS (RMSMAN), GARDS_BG_PROC_PARAMS_ROI (RMSAUTO), GARDS_BG_PROC_PARAMS_ROI (RMSMAN), GARDS_BG_ROI_CONCS (RMSAUTO), GARDS_BG_ROI_CONCS (RMSMAN), GARDS_BG_ROI_COUNTS (RMSAUTO), GARDS_BG_ROI_COUNTS (RMSMAN), GARDS_ROI_CHANNELS (RMSAUTO), GARDS_ROI_CHANNELS (RMSMAN), GARDS_ROI_CONCS (RMSAUTO), GARDS_ROI_CONCS (RMSMAN), GARDS_ROI_COUNTS (RMSAUTO), GARDS_ROI_COUNTS (RMSMAN), GARDS_ROI_LIB (RMSMAN), GARDS_ROI_LIMITS (RMSAUTO), GARDS_ROI_LIMITS

	(RMSMAN), GARDS_SAMPLE_XE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_XE_PROC_PARAMS (RMSMAN), GARDS_XE_PROC_PARAMS_TEMPLATE (RMSMAN)			
Description	ROI identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.627. role_id

Table(s)	GARDS_ROLES (RMSMAN), GARDS_ROLES_PERMISSIONS (RMS-MAN), GARDS_USERS_ROLES (RMSMAN)			
Description	Role identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.628. role_id

Table(s)	GARDS_DIST_SAMPLE_QUEUE (RMSMAN)			
Description	Role identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.629. role_name

Table(s)	GARDS_ROLES (RMSMAN)			
Description	Role name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(30)			a30	N
Range				

5.2.630. row_index

Table(s)	GARDS_ENERGY_CAL_COV (RMSAUTO), GARDS_ENERGY_CAL_COV (RMSMAN), GARDS_RESOLUTION_CAL_COV (RMSAUTO), GARDS_RESOLU-TION_CAL_COV (RMSMAN)			
Description	Row index			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(10,0)			i10	N
Range				

5.2.631. *rqst_id*

Table(s)	GARDS_QUERY_RESULTS (RMSAUTO), GARDS_QUERY_RESULTS (RMSMAN)			
Description	Unique query identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.632. *rqst_string*

Table(s)	GARDS_QUERY_RESULTS (RMSAUTO), GARDS_QUERY_RESULTS (RMSMAN)			
Description	Unique query identifier.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(100)			a100	Y
Range				

5.2.633. *sample_act*

Table(s)	GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN)			
Description	Spectrum activity without decay			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)			g8.5	Y
Range				

5.2.634. *sample_diameter*

Table(s)	GARDS_SAMPLE_AUX (RMSAUTO)			
Description	Diameter of the sample			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	cm		f5.1	N
Range				

5.2.635. *sample_height*

Table(s)	GARDS_SAMPLE_AUX (RMSAUTO)			
Description	Diameter of gas chamber.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	cm		f5.1	N
Range				

5.2.636. sample_id

Table(s)	GARDS_AUTO_SAMPLE_CAT (RMSAUTO), GARDS_BG_DETECTOR_STD_SPECTRA (RMSAUTO), GARDS_BG_EFFICIENCY_PAIRS (RMSAUTO), GARDS_BG_EFFICIENCY_PAIRS (RMSMAN), GARDS_BG_ENERGY_CAL (RMSAUTO), GARDS_BG_ENERGY_CAL (RMSMAN), GARDS_BG_ENERGY_CAL_DIRECTIVE (RMSMAN), GARDS_BG_ENERGY_CAL_ORIG (RMSAUTO), GARDS_BG_ENERGY_CAL_ORIG (RMSMAN), GARDS_BG_ISOTOPE_CONCS (RMSAUTO), GARDS_BG_ISOTOPE_CONCS (RMSMAN), GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN), GARDS_BG_PROC_PARAMS_ROI (RMSAUTO), GARDS_BG_PROC_PARAMS_ROI (RMSMAN), GARDS_BG_QC_RESULT (RMSAUTO), GARDS_BG_QC_RESULT (RMSMAN), GARDS_BG_ROI_CONCS (RMSAUTO), GARDS_BG_ROI_CONCS (RMSMAN), GARDS_BG_ROI_COUNTS (RMSAUTO), GARDS_BG_ROI_COUNTS (RMSMAN), GARDS_BG_STD_SPECTRA (RMSAUTO), GARDS_BG_STD_SPECTRA_RESULT (RMSAUTO), GARDS_BG_STD_SPECTRA_RESULT (RMSMAN), GARDS_B_ENERGY_PAIRS (RMSAUTO), GARDS_B_ENERGY_PAIRS (RMSMAN), GARDS_B_ENERGY_PAIRS_ORIG (RMSAUTO), GARDS_B_ENERGY_PAIRS_ORIG (RMSMAN), GARDS_B_RESOLUTION_CAL (RMSAUTO), GARDS_B_RESOLUTION_CAL (RMSMAN), GARDS_B_RESOLUTION_PAIRS (RMSAUTO), GARDS_B_RESOLUTION_PAIRS (RMSMAN), GARDS_B_RESOLUTION_PAIRS_ORIG (RMSAUTO), GARDS_B_RESOLUTION_PAIRS_ORIG (RMSMAN), GARDS_DIST_SAMPLE_QUEUE (RMSMAN), GARDS_EFFICIENCY_CAL (RMSAUTO), GARDS_EFFICIENCY_CAL (RMSMAN), GARDS_EFFICIENCY_ERROR_CAL (RMSAUTO), GARDS_EFFICIENCY_ERROR_CAL (RMSMAN), GARDS_EFFICIENCY_PAIRS (RMSAUTO), GARDS_EFFICIENCY_PAIRS (RMSMAN), GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMSMAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO), GARDS_ENERGY_CAL_ORIG (RMSMAN), GARDS_ENERGY_PAIRS (RMSAUTO), GARDS_ENERGY_PAIRS (RMSMAN), GARDS_ENERGY_PAIRS_ORIG (RMSAUTO), GARDS_ENERGY_PAIRS_ORIG (RMSMAN), GARDS_ENVIRONMENT (RMSAUTO), GARDS_HISTOGRAM (RMSAUTO), GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN), GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN), GARDS_PRODUCT (RMSAUTO), GARDS_QAT_NOTIFY (RMSMAN), GARDS_QCHISTORY (RMSAUTO), GARDS_QCHISTORY (RMSMAN), GARDS_RESOLUTION_CAL (RMSAUTO), GARDS_RESOLUTION_CAL (RMSMAN), GARDS_RESOLUTION_PAIRS (RMSAUTO), GARDS_RESOLUTION_PAIRS (RMSMAN), GARDS_RESOLUTION_PAIRS_ORIG (RMSAUTO), GARDS_RESOLUTION_PAIRS_ORIG (RMSMAN), GARDS_RLR_SSREB (RMSAUTO), GARDS_ROI_CHANNELS (RMSAUTO), GARDS_ROI_CHANNELS (RMSMAN), GARDS_ROI_CONCS

	(RMSAUTO), GARDS_ROI_CONCS (RMSMAN), GARDS_ROI_COUNTS (RMSAUTO), GARDS_ROI_COUNTS (RMSMAN), GARDS_ROI_LIMITS (RMSAUTO), GARDS_ROI_LIMITS (RMSMAN), GARDS_SAINT_PROCESS_PARAMS (RMSAUTO), GARDS_SAINT_PROCESS_PARAMS (RMSMAN), GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_AUX (RMSAUTO), GARDS_SAMPLE_CAT (RMSMAN), GARDS_SAMPLE_CERT (RMSAUTO), GARDS_SAMPLE_CERT_LINES (RMSAUTO), GARDS_SAMPLE_DATA (RMSAUTO), GARDS_SAMPLE_DATA (RMSMAN), GARDS_SAMPLE_DESCRIPTION (RMSAUTO), GARDS_SAMPLE_FLAGS (RMSAUTO), GARDS_SAMPLE_FLAGS (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN), GARDS_SAMPLE_RATIOS (RMSAUTO), GARDS_SAMPLE_RATIOS (RMSMAN), GARDS_SAMPLE_STATUS (RMSAUTO), GARDS_SAMPLE_STATUS (RMSMAN), GARDS_SAMPLE_UPDATE_PARAMS (RMSAUTO), GARDS_SAMPLE_UPDATE_PARAMS (RMSMAN), GARDS_SAMPLE_XE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_XE_PROC_PARAMS (RMSMAN), GARDS_SPECTRUM (RMSAUTO), GARDS_TOTAL_EFFIC (RMSAUTO), GARDS_TOTAL_EFFIC (RMSMAN), GARDS_XE_RESULTS (RMSAUTO), GARDS_XE_RESULTS (RMSMAN), GARDS_XE_SAMPLE_CATEGORY (RMSAUTO), GARDS_XE_SAMPLE_CATEGORY (RMSMAN), GARDS_XE_UNCORRECTED_RESULTS (RMSAUTO), GARDS_XE_UNCORRECTED_RESULTS (RMSMAN)
Description	Unique sample identifier

Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.637. sample_id

Table(s)	GARDS_NIC (RMSAUTO)
Description	

Storage type	**Unit**	**NA value**	**External**	**Nullable**
number				N
Range				

5.2.638. sample_id

Table(s)	GARDS_COMMENTS (RMSAUTO), GARDS_COMMENTS (RMSMAN), GARDS_EFFICIENCY_IDC_PAIRS (RMSAUTO), GARDS_EFFICIENCY_IDC_PAIRS (RMSMAN), GARDS_FPE (RMSAUTO), GARDS_FPE (RMSMAN), GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_PRODUCT (RMSMAN), GARDS_STATUS_HISTORY (RMSMAN), GARDS_USER_COMMENTS (RMSAUTO), GARDS_USER_COMMENTS

	(RMSMAN), RN_LOGS (RMSMAN)			
Description	Unique sample identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.639. sample_id

Table(s)	GARDS_NIC (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number				Y
Range				

5.2.640. sample_id

Table(s)	GARDS_SOH_EVALUATION (RMSAUTO), GARDS_SOH_EVALUATION (RMSMAN)			
Description	Unique sample identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(19,0)			i10	N
Range				

5.2.641. sample_id

Table(s)	GARDS_ENERGY_CAL_COV (RMSAUTO), GARDS_ENERGY_CAL_COV (RMSMAN), GARDS_QC_RESULTS (RMSAUTO), GARDS_QC_RESULTS (RMSMAN), GARDS_RESOLUTION_CAL_COV (RMSAUTO), GARDS_RESOLUTION_CAL_COV (RMSMAN)			
Description	Unique sample identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(22,0)			i10	N
Range				

5.2.642. sample_id

Table(s)	GARDS_RESOLUTION_CAL_ORIG (RMSAUTO), GARDS_RESOLUTION_CAL_ORIG (RMSMAN)			
Description	Unique sample identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number(8,0)			i10	N
Range				

5.2.643. sample_ref_id

Table(s)	GARDS_SAMPLE_AUX (RMSAUTO)			
Description	Sample reference identification			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)			a32	N
Range				

5.2.644. sample_ref_id

Table(s)	GARDS_PROCESSING_ERRORS (RMSMAN)			
Description	Sample reference identification			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)			a32	Y
Range				

5.2.645. sample_status

Table(s)	GARDS_NIC (RMSAUTO)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)				N
Range				

5.2.646. sample_status

Table(s)	GARDS_NIC (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)				Y
Range				

5.2.647. sample_type

Table(s)	GARDS_BASELINE (RMSAUTO), GARDS_BASELINE (RMSMAN), GARDS_RELEVANT_NUCLIDES (RMSMAN), GARDS_SPECTRUM (RM-SAUTO)			
Description	Sample type: P = particulate, G = HPGe based noble gas, or B = beta-gamma co-incidence based noble gas			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)			a1	N
Range	sample_type IN {P, G, B}			

5.2.648. sample_type

Table(s)	GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_DATA (RMSAUTO), GARDS_SAMPLE_DATA (RMSMAN), GARDS_SAMPLE_TESTS (RMS-MAN)			
Description	Sample type: P = particulate, G = HPGe based noble gas, or B = beta-gamma co-incidence based noble gas			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)			a1	Y
Range	sample_type IN {P, G, B}			

5.2.649. sample_type

Table(s)	GARDS_MDAS2REPORT (RMSMAN)			
Description	Sample type: P = particulate, G = HPGe based noble gas, or B = beta-gamma co-incidence based noble gas			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2)			a1	N
Range	sample_type IN {P, G, B}			

5.2.650. sample_type

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN)			
Description	Sample type: P = particulate, G = HPGe based noble gas, or B = beta-gamma co-incidence based noble gas			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2)			a1	Y
Range	sample_type IN {P, G, B}			

5.2.651. scan_msgtsd

Table(s)	PIPELINE_CONTROL (RMSMAN)			
Description	Y: scan ONCE the directory /$lan/data/shared/messages/rn_manual/msg_TSD for manually processing RN messages and after it finishes scanning it converts the value to N. N: Do not scan the directory			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)			a1	Y
Range				

5.2.652. score

Table(s)	GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMS-MAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO), GARDS_ENERGY_CAL_ORIG (RMSMAN)
Description	Score used when comparing this ECR to other ECRs, a measure of both the ape

	and determinant			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.653. sdmult

Table(s)	GARDS_QCPARAMS (RMSMAN)			
Description	Location test standard deviation multiplier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.654. sensor_name

Table(s)	GARDS_SOH_SENSOR_DATA (RMSAUTO)			
Description	Unique sensor name to distinguish between sensors of the same type			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(20)			a20	N
Range				

5.2.655. sensor_type

Table(s)	GARDS_SOH_SENSOR_DATA (RMSAUTO)			
Description	Sensor type (TEMP, PRESSURE, PROCESSFLOW, VOLTAGE, COUNTRATES, DEWPOINT, CO2VOLUME)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(20)			a20	N
Range	sensor_type IN { TEMP, PRESSURE, PROCESSFLOW, VOLTAGE, COUNTRATES, DEWPOINT, CO2VOLUME }			

5.2.656. session_id

Table(s)	GARDS_TRENDVUE (RMSAUTO), GARDS_TRENDVUE (RMSMAN)			
Description	Unique session identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.657. severity

Table(s)	RN_LOGS (RMSMAN)
Description	Severity level null, or between 1 and 4 for this analyst comment

Storage type	Unit	NA value	External	Nullable
number			i10	Y
Range				

5.2.658. shortterm_moving_avg_days

Table(s)	GARDS_XE_CATEGORY_PARAMS (RMSMAN)			
Description	period in which the average activity concentration is determined for a short term abnormal threshold determination (30 days as default)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.659. site_det_code

Table(s)	GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_DATA (RMSAUTO), GARDS_SAMPLE_DATA (RMSMAN)			
Description	Station code concatenated with detector code			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(15)			a15	Y
Range				

5.2.660. sleep_time

Table(s)	PIPELINE_CONTROL (RMSMAN)			
Description	Determines the sleep time in seconds before processing RECEIVED messages			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.661. slope

Table(s)	GARDS_BG_QC_RESULT (RMSAUTO), GARDS_BG_QC_RESULT (RMS-MAN)			
Description	Noise slope in QC spectrum			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)			g8.5	Y
Range				

5.2.662. soh_char_id

Table(s)	GARDS_SOH_CHAR_DATA (RMSAUTO)
Description	Unique state of health character data identifier

Storage type	Unit	NA value	External	Nullable
number			i10	N
Range				

5.2.663. soh_flag

Table(s)	GARDS_SOH_EVALUATION (RMSAUTO), GARDS_SOH_EVALUATION (RMSMAN)			
Description	SOH flag: B, F, G			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)			a1	Y
Range				

5.2.664. soh_id

Table(s)	GARDS_SOH_CHAR_DATA (RMSAUTO), GARDS_SOH_HEADER (RM-SAUTO), GARDS_SOH_NUM_DATA (RMSAUTO), GARDS_SOH_SENSOR_DATA (RMSAUTO)			
Description	SOH identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.665. soh_num_id

Table(s)	GARDS_SOH_NUM_DATA (RMSAUTO)			
Description	State of health identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.666. soh_sensor_id

Table(s)	GARDS_SOH_SENSOR_DATA (RMSAUTO)			
Description	State of health sensor id			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.667. soh_status

Table(s)	GARDS_SOH_EVALUATION (RMSAUTO), GARDS_SOH_EVALUATION (RMSMAN)

Description	Processing status: B, P, V			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1)			a1	Y
Range				

5.2.668. special_instructions

Table(s)	GARDS_RLR_OBJECTIVE (RMSAUTO)			
Description	Special instructions			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2048)			a2048	Y
Range				

5.2.669. spectral_qualifier

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_REFLINE_MASTER (RMSMAN), GARDS_UPDATE_REFLINES (RMSMAN), GARDS_XE_REFLINE_MASTER (RMSMAN)			
Description	Indicator of full or preliminary spectrum			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(5)			a5	N
Range				

5.2.670. spectral_qualifier

Table(s)	GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_DATA (RMSAUTO), GARDS_SAMPLE_DATA (RMSMAN)			
Description	Indicator of full or preliminary spectrum			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(5)			a5	Y
Range				

5.2.671. split_sample_ref_id

Table(s)	GARDS_RLR (RMSAUTO)			
Description	Split sample reference identification			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)			a32	Y
Range				

5.2.672. split_station

Table(s)	GARDS_STATIONS (RMSMAN)

Description	Flag indicating whether or not station is split			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.673. squant_err

Table(s)	GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_SAMPLE_PROC_PARAMS (RMSAUTO), GARDS_SAMPLE_PROC_PARAMS (RMSMAN)			
Description	Uncertainty of sample quantity (m3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	m3		g8.5	Y
Range				

5.2.674. srid

Table(s)	GARDS_SOH_EVALUATION (RMSAUTO), GARDS_SOH_EVALUATION (RMSMAN)			
Description	Sample reference identification			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)			a32	N
Range				

5.2.675. sta_msgid

Table(s)	RMS_MSGDISC (RMSAUTO)			
Description	Corresponding station message ID from the RN message			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(50)			i10	Y
Range				

5.2.676. start_channel

Table(s)	GARDS_SPECTRUM (RMSAUTO)			
Description	Start channel			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.677. start_date

Table(s)	GARDS_XE_CATEGORY_PARAMS (RMSMAN)

Description	Initialization date			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	N
Range	any valid ORACLE date			

5.2.678. start_time

Table(s)	GARDS_MET_DATA (RMSAUTO), GARDS_MET_HEADER (RMSAUTO)			
Description	Start time of the period			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.679. start_time

Table(s)	GARDS_RN_INTERVAL (RMSAUTO)			
Description	Start time of the period			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)	Date	NOT ALLOWED	a21	N
Range	any valid ORACLE date			

5.2.680. start_time

Table(s)	GARDS_INTERVAL (RMSAUTO)			
Description	Start time of the period			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(53)	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.681. state

Table(s)	GARDS_QCHISTORY (RMSAUTO), GARDS_QCHISTORY (RMSMAN)			
Description	Text results of quality control hypothesis tests			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(128)			a128	N
Range				

5.2.682. state

Table(s)	GARDS_RN_INTERVAL (RMSAUTO)			
Description	Workflow field indicating the status			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

varchar2(16)			a16	N
Range				

5.2.683. state

Table(s)	GARDS_INTERVAL (RMSAUTO)			
Description	Date of data sampling commencement.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)			a16	Y
Range				

5.2.684. station_code

Table(s)	GARDS_ALERTS (RMSAUTO)			
Description	Station code			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(5)			a5	Y
Range				

5.2.685. station_code

Table(s)	RMS_MSGDISC (RMSAUTO)			
Description	Station code			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(10)			a5	Y
Range				

5.2.686. station_code

Table(s)	RN_LOGS (RMSMAN)			
Description	Station code			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(20)			a5	Y
Range				

5.2.687. station_code

Table(s)	GARDS_PROCESSING_ERRORS (RMSMAN), GARDS_RN_INTERVAL (RMSAUTO), GARDS_SAMPLE (RMSMAN), GARDS_STATIONS (RMS-MAN)			
Description	Station code			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(5)			a5	Y

Range	

5.2.688. station_id

Table(s)	GARDS_ALERTS (RMSAUTO), GARDS_CAT_TEMPLATE (RMSMAN), GARDS_EFFICIENCY_IDC_PAIRS (RMSAUTO), GARDS_EFFICIENCY_IDC_PAIRS (RMSMAN), GARDS_PROC_PARAMS_TEMPLATE (RMSMAN), GARDS_QCTARGETS (RMSMAN), GARDS_SOH_CHAR_DATA (RMSAUTO), GARDS_SOH_HEADER (RMSAUTO), GARDS_SOH_NUM_DATA (RMSAUTO), GARDS_SOH_SENSOR_DATA (RMSAUTO), GARDS_STADET (RMSMAN), GARDS_STATIONS (RMSMAN), GARDS_STATIONS_SCHEDULE (RMSMAN), GARDS_STATION_ASSIGNMENTS (RMSMAN), GARDS_UPDATE_REFLINES (RMSMAN)			
Description	Unique station identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.689. station_id

Table(s)	GARDS_DATA_LOG (RMSAUTO), GARDS_MET_DATA (RMSAUTO), GARDS_MET_HEADER (RMSAUTO), GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN), GARDS_NUCL_LINES_IDED (RMSAUTO), GARDS_NUCL_LINES_IDED (RMSMAN), GARDS_NUCL_LINES_IDED_ORIG (RMSAUTO), GARDS_NUCL_LINES_IDED_ORIG (RMSMAN), GARDS_QCHISTORY (RMSAUTO), GARDS_QCHISTORY (RMSMAN), GARDS_RLR (RMSAUTO), GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_DATA (RMSAUTO), GARDS_SAMPLE_DATA (RMSMAN), GARDS_SAMPLE_TESTS (RMSMAN)			
Description	Unique station identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.690. station_id

Table(s)	GARDS_NIC (RMSAUTO), GARDS_NIC (RMSMAN), GARDS_NIC_INIT (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number				Y
Range				

5.2.691. station_list

Table(s)	GARDS_QAT_QUERY_FILTER (RMSMAN)			
Description	Comma-separated list of stations			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(1024)			a128	Y
Range				

5.2.692. status

Table(s)	GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_STATUS (RMSAUTO), GARDS_SAMPLE_STATUS (RMSMAN)			
Description	Current processing status of sample. Some possible values are: A- analyzed, P-processed, R- reviewed, U- unprocessed, V- viewed, F xxx, D xxx, B xxx, Z - xxx			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)			a1	Y
Range	status IN {A, P, R, U, V, F, D, B, Z}			

5.2.693. status

Table(s)	GARDS_DATA_LOG (RMSAUTO)			
Description	Status			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)			a1	Y
Range				

5.2.694. status

Table(s)	RMS_MSGDISC (RMSAUTO)			
Description	Status of the RN message. Values: SKIPPED, RECEIVED, QUEUED, RUN-NING, L-RUNNING, DONE, PARTIAL_DONE or FAILED.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)			a15	Y
Range				

5.2.695. status

Table(s)	GARDS_DETECTORS (RMSMAN)			
Description	Status of detector: if Y, then data from this detector are automatically processed; if N, then they are not processed automatically.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2)			a2	Y

Range	status IN {N, Y}

5.2.696. status

Table(s)	GARDS_STATIONS (RMSMAN)			
Description	Status of station: if NULL, then station is fully operational, otherwise status is I.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2)			a2	Y
Range	status IN {I}			

5.2.697. status_list

Table(s)	GARDS_QAT_QUERY_FILTER (RMSMAN)			
Description	Comma-separated list of statuses			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(128)			a128	Y
Range				

5.2.698. std_spectra_id

Table(s)	GARDS_BG_STD_SPECTRA_RESULT (RMSAUTO), GARDS_BG_STD_SPECTRA_RESULT (RMSMAN)			
Description	Unique identifier for the standard spectra. This is a sample id for the std spectra)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.699. stop_acquisition

Table(s)	PIPELINE_CONTROL (RMSMAN)			
Description	Y to stop/exit program RnMessagesProcessor.pl			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)			a1	Y
Range				

5.2.700. stop_pipeline

Table(s)	PIPELINE_CONTROL (RMSMAN)			
Description	Y to stop calling rms_pipeline but the program will continue read messages from acq.acq_msg table			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)			a1	Y
Range				

5.2.701. subid

Table(s)	GARDS_RECEIPT_LOG (RMSAUTO)			
Description	Subscription id of obsolete table?			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.702. subject

Table(s)	RN_LOGS (RMSMAN)			
Description	Subject of the analyst comment			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(50)			a50	Y
Range				

5.2.703. subject

Table(s)	RMS_MSGDISC (RMSAUTO)			
Description	Subject of the RN message extracted of the mail header of the message			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(64)			a64	Y
Range				

5.2.704. sum_corr

Table(s)	GARDS_IRF (RMSMAN)			
Description	Summing cascade correction factor			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number		NOT ALLOWED	f10.8	Y
Range				

5.2.705. t_time

Table(s)	GARDS_QAT_CONFIG (RMSMAN)			
Description	Number of minutes after gards_sample_status.entry_date that rms_QAT_auto waits before releasing a sample			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	Minutes		g8.5	Y
Range				

5.2.706. telephone

Table(s)	GARDS_POC (RMSMAN)			
Description	Telephone number of point of contact			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(20)			a20	Y
Range				

5.2.707. temp_count

Table(s)	GARDS_BG_ROI_COUNTS (RMSAUTO), GARDS_BG_ROI_COUNTS (RMSMAN)			
Description	Net number of counts in the ROI by subtracting the detector background and interference corrections			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		g8.5	Y
Range				

5.2.708. temp_count_err

Table(s)	GARDS_BG_ROI_COUNTS (RMSAUTO), GARDS_BG_ROI_COUNTS (RMSMAN)			
Description	Uncertainty of the net number of counts in the ROI by subtracting the detector background and interference corrections			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	counts		g8.5	Y
Range				

5.2.709. temperature

Table(s)	GARDS_ENVIRONMENT (RMSAUTO)			
Description	Outside temperature (degrees Celsius)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			f5.1	Y
Range				

5.2.710. temporal_unit

Table(s)	GARDS_STATIONS_SCHEDULE (RMSMAN)			
Description	Units for schedule period - currently only the value DAYS is supported			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(5)	days		a5	Y
Range	temporal_unit IN {DAYS}			

5.2.711. *temporal_value*

Table(s)	GARDS_STATIONS_SCHEDULE (RMSMAN)			
Description	Units for schedule period - currently only the value DAYS is supported.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	days		i10	Y
Range				

5.2.712. *test*

Table(s)	GARDS_FLAGS (RMSAUTO), GARDS_FLAGS (RMSMAN)			
Description	Calculated result of the test; this value is compared to the threshold value (examples are <, = , >, >=)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(8)			a8	Y
Range				

5.2.713. *test_code*

Table(s)	GARDS_CAT_CRITERIA_TESTS (RMSMAN), GARDS_SAMPLE_TESTS (RMSMAN)			
Description	Unique test code identifier string			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(24)			a24	Y
Range				

5.2.714. *test_date*

Table(s)	GARDS_RLR (RMSAUTO)			
Description	Test completion date at lab			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.715. *test_id*

Table(s)	GARDS_CAT_CRITERIA_TESTS (RMSMAN), GARDS_SAMPLE_TESTS (RMSMAN)			
Description	Unique identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.716. test_name

Table(s)	GARDS_QC_RESULTS (RMSAUTO), GARDS_QC_RESULTS (RMSMAN)			
Description	Quality control test name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)			a32	N
Range				

5.2.717. test_name

Table(s)	GARDS_CAT_CRITERIA_TESTS (RMSMAN), GARDS_SAMPLE_TESTS (RMSMAN)			
Description	Test name label for display			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(48)			a48	Y
Range				

5.2.718. test_type

Table(s)	GARDS_RLR (RMSAUTO)			
Description	Type of test performed			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(256)			a40	Y
Range				

5.2.719. tests_authorized

Table(s)	GARDS_RLR_OBJECTIVE (RMSAUTO)			
Description	Tests authorized			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2048)			a2048	Y
Range				

5.2.720. threshold

Table(s)	GARDS_FLAGS (RMSAUTO), GARDS_FLAGS (RMSMAN)			
Description	Value against which the results in the test column are compared			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.721. *total_rainfall*

Table(s)	GARDS_MET_DATA (RMSAUTO)			
Description	Total rainfall (mm)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	mm		f5.1	Y
Range				

5.2.722. *transmit_date*

Table(s)	GARDS_RLR (RMSAUTO)			
Description	Transmit date and time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.723. *transmit_dtg*

Table(s)	GARDS_SOH_HEADER (RMSAUTO)			
Description	Transmit date and time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	N
Range	any valid ORACLE date			

5.2.724. *transmit_dtg*

Table(s)	GARDS_SAMPLE (RMSMAN), GARDS_SAMPLE_DATA (RMSAUTO), GARDS_SAMPLE_DATA (RMSMAN)			
Description	Transmit date and time			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.725. *tstat*

Table(s)	GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMS-MAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO), GARDS_ENERGY_CAL_ORIG (RMSMAN)			
Description	Percentage point of the t-statistic for Type I error with a probability set to 99%			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.726. tstat

Table(s)	GARDS_CAT_TEMPLATE (RMSMAN)			
Description	Value of a variable used in bounds estimation			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.727. tstat

Table(s)	GARDS_NIC_INIT (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number				Y
Range				

5.2.728. type

Table(s)	GARDS_B_ENERGY_PAIRS (RMSAUTO), GARDS_B_ENERGY_PAIRS (RMSMAN), GARDS_B_ENERGY_PAIRS_ORIG (RMSAUTO), GARDS_B_ENERGY_PAIRS_ORIG (RMSMAN), GARDS_B_RESOLUTION_CAL (RMSAUTO), GARDS_B_RESOLUTION_CAL (RMSMAN), GARDS_B_RESOLUTION_PAIRS (RMSAUTO), GARDS_B_RESOLUTION_PAIRS (RMSMAN), GARDS_B_RESOLUTION_PAIRS_ORIG (RMSAUTO), GARDS_B_RESOLUTION_PAIRS_ORIG (RMSMAN), GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMSMAN), GARDS_ENERGY_CAL_COV (RMSAUTO), GARDS_ENERGY_CAL_COV (RMSMAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO), GARDS_ENERGY_CAL_ORIG (RMSMAN), GARDS_ENERGY_PAIRS (RMSAUTO), GARDS_ENERGY_PAIRS (RMSMAN), GARDS_ENERGY_PAIRS_ORIG (RMSAUTO), GARDS_ENERGY_PAIRS_ORIG (RMSMAN), GARDS_RESOLUTION_CAL (RMSAUTO), GARDS_RESOLUTION_CAL (RMSMAN), GARDS_RESOLUTION_CAL_COV (RMSAUTO), GARDS_RESOLUTION_CAL_COV (RMSMAN), GARDS_RESOLUTION_CAL_ORIG (RMSAUTO), GARDS_RESOLUTION_CAL_ORIG (RMSMAN), GARDS_RESOLUTION_PAIRS (RMSAUTO), GARDS_RESOLUTION_PAIRS (RMSMAN), GARDS_RESOLUTION_PAIRS_ORIG (RMSAUTO), GARDS_RESOLUTION_PAIRS_ORIG (RMSMAN)			
Description	Calibration type			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(8)			a8	N
Range				

5.2.729. *type*

Table(s)	GARDS_EFFICIENCY_ERROR_CAL (RMSAUTO), GARDS_EFFICIENCY_ERROR_CAL (RMSMAN)			
Description	Uncertainty type: up_err or low_err			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(8)			a8	N
Range				

5.2.730. *type*

Table(s)	GARDS_CODES (RMSMAN)			
Description	Category of code.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(15)			a15	N
Range				

5.2.731. *type*

Table(s)	GARDS_MDAS2REPORT (RMSMAN), GARDS_NUCL_IDED (RMSAUTO), GARDS_NUCL_IDED (RMSMAN), GARDS_NUCL_IDED_ORIG (RMSAUTO), GARDS_NUCL_IDED_ORIG (RMSMAN), GARDS_NUCL_LIB (RMSMAN), GARDS_NUCL_LIB_ARCHIVE (RMSMAN), GARDS_RELEVANT_NUCLIDES (RMSMAN), GARDS_XE_NUCL_LIB (RMSMAN)			
Description	Nuclide type of ACTIVATION, COSMIC, FISSION(G), FISSION(P), or NATURAL.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)			a16	Y
Range				

5.2.732. *type*

Table(s)	GARDS_RECEIPT_LOG (RMSAUTO)			
Description	Acknowledgment type of obsolete table?			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(5)			a5	Y
Range				

5.2.733. *type*

Table(s)	GARDS_DETECTORS (RMSMAN)			
Description	Detector type			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

varchar2(6)			a6	Y
Range				

5.2.734. type

Table(s)	GARDS_STATIONS (RMSMAN)			
Description	Station type			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(6)			a6	Y
Range				

5.2.735. typeid

Table(s)	GARDS_PRODUCT (RMSAUTO)			
Description	Unique type identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N
Range				

5.2.736. typeid

Table(s)	GARDS_PRODUCT (RMSMAN)			
Description	Unique type identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.737. unit

Table(s)	GARDS_SOH_CODE (RMSMAN)			
Description	Unit in which the parameter is stored			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(32)			a32	Y
Range				

5.2.738. units

Table(s)	GARDS_CAT_CRITERIA_TESTS (RMSMAN), GARDS_FLAGS (RMSAUTO), GARDS_FLAGS (RMSMAN), GARDS_SAMPLE_TESTS (RMSMAN)			
Description	Units of test bounds			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(16)			a16	Y

Range	

5.2.739. upper_bound

Table(s)	GARDS_AUTO_SAMPLE_CAT (RMSAUTO), GARDS_CAT_TEMPLATE (RMSMAN), GARDS_SAMPLE_CAT (RMSMAN)			
Description	Upper limit of the amount of a nuclide that can be acceptably found			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.740. upper_lim

Table(s)	GARDS_NIC (RMSAUTO), GARDS_NIC (RMSMAN), GARDS_NIC_INIT (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number				Y
Range				

5.2.741. upper_limit

Table(s)	GARDS_CAT_CRITERIA_TESTS (RMSMAN)			
Description	Upper limit bound of the test			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.742. upper_limit_green

Table(s)	GARDS_SAMPLE_TESTS (RMSMAN)			
Description	Green flag upper limit			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.743. upper_limit_yellow

Table(s)	GARDS_SAMPLE_TESTS (RMSMAN)			
Description	Yellow flag upper limit			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.744. *upper_roi_number*

Table(s)	GARDS_SAMPLE_RATIOS (RMSAUTO), GARDS_SAMPLE_RATIOS (RMSMAN)			
Description	Upper ROI number			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.745. *use_mult*

Table(s)	GARDS_SAMPLE_UPDATE_PARAMS (RMSAUTO), GARDS_SAMPLE_UPDATE_PARAMS (RMSMAN), GARDS_UPDATE_PARAMS_TEMPLATE (RMSMAN)			
Description	0/1 flag for use of multiplets in ECR updating (typically 1)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.746. *use_weight*

Table(s)	GARDS_SAMPLE_UPDATE_PARAMS (RMSAUTO), GARDS_SAMPLE_UPDATE_PARAMS (RMSMAN), GARDS_UPDATE_PARAMS_TEMPLATE (RMSMAN)			
Description	0/1 flag for use of weights in ECR updating (typically 1)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i1	Y
Range				

5.2.747. *user_comment*

Table(s)	GARDS_SOH_EVALUATION (RMSAUTO), GARDS_SOH_EVALUATION (RMSMAN)			
Description	Comment			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(2048)			a2048	Y
Range				

5.2.748. *user_id*

Table(s)	GARDS_USERS (RMSMAN), GARDS_USERS_ROLES (RMSMAN)			
Description	User identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	N

Range	

5.2.749. user_id

Table(s)	GARDS_DIST_SAMPLE_QUEUE (RMSMAN), GARDS_QAT_QUERY_FILTER (RMSMAN), GARDS_STATION_AS-SIGNMENTS (RMSMAN)			
Description	User identifier			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.2.750. user_name

Table(s)	GARDS_USERS (RMSMAN)			
Description	User name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(30)			a30	N
Range				

5.2.751. user_name

Table(s)	GARDS_STATUS_HISTORY (RMSMAN)			
Description	User name			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(30)			a30	Y
Range				

5.2.752. value

Table(s)	GARDS_SOH_NUM_DATA (RMSAUTO), GARDS_SOH_SENSOR_DATA (RMSAUTO)			
Description	Value of the specified SOH parameter			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			f8.5	N
Range				

5.2.753. value

Table(s)	GARDS_SAMPLE_FLAGS (RMSAUTO), GARDS_SAMPLE_FLAGS (RMSMAN)			
Description	Threshold value for the test.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number			g8.5	Y
Range				

5.2.754. value

Table(s)	GARDS_SAINT_DEFAULT_PARAMS (RMSAUTO), GARDS_SAINT_DEFAULT_PARAMS (RMSMAN)			
Description	Parameter default setting			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(255)			a256	N
Range				

5.2.755. value

Table(s)	GARDS_SAINT_PROCESS_PARAMS (RMSAUTO), GARDS_SAINT_PROCESS_PARAMS (RMSMAN)			
Description	Parameter setting			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(255)			a256	Y
Range				

5.2.756. value

Table(s)	GARDS_USERENV (RMSMAN)			
Description	Variable value			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(256)			a256	N
Range				

5.2.757. value

Table(s)	GARDS_SOH_CHAR_DATA (RMSAUTO)			
Description	Value of the specified SOH parameter			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
varchar2(30)			f8.5	N
Range				

5.2.758. width

Table(s)	GARDS_PEAKS (RMSAUTO), GARDS_PEAKS (RMSMAN), GARDS_PEAKS_ORIG (RMSAUTO), GARDS_PEAKS_ORIG (RMSMAN)			
Description	Width of the peak (channels)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number			g8.5	Y
Range				

5.2.759. width_adj

Table(s)	GARDS_QCPARAMS (RMSMAN)			
Description	Peak width standard deviation inflation factor			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.760. winner

Table(s)	GARDS_B_ENERGY_PAIRS (RMSAUTO), GARDS_B_ENERGY_PAIRS (RMSMAN), GARDS_B_ENERGY_PAIRS_ORIG (RMSAUTO), GARDS_B_ENERGY_PAIRS_ORIG (RMSMAN), GARDS_B_RESOLUTION_CAL (RMSAUTO), GARDS_B_RESOLUTION_CAL (RMSMAN), GARDS_B_RESOLUTION_PAIRS (RMSAUTO), GARDS_B_RESOLUTION_PAIRS (RMSMAN), GARDS_B_RESOLUTION_PAIRS_ORIG (RMSAUTO), GARDS_B_RESOLUTION_PAIRS_ORIG (RMSMAN), GARDS_ENERGY_CAL (RMSAUTO), GARDS_ENERGY_CAL (RMSMAN), GARDS_ENERGY_CAL_COV (RMSAUTO), GARDS_ENERGY_CAL_COV (RMSMAN), GARDS_ENERGY_CAL_ORIG (RMSAUTO), GARDS_ENERGY_CAL_ORIG (RMSMAN), GARDS_ENERGY_PAIRS (RMSAUTO), GARDS_ENERGY_PAIRS (RMSMAN), GARDS_ENERGY_PAIRS_ORIG (RMSAUTO), GARDS_ENERGY_PAIRS_ORIG (RMSMAN), GARDS_RESOLUTION_CAL (RMSAUTO), GARDS_RESOLUTION_CAL (RMSMAN), GARDS_RESOLUTION_CAL_COV (RMSAUTO), GARDS_RESOLUTION_CAL_COV (RMSMAN), GARDS_RESOLUTION_CAL_ORIG (RMSAUTO), GARDS_RESOLUTION_CAL_ORIG (RMSMAN), GARDS_RESOLUTION_PAIRS (RMSAUTO), GARDS_RESOLUTION_PAIRS (RMSMAN), GARDS_RESOLUTION_PAIRS_ORIG (RMSAUTO), GARDS_RESOLUTION_PAIRS_ORIG (RMSMAN)				
Description	Flag indicating whether the calibration type is used (Y) or not (N)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
char(1)			a1	Y
Range				

5.2.761. xe133_xe131m_limit

Table(s)	GARDS_XE_CATEGORY_PARAMS (RMSMAN)			
Description	Ratio limit of Xe-133 to Xe-131m, related to the categorization flag using the Bayesian ratio			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number			g8.5	Y
Range				

5.2.762. xe133m_xe131m_limit

Table(s)	GARDS_XE_CATEGORY_PARAMS (RMSMAN)			
Description	Ratio limit of Xe-133m to Xe-131m, related to the categorization flag using the Bayesian ratio			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.763. xe133m_xe133_limit

Table(s)	GARDS_XE_CATEGORY_PARAMS (RMSMAN)			
Description	Ratio limit of Xe-133m to Xe-133, related to the categorization flag using the Bayesian ratio			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.764. xe135_xe133_limit

Table(s)	GARDS_XE_CATEGORY_PARAMS (RMSMAN)			
Description	Ratio limit of Xe-135 to Xe-133, related to the categorization flag using the Bayesian ratio			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.765. xe_collect_yield

Table(s)	GARDS_SAMPLE_AUX (RMSAUTO)			
Description	Xenon collection yield of the system			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	N
Range				

5.2.766. xe_collect_yield_err

Table(s)	GARDS_SAMPLE_AUX (RMSAUTO)			
Description	Uncertainty of the xenon collection yield			
Storage type	**Unit**	**NA value**	**External**	**Nullable**

number			g8.5	N
Range				

5.2.767. xe_in_air

Table(s)	GARDS_BG_CONFIG_PARAMS (RMSMAN), GARDS_BG_PROC_PARAMS (RMSAUTO), GARDS_BG_PROC_PARAMS (RMSMAN)			
Description	Volume of stable xenon (ml) in the 1 m3 air			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
float(126)	cm3/m3		g8.5	Y
Range				

5.2.768. xe_volume

Table(s)	GARDS_SAMPLE_AUX (RMSAUTO)			
Description	Xenon volume (cm3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	cm3		g8.5	N
Range				

5.2.769. xe_volume_err

Table(s)	GARDS_SAMPLE_AUX (RMSAUTO)			
Description	Uncertainty of the xenon volume (cm3)			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number	cm3		g8.5	N
Range				

5.2.770. xform

Table(s)	GARDS_CAT_TEMPLATE (RMSMAN)			
Description	Code for transform function applied to measurement data			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			g8.5	Y
Range				

5.2.771. xform

Table(s)	GARDS_NIC_INIT (RMSMAN)			
Description				
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number				Y

Range	

5.2.772. zero_date

Table(s)	GARDS_RLR_RATIOS (RMSAUTO)			
Description	Zero date			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
date	Date	NOT ALLOWED	a21	Y
Range	any valid ORACLE date			

5.2.773. zeroshift

Table(s)	GARDS_SAMPLE_UPDATE_PARAMS (RMSAUTO), GARDS_SAMPLE_UPDATE_PARAMS (RMSMAN), GARDS_UPDATE_PARAMS_TEMPLATE (RMSMAN)			
Description	Change in channel number at 0 keV between one spectrum and the previous spectrum.			
Storage type	**Unit**	**NA value**	**External**	**Nullable**
number			i10	Y
Range				

5.3. Radionuclide Trigger Descriptions

5.3.1. ALERTS_B_I_U

Table	GARDS_ALERTS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.2. ALERTS_S_I

Table	GARDS_ALERTS
Type	BEFORE EACH ROW
Event	INSERT
Trigger body	`declare` `            new_id number;` `begin` `            select alert_seq.nextval into new_id from dual;` `        :new.alert_id := new_id;` `end;`

5.3.3. AUTO_SAMPLE_CAT_B_I_U

Table	GARDS_AUTO_SAMPLE_CAT
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.4. AUX_LIB_B_I_U

Table	GARDS_AUX_LIB
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.5. AUX_LINES_LIB_B_I_U

Table	GARDS_AUX_LINES_LIB

Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.6. BASELINE_B_I_U

Table	GARDS_BASELINE
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.7. BASELINE_B_I_U

Table	GARDS_BASELINE
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `  :new.moddate := sysdate;` `end;`

5.3.8. BG_CONFIG_PARAMS_B_I_U

Table	GARDS_BG_CONFIG_PARAMS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.9. BG_DET_STD_SPECTRA_B_I_U

Table	GARDS_BG_DETECTOR_STD_SPECTRA
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.10. BG_EFFICIENCY_PAIRS_B_I_U

Table	GARDS_BG_EFFICIENCY_PAIRS

Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.11. BG_ENERGY_CAL_B_I_U

Table	GARDS_BG_ENERGY_CAL
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `          :new.moddate := sysdate;` `  end;`

5.3.12. BG_ENERGY_CAL_DIR_B_I_U

Table	GARDS_BG_ENERGY_CAL_DIRECTIVE
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `          :new.moddate := sysdate;` `  end;`

5.3.13. BG_ENERGY_CAL_ORIG_B_I_U

Table	GARDS_BG_ENERGY_CAL_ORIG
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `          :new.moddate := sysdate;` `  end;`

5.3.14. BG_ISOTOPE_CONCS_B_I_U

Table	GARDS_BG_ISOTOPE_CONCS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `     :new.moddate := sysdate;` `end;`

5.3.15. BG_PROC_PARAMS_B_I_U

Table	GARDS_BG_PROC_PARAMS

Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.16. BG_PROC_PARAMS_ROI_B_I_U

Table	GARDS_BG_PROC_PARAMS_ROI
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.17. BG_QC_RESULT_B_I_U

Table	GARDS_BG_QC_RESULT
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.18. BG_ROI_CONCS_B_I_U

Table	GARDS_BG_ROI_CONCS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.19. BG_ROI_COUNTS_B_I_U

Table	GARDS_BG_ROI_COUNTS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.20. BG_STD_SPECTRA_B_I_U

Table	GARDS_BG_STD_SPECTRA

Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.21. BG_STD_SPECTRA_RESULT_B_I_U

Table	GARDS_BG_STD_SPECTRA_RESULT
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.22. BG_STD_SPECTRA_RESULT_I_U_D

Table	GARDS_BG_STD_SPECTRA_RESULT
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	(see below)

```
begin
      IF INSERTING THEN
      INSERT into rmsman.gards_bg_std_spectra_result (
            SAMPLE_ID                 ,
            STD_SPECTRA_ID            ,
            GAMMA_COEFF1              ,
            GAMMA_COEFF2              ,
            GAMMA_COEFF3              ,
            BETA_COEFF1               ,
            BETA_COEFF2               ,
            BETA_COEFF3               ,
            ESTIMATE                  ,
            ERROR
            )
      VALUES (
            :new.SAMPLE_ID                 ,
            :new.STD_SPECTRA_ID            ,
            :new.GAMMA_COEFF1              ,
            :new.GAMMA_COEFF2              ,
            :new.GAMMA_COEFF3              ,
            :new.BETA_COEFF1               ,
            :new.BETA_COEFF2               ,
            :new.BETA_COEFF3               ,
            :new.ESTIMATE                  ,
            :new.ERROR
            );
      ELSIF UPDATING THEN
      UPDATE rmsman.gards_bg_std_spectra_result set
            SAMPLE_ID = :new.SAMPLE_ID                ,
```

	` STD_SPECTRA_ID = :new.STD_SPECTRA_ID ,` ` GAMMA_COEFF1 = :new.GAMMA_COEFF1 ,` ` GAMMA_COEFF2 = :new.GAMMA_COEFF2 ,` ` GAMMA_COEFF3 = :new.GAMMA_COEFF3 ,` ` BETA_COEFF1 = :new.BETA_COEFF1 ,` ` BETA_COEFF2 = :new.BETA_COEFF2 ,` ` BETA_COEFF3 = :new.BETA_COEFF3 ,` ` ESTIMATE = :new.ESTIMATE ,` ` ERROR = :new.ERROR` ` where sample_id = :old.sample_id;` ` ELSE` ` delete from rmsman.gards_bg_std_spectra_result` `where sample_id = :old.sample_id;` ` END IF;` `end;`

5.3.23. B_ENERGY_PAIRS_B_I_U

Table	GARDS_B_ENERGY_PAIRS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` ` :new.moddate := sysdate;` `end;`

5.3.24. B_ENERGY_PAIRS_ORIG_B_I_U

Table	GARDS_B_ENERGY_PAIRS_ORIG
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` ` :new.moddate := sysdate;` `end;`

5.3.25. B_RESOLUTION_PAIRS_B_I_U

Table	GARDS_B_RESOLUTION_PAIRS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` ` :new.moddate := sysdate;` `end;`

5.3.26. B_RESOLUTION_PAIRS_ORIG_B_I_U

Table	GARDS_B_RESOLUTION_PAIRS_ORIG
Type	BEFORE EACH ROW

Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.27. CAT_CRITERIA_B_I_U

Table	GARDS_CAT_CRITERIA_TESTS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.28. CAT_TEMPLATE_B_I_U

Table	GARDS_CAT_TEMPLATE
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.29. CODES_B_I_U

Table	GARDS_CODES
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.30. COMMENTS_B_I_U

Table	GARDS_COMMENTS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.31. COMMENTS_DEFS_B_I_U

Table	GARDS_COMMENTS_DEFS
Type	BEFORE EACH ROW

Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.32. CSC_MODCOEFF_LIB_B_I_U

Table	GARDS_CSC_MODCOEFF_LIB
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.33. DATA_LOG_B_I_U

Table	GARDS_DATA_LOG
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.34. DBROLE_OWNER_B_I_U

Table	GARDS_DBROLE_OWNER
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.35. DEFAULT_PARAMS_B_I_U

Table	GARDS_SAINT_DEFAULT_PARAMS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.36. DETECTORS_B_I_U

Table	GARDS_DETECTORS
Type	BEFORE EACH ROW

Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.37. DIST_SAMPLE_QUEUE_B_I_U

Table	GARDS_DIST_SAMPLE_QUEUE
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` ` :new.moddate := sysdate;` `end;`

5.3.38. EFFICIENCY_CAL_B_I_U

Table	GARDS_EFFICIENCY_CAL
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.39. EFFICIENCY_ERROR_CAL_B_I_U

Table	GARDS_EFFICIENCY_ERROR_CAL
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.40. EFFICIENCY_ERR_CAL_B_I_U

Table	GARDS_EFFICIENCY_ERROR_CAL
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.41. EFFICIENCY_IDC_PAIRS_B_I_U

Table	GARDS_EFFICIENCY_IDC_PAIRS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` ` :new.moddate := sysdate;` `end;`

5.3.42. EFFICIENCY_IDC_PAIRS_I_U_D

Table	GARDS_EFFICIENCY_IDC_PAIRS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	(see below)

```
begin
        IF INSERTING THEN
        INSERT into rmsman.gards_efficiency_idc_pairs (
  detector_id,
  station_id,
  effic_energy,
  efficiency,
  effic_error,
  begin_date,
  end_date,
  sample_id
) values (
  :new.detector_id,
  :new.station_id,
  :new.effic_energy,
  :new.efficiency,
  :new.effic_error,
  :new.begin_date,
  :new.end_date,
  :new.sample_id
);
ELSIF UPDATING THEN
update rmsman.gards_efficiency_idc_pairs set
  detector_id=:new.detector_id,
  station_id=:new.station_id,
  effic_energy=:new.effic_energy,
  efficiency=:new.efficiency,
  effic_error=:new.effic_error,
  begin_date=:new.begin_date,
  end_date=:new.end_date,
  sample_id=:new.sample_id
where detector_id=:old.detector_id and station_id=:old.sta-
tion_id and begin_date=:old.begin_date
  and effic_energy=:old.effic_energy;
ELSE
  delete from rmsman.gards_efficiency_idc_pairs where de-
```

	tector_id=:old.detector_id and station_id=:old.station_id and begin_date=:old.begin_date and effic_energy=:old.effic_energy; END IF; end;

5.3.43. EFFICIENCY_PAIRS_B_I_U

Table	GARDS_EFFICIENCY_PAIRS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	begin :new.moddate := sysdate; end;

5.3.44. EFF_VGSL_PAIRS_B_I_U

Table	GARDS_EFFICIENCY_VGSL_PAIRS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	begin :new.moddate := sysdate; end;

5.3.45. ENERGY_CAL_B_I_U

Table	GARDS_ENERGY_CAL
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	begin :new.moddate := sysdate; end;

5.3.46. ENERGY_CAL_COV_B_I_U

Table	GARDS_ENERGY_CAL_COV
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	begin :new.moddate := sysdate; end;

5.3.47. ENERGY_CAL_ORIG_B_I_U

Table	GARDS_ENERGY_CAL_ORIG
Type	BEFORE EACH ROW

Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.48. ENERGY_PAIRS_B_I_U

Table	GARDS_ENERGY_PAIRS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` ` :new.moddate := sysdate;` `end;`

5.3.49. ENERGY_PAIRS_B_I_U

Table	GARDS_ENERGY_PAIRS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `if user !='VPACI' then` ` :new.moddate := sysdate;` `end if;` `end;`

5.3.50. ENERGY_PAIRS_ORIG_B_I_U

Table	GARDS_ENERGY_PAIRS_ORIG
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.51. ENVIRONMENT_B_I_U

Table	GARDS_ENVIRONMENT
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.52. FLAGS_B_I_U

Table	GARDS_FLAGS

Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.53. FPE_B_I_U

Table	GARDS_FPE
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.54. GARDS_BG_EFFIC_PRS_I_U_D

Table	GARDS_BG_EFFICIENCY_PAIRS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	see below

```
begin
    IF INSERTING THEN
          insert into rmsman.gards_bg_efficiency_pairs
            (sample_id, bg_efficiency, bg_effic_error, roi)
          values
(:new.sample_id, :new.bg_efficiency, :new.bg_effic_error, :new
.roi);
    ELSIF UPDATING THEN
          update rmsman.gards_bg_efficiency_pairs set
            sample_id = :new.sample_id,
            bg_efficiency = :new.bg_efficiency ,
            bg_effic_error = :new.bg_effic_error ,
            roi = :new.roi
          where sample_id= :old.sample_id and roi = :old.roi;
    ELSE
        delete from rmsman.gards_bg_efficiency_pairs where
            sample_id = :old.sample_id and roi = :old.roi;
    END IF;
end;
```

5.3.55. GARDS_BG_ENERGY_CAL_I_U_D

Table	GARDS_BG_ENERGY_CAL
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	`begin` `                IF INSERTING THEN`

	insert into rmsman.gards_bg_energy_cal (sample_id, beta_coeff1, beta_coeff2, beta_coeff3, gamma_coeff1, gamma_coeff2, gamma_coeff3) values (:new.sample_id, :new.beta_coeff1, :new.beta_coeff2, :new.beta_coeff3, :new.gamma_coeff1, :new.gamma_coeff2, :new.gamma_coeff3); ELSIF UPDATING THEN update rmsman.gards_bg_energy_cal set sample_id = :new.sample_id, beta_coeff1 = :new.beta_coeff1, beta_coeff2 = :new.beta_coeff2, beta_coeff3 = :new.beta_coeff3, gamma_coeff1 = :new.gamma_coeff1, gamma_coeff2 = :new.gamma_coeff2, gamma_coeff3 = :new.gamma_coeff3 where sample_id= :old.sample_id; ELSE delete from rmsman.gards_bg_energy_cal where sample_id = :old.sample_id; END IF; end;

5.3.56. GARDS_BG_ENERGY_CAL_ORIG_I_U_D

Table	GARDS_BG_ENERGY_CAL_ORIG
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	begin IF INSERTING THEN insert into rmsman.gards_bg_energy_cal_orig (sample_id, beta_coeff1, beta_coeff2, beta_coeff3, gamma_coeff1,

	`` gamma_coeff2, gamma_coeff3) values (:new.sample_id, :new.beta_coeff1, :new.beta_coeff2, :new.beta_coeff3, :new.gamma_coeff1, :new.gamma_coeff2, :new.gamma_coeff3); ELSIF UPDATING THEN update rmsman.gards_bg_energy_cal_orig set sample_id = :new.sample_id, beta_coeff1 = :new.beta_coeff1, beta_coeff2 = :new.beta_coeff2, beta_coeff3 = :new.beta_coeff3, gamma_coeff1 = :new.gamma_coeff1, gamma_coeff2 = :new.gamma_coeff2, gamma_coeff3 = :new.gamma_coeff3 where sample_id= :old.sample_id; ELSE delete from rmsman.gards_bg_energy_cal_orig where sample_id = :old.sample_id; END IF; end; ```

5.3.57. GARDS_BG_ISOTOPE_CONCS_I_U_D

Table	GARDS_BG_ISOTOPE_CONCS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	``` begin IF INSERTING THEN INSERT into rmsman.gards_bg_isotope_concs (SAMPLE_ID , NUCLIDE_ID , CONC , CONC_ERR , MDC , ACTIVITY_ACQ_START , ACTIVITY_ERR_ACQ_START , MDA_ACQ_START , NID_FLAG , LC , LD , METHOD_ID) ```

	``VALUES (:new.SAMPLE_ID , :new.NUCLIDE_ID , :new.CONC , :new.CONC_ERR , :new.MDC , :new.ACTIVITY_ACQ_START , :new.ACTIVITY_ERR_ACQ_START , :new.MDA_ACQ_START , :new.NID_FLAG , :new.LC , :new.LD , :new.METHOD_ID); ELSIF UPDATING THEN UPDATE rmsman.gards_bg_isotope_concs set SAMPLE_ID = :new.SAMPLE_ID , NUCLIDE_ID = :new.NUCLIDE_ID , CONC = :new.CONC , CONC_ERR = :new.CONC_ERR , MDC = :new.MDC , ACTIVITY_ACQ_START = :new.ACTIVITY_ACQ_START , ACTIVITY_ERR_ACQ_START = :new.ACTIVITY_ERR_ACQ_START , MDA_ACQ_START = :new.MDA_ACQ_START , NID_FLAG = :new.NID_FLAG , LC = :new.LC , LD = :new.LD , METHOD_ID = :new.METHOD_ID where sample_id = :old.sample_id; ELSE delete from rmsman.gards_bg_isotope_concs where sample_id = :old.sample_id; END IF; end;```

5.3.58. GARDS_BG_PROC_PARAMS_I_U_D

Table	GARDS_BG_PROC_PARAMS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	```begin IF INSERTING THEN INSERT into rmsman.gards_bg_proc_params (SAMPLE_ID, LC_ABSCISSA, METHOD, DET_BKGND_USED, GAS_BKGND_USED, BETA_ECR_ORDER, GAMMA_ECR_ORDER,```

```
                MAX_QC_DEV,
                QC_ID,
                XE_IN_AIR,
                DET_BKGND_ID,
                GAS_BKGND_ID,
                QC_B_THRESHOLD,
                BIN_ROWS,
                BIN_MIN_COUNT,
                BIN_GAMMA_START,
                BIN_BETA_START,
                BIN_MAX_VECTOR_SIZE,
                INTERFERENCE_USED
                )
        VALUES (
                :new.SAMPLE_ID,
                :new.LC_ABSCISSA,
                :new.METHOD,
                :new.DET_BKGND_USED,
                :new.GAS_BKGND_USED,
                :new.BETA_ECR_ORDER,
                :new.GAMMA_ECR_ORDER,
                :new.MAX_QC_DEV,
                :new.QC_ID,
                :new.XE_IN_AIR,
                :new.DET_BKGND_ID,
                :new.GAS_BKGND_ID,
                :new.QC_B_THRESHOLD,
                :new.BIN_ROWS,
                :new.BIN_MIN_COUNT,
                :new.BIN_GAMMA_START,
                :new.BIN_BETA_START,
                :new.BIN_MAX_VECTOR_SIZE,
                :new.INTERFERENCE_USED
                );
        ELSIF UPDATING THEN
        UPDATE rmsman.gards_bg_proc_params set
                SAMPLE_ID = :new.SAMPLE_ID,
                LC_ABSCISSA = :new.LC_ABSCISSA,
                METHOD = :new.METHOD,
                DET_BKGND_USED = :new.DET_BKGND_USED,
                GAS_BKGND_USED = :new.GAS_BKGND_USED,
                BETA_ECR_ORDER = :new.BETA_ECR_ORDER,
                GAMMA_ECR_ORDER = :new.GAMMA_ECR_ORDER,
                MAX_QC_DEV = :new.MAX_QC_DEV,
                QC_ID = :new.QC_ID,
                XE_IN_AIR = :new.XE_IN_AIR,
                DET_BKGND_ID = :new.DET_BKGND_ID,
                GAS_BKGND_ID = :new.GAS_BKGND_ID,
                QC_B_THRESHOLD = :new.QC_B_THRESHOLD,
                BIN_ROWS = :new.BIN_ROWS,
                BIN_MIN_COUNT = :new.BIN_MIN_COUNT,
                BIN_GAMMA_START = :new.BIN_GAMMA_START,
                BIN_BETA_START = :new.BIN_BETA_START,
```

	`` BIN_MAX_VECTOR_SIZE = :new.BIN_MAX_VECTOR_SIZE, INTERFERENCE_USED = :new.INTERFERENCE_USED where sample_id= :old.sample_id; ELSE delete from rmsman.gards_bg_proc_params where sample_id = :old.sample_id; END IF; end; ```

5.3.59. GARDS_BG_PROC_PARAMS_ROI_I_U_D

Table	GARDS_BG_PROC_PARAMS_ROI
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	``` begin IF INSERTING THEN INSERT into rmsman.gards_bg_proc_params_roi (SAMPLE_ID , ROI , HALFLIFE_SEC , ABUNDANCE , NUCLIDE_ID) VALUES (:new.SAMPLE_ID , :new.ROI , :new.HALFLIFE_SEC , :new.ABUNDANCE , :new.NUCLIDE_ID); ELSIF UPDATING THEN UPDATE rmsman.gards_bg_proc_params_roi set SAMPLE_ID = :new.SAMPLE_ID , ROI = :new.ROI , HALFLIFE_SEC = :new.HALFLIFE_SEC , ABUNDANCE = :new.ABUNDANCE , NUCLIDE_ID = :new.NUCLIDE_ID where sample_id= :old.sample_id; ELSE delete from rmsman.gards_bg_proc_params_roi where sample_id = :old.sample_id; END IF; end; ```

5.3.60. GARDS_BG_QC_RESULT_I_U_D

Table	GARDS_BG_QC_RESULT
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	``` begin IF INSERTING THEN ```

	`INSERT into rmsman.gards_bg_qc_result (` `SAMPLE_ID ,` `AMPLITUDE ,` `FWHM ,` `CENTROID ,` `OFFSET ,` `SLOPE` `)` `VALUES (` `:new.SAMPLE_ID ,` `:new.AMPLITUDE ,` `:new.FWHM ,` `:new.CENTROID ,` `:new.OFFSET ,` `:new.SLOPE` `);` `ELSIF UPDATING THEN` `UPDATE rmsman.gards_bg_qc_result set` `SAMPLE_ID = :new.SAMPLE_ID ,` `AMPLITUDE = :new.AMPLITUDE ,` `FWHM = :new.FWHM ,` `CENTROID = :new.CENTROID ,` `OFFSET = :new.OFFSET ,` `SLOPE = :new.SLOPE` `where sample_id = :old.sample_id;` `ELSE` `delete from rmsman.gards_bg_qc_result where` `sample_id = :old.sample_id;` `END IF;` `end;`

5.3.61. GARDS_BG_ROI_CONCS_I_U_D

Table	GARDS_BG_ROI_CONCS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	`begin` `IF INSERTING THEN` `INSERT into rmsman.gards_bg_roi_concs (` `SAMPLE_ID ,` `ROI ,` `CONC ,` `CONC_ERR ,` `MDC ,` `NID_FLAG ,` `LC ,` `LD ,` `METHOD_ID` `)` `VALUES (` `:new.SAMPLE_ID ,`

	`` :new.ROI , :new.CONC , :new.CONC_ERR , :new.MDC , :new.NID_FLAG , :new.LC , :new.LD , :new.METHOD_ID); ELSIF UPDATING THEN UPDATE rmsman.gards_bg_roi_concs set SAMPLE_ID = :new.SAMPLE_ID , ROI = :new.ROI , CONC = :new.CONC , CONC_ERR = :new.CONC_ERR , MDC = :new.MDC , NID_FLAG = :new.NID_FLAG , LC = :new.LC , LD = :new.LD , METHOD_ID = :new.METHOD_ID where SAMPLE_ID = :old.SAMPLE_ID and ROI = :old.ROI and METHOD_ID = :old.METHOD_ID; ELSE delete from rmsman.gards_bg_roi_concs where SAMPLE_ID = :old.SAMPLE_ID and ROI = :old.ROI and METHOD_ID = :old.METHOD_ID; END IF; end; ```

5.3.62. GARDS_BG_ROI_COUNTS_I_U_D

Table	GARDS_BG_ROI_COUNTS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	``` begin if inserting then insert into RMSMAN.GARDS_BG_ROI_COUNTS (SAMPLE_ID, ROI, GROSS, GROSS_ERR, GAS_BKGND_GROSS, TEMP_COUNT, TEMP_COUNT_ERR, GAS_BKGND_COUNT, GAS_BKGND_COUNT_ERR, ```

	`` DET_BKGND_COUNT, DET_BKGND_COUNT_ERR, NET_COUNT, NET_COUNT_ERR, CRITICAL_LEV_SAMP, CRITICAL_LEV_GAS, MODDATE, METHOD_ID) values (:new.SAMPLE_ID, :new.ROI, :new.GROSS, :new.GROSS_ERR, :new.GAS_BKGND_GROSS, :new.TEMP_COUNT, :new.TEMP_COUNT_ERR, :new.GAS_BKGND_COUNT, :new.GAS_BKGND_COUNT_ERR, :new.DET_BKGND_COUNT, :new.DET_BKGND_COUNT_ERR, :new.NET_COUNT, :new.NET_COUNT_ERR, :new.CRITICAL_LEV_SAMP, :new.CRITICAL_LEV_GAS, :new.MODDATE, :new.METHOD_ID); elsif updating then update RMSMAN.GARDS_BG_ROI_COUNTS set GROSS = :new.GROSS, GROSS_ERR = :new.GROSS_ERR, GAS_BKGND_GROSS = :new.GAS_BKGND_GROSS, TEMP_COUNT = :new.TEMP_COUNT, TEMP_COUNT_ERR = :new.TEMP_COUNT_ERR, GAS_BKGND_COUNT = :new.GAS_BKGND_COUNT, GAS_BKGND_COUNT_ERR = :new.GAS_BKGND_COUNT_ERR, DET_BKGND_COUNT = :new.DET_BKGND_COUNT, DET_BKGND_COUNT_ERR = :new.DET_BKGND_COUNT_ERR, NET_COUNT = :new.NET_COUNT, NET_COUNT_ERR = :new.NET_COUNT_ERR, CRITICAL_LEV_SAMP = :new.CRITICAL_LEV_SAMP, CRITICAL_LEV_GAS = :new.CRITICAL_LEV_GAS, MODDATE = :new.MODDATE, METHOD_ID = :new.METHOD_ID where SAMPLE_ID = :old.SAMPLE_ID and ROI = :old.ROI and METHOD_ID = :old.METHOD_ID; else delete from RMSMAN.GARDS_BG_ROI_COUNTS where SAMPLE_ID = :old.SAMPLE_ID and ROI = :old.ROI and ```

	` METHOD_ID = :old.METHOD_ID;` `   end if;` `end;`

5.3.63. GARDS_B_ENRGY_PRS_INSERT

Table	GARDS_B_ENERGY_PAIRS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	see below

```
begin
    if inserting then
      insert into rmsman.gards_b_energy_pairs (sample_id, de-
cay_mode, cal_energy, cal_error, channel, type, winner)
        values (:new.sample_id, :new.decay_mode, :new.cal_en-
ergy, :new.cal_error, :new.channel, :new.type, :new.winner);
    elsif updating then
      update rmsman.gards_b_energy_pairs set
        sample_id = :new.sample_id,
        decay_mode = :new.decay_mode ,
        cal_energy = :new.cal_energy ,
        cal_error = :new.cal_error ,
        channel = :new.channel ,
        type = :new.type,
        winner = :new.winner
        where sample_id= :old.sample_id and nvl(type,'NULL') =
nvl(:old.type,'NULL') and cal_energy = :old.cal_energy;
    else
      delete from rmsman.gards_b_energy_pairs where sample_id
= :old.sample_id and cal_energy = :old.cal_energy and
nvl(type,'NULL') = nvl(:old.type,'NULL');
    end if;
  end;
```

5.3.64. GARDS_B_ENRGY_PRS_ORG_I_U_D

Table	GARDS_B_ENERGY_PAIRS_ORIG
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	see below

```
begin
    if inserting then
        insert into rmsman.gards_b_energy_pairs_orig
          (sample_id, decay_mode, cal_energy, cal_error, chan-
nel, type, winner)
        values (:new.sample_id, :new.decay_mode, :new.cal_en-
ergy, :new.cal_error, :new.channel, :new.type, :new.winner);
    elsif updating then
        update rmsman.gards_b_energy_pairs_orig set
          sample_id = :new.sample_id,
          decay_mode = :new.decay_mode ,
          cal_energy = :new.cal_energy ,
```

	`` cal_error = :new.cal_error , channel = :new.channel, type = :new.type, winner = :new.winner where sample_id= :old.sample_id and cal_energy = :old.cal_energy and nvl(type,'NULL') = nvl(:old.type,'NULL'); else delete from rmsman.gards_b_energy_pairs_orig where sample_id = :old.sample_id and cal_energy = :old.cal_energy and nvl(type,'NULL') = nvl(:old.type,'NULL'); end if; end;```

5.3.65. GARDS_B_RESOLUTION_CAL_B_I_U

Table	GARDS_B_RESOLUTION_CAL
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	begin :new.moddate := sysdate; end;

5.3.66. GARDS_B_RESOLUTION_CAL_I_U_D

Table	GARDS_B_RESOLUTION_CAL
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	begin IF INSERTING THEN insert into RMSMAN.GARDS_B_RESOLUTION_CAL (sample_id, coeff1, coeff2, coeff3, coeff4, coeff5, coeff6, coeff7, coeff8, type, winner) values (:new.sample_id, :new.coeff1, :new.coeff2, :new.coeff3, :new.coeff4,

	`` :new.coeff5, :new.coeff6, :new.coeff7, :new.coeff8, :new.type, :new.winner); ELSIF UPDATING THEN update RMSMAN.GARDS_B_RESOLUTION_CAL set sample_id = :new.sample_id, coeff1 = :new.coeff1, coeff2 = :new.coeff2, coeff3 = :new.coeff3, coeff4 = :new.coeff4, coeff5 = :new.coeff5, coeff6 = :new.coeff6, coeff7 = :new.coeff7, coeff8 = :new.coeff8, type = :new.type, winner = :new.winner where sample_id= :old.sample_id and NVL(type,'NULL') = NVL(:old.type,'NULL'); ELSE delete from RMSMAN.GARDS_B_RESOLUTION_CAL where sample_id = :old.sample_id and NVL(type,'NULL') = NVL(:old.-type,'NULL'); END IF; end; ```

5.3.67. GARDS_B_RES_PAIRS_I_U_D

Table	GARDS_B_RESOLUTION_PAIRS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	``` begin if inserting then insert into rmsman.gards_b_resolution_pairs (sample_id, res_energy, resolution, res_error, type, winner) values (:new.sample_id, :new.res_energy, :new.resolu-tion, :new.res_error, :new.type, :new.winner); elsif updating then update rmsman.gards_b_resolution_pairs set sample_id = :new.sample_id, res_energy = :new.res_energy, resolution = :new.resolution, res_error = :new.res_error, type = :new.type, winner = :new.winner where sample_id= :old.sample_id and nvl(type,'NULL') = nvl(:old.type,'NULL') and res_energy = :old.res_energy; else delete from rmsman.gards_b_resolution_pairs where sample_id = :old.sample_id and res_energy = :old.res_energy ```

	and nvl(type,'NULL') = nvl(:old.type,'NULL'); end if; end;

5.3.68. GARDS_B_RES_PRS_ORIG_I_U_D

Table	GARDS_B_RESOLUTION_PAIRS_ORIG
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	begin if inserting then insert into rmsman.gards_b_resolution_pairs_orig (sample_id, res_energy, resolution, res_error, type, winner) values (:new.sample_id, :new.res_energy, :new.resolu- tion, :new.res_error, :new.type, :new.winner); elsif updating then update rmsman.gards_b_resolution_pairs_orig set sample_id = :new.sample_id, res_energy = :new.res_energy, res- olution = :new.resolution, res_error = :new.res_error, type = :new.type, winner = :new.winner where sample_id= :old.sample_id and nvl(type,'NULL') = nvl(:old.type,'NULL') and res_energy = :old.res_energy; else delete from rmsman.gards_b_resolution_pairs_orig where sample_id = :old.sample_id and res_energy = :old.res_energy and nvl(type,'NULL') = nvl(:old.type,'NULL'); end if; end;

5.3.69. GARDS_COMMENTS_I_U_D

Table	GARDS_COMMENTS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	begin IF INSERTING THEN insert into rmsman.gards_comments (sample_id, peak_id, nucl_name, comment_id, analyst, dtg, comment_type) values (:new.sample_id, :new.peak_id, :new.nucl_name,

```
                  :new.comment_id,
                  :new.analyst,
                  :new.dtg,
                  :new.comment_type
                );
        ELSIF UPDATING THEN
                update rmsman.gards_comments set
                  sample_id = :new.sample_id,
                  peak_id = :new.peak_id,
                  nucl_name = :new.nucl_name,
                  comment_id = :new.comment_id,
                  analyst = :new.analyst,
                  dtg = :new.dtg,
                  comment_type = :new.comment_type
                where comment_id= :old.comment_id;
        ELSE
                delete from rmsman.gards_comments where comment_id
= :old.comment_id;
        END IF;
end;
```

5.3.70. GARDS_EFFICIENCY_CAL_I_U_D

Table	GARDS_EFFICIENCY_CAL
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	(see below)

```
begin
        IF INSERTING THEN
                insert into rmsman.gards_efficiency_cal (
                  sample_id,
                  degree,
                  efftype,
                  coeff1,
                  coeff2,
                  coeff3,
                  coeff4,
                  coeff5,
                  coeff6,
                  coeff7,
                  coeff8
                )
                values (
                  :new.sample_id,
                  :new.degree,
                  :new.efftype,
                  :new.coeff1,
                  :new.coeff2,
                  :new.coeff3,
                  :new.coeff4,
                  :new.coeff5,
                  :new.coeff6,
```

	`` :new.coeff7, :new.coeff8); ELSIF UPDATING THEN update rmsman.gards_efficiency_cal set sample_id = :new.sample_id, degree = :new.degree, efftype = :new.efftype, coeff1 = :new.coeff1, coeff2 = :new.coeff2, coeff3 = :new.coeff3, coeff4 = :new.coeff4, coeff5 = :new.coeff5, coeff6 = :new.coeff6, coeff7 = :new.coeff7, coeff8 = :new.coeff8 where sample_id= :old.sample_id; ELSE delete from rmsman.gards_efficiency_cal where sample_id = :old.sample_id; END IF; end; ```

5.3.71. GARDS_EFFICIENCY_ERR_CAL_I_U_D

Table	GARDS_EFFICIENCY_ERROR_CAL
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	``` begin IF INSERTING THEN insert into rmsman.gards_efficiency_error_cal (sample_id, degree, type, coeff1, coeff2, coeff3, coeff4, coeff5, ```

```
                 coeff6,
                 coeff7,
                 coeff8
               )
               values (
                 :new.sample_id,
                 :new.degree,
                 :new.type,
                 :new.coeff1,
                 :new.coeff2,
                 :new.coeff3,
                 :new.coeff4,
                 :new.coeff5,
                 :new.coeff6,
                 :new.coeff7,
                 :new.coeff8
               );
       ELSIF UPDATING THEN
               update rmsman.gards_efficiency_error_cal set
                 sample_id = :new.sample_id,
                 degree = :new.degree,
                 type = :new.type,
                 coeff1 = :new.coeff1,
                 coeff2 = :new.coeff2,
                 coeff3 = :new.coeff3,
                 coeff4 = :new.coeff4,
                 coeff5 = :new.coeff5,
```

	`` coeff6 = :new.coeff6, coeff7 = :new.coeff7, coeff8 = :new.coeff8 where sample_id= :old.sample_id; ELSE delete from rmsman.gards_efficiency_error_cal where sample_id = :old.sample_id; END IF; end; ```

5.3.72. *GARDS_EFFICIENCY_PAIRS_I_U_D*

Table	GARDS_EFFICIENCY_PAIRS
Type	AFTER EACH ROW
Event	INSERT
Trigger body	see below

```
begin
      IF INSERTING THEN
            insert into rmsman.gards_efficiency_pairs (
              sample_id,
              effic_energy,
              efficiency,
              effic_error
            )
            values (
              :new.sample_id,
              :new.effic_energy,
              :new.efficiency,
              :new.effic_error
            );
      ELSIF UPDATING THEN
            update rmsman.gards_efficiency_pairs set
              sample_id = :new.sample_id,
              effic_energy = :new.effic_energy,
              efficiency = :new.efficiency ,
              effic_error = :new.effic_error
            where sample_id= :old.sample_id and effic_energy =
:old.effic_energy;
      ELSE
            delete from rmsman.gards_efficiency_pairs where
sample_id = :old.sample_id and effic_energy = :old.effic_en-
ergy ;
      END IF;
end;
```

5.3.73. GARDS_ENERGY_CAL_COV_I_U_D

Table	GARDS_ENERGY_CAL_COV
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	`begin` ` IF INSERTING THEN` `  insert into rmsman.gards_energy_cal_cov (` `          sample_id,` `          row_index,` `          col_index,` `          coeff,` `          type,` `          winner` `        )` `        values (` `          :new.sample_id,` `          :new.row_index,` `          :new.col_index,` `          :new.coeff,` `          :new.type,` `          :new.winner` `        );` `    ELSIF UPDATING THEN` `        update rmsman.gards_energy_cal_cov set` `           sample_id = :new.sample_id,` `           row_index = :new.row_index,` `           col_index = :new.col_index,` `           coeff = :new.coeff,` `           type = :new.type,` `           winner = :new.winner` `        where sample_id= :old.sample_id and NVL(type,'NULL') = NVL(:old.type,'NULL') and row_index= :old.row_index and col_index= :old.col_index;` `    ELSE` `        delete from rmsman.gards_energy_cal_cov where sample_id = :old.sample_id and NVL(type,'NULL') = NVL(:old.type,'NULL')` `      and row_index= :old.row_index and col_index= :old.col_index;` `    END IF;` `end;`

5.3.74. GARDS_ENERGY_CAL_I_U_D

Table	GARDS_ENERGY_CAL
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	`begin` `        IF INSERTING THEN`

	`` insert into rmsman.gards_energy_cal (sample_id, coeff1, coeff2, coeff3, coeff4, coeff5, coeff6, coeff7, coeff8, energy_units, cnv_factor, ape, det, mse, tstat, score, type, winner) values (:new.sample_id, :new.coeff1, :new.coeff2, :new.coeff3, :new.coeff4, :new.coeff5, :new.coeff6, :new.coeff7, :new.coeff8, :new.energy_units, :new.cnv_factor, :new.ape, :new.det, :new.mse, :new.tstat, :new.score, :new.type, :new.winner); ELSIF UPDATING THEN update rmsman.gards_energy_cal set sample_id = :new.sample_id, coeff1 = :new.coeff1, coeff2 = :new.coeff2, coeff3 = :new.coeff3, coeff4 = :new.coeff4, coeff5 = :new.coeff5, coeff6 = :new.coeff6, coeff7 = :new.coeff7, coeff8 = :new.coeff8, energy_units = :new.energy_units, cnv_factor = :new.cnv_factor, ```

	`` ape = :new.ape, det = :new.det, mse = :new.mse, tstat = :new.tstat, score = :new.score, type = :new.type, winner = :new.winner where sample_id= :old.sample_id and NVL(type,'NULL') = NVL(:old.type,'NULL'); ELSE delete from rmsman.gards_energy_cal where sample_id = :old.sample_id and NVL(type,'NULL') = NVL(:old.- type,'NULL'); END IF; end; ```

5.3.75. GARDS_ENERGY_CAL_ORIG_I_U_D

Table	GARDS_ENERGY_CAL_ORIG
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	begin IF INSERTING THEN insert into rmsman.gards_energy_cal_orig (sample_id, coeff1, coeff2, coeff3, coeff4, coeff5, coeff6, coeff7, coeff8, energy_units, cnv_factor, ape, det, mse, tstat, score, type, winner) values (:new.sample_id, :new.coeff1, :new.coeff2, :new.coeff3, :new.coeff4, :new.coeff5, :new.coeff6,

	:new.coeff7, :new.coeff8, :new.energy_units, :new.cnv_factor, :new.ape, :new.det, :new.mse, :new.tstat, :new.score, :new.type, :new.winner); ELSIF UPDATING THEN update rmsman.gards_energy_cal_orig set sample_id = :new.sample_id, coeff1 = :new.coeff1, coeff2 = :new.coeff2, coeff3 = :new.coeff3, coeff4 = :new.coeff4, coeff5 = :new.coeff5, coeff6 = :new.coeff6, coeff7 = :new.coeff7, coeff8 = :new.coeff8, energy_units = :new.energy_units, cnv_factor = :new.cnv_factor, ape = :new.ape, det = :new.det, mse = :new.mse, tstat = :new.tstat, score = :new.score, type = :new.type, winner = :new.winner where sample_id= :old.sample_id and NVL(type,'NULL') = NVL(:old.type,'NULL'); ELSE delete from rmsman.gards_energy_cal_orig where sample_id = :old.sample_id and NVL(type,'NULL') = NVL(:old.-type,'NULL'); END IF; end;

5.3.76. GARDS_ENERGY_PAIRS_I_U_D

Table	GARDS_ENERGY_PAIRS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	begin IF INSERTING THEN insert into rmsman.gards_energy_pairs (sample_id, cal_energy,

	`` channel, cal_error, type, winner) values (:new.sample_id, :new.cal_energy, :new.channel, :new.cal_error, :new.type, :new.winner); ELSIF UPDATING THEN update rmsman.gards_energy_pairs set sample_id = :new.sample_id, cal_energy = :new.cal_energy, channel = :new.channel, cal_error = :new.cal_error, type = :new.type, winner = :new.winner where sample_id= :old.sample_id and NVL(type,'NULL') = NVL(:old.type,'NULL') and cal_energy = :old.cal_energy; ELSE delete from rmsman.gards_energy_pairs where sample_id = :old.sample_id and cal_energy = :old.cal_energy and NVL(type,'NULL') = NVL(:old.type,'NULL'); END IF; end; ```

5.3.77. GARDS_ENERGY_PAIRS_ORIG_I_U_D

Table	GARDS_ENERGY_PAIRS_ORIG
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	``` begin IF INSERTING THEN insert into rmsman.gards_energy_pairs_orig (sample_id, cal_energy, channel, cal_error, type, winner) values (:new.sample_id, :new.cal_energy, :new.channel, ```

	`` :new.cal_error, :new.type, :new.winner); ELSIF UPDATING THEN update rmsman.gards_energy_pairs_orig set sample_id = :new.sample_id, cal_energy = :new.cal_energy, channel = :new.channel, cal_error = :new.cal_error, type = :new.type, winner = :new.winner where sample_id= :old.sample_id and cal_energy = :old.cal_energy and NVL(type,'NULL') = NVL(:old.type,'NULL'); ELSE delete from rmsman.gards_energy_pairs_orig where sample_id = :old.sample_id and cal_energy = :old.cal_en- ergy and NVL(type,'NULL') = NVL(:old.type,'NULL'); END IF; end;```

5.3.78. GARDS_NCL_LNS_IDD_ORG_I_U_D

Table	GARDS_NUCL_LINES_IDED_ORIG
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	```begin IF INSERTING THEN insert into rmsman.gards_nucl_lines_ided_orig (sample_id, station_id, detector_id, name, energy, energy_err, abundance, abundance_err, peak, activity, activ_err, effic, effic_err, mda, key_flag, nuclide_id, csc_ratio, csc_ratio_err, csc_mod_flag, id_percent) values (```

	`` :new.sample_id, :new.station_id, :new.detector_id, :new.name, :new.energy, :new.energy_err, :new.abundance, :new.abundance_err, :new.peak, :new.activity, :new.activ_err, :new.effic, :new.effic_err, :new.mda, :new.key_flag, :new.nuclide_id, :new.csc_ratio, :new.csc_ratio_err, :new.csc_mod_flag, :new.id_percent); ELSIF UPDATING THEN update rmsman.gards_nucl_lines_ided_orig set sample_id = :new.sample_id, station_id = :new.station_id, detector_id = :new.detector_id, name = :new.name, energy = :new.energy, energy_err = :new.energy_err, abundance = :new.abundance, abundance_err = :new.abundance_err, peak = :new.peak, activity = :new.activity, activ_err = :new.activ_err, effic = :new.effic, effic_err = :new.effic_err, mda = :new.mda, key_flag = :new.key_flag, nuclide_id = :new.nuclide_id, csc_ratio = :new.csc_ratio, csc_ratio_err = :new.csc_ratio_err, csc_mod_flag = :new.csc_mod_flag, id_percent = :new.id_percent where sample_id= :old.sample_id and name = :old.name and en- ergy = :old.energy; ELSE delete from rmsman.gards_nucl_lines_ided_orig where sample_id = :old.sample_id and name = :old.name and energy = :old.energy; END IF; end; ```

5.3.79. GARDS_NUCL_IDED_I_U_D

Table	GARDS_NUCL_IDED
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	`begin` `        IF INSERTING THEN` `                insert into rmsman.gards_nucl_ided (` `                  sample_id,` `                  station_id,` `                  detector_id,` `                  nuclide_id,` `                  name,` `                  type,` `                  halflife,` `                  ave_activ,` `                  ave_activ_err,` `                  activ_key,` `                  activ_key_err,` `                  mda,` `                  mda_err,` `                  ave_activ_acq_start,` `                  ave_activ_err_acq_start,` `                  activ_key_acq_start,` `                  activ_key_err_acq_start,` `                  mda_acq_start,` `                  mda_err_acq_start,` `                  nid_flag,` `                  activ_decay,` `                  activ_decay_err,` `                  comp_confid,` `                  report_mda,` `                  pd_mod_flag,` `                  csc_ratio,` `                  csc_ratio_err,` `                  csc_mod_flag` `                )` `                values (` `                  :new.sample_id,` `                  :new.station_id,` `                  :new.detector_id,` `                  :new.nuclide_id,` `                  :new.name, :new.type,` `                  :new.halflife ,` `                  :new.ave_activ,` `                  :new.ave_activ_err,` `                  :new.activ_key,` `                  :new.activ_key_err,` `                  :new.mda,` `                  :new.mda_err,` `                  :new.ave_activ_acq_start,` `                  :new.ave_activ_err_acq_start,`

```
                  :new.activ_key_acq_start,
                  :new.activ_key_err_acq_start,
                  :new.mda_acq_start,
                  :new.mda_err_acq_start,
                  :new.nid_flag,
                  :new.activ_decay,
                  :new.activ_decay_err,
                  :new.comp_confid,
                  :new.report_mda,
                  :new.pd_mod_flag,
                  :new.csc_ratio,
                  :new.csc_ratio_err,
                  :new.csc_mod_flag
                );
        ELSIF UPDATING THEN
                update rmsman.gards_nucl_ided set
                  sample_id = :new.sample_id,
                  station_id = :new.station_id,
                  detector_id = :new.detector_id,
                  nuclide_id = :new.nuclide_id,
                  name = :new.name,
                  type = :new.type,
                  halflife = :new.halflife ,
                  ave_activ = :new.ave_activ,
                  ave_activ_err = :new.ave_activ_err ,
                  activ_key = :new.activ_key,
                  activ_key_err = :new.activ_key_err,
                  mda = :new.mda,
                  mda_err = :new.mda_err,
                  ave_activ_acq_start
= :new.ave_activ_acq_start,
                  ave_activ_err_acq_start
= :new.ave_activ_err_acq_start ,
                  activ_key_acq_start
= :new.activ_key_acq_start,
                  activ_key_err_acq_start
= :new.activ_key_err_acq_start,
                  mda_acq_start = :new.mda_acq_start,
                  mda_err_acq_start = :new.mda_err_acq_start,
                  nid_flag = :new.nid_flag,
                  activ_decay = :new.activ_decay,
                  activ_decay_err = :new.activ_decay_err,
                  comp_confid = :new.comp_confid,
                  report_mda = :new.report_mda,
                  pd_mod_flag = :new.pd_mod_flag,
                  csc_ratio = :new.csc_ratio,
                  csc_ratio_err = :new.csc_ratio_err,
                  csc_mod_flag = :new.csc_mod_flag
                where sample_id= :old.sample_id and name
= :old.name;
        ELSE
                delete from rmsman.gards_nucl_ided where
sample_id = :old.sample_id and name = :old.name;
```

	`` END IF; end; ```

5.3.80. GARDS_NUCL_IDED_ORIG_I_U_D

Table	GARDS_NUCL_IDED_ORIG
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	(see below)

```
begin
        IF INSERTING THEN
                insert into rmsman.gards_nucl_ided_orig (
                  sample_id,
                  station_id,
                  detector_id,
                  nuclide_id,
                  name,
                  type,
                  halflife,
                  ave_activ,
                  ave_activ_err,
                  activ_key,
                  activ_key_err,
                  mda,
                  mda_err,
                  ave_activ_acq_start,
                  ave_activ_err_acq_start,
                  activ_key_acq_start,
                  activ_key_err_acq_start,
                  mda_acq_start,
                  mda_err_acq_start,
                  nid_flag,
                  activ_decay,
                  activ_decay_err,
                  comp_confid,
                  report_mda,
                  pd_mod_flag,
                  csc_ratio,
                  csc_ratio_err,
                  csc_mod_flag
                )
                values (
                  :new.sample_id,
                  :new.station_id,
                  :new.detector_id,
                  :new.nuclide_id,
                  :new.name,
                  :new.type,
                  :new.halflife,
                  :new.ave_activ,
                  :new.ave_activ_err,
                  :new.activ_key,
```

```
                  :new.activ_key_err,
                  :new.mda,
                  :new.mda_err,
                  :new.ave_activ_acq_start,
                  :new.ave_activ_err_acq_start,
                  :new.activ_key_acq_start,
                  :new.activ_key_err_acq_start,
                  :new.mda_acq_start,
                  :new.mda_err_acq_start,
                  :new.nid_flag,
                  :new.activ_decay,
                  :new.activ_decay_err,
                  :new.comp_confid,
                  :new.report_mda,
                  :new.pd_mod_flag,
                  :new.csc_ratio,
                  :new.csc_ratio_err,
                  :new.csc_mod_flag
                );
        ELSIF UPDATING THEN
                update rmsman.gards_nucl_ided_orig set
                  sample_id = :new.sample_id,
                  station_id = :new.station_id ,
                  detector_id = :new.detector_id,
                  nuclide_id = :new.nuclide_id,
                  name = :new.name,
                  type = :new.type,
                  halflife = :new.halflife,
                  ave_activ = :new.ave_activ,
                  ave_activ_err = :new.ave_activ_err,
                  activ_key = :new.activ_key,
                  activ_key_err = :new.activ_key_err,
                  mda = :new.mda,
                  mda_err = :new.mda_err,
                  ave_activ_acq_start
= :new.ave_activ_acq_start,
                  ave_activ_err_acq_start
= :new.ave_activ_err_acq_start,
                  activ_key_acq_start
= :new.activ_key_acq_start,
                  activ_key_err_acq_start
= :new.activ_key_err_acq_start,
                  mda_acq_start = :new.mda_acq_start,
                  mda_err_acq_start = :new.mda_err_acq_start,
                  nid_flag = :new.nid_flag,
                  activ_decay = :new.activ_decay,
                  activ_decay_err = :new.activ_decay_err,
                  comp_confid = :new.comp_confid ,
                  report_mda = :new.report_mda,
                  pd_mod_flag = :new.pd_mod_flag,
                  csc_ratio = :new.csc_ratio,
                  csc_ratio_err = :new.csc_ratio_err,
                  csc_mod_flag = :new.csc_mod_flag
```

	`where sample_id= :old.sample_id and name = :old.name;` `ELSE` `delete from rmsman.gards_nucl_ided_orig where sample_id = :old.sample_id and name = :old.name;` `END IF;` `end;`

5.3.81. GARDS_NUCL_LINES_IDED_I_U_D

Table	GARDS_NUCL_LINES_IDED
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	see below

```
begin
 IF INSERTING THEN
  insert into rmsman.gards_nucl_lines_ided (
    sample_id,
    station_id,
    detector_id,
    name,
    energy,
    energy_err,
    abundance,
    abundance_err,
    peak,
    activity,
    activ_err,
    effic,
    effic_err,
    mda,
    key_flag,
    nuclide_id,
                  csc_ratio,
                  csc_ratio_err,
                  csc_mod_flag,
                  id_percent
  )
  values (
    :new.sample_id,
    :new.station_id,
    :new.detector_id,
    :new.name,
    :new.energy,
    :new.energy_err,
    :new.abundance,
    :new.abundance_err,
    :new.peak,
    :new.activity,
    :new.activ_err,
    :new.effic,
```

	`` :new.effic_err, :new.mda, :new.key_flag, :new.nuclide_id, :new.csc_ratio, :new.csc_ratio_err, :new.csc_mod_flag, :new.id_percent); ELSIF UPDATING THEN update rmsman.gards_nucl_lines_ided set sample_id = :new.sample_id, station_id = :new.station_id, detector_id = :new.detector_id, name = :new.name, energy = :new.energy, energy_err = :new.energy_err, abundance = :new.abundance, abundance_err = :new.abundance_err, peak = :new.peak, activity = :new.activity, activ_err = :new.activ_err, effic = :new.effic , effic_err = :new.effic_err, mda = :new.mda, key_flag = :new.key_flag, nuclide_id = :new.nuclide_id, csc_ratio = :new.csc_ratio, csc_ratio_err = :new.csc_ratio_err, csc_mod_flag = :new.csc_mod_flag, id_percent = :new.id_percent where sample_id= :old.sample_id and name = :old.name and en- ergy = :old.energy; ELSE delete from rmsman.gards_nucl_lines_ided where sample_id = :old.sample_id and name = :old.name and energy = :old.energy; END IF; end; ```

5.3.82. GARDS_PEAKS_I_U_D

Table	GARDS_PEAKS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	``` begin IF INSERTING THEN insert into rmsman.gards_peaks (sample_id, peak_id, centroid, ```

	`` centroid_err, energy, energy_err, left_chan, width, back_count, back_uncer, fwhm, fwhm_err, area, area_err, original_area, original_uncer, counts_sec, counts_sec_err, efficiency, eff_error, back_channel, ided, fitted, multiplet, peak_sig, lc, pss, peak_tol, detectability, bkgnd_area, bkgnd_area_err, net_area, net_area_err) values (:new.sample_id, :new.peak_id, :new.centroid, :new.centroid_err, :new.energy, :new.energy_err, :new.left_chan, :new.width, :new.back_count, :new.back_uncer, :new.fwhm, :new.fwhm_err, :new.area, :new.area_err, :new.original_area, :new.original_uncer, :new.counts_sec, :new.counts_sec_err, :new.efficiency, :new.eff_error, :new.back_channel, :new.ided, ```

	`` :new.fitted, :new.multiplet, :new.peak_sig, :new.lc, :new.pss, :new.peak_tol, :new.detectability, :new.bkgnd_area, :new.bkgnd_area_err, :new.net_area, :new.net_area_err); ELSIF UPDATING THEN update rmsman.gards_peaks set sample_id = :new.sample_id , peak_id = :new.peak_id, centroid = :new.centroid, centroid_err = :new.centroid_err, energy = :new.energy, energy_err = :new.energy_err, left_chan = :new.left_chan, width = :new.width, back_count = :new.back_count, back_uncer = :new.back_uncer, fwhm = :new.fwhm , fwhm_err = :new.fwhm_err, area = :new.area, area_err = :new.area_err, original_area = :new.original_area, original_uncer = :new.original_uncer, counts_sec = :new.counts_sec , counts_sec_err = :new.counts_sec_err , efficiency = :new.efficiency, eff_error = :new.eff_error , back_channel = :new.back_channel, ided = :new.ided, fitted = :new.fitted, multiplet = :new.multiplet, peak_sig = :new.peak_sig, lc = :new.lc, pss = :new.pss, peak_tol = :new.peak_tol, detectability = :new.detectability, bkgnd_area = :new.bkgnd_area, bkgnd_area_err = :new.bkgnd_area_err, net_area = :new.net_area, net_area_err = :new.net_area_err where sample_id= :old.sample_id and peak_id = :old.peak_id; ELSE delete from rmsman.gards_peaks where sample_id = :old.sample_id and peak_id = :old.peak_id; END IF; end; ```

5.3.83. GARDS_PEAKS_ORIG_I_U_D

Table	GARDS_PEAKS_ORIG
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	<pre>begin IF INSERTING THEN insert into rmsman.gards_peaks_orig (sample_id, peak_id, centroid, centroid_err, energy, energy_err, left_chan, width, back_count, back_uncer, fwhm, fwhm_err, area, area_err, original_area, original_uncer, counts_sec, counts_sec_err, efficiency, eff_error, back_channel, ided, fitted, multiplet, peak_sig, lc, pss, peak_tol, detectability) values (:new.sample_id, :new.peak_id, :new.centroid, :new.centroid_err, :new.energy, :new.energy_err, :new.left_chan, :new.width, :new.back_count, :new.back_uncer, :new.fwhm, :new.fwhm_err, :new.area,</pre>

	`` :new.area_err, :new.original_area, :new.original_uncer, :new.counts_sec, :new.counts_sec_err, :new.efficiency, :new.eff_error, :new.back_channel, :new.ided, :new.fitted, :new.multiplet, :new.peak_sig, :new.lc, :new.pss, :new.peak_tol, :new.detectability); ELSIF UPDATING THEN update rmsman.gards_peaks_orig set sample_id = :new.sample_id, peak_id = :new.peak_id, centroid = :new.centroid, centroid_err = :new.centroid_err, energy = :new.energy, energy_err = :new.energy_err , left_chan = :new.left_chan, width = :new.width, back_count = :new.back_count , back_uncer = :new.back_uncer, fwhm = :new.fwhm , fwhm_err = :new.fwhm_err, area = :new.area, area_err = :new.area_err, original_area = :new.original_area, original_uncer = :new.original_uncer, counts_sec = :new.counts_sec, counts_sec_err = :new.counts_sec_err, efficiency = :new.efficiency, eff_error = :new.eff_error, back_channel = :new.back_channel, ided = :new.ided, fitted = :new.fitted, multiplet = :new.multiplet, peak_sig = :new.peak_sig, lc = :new.lc, pss = :new.pss, peak_tol = :new.peak_tol, detectability = :new.detectability where sample_id= :old.sample_id and peak_id = :old.peak_id; ELSE delete from rmsman.gards_peaks_orig where sample_id = :old.sample_id and peak_id = :old.peak_id; END IF; ```

	end;

5.3.84. GARDS_PRODUCT_I_U_D

Table	GARDS_PRODUCT
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	begin IF INSERTING THEN insert into rmsman.gards_product (sample_id, foff, dsize, dir, dfile, author, revision, typeid) VALUES (:new.sample_id, :new.foff, :new.dsize, :new.dir, :new.dfile, :new.author, :new.revision, :new.typeid); ELSIF UPDATING THEN update rmsman.gards_product set sample_id = :new.sample_id, foff = :new.foff, dsize = :new.dsize, dir = :new.dir, dfile = :new.dfile, author = :new.author, revision = :new.revision, typeid = :new.typeid where sample_id= :old.sample_id and dfile = :old.dfile and typeid = :old.typeid; ELSE delete from rmsman.gards_product where sample_id = :old.sample_id and dfile = :old.dfile and typeid = :old.typeid; END IF; end;

5.3.85. GARDS_QCHISTORY_I_U_D

Table	GARDS_QCHISTORY
Type	AFTER EACH ROW

Event	INSERT OR UPDATE OR DELETE
Trigger body	`begin` `      IF INSERTING THEN` `            insert into rmsman.gards_qchistory (` `              station_id,` `              detector_id,` `              sample_id,` `              state,` `              lddate` `            )` `            values (` `              :new.station_id,` `              :new.detector_id,` `              :new.sample_id,` `              :new.state,` `              :new.lddate` `            );` `      ELSIF UPDATING THEN` `            update rmsman.gards_qchistory set` `              station_id = :new.station_id,` `              detector_id = :new.detector_id,` `              sample_id = :new.sample_id ,` `              state = :new.state,` `              lddate = :new.lddate` `            where sample_id= :old.sample_id and state` `= :old.state;` `      ELSE` `            delete from rmsman.gards_qchistory where sample_id` `= :old.sample_id` `                  and state = :old.state;` `      END IF;` `end;`

5.3.86. GARDS_QC_RESULTS_I_U_D

Table	GARDS_QC_RESULTS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	`begin` ` IF INSERTING THEN` `        insert into rmsman.gards_qc_results (` `          sample_id,` `          test_name,` `          flag,` `          qc_comment` `        )` `        values (` `          :new.sample_id,` `          :new.test_name,` `          :new.flag,` `          :new.qc_comment`

	``); ELSIF UPDATING THEN update rmsman.gards_qc_results set sample_id = :new.sample_id, test_name = :new.test_name, flag = :new.flag, qc_comment = :new.qc_comment where sample_id = :old.sample_id; ELSE delete from rmsman.gards_qc_results where sample_id = :old.sample_id; END IF; end; ```

5.3.87. GARDS_RESOLUTION_CAL_COV_I_U_D

Table	GARDS_RESOLUTION_CAL_COV
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	``` begin IF INSERTING THEN insert into rmsman.gards_resolution_cal_cov (sample_id, row_index, col_index, coeff, type, winner) values (:new.sample_id, :new.row_index, :new.col_index, :new.coeff, :new.type, :new.winner); ELSIF UPDATING THEN update rmsman.gards_resolution_cal_cov set sample_id = :new.sample_id, row_index = :new.row_index, col_index = :new.col_index, coeff = :new.coeff, type = :new.type, winner = :new.winner where sample_id= :old.sample_id and NVL(type,'NULL') = NVL(:old.type,'NULL') and row_index= :old.row_index and col_index= :old.col_index; ELSE delete from rmsman.gards_resolution_cal_cov where sample_id = :old.sample_id and NVL(type,'NULL') = NVL(:old.- ```

	type,'NULL') and row_index= :old.row_index and col_index= :old.col_index; END IF; end;

5.3.88. GARDS_RESOLUTION_CAL_I_U_D

Table	GARDS_RESOLUTION_CAL
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	begin IF INSERTING THEN insert into rmsman.gards_resolution_cal (sample_id, coeff1, coeff2, coeff3, coeff4, coeff5, coeff6, coeff7, coeff8, type, winner) values (:new.sample_id, :new.coeff1, :new.coeff2, :new.coeff3, :new.coeff4, :new.coeff5, :new.coeff6, :new.coeff7, :new.coeff8, :new.type, :new.winner); ELSIF UPDATING THEN update rmsman.gards_resolution_cal set sample_id = :new.sample_id, coeff1 = :new.coeff1, coeff2 = :new.coeff2, coeff3 = :new.coeff3, coeff4 = :new.coeff4, coeff5 = :new.coeff5, coeff6 = :new.coeff6, coeff7 = :new.coeff7, coeff8 = :new.coeff8, type = :new.type,

	`winner = :new.winner` `where sample_id= :old.sample_id and NVL(type,'NULL') = NVL(:old.type,'NULL');` `ELSE` `delete from rmsman.gards_resolution_cal where sample_id = :old.sample_id and NVL(type,'NULL') = NVL(:old.type,'NULL');` `END IF;` `end;`

5.3.89. GARDS_RESOLUTION_PAIRS_I_U_D

Table	GARDS_RESOLUTION_PAIRS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	`begin` `IF INSERTING THEN` `insert into rmsman.gards_resolution_pairs (` `sample_id,` `res_energy,` `resolution,` `res_error,` `type,` `winner` `)` `values (` `:new.sample_id,` `:new.res_energy,` `:new.resolution,` `:new.res_error,` `:new.type,` `:new.winner` `);` `ELSIF UPDATING THEN` `update rmsman.gards_resolution_pairs set` `sample_id = :new.sample_id,` `res_energy = :new.res_energy,` `resolution = :new.resolution,` `res_error = :new.res_error,` `type = :new.type,` `winner = :new.winner` `where sample_id= :old.sample_id and res_energy = :old.res_energy and NVL(type,'NULL') = NVL(:old.type,'NULL');` `ELSE` `delete from rmsman.gards_resolution_pairs where sample_id = :old.sample_id and res_energy = :old.res_energy and NVL(type,'NULL') = NVL(:old.type,'NULL');` `END IF;` `end;`

5.3.90. GARDS_RES_CAL_ORIG_I_U_D

Table	GARDS_RESOLUTION_CAL_ORIG
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	begin IF INSERTING THEN insert into rmsman.gards_resolution_cal_orig (sample_id, coeff1, coeff2, coeff3, coeff4, coeff5, coeff6, coeff7, coeff8, type, winner) values (:new.sample_id, :new.coeff1, :new.coeff2, :new.coeff3, :new.coeff4, :new.coeff5, :new.coeff6, :new.coeff7, :new.coeff8, :new.type, :new.winner); ELSIF UPDATING THEN update rmsman.gards_resolution_cal_orig set sample_id = :new.sample_id, coeff1 = :new.coeff1, coeff2 = :new.coeff2, coeff3 = :new.coeff3, coeff4 = :new.coeff4, coeff5 = :new.coeff5, coeff6 = :new.coeff6, coeff7 = :new.coeff7, coeff8 = :new.coeff8, type = :new.type, winner = :new.winner where sample_id= :old.sample_id and NVL(type,'NULL') = NVL(:old.type,'NULL'); ELSE delete from rmsman.gards_resolution_cal_orig where sample_id = :old.sample_id and NVL(type,'NULL') = NVL(:old.type,'NULL');

	END IF; end;

5.3.91. GARDS_RES_PAIRS_ORIG_I_U_D

Table	GARDS_RESOLUTION_PAIRS_ORIG
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	begin IF INSERTING THEN insert into rmsman.gards_resolution_pairs_orig (sample_id, res_energy, resolution, res_error, type, winner) values (:new.sample_id, :new.res_energy, :new.resolution, :new.res_error, :new.type, :new.winner); ELSIF UPDATING THEN update rmsman.gards_resolution_pairs_orig set sample_id = :new.sample_id, res_energy = :new.res_energy, resolution = :new.resolution, res_error = :new.res_error, type = :new.type, winner = :new.winner where sample_id= :old.sample_id and res_energy = :new.res_energy and NVL(type,'NULL') = NVL(:old.type,'NULL'); ELSE delete from rmsman.gards_resolution_pairs_orig where sample_id = :old.sample_id and res_energy = :new.res_en- ergy and NVL(type,'NULL') = NVL(:old.type,'NULL'); END IF; end;

5.3.92. GARDS_RLR_B_I_U

Table	GARDS_RLR
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	begin

	`` :new.moddate := sysdate; end; ```

5.3.93. GARDS_ROI_CHANNELS_I_U_D

Table	GARDS_ROI_CHANNELS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	see below

```
begin
      IF INSERTING THEN
            insert into rmsman.gards_roi_channels (
              sample_id, roi, b_chan_start, b_chan_stop,
g_chan_start, g_chan_stop
            )
            values (
              :new.sample_id, :new.roi, :new.b_chan_start, :ne
w.b_chan_stop, :new.g_chan_start, :new.g_chan_stop);
      ELSIF UPDATING THEN
            update rmsman.gards_roi_channels set
              sample_id = :new.sample_id,
              roi = :new.sample_id,
              b_chan_start = :new.b_chan_start,
              b_chan_stop = :new.b_chan_stop,
              g_chan_start = :new.g_chan_start,
              g_chan_stop = :new.g_chan_stop
            where sample_id= :old.sample_id and roi
= :old.roi;
      ELSE
            delete from rmsman.gards_roi_channels where
sample_id = :old.sample_id and roi = :old.roi;
      END IF;
end;
```

5.3.94. GARDS_ROI_CONCS_I_U_D

Table	GARDS_ROI_CONCS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	see below

```
begin
      IF INSERTING THEN
            insert into rmsman.gards_roi_concs (
              sample_id, roi, activity, activ_err, mda,
nid_flag, report_mda
            )
            values (
              :new.sample_id, :new.roi, :new.activity, :new.ac
tiv_err, :new.mda, :new.nid_flag, :new.report_mda
            );
      ELSIF UPDATING THEN
            update rmsman.gards_roi_concs set
```

	`` sample_id = :new.sample_id, roi = :new.sample_id, activity = :new.activity, activ_err = :new.activ_err, mda = :new.mda, nid_flag = :new.nid_flag, report_mda = :new.report_mda where sample_id= :old.sample_id and roi = :old.roi; ELSE delete from rmsman.gards_roi_concs where sample_id = :old.sample_id and roi = :old.roi; END IF; end; ```

5.3.95. GARDS_ROI_COUNTS_I_U_D

Table	GARDS_ROI_COUNTS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	``` begin IF INSERTING THEN insert into rmsman.gards_roi_counts (sample_id, roi, gross, gross_err, compton, compton_err, interference, interference_err, memory, memory_err, detector_back, detector_back_err, net, net_err, lc) values (:new.sample_id, :new.roi, :new.gross, :new.- gross_err, :new.compton, :new.compton_err, :new.interference, :new.inter- ference_err, :new.memory, :new.memory_err, :new.detector_back, :new.de- tector_back_err, :new.net, :new.net_err, :new.lc); ELSIF UPDATING THEN update rmsman.gards_roi_counts set sample_id = :new.sample_id, roi = :new.sample_id, gross = :new.gross, gross_err = :new.gross_err, compton = :new.compton, compton_err = :new.compton_err, interference = :new.interference, interference_err = :new.interference_err, memory = :new.memory, memory_err = :new.memory_err, detector_back = :new.detector_back, detector_back_err = :new.detector_back_err, net = :new.net, ```

	`` net_err = :new.net_err, lc = :new.lc where sample_id= :old.sample_id and roi = :old.roi; ELSE delete from rmsman.gards_roi_counts where sample_id = :old.sample_id and roi = :old.roi; END IF; end; ```

5.3.96. GARDS_ROI_LIMITS_I_U_D

Table	GARDS_ROI_LIMITS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	``` begin IF INSERTING THEN insert into rmsman.gards_roi_limits (sample_id, roi, b_energy_start, b_energy_stop, g_energy_start, g_energy_stop) values (:new.sample_id, :new.roi, :new.b_energy_start, :new.b_energy_stop, :new.g_energy_start, :new.g_ energy_stop); ELSIF UPDATING THEN update rmsman.gards_roi_limits set sample_id = :new.sample_id, roi = :new.sample_id, b_energy_start = :new.b_energy_start, b_energy_stop = :new.b_energy_stop, g_energy_start = :new.g_energy_start, g_energy_stop = :new.g_energy_stop where sample_id= :old.sample_id and roi = :old.roi; ELSE delete from rmsman.gards_roi_limits where sample_id = :old.sample_id and roi = :old.roi; END IF; end; ```

5.3.97. GARDS_SAINT_PROC_PAR_I_U_D

Table	GARDS_SAINT_PROCESS_PARAMS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	``` begin IF INSERTING THEN insert into rmsman.gards_saint_process_params ```

	`` (sample_id, name, value) values (:new.sample_id, :new.name, :new.value); ELSIF UPDATING THEN update rmsman.gards_saint_process_params set sample_id = :new.sample_id, name = :new.name, value = :new.value where sample_id= :old.sample_id and name = :old.name; ELSE delete from rmsman.gards_saint_process_params where sample_id = :old.sample_id and name = :old.name; END IF; end; ```

5.3.98. GARDS_SAMPLE_CAT_I_U_D

Table	GARDS_AUTO_SAMPLE_CAT
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	see below

```
begin
            IF INSERTING THEN
                  insert into rmsman.gards_sample_cat
                  (sample_id,
                   name,
                   method_id,
                   category,
                   upper_bound,
                   lower_bound,
                   central_value,
                   delta,
                   activity,
                   hold)
                  values (
                  :new.sample_id,
                  :new.name,
                  :new.method_id,
                  :new.category,
                  :new.upper_bound,
                  :new.lower_bound,
                  :new.central_value,
                  :new.delta,
                  :new.activity,
                  :new.hold);
            ELSIF UPDATING THEN
                  update rmsman.gards_sample_cat set
                  sample_id = :new.sample_id,
                  name = :new.name,
                  method_id = :new.method_id,
                  category = :new.category,
                  upper_bound = :new.upper_bound,
                  lower_bound = :new.lower_bound,
```

	`` central_value = :new.central_value, delta = :new.delta, activity = :new.activity, hold = :new.hold where sample_id= :old.sample_id and name = :old.name; ELSE delete from rmsman.gards_sample_cat where sample_id = :old.sample_id and name = :old.name; END IF; end; ```

5.3.99. GARDS_SAMPLE_DATA_I_U_D

Table	GARDS_SAMPLE_DATA
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	``` begin IF INSERTING THEN insert into rmsman.gards_sample_data (site_det_code,sample_id,station_id,detector_id,input_file_nam e, sample_type,data_type,geometry,spectral_qualifier,trans- mit_dtg, collect_start,collect_stop,acquisition_start,ac- quisition_stop, acquisition_real_sec,acquisition_live_sec,quant- ity) values (:new.site_det_code,:new.sample_id,:new.station_id,:new.de- tector_id, :new.input_file_name,:new.sample_type,:new.data_ty pe,:new.geometry, :new.spectral_qualifier,:new.transmit_dtg,:new.- collect_start,:new.collect_stop, :new.acquisition_start,:new.acquisition_stop,:new. acquisition_real_sec, :new.acquisition_live_sec,:new.quantity); ELSIF UPDATING THEN update rmsman.gards_sample_data set site_det_code = :new.site_det_code, sample_id = :new.sample_id, station_id = :new.station_id, detector_id = :new.detector_id, input_file_name = :new.input_file_name, sample_type = :new.sample_type, ```

	`` data_type = :new.data_type, geometry = :new.geometry, spectral_qualifier = :new.spectral_qualifier, transmit_dtg = :new.transmit_dtg, collect_start = :new.collect_start, collect_stop = :new.collect_stop, acquisition_start = :new.acquisition_start, acquisition_stop = :new.acquisition_stop, acquisition_real_sec = :new.acquisition_real_sec, acquisition_live_sec = :new.acquisition_live_sec, quantity = :new.quantity where sample_id= :old.sample_id; ELSE delete from rmsman.gards_sample_data where sample_id = :old.sample_id; END IF; end; ```

5.3.100. GARDS_SAMPLE_FLAGS_I_U_D

Table	GARDS_SAMPLE_FLAGS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	``` begin IF INSERTING THEN insert into rmsman.gards_sample_flags (sample_id, flag_id, result, value) values (:new.sample_id, :new.flag_id, :new.result, :new.value); ELSIF UPDATING THEN update rmsman.gards_sample_flags set sample_id = :new.sample_id, flag_id = :new.flag_id, result = :new.result, value = :new.value where sample_id = :old.sample_id and flag_id = :old.flag_id; ELSE delete from rmsman.gards_sample_flags where sample_id = :old.sample_id and flag_id = :old.flag_id; END IF; end; ```

5.3.101. GARDS_SAMPLE_PROC_PARAMS_I_U_D

Table	GARDS_SAMPLE_PROC_PARAMS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	begin IF INSERTING THEN insert into rmsman.gards_sample_proc_params (sample_id, do_back, back_data_type, back_sample_id, nuclide_lib, energy_tol, mda_level, nid_confid, squant_err, buildtype, peak_sense, peak_start, peak_end, fwhm_mult_width, left_fwhm_lim, right_fwhm_lim, back_chan, back_type, fit_singlets, crit_level, fix_fwhm, area_reject, mdc_width, lc_abscissa, do_pd_calc, do_csc) values (:new.sample_id, :new.do_back, :new.back_data_typ e, :new.back_sample_id, :new.nuclide_lib, :new.energy_tol, :new.mda_level, :new.nid_con- fid, :new.squant_err, :new.buildtype, :new.peak_sense, :new.peak_start, :new.peak_end, :new.fwhm_mult_width, :new.left_fwhm_lim, :new.right_fwhm_lim, :new.- back_chan, :new.back_type, :new.fit_singlets, :new.crit_level, :new.fix_fwhm, :ne w.area_reject, :new.mdc_width, :new.lc_abscissa, :new.do_pd_calc, :new.do_csc); ELSIF UPDATING THEN update rmsman.gards_sample_proc_params set sample_id = :new.sample_id, do_back = :new.do_back, back_data_type = :new.back_data_type, back_sample_id = :new.back_sample_id, nuclide_lib = :new.nuclide_lib, energy_tol = :new.energy_tol, mda_level = :new.mda_level, nid_confid = :new.nid_confid, squant_err = :new.squant_err, buildtype = :new.buildtype, peak_sense = :new.peak_sense, peak_start = :new.peak_start, peak_end = :new.peak_end, fwhm_mult_width = :new.fwhm_mult_width, left_fwhm_lim = :new.left_fwhm_lim, right_fwhm_lim = :new.right_fwhm_lim, back_chan = :new.back_chan, back_type = :new.back_type,

	`` fit_singlets = :new.fit_singlets, crit_level = :new.crit_level, fix_fwhm = :new.fix_fwhm, area_reject = :new.area_reject, mdc_width = :new.mdc_width, lc_abscissa = :new.lc_abscissa, do_pd_calc = :new.do_pd_calc, do_csc = :new.do_csc where sample_id= :old.sample_id; ELSE delete from rmsman.gards_sample_proc_params where sample_id = :old.sample_id; END IF; end; ```

5.3.102. GARDS_SAMPLE_RATIOS_I_U_D

Table	GARDS_SAMPLE_RATIOS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	``` begin IF INSERTING THEN insert into rmsman.gards_sample_ratios (sample_id, ratio_id, upper_roi_number, lower_roi_number, count_ratio, count_ratio_err) values (:new.sample_id, :new.ratio_id, :new.upper_roi_nu mber, :new.lower_roi_number, :new.count_ratio, :new.count_ratio_err); ELSIF UPDATING THEN update rmsman.gards_sample_ratios set sample_id = :new.sample_id, ratio_id = :new.ratio_id, upper_roi_number = :new.upper_roi_number, lower_roi_number = :new.lower_roi_number, count_ratio = :new.count_ratio, count_ratio_err = :new.count_ratio_err where sample_id= :old.sample_id and ratio_id = :old.ratio_id; ELSE delete from rmsman.gards_sample_ratios where sample_id = :old.sample_id and ratio_id = :old.ratio_id; END IF; end; ```

5.3.103. GARDS_SAMPLE_STATUS_I_U_D

Table	GARDS_SAMPLE_STATUS

Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	`begin` `      IF INSERTING THEN` `            insert into rmsman.gards_sample_status (` `              sample_id,entry_date,cnf_begin_date,` `cnf_end_date,review_date,review_time,analyst,status,category,a` `uto_category` `            )` `            values (` `              :new.sample_id, :new.entry_date, :new.cnf_begin_` `date,` `              :new.cnf_end_date,:new.review_date,:new.review_t` `ime, :new.analyst, :new.status,` `              :new.category,:new.auto_category` `            );` `      ELSIF UPDATING THEN` `            update rmsman.gards_sample_status set` `              sample_id = :new.sample_id,` `              entry_date = :new.entry_date,` `              cnf_begin_date = :new.cnf_begin_date,` `              cnf_end_date = :new.cnf_end_date,` `              review_date = :new.review_date,` `              review_time = :new.review_time,` `              analyst = :new.analyst,` `              status = :new.status,` `              category = :new.category,` `              auto_category = :new.auto_category` `            where sample_id= :old.sample_id;` `      ELSE` `            delete from rmsman.gards_sample_status where` `sample_id = :old.sample_id;` `      END IF;` `end;`

5.3.104. GARDS_SAMP_UPD_PRMS_I_U_D

Table	GARDS_SAMPLE_UPDATE_PARAMS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	`begin` `      IF INSERTING THEN` `            insert into rmsman.gards_sample_update_params (` `              sample_id, mrp_used, mrp_sample_id, gainshift,` `zeroshift, area_lim,` `              use_weight, use_mult, f_linear, bootstrap,` `min_lookup, rer_intercept,` `              rer_slope, ecr_slope, do_reru` `            )`

	`` values (:new.sample_id, :new.mrp_used, :new.mrp_sample_i d, :new.gainshift, :new.zeroshift, :new.area_lim, :new.use_weight, :new.use_mult, : new.f_linear, :new.bootstrap, :new.min_lookup, :new.rer_intercept, :new.rer_slope, : new.ecr_slope, :new.do_reru); ELSIF UPDATING THEN update rmsman.gards_sample_update_params set sample_id = :new.sample_id, mrp_used = :new.mrp_used, mrp_sample_id = :new.mrp_sample_id, gainshift = :new.gainshift, zeroshift = :new.zeroshift, area_lim = :new.area_lim, use_weight = :new.use_weight, use_mult = :new.use_mult, f_linear = :new.f_linear, bootstrap = :new.bootstrap, min_lookup = :new.min_lookup, rer_intercept = :new.rer_intercept, rer_slope = :new.rer_slope, ecr_slope = :new.ecr_slope, do_reru = :new.do_reru where sample_id= :old.sample_id; ELSE delete from rmsman.gards_sample_update_params where sample_id = :old.sample_id; END IF; end; ```

5.3.105. GARDS_SMPLE_XE_P_PRMS_I_U_D

Table	GARDS_SAMPLE_XE_PROC_PARAMS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	``` begin IF INSERTING THEN insert into rmsman.gards_sample_xe_proc_params (sample_id, roi, lc_abscissa,beta_ecr_order, gamma_ecr_order, compton, det_back_used, gas_back_used) values (:new.sample_id, :new.roi, :new.lc_abscissa,:new. beta_ecr_order, :new.gamma_ecr_order, :new.compton, :new.det_back_used, :new.gas_back_used); ELSIF UPDATING THEN update rmsman.gards_sample_xe_proc_params set ```

	`` sample_id = :new.sample_id, roi = :new.sample_id, lc_abscissa = :new.lc_abscissa, beta_ecr_order = :new.beta_ecr_order, gamma_ecr_order = :new.gamma_ecr_order, compton = :new.compton, det_back_used = :new.det_back_used, gas_back_used = :new.gas_back_used where sample_id= :old.sample_id and roi = :old.roi; ELSE delete from rmsman.gards_sample_xe_proc_params where sample_id = :old.sample_id and roi = :old.roi; END IF; end; ```

5.3.106. GARDS_SOH_EVALUATION_I_U_D

Table	GARDS_SOH_EVALUATION
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	``` begin IF INSERTING THEN insert into rmsman.gards_soh_evaluation (sample_id,srid,soh_status,soh_flag,author,user_comment, ld- date) values (:new.sample_id,:new.srid,:new.soh_status,:new.soh_flag, :new.author,:new.user_comment,:new.lddate); ELSIF UPDATING THEN update rmsman.gards_soh_evaluation set sample_id = :new.sample_id, srid = :new.srid, soh_status = :new.soh_status, soh_flag = :new.soh_flag, author= :new.author, user_comment = :new.user_comment, lddate = :new.lddate where sample_id= :old.sample_id; ELSE delete from rmsman.gards_soh_evaluation where sample_id = :old.sample_id; END IF; end; ```

5.3.107. GARDS_TOTAL_EFFIC_I_U_D

Table	GARDS_TOTAL_EFFIC
Type	AFTER EACH ROW

<table>
<tr><td>Event</td><td>INSERT OR UPDATE OR DELETE</td></tr>
<tr><td>Trigger body</td><td><pre>begin
      IF INSERTING THEN
            insert into rmsman.gards_total_effic (
              sample_id, effic_energy, efficiency , effic_er-
ror
)
            values (
              :new.sample_id, :new.effic_energy, :new.effi-
ciency , :new.effic_error
            );
      ELSIF UPDATING THEN
            update rmsman.gards_total_effic set
              sample_id = :new.sample_id ,
              effic_energy = :new.effic_energy,
              efficiency = :new.efficiency,
              effic_error = :new.effic_error
            where sample_id= :old.sample_id and effic_energy =
:old.effic_energy;
      ELSE
            delete from rmsman.gards_total_effic where
sample_id = :old.sample_id and effic_energy = :old.effic_en-
ergy;
      END IF;

end;</pre></td></tr>
</table>

5.3.108. GARDS_USER_COMMENTS_I_U_D

<table>
<tr><td>Table</td><td>GARDS_USER_COMMENTS</td></tr>
<tr><td>Type</td><td>AFTER EACH ROW</td></tr>
<tr><td>Event</td><td>INSERT OR UPDATE OR DELETE</td></tr>
<tr><td>Trigger body</td><td><pre>begin
    IF INSERTING THEN
      insert into rmsman.gards_user_comments (
        comment_id,
        comment_text,
        sample_id
) values (
        :new.comment_id,
        :new.comment_text,
        :new.sample_id
      );
    ELSIF UPDATING THEN
      update rmsman.gards_user_comments set
        comment_id = :new.comment_id,
        comment_text = :new.comment_text,
        sample_id = :new.sample_id
      ;
    ELSE</pre></td></tr>
</table>

	`` delete from rmsman.gards_user_comments where comment_id = :old.comment_id; END IF; end; ```

5.3.109. GARDS_USER_DELETE

Table	GARDS_USERS
Type	AFTER EACH ROW
Event	DELETE
Trigger body	``` begin update gards_station_assignments set user_id = null where user_id = :old.user_id; end; ```

5.3.110. GARDS_XE_RESULTS_I_U_D

Table	GARDS_XE_RESULTS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	``` begin IF INSERTING THEN insert into rmsman.gards_xe_results (sample_id, method_id, nuclide_id, conc, conc_err, mdc, mdi, activity_acq_start, activity_err_acq_start, mda_acq_start, nid_flag, lc, ld, sample_act, cov_xe_131m, cov_xe_133m, cov_xe_133, cov_xe_135, cov_radon) VALUES (:new.sample_id, :new.method_id, :new.nuclide_id, :new.conc, ```

	`` :new.conc_err, :new.mdc, :new.mdi, :new.activity_acq_start, :new.activity_err_acq_start, :new.mda_acq_start, :new.nid_flag, :new.lc, :new.ld, :new.sample_act, :new.cov_xe_131m, :new.cov_xe_133m, :new.cov_xe_133, :new.cov_xe_135, :new.cov_radon); ELSIF UPDATING THEN update rmsman.gards_xe_results set sample_id = :new.sample_id, method_id = :new.method_id, nuclide_id = :new.nuclide_id, conc = :new.conc, conc_err = :new.conc_err, mdc = :new.mdc, mdi = :new.mdi, activity_acq_start = :new.activity_acq_start, activity_err_acq_start = :new.activ- ity_err_acq_start, mda_acq_start = :new.mda_acq_start, nid_flag = :new.nid_flag, lc = :new.lc, ld = :new.ld, sample_act = :new.sample_act, cov_xe_131m = :new.cov_xe_131m, cov_xe_133m = :new.cov_xe_133m, cov_xe_133 = :new.cov_xe_133, cov_xe_135 = :new.cov_xe_135, cov_radon = :new.cov_radon where sample_id= :old.sample_id; ELSE delete from rmsman.gards_xe_results where sample_id = :old.sample_id; END IF; end; ```

5.3.111. GARDS_XE_SAMPLE_CATEGORY_I_U

Table	GARDS_XE_SAMPLE_CATEGORY
Type	AFTER EACH ROW
Event	INSERT OR UPDATE

Trigger body	<pre>BEGIN IF INSERTING THEN INSERT INTO rmsman.GARDS_xe_sample_category (sample_id , prev_valid_samples , abn_xe131m , abn_xe133m , abn_xe133 , abn_xe135 , median_xe131m , median_xe133m , median_xe133 , median_xe135 , bayes_133m_131m , bayes_133m_133 , bayes_135_133 , conc_133m_131m, conc_133m_133, conc_135_133, conc_133_131m_mdc, cat_xe131m , cat_xe133m , cat_xe133 , cat_xe135 , flag_133m_131m , flag_133m_133 , flag_135_133 , cat_sample , flag_atm , flag_shortterm, moddate) VALUES (:new.sample_id , :new.prev_valid_samples , :new.abn_xe131m , :new.abn_xe133m , :new.abn_xe133 , :new.abn_xe135 , :new.median_xe131m , :new.median_xe133m , :new.median_xe133 , :new.median_xe135 , :new.bayes_133m_131m , :new.bayes_133m_133 , :new.bayes_135_133 , :new.conc_133m_131m, :new.conc_133m_133, :new.conc_135_133, :new.conc_133_131m_mdc, :new.cat_xe131m ,</pre>

	`` :new.cat_xe133m , :new.cat_xe133 , :new.cat_xe135 , :new.flag_133m_131m , :new.flag_133m_133 , :new.flag_135_133 , :new.cat_sample , :new.flag_atm , :new.flag_shortterm, :new.moddate); ELSIF UPDATING THEN UPDATE rmsman.GARDS_xe_sample_category SET prev_valid_samples = :new.prev_valid_samples , abn_xe131m = :new.abn_xe131m , abn_xe133m = :new.abn_xe133m , abn_xe133 = :new.abn_xe133 , abn_xe135 = :new.abn_xe135 , median_xe131m = :new.median_xe131m , median_xe133m = :new.median_xe133m , median_xe133 = :new.median_xe133 , median_xe135 = :new.median_xe135 , bayes_133m_131m = :new.bayes_133m_131m , bayes_133m_133 = :new.bayes_133m_133 , bayes_135_133 = :new.bayes_135_133 , conc_133m_131m = :new.conc_133m_131m, conc_133m_133 = :new.conc_133m_133, conc_135_133 = :new.conc_135_133, conc_133_131m_mdc = :new.conc_133_131m_mdc, cat_xe131m = :new.cat_xe131m , cat_xe133m = :new.cat_xe133m , cat_xe133 = :new.cat_xe133 , cat_xe135 = :new.cat_xe135 , flag_133m_131m = :new.flag_133m_131m , flag_133m_133 = :new.flag_133m_133 , flag_135_133 = :new.flag_135_133 , cat_sample = :new.cat_sample , flag_atm = :new.flag_atm , moddate = :new.moddate WHERE sample_id= :old.sample_id and flag_shortterm=:old.- flag_shortterm; END IF; END; ```

5.3.112. GARDS_XE_UNCORR_RES_A_I_U

Table	GARDS_XE_UNCORRECTED_RESULTS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	begin :new.moddate := sysdate;

	end;

5.3.113. GARDS_XE_UNCORR_RES_I_U_D

Table	GARDS_XE_UNCORRECTED_RESULTS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE OR DELETE
Trigger body	(see code below)

```
begin
      IF INSERTING THEN
            insert into rmsman.gards_xe_uncorrected_results (
              sample_id,
              method_id,
              nuclide_id,
              conc,
              conc_error,
              mdc,
              mdi,
              lc
            )
            values (
              :new.sample_id,
              :new.method_id,
              :new.nuclide_id,
              :new.conc,
              :new.conc_error,
              :new.mdc,
              :new.mdi,
              :new.lc
            );
      ELSIF UPDATING THEN
            update rmsman.gards_xe_uncorrected_results set
              sample_id = :new.sample_id,
              method_id = :new.method_id,
              nuclide_id = :new.nuclide_id,
              conc = :new.conc,
              conc_error = :new.conc_error,
              mdc = :new.mdc,
              mdi = :new.mdi,
              lc = :new.lc
            where sample_id= :old.sample_id and method_id
= :old.method_id and nuclide_id = :old.nuclide_id;
      ELSE
            delete from rmsman.gards_xe_uncorrected_results
where sample_id = :old.sample_id and method_id
= :old.method_id and nuclide_id = :old.nuclide_id;
      END IF;
end;
```

5.3.114. HISTOGRAM_B_I_U

Table	GARDS_HISTOGRAM

Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.115. INTERVAL_B_I_U

Table	GARDS_INTERVAL
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.116. INTERVAL_S_I

Table	GARDS_INTERVAL
Type	BEFORE EACH ROW
Event	INSERT
Trigger body	`declare` `            new_id number;` `begin` `            select intvl_seq.nextval into new_id from dual;` `        :new.intvlid := new_id;` `end;`

5.3.117. IRF_B_I_U

Table	GARDS_IRF
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.118. LAB_CAT_DESC_B_I_U

Table	GARDS_LAB_CATEGORY_DESCRIPTION
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.119. MET_DATA_B_I_U

Table	GARDS_MET_DATA
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.120. MET_DATA_S_I

Table	GARDS_MET_DATA
Type	BEFORE EACH ROW
Event	INSERT
Trigger body	`declare` `            new_id number;` `begin` `            select met_seq.nextval into new_id from dual;` `        :new.met_id := new_id;` `end;`

5.3.121. MET_HEADER_B_I_U

Table	GARDS_MET_HEADER
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.122. MET_HEADER_S_I

Table	GARDS_MET_HEADER
Type	BEFORE EACH ROW
Event	INSERT
Trigger body	`declare` `                new_id number;` `begin` `                select met_header_seq.nextval into new_id from` `dual;` `        :new.met_group_id := new_id;` `end;`

5.3.123. NOTIFY_B_I_U

Table	GARDS_NOTIFY

Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` ` :new.moddate := sysdate;` `end;`

5.3.124. NUCL2QUANTIFY_B_I_U

Table	GARDS_NUCL2QUANTIFY
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.125. NUCL_IDED_B_I_U

Table	GARDS_NUCL_IDED
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.126. NUCL_IDED_ORIG_B_I_U

Table	GARDS_NUCL_IDED_ORIG
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.127. NUCL_LIB_B_I_U

Table	GARDS_NUCL_LIB
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.128. NUCL_LINES_IDED_B_I_U

Table	GARDS_NUCL_LINES_IDED

Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.129. NUCL_LINES_IDED_ORIG_B_I_U

Table	GARDS_NUCL_LINES_IDED_ORIG
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.130. NUCL_LINES_LIB_B_I_U

Table	GARDS_NUCL_LINES_LIB
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.131. PEAKS_B_I_U

Table	GARDS_PEAKS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.132. PEAKS_ORIG_B_I_U

Table	GARDS_PEAKS_ORIG
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.133. PERMISSIONS_B_I_U

Table	GARDS_PERMISSIONS

Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.134. POC_B_I_U

Table	GARDS_POC
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.135. PROCESSING_ERRORS_B_I_U

Table	GARDS_PROCESSING_ERRORS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.136. PROCESS_PARAMS_B_I_U

Table	GARDS_SAINT_PROCESS_PARAMS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.137. PROC_PARAMS_TEMPLATE_B_I_U

Table	GARDS_PROC_PARAMS_TEMPLATE
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.138. PRODUCT_B_I_U

Table	GARDS_PRODUCT

Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.139. QAT_CONFIG_B_I_U

Table	GARDS_QAT_CONFIG
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.140. QAT_QUERY_FILTER_B_I_U

Table	GARDS_QAT_QUERY_FILTER
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.141. QCHISTORY_B_I_U

Table	GARDS_QCHISTORY
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` ` :new.moddate := sysdate;` `end;`

5.3.142. QCPARAMS_B_I_U

Table	GARDS_QCPARAMS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.143. QCTARGETS_B_I_U

Table	GARDS_QCTARGETS

Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.144. QC_RESULTS_B_I_U

Table	GARDS_QC_RESULTS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.145. QUERY_RESULTS_B_I_U

Table	GARDS_QUERY_RESULTS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` ` :new.moddate := sysdate;` `end;`

5.3.146. REFLINE_MASTER_B_I_U

Table	GARDS_REFLINE_MASTER
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.147. RELEVANT_NUCLIDES_B_I_U

Table	GARDS_RELEVANT_NUCLIDES
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.148. RESOLUTION_CAL_B_I_U

Table	GARDS_RESOLUTION_CAL

Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.149. RESOLUTION_CAL_COV_B_I_U

Table	GARDS_RESOLUTION_CAL_COV
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `     :new.moddate := sysdate;` `end;`

5.3.150. RESOLUTION_CAL_ORIG_B_I_U

Table	GARDS_RESOLUTION_CAL_ORIG
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.151. RESOLUTION_PAIRS_B_I_U

Table	GARDS_RESOLUTION_PAIRS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` ` :new.moddate := sysdate;` `end;`

5.3.152. RESOLUTION_PAIRS_ORIG_B_I_U

Table	GARDS_RESOLUTION_PAIRS_ORIG
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.153. RESOLUTION_PAIRS_ORIG_B_I_U

Table	GARDS_RESOLUTION_PAIRS_ORIG

Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` ` :new.moddate := sysdate;` `end;`

5.3.154. RLR_CONCLUSIONS_B_I_U

Table	GARDS_RLR_CONCLUSIONS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.155. RLR_OBJECTIVE_B_I_U

Table	GARDS_RLR_OBJECTIVE
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.156. RLR_RATIOS_B_I_U

Table	GARDS_RLR_RATIOS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.157. RLR_RESULTS_B_I_U

Table	GARDS_RLR_RESULTS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.158. RLR_SSREB_B_I_U

Table	GARDS_RLR_SSREB

Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.159. RN_INTERVAL_S_I

Table	GARDS_RN_INTERVAL
Type	BEFORE EACH ROW
Event	INSERT
Trigger body	`declare` `            new_id number;` `begin` `            select rn_intvl_seq.nextval into new_id from dual;` `        :new.intvlid := new_id;` `end;`

5.3.160. ROI_CHANNELS_B_I_U

Table	GARDS_ROI_CHANNELS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.161. ROI_CONCS_B_I_U

Table	GARDS_ROI_CONCS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.162. ROI_COUNTS_B_I_U

Table	GARDS_ROI_COUNTS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.163. ROI_LIB_B_I_U

Table	GARDS_ROI_LIB
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.164. ROI_LIMITS_B_I_U

Table	GARDS_ROI_LIMITS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.165. ROLES_B_I_U

Table	GARDS_ROLES
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.166. ROLES_PERMISSIONS_B_I_U

Table	GARDS_ROLES_PERMISSIONS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` ` :new.moddate := sysdate;` `end;`

5.3.167. SAMPLE_AUX_B_I_U

Table	GARDS_SAMPLE_AUX
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.168. SAMPLE_CAT_B_I_U

Table	GARDS_SAMPLE_CAT
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.169. SAMPLE_CERT_B_I_U

Table	GARDS_SAMPLE_CERT
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.170. SAMPLE_CERT_LINES_B_I_U

Table	GARDS_SAMPLE_CERT_LINES
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.171. SAMPLE_DATA_B_I_U

Table	GARDS_SAMPLE_DATA
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.172. SAMPLE_DATA_INSERT

Table	GARDS_SAMPLE_DATA
Type	AFTER EACH ROW
Event	INSERT
Trigger body	`begin` `        if newstadet(:new.station_id, :new.detector_id) then` `                insert into gards_stadet (`

	`station_id,` `detector_id` `)` `values (` `:new.station_id,` `:new.detector_id` `);` `end if;` `end;`

5.3.173. SAMPLE_DESCRIPTION_B_I_U

Table	GARDS_SAMPLE_DESCRIPTION
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `:new.moddate := sysdate;` `end;`

5.3.174. SAMPLE_FLAGS_B_I_U

Table	GARDS_SAMPLE_FLAGS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `:new.moddate := sysdate;` `end;`

5.3.175. SAMPLE_PROC_PARAMS_B_I_U

Table	GARDS_SAMPLE_PROC_PARAMS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `:new.moddate := sysdate;` `end;`

5.3.176. SAMPLE_RATIOS_B_I_U

Table	GARDS_SAMPLE_RATIOS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `:new.moddate := sysdate;` `end;`

5.3.177. SAMPLE_STATUS_B_I_U

Table	GARDS_SAMPLE_STATUS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.178. SAMPLE_STATUS_UPDATE

Table	GARDS_SAMPLE_STATUS
Type	AFTER EACH ROW
Event	UPDATE
Trigger body	see below

```
begin

      IF :new.category >= 4 AND :old.category IS NULL
AND :new.status = 'R' THEN
            insert into gards_fpe (
              fpid,
              revid,
              dtg,
              sample_id
            )
            values (
              gards_fpid_seq.nextval,
              1,
              sysdate,
              :new.sample_id
            );
      END IF;
end;
```

5.3.179. SAMPLE_UPDATE_PARAMS_B_I_U

Table	GARDS_SAMPLE_UPDATE_PARAMS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.180. SAMPLE_XE_PROC_PARAMS_B_I_U

Table	GARDS_SAMPLE_XE_PROC_PARAMS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE

Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.181. SOH_CHAR_DATA_B_I_U

Table	GARDS_SOH_CHAR_DATA
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.182. SOH_CHAR_DATA_S_I

Table	GARDS_SOH_CHAR_DATA
Type	BEFORE EACH ROW
Event	INSERT
Trigger body	`declare` `                new_id number;` `begin` `                select soh_char_seq.nextval into new_id from dual;` `          :new.soh_char_id := new_id;` `end;`

5.3.183. SOH_CODE_B_I_U

Table	GARDS_SOH_CODE
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.184. SOH_EVALUATION_B_I

Table	GARDS_SOH_EVALUATION
Type	BEFORE EACH ROW
Event	INSERT
Trigger body	`begin` `          :new.lddate := sysdate;` `end;`

5.3.185. SOH_EVALUATION_B_I_U

Table	GARDS_SOH_EVALUATION

Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.186. SOH_HEADER_B_I_U

Table	GARDS_SOH_HEADER
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.187. SOH_NUM_DATA_B_I_U

Table	GARDS_SOH_NUM_DATA
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.188. SOH_NUM_DATA_S_I

Table	GARDS_SOH_NUM_DATA
Type	BEFORE EACH ROW
Event	INSERT
Trigger body	`declare` `            new_id number;` `begin` `            select soh_num_seq.nextval into new_id from dual;` `        :new.soh_num_id := new_id;` `end;`

5.3.189. SOH_SENSOR_DATA_B_I_U

Table	GARDS_SOH_SENSOR_DATA
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.190. SOH_SENSOR_DATA_S_I

Table	GARDS_SOH_SENSOR_DATA
Type	BEFORE EACH ROW
Event	INSERT
Trigger body	`declare` `            new_id number;` `begin` `            select soh_sensor_seq.nextval into new_id from` `dual;` `        :new.soh_sensor_id := new_id;` `end;`

5.3.191. SPECTRUM_B_I_U

Table	GARDS_SPECTRUM
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.192. STADET_B_I_U

Table	GARDS_STADET
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.193. STATIONS_B_I_U

Table	GARDS_STATIONS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.194. STATIONS_INSERT

Table	GARDS_STATIONS
Type	AFTER EACH ROW
Event	INSERT

Trigger body	`begin` `        insert into gards_station_assignments (` `          station_id,` `          user_id` `        )` `        values (` `          :new.station_id,` `          NULL` `        );` `end;`

5.3.195. STATIONS_SCHEDULE_B_I_U

Table	GARDS_STATIONS_SCHEDULE
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.196. STATION_ASSIGNMENTS_B_I_U

Table	GARDS_STATION_ASSIGNMENTS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.197. STATUS_HISTORY_B_I_U

Table	GARDS_STATUS_HISTORY
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.198. TOTAL_EFFIC_B_I_U

Table	GARDS_TOTAL_EFFIC
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.199. TRENDVUE_B_I_U

Table	GARDS_TRENDVUE
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `      :new.moddate := sysdate;` `end;`

5.3.200. UPDATE_NUCL_ORIG_I_U_D

Table	GARDS_NUCL_IDED
Type	AFTER EACH ROW
Event	INSERT OR UPDATE
Trigger body	(see code below)

```
begin
        IF INSERTING THEN
                insert into rmsauto.gards_nucl_ided_orig (
                  sample_id,
                  station_id,
                  detector_id,
                  nuclide_id,
                  name,
                  type,
                  halflife,
                  ave_activ,
                  ave_activ_err,
                  activ_key,
                  activ_key_err,
                  mda,
                  mda_err,
                  ave_activ_acq_start,
                  ave_activ_err_acq_start,
                  activ_key_acq_start,
                  activ_key_err_acq_start,
                  mda_acq_start,
                  mda_err_acq_start,
                  nid_flag,
                  activ_decay,
                  activ_decay_err,
                  comp_confid,
                  report_mda,
                  pd_mod_flag,
                  csc_ratio,
                  csc_ratio_err,
                  csc_mod_flag
                )
                values (
                  :new.sample_id,
                  :new.station_id,
                  :new.detector_id,
```

	`` :new.nuclide_id, :new.name, :new.type, :new.halflife , :new.ave_activ, :new.ave_activ_err, :new.activ_key, :new.activ_key_err, :new.mda, :new.mda_err, :new.ave_activ_acq_start, :new.ave_activ_err_acq_start, :new.activ_key_acq_start, :new.activ_key_err_acq_start, :new.mda_acq_start, :new.mda_err_acq_start, :new.nid_flag, :new.activ_decay, :new.activ_decay_err, :new.comp_confid, :new.report_mda, :new.pd_mod_flag, :new.csc_ratio, :new.csc_ratio_err, :new.csc_mod_flag); ELSIF UPDATING THEN update rmsauto.gards_nucl_ided_orig set sample_id = :new.sample_id, station_id = :new.station_id, detector_id = :new.detector_id, nuclide_id = :new.nuclide_id, name = :new.name, type = :new.type, halflife = :new.halflife , ave_activ = :new.ave_activ, ave_activ_err = :new.ave_activ_err , activ_key = :new.activ_key, activ_key_err = :new.activ_key_err, mda = :new.mda, mda_err = :new.mda_err, ave_activ_acq_start = :new.ave_activ_acq_start, ave_activ_err_acq_start = :new.ave_activ_err_acq_start , activ_key_acq_start = :new.activ_key_acq_start, activ_key_err_acq_start = :new.activ_key_err_acq_start, mda_acq_start = :new.mda_acq_start, mda_err_acq_start = :new.mda_err_acq_start, nid_flag = :new.nid_flag, activ_decay = :new.activ_decay, activ_decay_err = :new.activ_decay_err, ```

	` comp_confid = :new.comp_confid,` ` report_mda = :new.report_mda,` ` pd_mod_flag = :new.pd_mod_flag,` ` csc_ratio = :new.csc_ratio,` ` csc_ratio_err = :new.csc_ratio_err,` ` csc_mod_flag = :new.csc_mod_flag` ` where sample_id= :old.sample_id and name` `= :old.name;` ` ELSE` ` delete from rmsauto.gards_nucl_ided_orig where` `sample_id = :old.sample_id and name = :old.name;` ` END IF;` `end;`

5.3.201. UPDATE_NUCL_ORIG_LINES_I_U_D

Table	GARDS_NUCL_LINES_IDED
Type	AFTER EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` ` IF INSERTING THEN` `  insert into rmsauto.gards_nucl_lines_ided_orig (` `    sample_id,` `    station_id,` `    detector_id,` `    name,` `    energy,` `    energy_err,` `    abundance,` `    abundance_err,` `    peak,` `    activity,` `    activ_err,` `    effic,` `    effic_err,` `    mda,` `    key_flag,` `    nuclide_id,` `                  csc_ratio,` `                  csc_ratio_err,` `                  csc_mod_flag,` `                  id_percent` `  )` `  values (` `    :new.sample_id,` `    :new.station_id,` `    :new.detector_id,` `    :new.name,` `    :new.energy,` `    :new.energy_err,` `    :new.abundance,`

	`` :new.abundance_err, :new.peak, :new.activity, :new.activ_err, :new.effic, :new.effic_err, :new.mda, :new.key_flag, :new.nuclide_id, :new.csc_ratio, :new.csc_ratio_err, :new.csc_mod_flag, :new.id_percent); ELSIF UPDATING THEN update rmsauto.gards_nucl_lines_ided_orig set sample_id = :new.sample_id, station_id = :new.station_id, detector_id = :new.detector_id, name = :new.name, energy = :new.energy, energy_err = :new.energy_err, abundance = :new.abundance, abundance_err = :new.abundance_err, peak = :new.peak, activity = :new.activity, activ_err = :new.activ_err, effic = :new.effic , effic_err = :new.effic_err, mda = :new.mda, key_flag = :new.key_flag, nuclide_id = :new.nuclide_id, csc_ratio = :new.csc_ratio, csc_ratio_err = :new.csc_ratio_err, csc_mod_flag = :new.csc_mod_flag, id_percent = :new.id_percent where sample_id= :old.sample_id and name = :old.name and en- ergy = :old.energy; ELSE delete from rmsauto.gards_nucl_lines_ided_orig where sample_id = :old.sample_id and name = :old.name and energy = :old.energy; END IF; end; ```

5.3.202. UPDATE_PARAMS_TEMPLATE_B_I_U

Table	GARDS_UPDATE_PARAMS_TEMPLATE
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	begin

	`    :new.moddate := sysdate;` `end;`

5.3.203. UPDATE_PEAKS_ORIG_I_U_D

Table	GARDS_PEAKS
Type	AFTER EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` ` IF INSERTING THEN` `  insert into rmsauto.gards_peaks_orig (` `    sample_id,` `    peak_id,` `    centroid,` `    centroid_err,` `    energy, energy_err,` `    left_chan,` `    width,` `     back_count,` `    back_uncer,` `    fwhm,` `    fwhm_err,` `    area,` `    area_err,` `    original_area,` `     original_uncer,` `    counts_sec,` `    counts_sec_err,` `    efficiency,` `    eff_error,` `     back_channel,` `    ided,` `    fitted,` `    multiplet,` `    peak_sig,` `    lc,` `    pss,` `    peak_tol,` `    detectability` `  )` `  values (` `    :new.sample_id,` `    :new.peak_id,` `    :new.centroid,` `    :new.centroid_err,` `    :new.energy,` `    :new.energy_err,` `    :new.left_chan,` `    :new.width,` `    :new.back_count,` `    :new.back_uncer,`

	`` :new.fwhm, :new.fwhm_err, :new.area, :new.area_err, :new.original_area, :new.original_uncer, :new.counts_sec, :new.counts_sec_err, :new.efficiency, :new.eff_error, :new.back_channel, :new.ided, :new.fitted, :new.multiplet, :new.peak_sig, :new.lc, :new.pss, :new.peak_tol, :new.detectability); ELSIF UPDATING THEN update rmsauto.gards_peaks_orig set sample_id = :new.sample_id , peak_id = :new.peak_id, centroid = :new.centroid, centroid_err = :new.centroid_err, energy = :new.energy, energy_err = :new.energy_err, left_chan = :new.left_chan, width = :new.width, back_count = :new.back_count, back_uncer = :new.back_uncer, fwhm = :new.fwhm , fwhm_err = :new.fwhm_err, area = :new.area, area_err = :new.area_err, original_area = :new.original_area, original_uncer = :new.original_uncer, counts_sec = :new.counts_sec , counts_sec_err = :new.counts_sec_err , efficiency = :new.efficiency, eff_error = :new.eff_error , back_channel = :new.back_channel, ided = :new.ided, fitted = :new.fitted, multiplet = :new.multiplet, peak_sig = :new.peak_sig, lc = :new.lc, pss = :new.pss, peak_tol = :new.peak_tol, detectability = :new.detectability where sample_id= :old.sample_id and peak_id = :old.peak_id; ELSE delete from rmsauto.gards_peaks_orig where sample_id ```

	`= :old.sample_id and peak_id` `= :old.peak_id;` ` END IF;` `end;`

5.3.204. UPDATE_REFLINES_B_I_U

Table	GARDS_UPDATE_REFLINES
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.205. USERENV_B_I_U

Table	GARDS_USERENV
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.206. USERS_B_I_U

Table	GARDS_USERS
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.207. USERS_ROLES_B_I_U

Table	GARDS_USERS_ROLES
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` ` :new.moddate := sysdate;` `end;`

5.3.208. USER_COMMENTS_B_I_U

Table	GARDS_USER_COMMENTS
Type	BEFORE EACH ROW

Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.209. XE_NUCL_LIB_B_I_U

Table	GARDS_XE_NUCL_LIB
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.210. XE_NUCL_LINES_LIB_B_I_U

Table	GARDS_XE_NUCL_LINES_LIB
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.211. XE_PROC_PARAMS_TEMPLATE_B_I_U

Table	GARDS_XE_PROC_PARAMS_TEMPLATE
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `        :new.moddate := sysdate;` `end;`

5.3.212. XE_REFLINE_MASTER_B_I_U

Table	GARDS_XE_REFLINE_MASTER
Type	BEFORE EACH ROW
Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.3.213. XE_RESULTS_B_I_U

Table	GARDS_XE_RESULTS
Type	BEFORE EACH ROW

Event	INSERT OR UPDATE
Trigger body	`begin` `    :new.moddate := sysdate;` `end;`

5.4. Radionuclide Index Descriptions

Table name	Index name	Unique	Index columns
GARDS_ALERTS	ALERTS_UQ	Yes	station_id, dtg, alert_type, alert_id
	GA_DTG_NDX	No	dtg
	PK_ALERTS	Yes	alert_id
GARDS_AUTO_SAMPLE_CAT	PK_AUTOSAMPCAT	Yes	sample_id, name
	SAMP_CAT_NDX	No	sample_id
GARDS_AUX_LIB	PK_GARDS_AUX_LIB	Yes	name
GARDS_AUX_LINES_LIB	PK_AUX_LINS_LIB	Yes	name, energy, abundance_act
GARDS_BASELINE	PK_GARDS_BASELINE	Yes	detector_id, sample_type, data_type, baseline_type, index_no
GARDS_BG_CONFIG_PARAMS	PK_GARDS_BG_CONFIG_PARAMS	Yes	detector_id
GARDS_BG_DETECTOR_STD_SPECTRA	PK_GARDS_BG_DETECTOR_STD_SPEC	Yes	detector_id, sample_id
GARDS_BG_EFFICIENCY_PAIRS	BG_EFFICIENCY_PAIRS_NDX	No	sample_id
	PK_GARDS_BG_EFFICIENCY_PAIRS	Yes	sample_id, roi
GARDS_BG_ENERGY_CAL	PK_BG_EN_CAL	Yes	sample_id
GARDS_BG_ENERGY_CAL_DIRECTIVE	PK_BG_EN_CAL_DIRECTIVE	Yes	detector_id, ondate, cal_mode, sample_id
GARDS_BG_ENERGY_CAL_ORIG	PK_BG_EN_CAL_ORIG	Yes	sample_id
GARDS_BG_ISOTOPE_CONCS	BG_ISOTOPE_CONCS_NDX	No	sample_id
	PK_GARDS_BG_ISOTOPE_CONCS	Yes	sample_id, nuclide_id, method_id
GARDS_BG_PROC_PARAMS	BG_PROC_PARAMS_NDX	Yes	sample_id
GARDS_BG_PROC_PARAMS_ROI	BG_PROC_PARAMS_ROI_NDX	No	sample_id
	PK_GARDS_BG_PROC_PARAMS_ROI	Yes	sample_id, roi
GARDS_BG_QC_RESULT	BG_QC_RESULT_NDX	Yes	sample_id
GARDS_BG_ROI_CONCS	BG_ROI_CONCS_NDX	No	sample_id
	PK_GARDS_BG_ROI_CONCS	Yes	sample_id, roi, method_id

Table name	Index name	Unique	Index columns
GARDS_BG_ROI_COUNTS	BG_ROI_COUNTS_NDX	No	sample_id
	PK_GARDS_BG_ROI_COUNTS	Yes	sample_id, roi, method_id
GARDS_BG_STD_SPECTRA	BG_STD_SPECTRA_NDX	Yes	sample_id
GARDS_BG_STD_SPECTRA_RESULT	BG_STD_SPEC_RES_NDX	No	sample_id
	PK_GARDS_BG_STD_SPECTRA_RESULT	Yes	sample_id, std_spectra_id
GARDS_B_ENERGY_PAIRS	B_ENERGY_PAIRS_NDX	No	sample_id
	PK_GARDS_B_ENERGY_PAIRS	Yes	sample_id, cal_energy, type
GARDS_B_ENERGY_PAIRS_ORIG	B_ENERGY_PAIRS_ORIG_NDX	No	sample_id
	PK_GARDS_B_ENERGY_PAIRS_ORIG	Yes	sample_id, cal_energy, type
GARDS_B_RESOLUTION_CAL	PK_GARDS_B_RESOLUTION_CAL	Yes	sample_id, type
GARDS_B_RESOLUTION_PAIRS	B_RESOLUTION_PAIRS_NDX	No	sample_id
	PK_GARDS_B_RESOLUTION_PAIRS	Yes	sample_id, res_energy, type
GARDS_B_RESOLUTION_PAIRS_ORIG	B_RESOLUTION_PAIRS_ORIG_NDX	No	sample_id
	PK_GARDS_B_RESOLUTION_PAIRS_O	Yes	sample_id, res_energy, type
GARDS_CAT_CRITERIA_TESTS	PK_CAT_CRIT_TEST_ID	Yes	test_id
	UQ_CAT_CRIT_TEST_CODE	Yes	test_code
GARDS_CAT_TEMPLATE	CAT_TEMPLATE_DET_NDX	No	detector_id
	CAT_TEMPLATE_STA_NDX	No	station_id
	PK_GARDS_CAT_TEMPLATE	Yes	station_id, detector_id, name, begin_date
GARDS_CODES	PK_GARDS_CODES	Yes	type, code
GARDS_COMMENTS	COMMENTS_NDX	No	sample_id, analyst
	PK_COMMENTS	Yes	comment_id
GARDS_COMMENTS_DEFS	PK_COMMENTS_DEF	Yes	comment_type
GARDS_CSC_MODCOEFF_LIB	PK_CSC_MODCOEFF	Yes	detector_id, name, energy
GARDS_DATA_LOG	DATA_LOG_MOD_NDX	No	moddate
	DATA_LOG_NDX	No	station_id, data_type, status
	DATA_LOG_TYPE_DTG_NDX	No	data_type, dtg

Table name	Index name	Unique	Index columns
	GDL_MSG_ID_NDX	No	msg_id
	GDL_RMS_ID_NDX	No	rms_id
	PK_GARDS_DATA_LOG	Yes	dlid
GARDS_DETECTORS	PK_DETECTORS	Yes	detector_id
	UQ_DETECTORS	Yes	detector_code
GARDS_DIST_SAMPLE_QUEUE	PK_DIST_SAMPLE_QUEUE	Yes	sample_id
GARDS_EFFICIENCY_CAL	EFFICIENCY_CAL_NDX	Yes	sample_id
GARDS_EFFICIENCY_ERROR_CAL	EFFICIENCY_CAL_ERR_NDX	No	sample_id
	PK_GARDS_EFFICIENCY_ERROR_CAL	Yes	sample_id, type
GARDS_EFFICIENCY_IDC_PAIRS	EFFICIENCY_IDC_PAIRS_NDX	No	detector_id, station_id, begin_date
	PK_GARDS_EFF_IDC_PAIRS	Yes	detector_id, station_id, begin_date, effic_energy
GARDS_EFFICIENCY_PAIRS	EFFICIENCY_PAIRS_EFF_NDX	No	efficiency
	EFFICIENCY_PAIRS_EN_NDX	No	effic_energy
	EFFICIENCY_PAIRS_NDX	No	sample_id
	PK_GARDS_EFFICIENCY_PAIRS	Yes	sample_id, effic_energy
GARDS_EFFICIENCY_VGSL_PAIRS	EFFICIENCY_VGSL_PAIR_NDX	No	detector_id
	PK_GARDS_EFF_VGSL_PAIRS	Yes	detector_id, begin_date, end_date, effic_energy
GARDS_ENERGY_CAL	ENERGY_CAL_NDX	No	sample_id
	PK_GARDS_ENERGY_CAL	Yes	sample_id, type
GARDS_ENERGY_CAL_COV	ENERGY_CAL_COV_NDX	No	sample_id
	PK_GARDS_ENERGY_CAL_COV	Yes	sample_id, type, row_index, col_index
GARDS_ENERGY_CAL_ORIG	ENERGY_CAL_ORIG_NDX	Yes	sample_id
	PK_GARDS_ENERGY_CAL_ORIG	Yes	sample_id, type
GARDS_ENERGY_PAIRS	ENERGY_PAIRS_NDX	No	sample_id
	ENERGY_PAIRS_TYPE_NDX	No	sample_id, type
	PK_GARDS_ENERGY_PAIRS	Yes	sample_id, cal_energy, type
GARDS_ENERGY_PAIRS_	ENERGY_PAIRS_ORIG_NDX	No	sample_id

Table name	Index name	Unique	Index columns
ORIG	PK_GARDS_ENERGY_PAIRS_ORIG	Yes	sample_id, cal_energy, type
GARDS_ENVIRONMENT	ENVIRONMENT_NDX	No	sample_id
GARDS_FLAGS	SYS_C0028368	Yes	flag_id
GARDS_FPE	FPE_NDX	No	sample_id
	PK_GARDS_FPE	Yes	fpid
GARDS_HISTOGRAM	HISTOGRAM_NDX	Yes	sample_id
GARDS_INTERVAL	GINT_LDDATEX	No	lddate
	GINT_MODDATEX	No	moddate
	PK_GARDS_INTERVAL	Yes	intvlid
GARDS_IRF	IRF_NDX	No	detector_id
GARDS_LAB_CAT-EGORY_DESCRIPTION	PK_LAB_CATEGORY_DE-SCRIPTION	Yes	lab_sample_category
GARDS_MDAS2REPORT	PK_GARDS_MDAS2REPORT	Yes	name, sample_type
GARDS_MET_DATA	MET_DATA_NDX	No	station_id, start_time, end_time
	PK_GARDS_MET_DATA	Yes	met_id
GARDS_MET_HEADER	GMH_END_TIME_NDX	No	end_time
	GMH_START_TIME_NDX	No	start_time
	PK_GARDS_MET_HEADER	Yes	met_group_id
	UQ_MET_HEADER	Yes	station_id, start_time, end_time
GARDS_NIC	PK_GARDS_NIC	Yes	sample_id, name, sample_status
GARDS_NOTIFY	NOTIFY_NDX	No	poc_id
	PK_GARDS_NOTIFY	Yes	event, email_addr, dtg_begin
GARDS_NUC-L2QUANTIFY	PK_GARDS_NUC-L2QUANTIFY	Yes	name, dtg_begin
GARDS_NUCL_IDED	NUCL_IDED_NDX	No	sample_id, nuclide_id
	PK_NUCL_IDED	Yes	sample_id, name
GARDS_NUCL_IDED_ORIG	NUCL_IDED_ORIG_NDX	No	sample_id, nuclide_id
	PK_NUCL_IDED_ORIG	Yes	sample_id, name
GARDS_NUCL_LIB	PK_GARDS_NUCL_LIB	Yes	name
GARDS_NUCL_LIB_ARCHIVE	PK_ARCH_NUCL_LIB	Yes	name, begin_date
GARDS_NUCL_LINES_IDED	NUCL_LINES_IDED_NDX	No	sample_id, peak, name
	PK_GARDS_NUCL_LINES_IDED	No	sample_id, sample_id, name, name, nuclide_id, nuclide_id,

Table name	Index name	Unique	Index columns
			energy, energy, peak, peak, peak, peak
GARDS_NUCL_LINES_IDED_ORIG	NUCL_LINES_IDED_ORIG_NDX	No	sample_id, peak, name
	NUCL_LINES_IDED_ORIG_NDX2	No	sample_id, nuclide_id, peak
	PK_GARDS_NUCL_LINES_IDED_ORIG	Yes	sample_id, name, energy, peak
GARDS_NUCL_LINES_LIB	PK_GARDS_NUCL_LINES_LIB	Yes	name, energy
GARDS_NUCL_LINES_LIB_ARCHIVE	PK_ARCH_NUCL_LINES_LIB	Yes	name, energy, begin_date
GARDS_PEAKS	PEAKS_NDX	No	sample_id, sample_id, peak_id, peak_id, energy, energy, ided, ided
	PK_GARDS_PEAKS	Yes	sample_id, peak_id
GARDS_PEAKS_ORIG	PEAKS_ORIG_NDX	No	sample_id, peak_id, energy, ided
	PK_GARDS_PEAKS_ORIG	Yes	sample_id, peak_id
GARDS_PERMISSIONS	PK_PERMISSIONS	Yes	permission_id
GARDS_POC	PK_POC	Yes	pocid
GARDS_PROC_PARAMS_TEMPLATE	PK_GARDS_PROC_PARAMS_TEMPLATE	Yes	station_id, detector_id, data_type, spectral_qualifier
	PROC_PAR_TPL_DET_NDX	No	detector_id
	PROC_PAR_TPL_STA_NDX	No	station_id
GARDS_PRODUCT	GARDS_PRODUCT_PK	Yes	sample_id, typeid, revision
	PRODUCT_NDX	No	sample_id
GARDS_QCHISTORY	PK_GARDS_QCHISTORY	Yes	sample_id, state
	QCHISTORY_NDX	No	sample_id
GARDS_QCPARAMS	PK_GARDS_QCPARAMS	No	detector_id
GARDS_QCTARGETS	PK_GARDS_QCTARGETS	Yes	name, detector_id, station_id, energy
	QCTARGETS_DET_NDX	No	detector_id
	QCTARGETS_STA_NDX	No	station_id
GARDS_QC_RESULTS	GARDS_QC_RESULTS_PK	Yes	sample_id, test_name
	PK_GARDS_QC_RESULTS	Yes	sample_id, test_name
	QC_RESULTS_NDX	No	sample_id
	QC_RESULTS_SID_NDX	No	sample_id

Table name	Index name	Unique	Index columns
GARDS_RECEIPT_LOG	PK_GARDS_RECEIPT_LOG	Yes	pocid, subid, prodid
GARDS_REFLINE_MASTER	PK_GARDS_REFLINE_MASTER	Yes	refpeak_energy, data_type, spectral_qualifier
GARDS_RELEVANT_NUCLIDES	PK_GARDS_RELEVANT_NUCL	Yes	name, sample_type
GARDS_RESOLUTION_CAL	PK_GARDS_RESOLUTION_CAL	Yes	sample_id, type
	RESOLUTION_CAL_NDX	No	sample_id
GARDS_RESOLUTION_CAL_COV	PK_GARDS_RESOLUTION_CAL_COV	Yes	sample_id, type, row_index, col_index
	RESOLUTION_CAL_COV_SID_NDX	No	sample_id
GARDS_RESOLUTION_CAL_ORIG	PK_GARDS_RESOLUTION_CAL_ORIG	Yes	sample_id, type
	RESOLUTION_CAL_ORIG_NDX	Yes	sample_id
GARDS_RESOLUTION_PAIRS	PK_GARDS_RESOLUTION_PAIRS	Yes	sample_id, res_energy, type
	RESOLUTION_PAIRS_NDX	No	sample_id
	RESOLUTION_PAIRS_TYPE_NDX	No	sample_id, type
GARDS_RESOLUTION_PAIRS_ORIG	PK_GARDS_RESOLUTION_PAIRS_ORIG	Yes	sample_id, res_energy, type
	RESOLUTION_PAIRS_ORIG_NDX	No	sample_id
GARDS_RLR	RLRID_PK	Yes	rlr_id
GARDS_RLR_CONCLUSIONS	PK_RLR_CONCLUSIONS	Yes	rlr_id
GARDS_RLR_OBJECTIVE	PK_RLR_OBJECTIVE	Yes	rlr_id
GARDS_RLR_RATIOS	PK_RLR_RATIOS	Yes	rlr_id, nuclide1, nuclide2, activity_ratio
	RLR_RATIOS_NDX	Yes	rlr_id
GARDS_RLR_RESULTS	PK_RLR_RESULTS	Yes	rlr_id, nuclide_name, activity
	RLR_RESULTS_NDX	No	rlr_id
GARDS_RLR_SSREB	PK_RLR_SSREB	Yes	rlr_id, sample_id
	RLR_SSREB_NDX	Yes	rlr_id
	RLR_SSREB_SID_NDX	No	sample_id
GARDS_RN_INTERVAL	GARDS_RN_INTERVAL_CNE_NDX	No	class, name, end_time

Table name	Index name	Unique	Index columns
	PK_RN_INTERVAL	Yes	intvlid
	RN_INTERVAL_MOD_NDX	No	moddate
	RN_INTERVAL_REF_NDX	No	refid, refidtype, state
GARDS_ROI_CHANNELS	PK_GARDS_ROI_CHANNELS	Yes	sample_id, roi
	ROI_CHANNELS_NDX	No	sample_id
GARDS_ROI_CONCS	PK_GARDS_ROI_CONCS	Yes	sample_id, roi
	ROI_CONCS_NDX	No	sample_id
GARDS_ROI_COUNTS	PK_GARDS_ROI_COUNTS	Yes	sample_id, roi
	ROI_COUNTS_NDX	No	sample_id
GARDS_ROI_LIB	PK_GARDS_ROI_LIB	Yes	roi
GARDS_ROI_LIMITS	PK_GARDS_ROI_LIMITS	Yes	sample_id, roi
	ROI_LIMITS_NDX	No	sample_id
GARDS_ROLES	PK_ROLES	Yes	role_id
GARDS_ROLES_PERMIS-SIONS	PK_GARDS_ROLES_PERM	Yes	role_id, permission_id
	ROLES_PERMISSIONS_NDX	No	role_id
	ROLES_PERM_NDX	No	permission_id
GARDS_SAINT_DE-FAULT_PARAMS	PK_GARDS_SAINT_DE-FAULT_PARAMS	Yes	name
GARDS_SAINT_PRO-CESS_PARAMS	PK_GARDS_SAINT_PRO-CESS_PARAMS	Yes	sample_id, name
	SAINT_PROC_PARAMS_NDX	No	sample_id
GARDS_SAMPLE_AUX	PK_SAMPLE_AUX	Yes	sample_id
	SAMPLE_AUX_MES_NDX	No	measurement_id, sample_id
	SAMPLE_AUX_MSG_ID_NDX	No	msg_id
	SAMPLE_AUX_REFID_NDX	No	sample_ref_id, sample_id
GARDS_SAMPLE_CAT	PK_GARDS_SAMPLE_CAT	Yes	sample_id, name, method_id
	SAMP_CAT_NDX	No	sample_id
GARDS_SAMPLE_CERT	SAMPLE_CERT_NDX	Yes	sample_id
GARDS_SAMPLE_CERT_LINES	PK_GARDS_SAMPLE_CERT_LINES	Yes	sample_id, nucl_name, energy, b_energy
	SAMPLE_CERT_LINES_NDX	No	sample_id
GARDS_SAMPLE_DATA	GARDS_SAMPLE_DATA_NDX	No	station_id, detector_id, spectral_qualifier, data_type, acquisition_start
	GSD_ACQUISITION_START_NDX	No	acquisition_start

Table name	Index name	Unique	Index columns
	GSD_ACQUISITION_STOP_NDX	No	acquisition_stop
	GSD_COLLECT_START_NDX	No	collect_start
	GSD_COLLECT_STOP_NDX	No	collect_stop
	GSD_DSX	No	data_type, spectral_qualifier
	NUQ2_SAMPLE_DATA	No	data_type, detector_id, spectral_qualifier, sample_type, acquisition_start, sample_id
	PK_SAMPLE_DATA	Yes	sample_id
	SAMPLE_DATA_NDX	No	station_id, detector_id, collect_stop, data_type, sample_type, spectral_qualifier
	UQ2_SAMPLE_DATA	Yes	data_type, detector_id, spectral_qualifier, sample_type, acquisition_start, sample_id
	UQ_SAMPLE_DATA	No	station_id, detector_id, spectral_qualifier, collect_stop, acquisition_stop, transmit_dtg
GARDS_SAMPLE_DESCRIPTION	PK_SAMPLE_DESCRIPTION	Yes	sample_id
GARDS_SAMPLE_FLAGS	PK_GARDS_SAMPLE_FLAGS	Yes	sample_id, flag_id
	SAMPLE_FLAGS_NDX	No	sample_id
GARDS_SAMPLE_PROC_PARAMS	PK_GARDS_SAMPLE_PROC_PARAMS	Yes	sample_id
	PK_GARDS_SAMPLE_PROC_PARS	Yes	sample_id
GARDS_SAMPLE_RATIOS	PK_GARDS_SAMPLE_RATIOS	Yes	sample_id, ratio_id
	SAMPLE_RATIOS_NDX	No	sample_id
GARDS_SAMPLE_STATUS	PK_SAMPLE_STATUS	Yes	sample_id
	SAMPLE_STATUS_NDX	Yes	status, sample_id
GARDS_SAMPLE_TESTS	PK_SAMPLE_TESTS	Yes	test_id
GARDS_SAMPLE_UPDATE_PARAMS	PK_GARDS_SAMPLE_UPD_PAR	No	sample_id
	PK_SAMPLE_UPDATE_PARAMS	Yes	sample_id
GARDS_SAMPLE_XE_PROC_PARAMS	PK_GARDS_SAMPLE_XE_PROC_PARAMS	Yes	sample_id, roi

Table name	Index name	Unique	Index columns
	SAMPLE_XE_PROC_PARAMS_SID_NDX	No	sample_id
GARDS_SOH_CHAR_DATA	FK_SOH_ID_CHAR_DATA	No	soh_id
	PK_CHAR_DATA	Yes	soh_char_id
	SOH_CHAR_DATA_NDX1	No	dtg_end
	SOH_CHAR_VALUE_NDX	Yes	station_id, param_code, value, dtg_begin, dtg_end
	UQ_SOH_CHAR_DATA	Yes	station_id, param_code, dtg_begin, dtg_end
GARDS_SOH_CODE	PK_SOH_CODE	Yes	param
GARDS_SOH_EVALUATION	PK_GSE	Yes	sample_id
	SYS_C002723457	Yes	sample_id
GARDS_SOH_HEADER	GSH_DTG_BEGIN_NDX	No	dtg_begin
	GSH_DTG_END_NDX	No	dtg_end
	PK_SOH_HEADER	Yes	soh_id
	UQ_SOH_HEADER	Yes	station_id, dtg_begin, dtg_end
GARDS_SOH_NUM_DATA	FK_SOH_ID_NUM_DATA	No	soh_id
	PK_NUM_DATA	Yes	soh_num_id
	SOH_NUM_DTG_BEGIN_NDX	No	dtg_begin
	SOH_NUM_DTG_END_NDX	No	dtg_end
	SOH_NUM_STAPAR_NDX	No	station_id, detector_id, param_code
	UQ_SOH_NUM_DATA	Yes	station_id, param_code, dtg_begin, dtg_end
GARDS_SOH_SENSOR_DATA	FK_SOH_ID_SENSOR_DATA	No	soh_id
	GSSD_DTG_ENDX	No	dtg_end
	PK_SENSOR_DATA	Yes	soh_sensor_id
	UQ_SENSOR_DATA	Yes	station_id, sensor_type, sensor_name, dtg_begin, dtg_end
GARDS_SPECTRUM	PK_GARDS_SPECTRUM	Yes	sample_id, sample_type
	SPECTRUM_NDX	No	sample_id
GARDS_STADET	GARDS_STADET_DID_NDX	No	detector_id
	PK_STADET	Yes	station_id, detector_id
GARDS_STATIONS	PK_STATIONS	Yes	station_id

Table name	Index name	Unique	Index columns
	UQ_STATIONS	Yes	station_code
GARDS_STATIONS_SCHEDULE	PK_GARDS_STATIONS_SCHEDULE	Yes	station_id, code, begin_date
	STATIONS_SCHEDULE_NDX	No	station_id
GARDS_STATION_ASSIGNMENTS	PK_GARDS_STATION_ASS	No	station_id
	STATION_ASSIGN_UID_NDX	No	user_id
GARDS_STATUS_HISTORY	STATUS_HISTORY_NDX	No	sample_id
GARDS_TOTAL_EFFIC	PK_GARDS_TOTAL_EFFIC	Yes	sample_id, effic_energy
	TOTAL_EFFIC_NDX	No	sample_id
GARDS_UPDATE_PARAMS_TEMPLATE	PK_GARDS_UPDATE_PAR_TEMPL	Yes	detector_id
GARDS_UPDATE_REFLINES	PK_GARDS_UPDATE_REFLINES	Yes	station_id, detector_id, refpeak_energy, data_type, spectral_qualifier
	UPDATE_REFLINES_DET_NDX	No	detector_id
	UPDATE_REFLINES_NDX	No	station_id
GARDS_USERENV	PK_GARDS_USERENV	Yes	name
GARDS_USERS	PK_USERS	Yes	user_id
GARDS_USERS_ROLES	PK_GARDS_USERS_ROLES	Yes	user_id, role_id
	USERS_ROLES_ROLE_NDX	No	role_id
	USERS_ROLES_UID_NDX	No	user_id
GARDS_USER_COMMENTS	PK_GARDS_USER_COMMENTS	Yes	comment_id
	USER_COMMENTS_SID_NDX	No	sample_id
GARDS_XE_CATEGORY_PARAMS	GARDS_XE_CAT_PAR_PK	Yes	start_date
GARDS_XE_NUCL_LIB	PK_GARDS_XE_NUCL_LIB	Yes	name
GARDS_XE_NUCL_LINES_LIB	PK_GARDS_XE_NUCL_LINES_LIB	Yes	name, energy
GARDS_XE_PROC_PARAMS_TEMPLATE	PK_GARDS_XE_PROC_PARAMS_TEMP	Yes	detector_id, roi
	XE_PROC_PARAMS_TEMPL_NDX	No	detector_id
GARDS_XE_REFLINE_MASTER	PK_GARDS_XE_REFLINE_MASTER	Yes	refpeak_energy, data_type, spectral_qualifier
GARDS_XE_RESULTS	PK_GARDS_XE_RESULTS	Yes	sample_id, method_id,

Table name	Index name	Unique	Index columns
			nuclide_id
	XE_RESULTS_NDX	No	sample_id
GARDS_XE_SAMPLE_CATEGORY	PK_SAMPLE_ID	Yes	sample_id, flag_shortterm
GARDS_XE_UNCORRECTED_RESULTS	PK_XE_UNCORRECTED_RESULTS	Yes	sample_id, method_id, nuclide_id
RMS_MSGDISC	PK_RMS_MSGDISC	Yes	msgid
	RMS_MSGDISC_LDDATE_NDX	No	lddate
	RMS_MSGDISC_MOD_NDX	No	moddate
	RMS_MSGDISC_NDX	Yes	status, msgid
RN_LOGS	PK_RN_LOGS	Yes	comment_id
RN_LOGS_TXT	PK_RN_LOGS_TXT	Yes	comment_id

5.5. Radionuclide Synonym Descriptions

Schema	Synonym	Table	Table Owner
RMSAUTO	FILEPRODUCT	FILEPRODUCT	IDCX
	FPDESCRIPTION	FPDESCRIPTION	IDCX
	GARDS_AUX_LIB	GARDS_AUX_LIB	RMSMAN
	GARDS_AUX_LINES_LIB	GARDS_AUX_LINES_LIB	RMSMAN
	GARDS_BG_CONFIG_PARAMS	GARDS_BG_CONFIG_PARAMS	RMSMAN
	GARDS_BG_ENERGY_CAL_DIRECTIVE	GARDS_BG_ENERGY_CAL_DIRECTIVE	RMSMAN
	GARDS_CAT_CRITERIA_TESTS	GARDS_CAT_CRITERIA_TESTS	RMSMAN
	GARDS_CAT_TEMPLATE	GARDS_CAT_TEMPLATE	RMSMAN
	GARDS_CODES	GARDS_CODES	RMSMAN
	GARDS_COMMENTS_DEFS	GARDS_COMMENTS_DEFS	RMSMAN
	GARDS_CSC_MODCOEFF_LIB	GARDS_CSC_MODCOEFF_LIB	RMSMAN
	GARDS_DBROLE_OWNER	GARDS_DBROLE_OWNER	RMSMAN
	GARDS_DETECTORS	GARDS_DETECTORS	RMSMAN
	GARDS_DIST_SAMPLE_QUEUE	GARDS_DIST_SAMPLE_QUEUE	RMSMAN
	GARDS_EFFICIENCY_VGSL_PAIRS	GARDS_EFFICIENCY_VGSL_PAIRS	RMSMAN
	GARDS_IRF	GARDS_IRF	RMSMAN
	GARDS_LAB_CATEGORY_DESCRIPTION	GARDS_LAB_CATEGORY_DESCRIPTION	RMSMAN
	GARDS_MDAS2REPORT	GARDS_MDAS2REPORT	RMSMAN
	GARDS_NUCL2QUANTIFY	GARDS_NUCL2QUANTIFY	RMSMAN
	GARDS_NUCL_LIB	GARDS_NUCL_LIB	RMSMAN
	GARDS_NUCL_LINES_LIB	GARDS_NUCL_LINES_LIB	RMSMAN
	GARDS_PERMISSIONS	GARDS_PERMISSIONS	RMSMAN
	GARDS_POC	GARDS_POC	RMSMAN
	GARDS_PROCESSING_ERRORS	GARDS_PROCESSING_ERRORS	RMSMAN
	GARDS_PROC_PARAMS_TEMPLATE	GARDS_PROC_PARAMS_TEMPLATE	RMSMAN
	GARDS_QAT_CONFIG	GARDS_QAT_CONFIG	RMSMAN
	GARDS_QAT_NOTIFY	GARDS_QAT_NOTIFY	RMSMAN
	GARDS_QAT_QUERY_FILTER	GARDS_QAT_QUERY_FILTER	RMSMAN

Schema	Synonym	Table	Table Owner
	GARDS_QCPARAMS	GARDS_QCPARAMS	RMSMAN
	GARDS_QCTARGETS	GARDS_QCTARGETS	RMSMAN
	GARDS_READ_SAMPLE_CAT	GARDS_SAMPLE_CAT	RMSMAN
	GARDS_READ_SAMPLE_STATUS	GARDS_SAMPLE_STATUS	RMSMAN
	GARDS_REFLINE_MASTER	GARDS_REFLINE_MASTER	RMSMAN
	GARDS_RELEVANT_NUCLIDES	GARDS_RELEVANT_NUCLIDES	RMSMAN
	GARDS_ROI_LIB	GARDS_ROI_LIB	RMSMAN
	GARDS_ROLES	GARDS_ROLES	RMSMAN
	GARDS_ROLES_PERMISSIONS	GARDS_ROLES_PERMISSIONS	RMSMAN
	GARDS_SAMPLE_CAT	GARDS_AUTO_SAMPLE_CAT	RMSAUTO
	GARDS_SAMPLE_TESTS	GARDS_SAMPLE_TESTS	RMSMAN
	GARDS_SOH_CODE	GARDS_SOH_CODE	RMSMAN
	GARDS_STADET	GARDS_STADET	RMSMAN
	GARDS_STATIONS	GARDS_STATIONS	RMSMAN
	GARDS_STATIONS_SCHEDULE	GARDS_STATIONS_SCHEDULE	RMSMAN
	GARDS_STATION_ASSIGNMENTS	GARDS_STATION_ASSIGNMENTS	RMSMAN
	GARDS_STATUS_HISTORY	GARDS_STATUS_HISTORY	RMSMAN
	GARDS_UPDATE_PARAMS_TEMPLATE	GARDS_UPDATE_PARAMS_TEMPLATE	RMSMAN
	GARDS_UPDATE_REFLINES	GARDS_UPDATE_REFLINES	RMSMAN
	GARDS_USERENV	GARDS_USERENV	RMSMAN
	GARDS_USERS	GARDS_USERS	RMSMAN
	GARDS_USERS_ROLES	GARDS_USERS_ROLES	RMSMAN
	GARDS_WRITE_SAMPLE_CAT	GARDS_AUTO_SAMPLE_CAT	RMSAUTO
	GARDS_XE_CATEGORY_PARAMS	GARDS_XE_CATEGORY_PARAMS	RMSMAN
	GARDS_XE_NUCL_LIB	GARDS_XE_NUCL_LIB	RMSMAN
	GARDS_XE_NUCL_LINES_LIB	GARDS_XE_NUCL_LINES_LIB	RMSMAN
	GARDS_XE_PROC_PARAMS_TEMPLATE	GARDS_XE_PROC_PARAMS_TEMPLATE	RMSMAN
	GARDS_XE_REFLINE_MASTER	GARDS_XE_REFLINE_MASTER	RMSMAN

Schema	Synonym	Table	Table Owner
	GBEPO	GARDS_B_ENERGY_PAIRS_ORIG	RMSAUTO
	GBGEP	GARDS_BG_EFFICIENCY_PAIRS	RMSAUTO
	GBRP	GARDS_B_RESOLUTION_PAIRS	RMSAUTO
	GBRPO	GARDS_B_RESOLUTION_PAIRS_ORIG	RMSAUTO
	GEPO	GARDS_ENERGY_PAIRS_ORIG	RMSAUTO
	GNLIO	GARDS_NUCL_LINES_IDED_ORIG	RMSAUTO
	GRCO	GARDS_RESOLUTION_CAL_ORIG	RMSAUTO
	GRPO	GARDS_RESOLUTION_PAIRS_ORIG	RMSAUTO
	GSCL	GARDS_SAMPLE_CERT_LINES	RMSAUTO
	GSD	GARDS_SAMPLE_DATA	RMSAUTO
	GSDESC	GARDS_SAMPLE_DESCRIP-TION	RMSAUTO
	GSPP	GARDS_SAMPLE_PROC_PARAMS	RMSAUTO
	GSS	GARDS_SAMPLE_STATUS	RMSAUTO
	GSUP	GARDS_SAMPLE_UPDATE_PARAMS	RMSAUTO
	GSXPP	GARDS_SAMPLE_XE_PROC_PARAMS	RMSAUTO
	INTERVAL	GARDS_INTERVAL	RMSAUTO
	LASTID	LASTID	IDCX
	MSGDISC	MSGDISC	IDCX
	PIPELINE_CONTROL	PIPELINE_CONTROL	RMSMAN
RMSMAN	FILEPRODUCT	FILEPRODUCT	IDCX
	FPDESCRIPTION	FPDESCRIPTION	IDCX
	GARDS_ALERTS	GARDS_ALERTS	RMSAUTO
	GARDS_BG_DETECTOR_STD_SPECTRA	GARDS_BG_DETECTOR_STD_SPECTRA	RMSAUTO
	GARDS_BG_STD_SPECTRA	GARDS_BG_STD_SPECTRA	RMSAUTO
	GARDS_DATA_LOG	GARDS_DATA_LOG	RMSAUTO
	GARDS_ENVIRONMENT	GARDS_ENVIRONMENT	RMSAUTO
	GARDS_HISTOGRAM	GARDS_HISTOGRAM	RMSAUTO

Schema	Synonym	Table	Table Owner
	GARDS_INTERVAL	GARDS_INTERVAL	RMSAUTO
	GARDS_MET_DATA	GARDS_MET_DATA	RMSAUTO
	GARDS_MET_HEADER	GARDS_MET_HEADER	RMSAUTO
	GARDS_READ_SAMPLE_CAT	GARDS_SAMPLE_CAT	RMSMAN
	GARDS_READ_SAMPLE_STA TUS	GARDS_SAMPLE_STATUS	RMSMAN
	GARDS_RECEIPT_LOG	GARDS_RECEIPT_LOG	RMSAUTO
	GARDS_RLR	GARDS_RLR	RMSAUTO
	GARDS_RLR_CONCLUSIONS	GARDS_RLR_CONCLU-SIONS	RMSAUTO
	GARDS_RLR_OBJECTIVE	GARDS_RLR_OBJECTIVE	RMSAUTO
	GARDS_RLR_RATIOS	GARDS_RLR_RATIOS	RMSAUTO
	GARDS_RLR_RESULTS	GARDS_RLR_RESULTS	RMSAUTO
	GARDS_RLR_SSREB	GARDS_RLR_SSREB	RMSAUTO
	GARDS_RN_INTERVAL	GARDS_RN_INTERVAL	RMSAUTO
	GARDS_SAMPLE_AUX	GARDS_SAMPLE_AUX	RMSAUTO
	GARDS_SAMPLE_CERT	GARDS_SAMPLE_CERT	RMSAUTO
	GARDS_SAMPLE_CERT_LINE S	GARDS_SAMPLE_CERT_LIN ES	RMSAUTO
	GARDS_SAMPLE_DESCRIP-TION	GARDS_SAMPLE_DESCRIP-TION	RMSAUTO
	GARDS_SOH_CHAR_DATA	GARDS_SOH_CHAR_DATA	RMSAUTO
	GARDS_SOH_HEADER	GARDS_SOH_HEADER	RMSAUTO
	GARDS_SOH_NUM_DATA	GARDS_SOH_NUM_DATA	RMSAUTO
	GARDS_SOH_SENSOR_DATA	GARDS_SOH_SENSOR_DAT A	RMSAUTO
	GARDS_SPECTRUM	GARDS_SPECTRUM	RMSAUTO
	GARDS_WRITE_SAMPLE_CA T	GARDS_SAMPLE_CAT	RMSMAN
	GBEPO	GARDS_B_ENERGY_PAIRS_ ORIG	RMSMAN
	GBGEP	GARDS_BG_EFFICIENCY_P AIRS	RMSMAN
	GBRP	GARDS_B_RESOLUTION_P AIRS	RMSMAN
	GBRPO	GARDS_B_RESOLUTION_P AIRS_ORIG	RMSMAN
	GCCT	GARDS_CAT_CRITERIA_TE STS	RMSMAN
	GNLIO	GARDS_NUCL_LINES_IDED	RMSMAN

Schema	Synonym	Table	Table Owner
		_ORIG	
	GPPT	GARDS_PROC_PARAMS_TEMPLATE	RMSMAN
	GRCO	GARDS_RESOLUTION_CAL_ORIG	RMSMAN
	GRPO	GARDS_RESOLUTION_PAIRS_ORIG	RMSMAN
	GSD	GARDS_SAMPLE_DATA	RMSMAN
	GSPP	GARDS_SAMPLE_PROC_PARAMS	RMSMAN
	GSS	GARDS_SAMPLE_STATUS	RMSMAN
	GSTA	GARDS_STATION_ASSIGN-MENTS	RMSMAN
	GSUP	GARDS_SAMPLE_UPDATE_PARAMS	RMSMAN
	GSXPP	GARDS_SAMPLE_XE_PROC_PARAMS	RMSMAN
	GUPT	GARDS_UPDATE_PARAMS_TEMPLATE	RMSMAN
	GXPPT	GARDS_XE_PROC_PARAMS_TEMPLATE	RMSMAN
	LASTID	LASTID	IDCX
	MSGDISC	MSGDISC	IDCX

5.6. Radionuclide Foreign Key Descriptions

Table name	Constraint name	Con-strained column	Foreign table
GARDS_AUTO_SAMPLE_CAT	FK_SID_AUTOSAMPCAT	sample_id	GARDS_SAMPLE_DATA
GARDS_BG_CONFIG_PARAMS	FK_BG_CONFIG_PARAMS	detector_id	GARDS_DETECTORS
GARDS_BG_EFFICIENCY_PAIRS	FK_BG_EFFICIENCY_PAIRS	sample_id	GARDS_SAMPLE_DATA
GARDS_BG_ENERGY_CAL	FK_BG_EN_CAL_SID	sample_id	GARDS_SAMPLE_DATA
GARDS_BG_ENERGY_CAL_DIRECTIVE	FK_BG_EN_CAL_DIR_DETID	detector_id	GARDS_DETECTORS
GARDS_BG_ENERGY_CAL_ORIG	FK_BG_EN_CAL_ORIG_SID	sample_id	GARDS_SAMPLE_DATA
GARDS_BG_ISOTOPE_CONCS	FK_BG_ISOTOPE_CONCS	sample_id	GARDS_SAMPLE_DATA
GARDS_BG_PROC_PARAMS	FK_BG_PROC_PARAMS	sample_id	GARDS_SAMPLE_DATA
GARDS_BG_PROC_PARAMS_ROI	FK_BG_PROC_PARAMS_ROI	sample_id	GARDS_SAMPLE_DATA
GARDS_BG_QC_RESULT	FK_BG_QC_RESULT	sample_id	GARDS_SAMPLE_DATA
GARDS_BG_ROI_CONCS	FK_BG_ROI_CONCS	sample_id	GARDS_SAMPLE_DATA
GARDS_BG_ROI_COUNTS	FK_BG_ROI_COUNTS	sample_id	GARDS_SAMPLE_DATA
GARDS_BG_STD_SPECTRA	FK_BG_STD_SPECTRA	sample_id	GARDS_SAMPLE_DATA
GARDS_BG_STD_SPECTRA_RESULT	FK_BG_STD_SPECTRA_RESULT	sample_id	GARDS_SAMPLE_DATA
GARDS_B_ENERGY_PAIRS	FK_B_ENERGY_PAIRS	sample_id	GARDS_SAMPLE_DATA
GARDS_B_ENERGY_PAIRS_ORIG	FK_B_ENERGY_PAIRS_ORIG	sample_id	GARDS_SAMPLE_DATA
GARDS_B_RESOLUTION_CAL	FK_GARDS_B_RESOLUTION_CAL	sample_id	GARDS_SAMPLE_DATA
GARDS_B_RESOLUTION_PAIRS	FK_B_RESOLUTION_PAIRS	sample_id	GARDS_SAMPLE_DATA
GARDS_B_RESOLUTION_PAIRS_ORIG	FK_B_RESOLUTION_PAIRS_ORIG	sample_id	GARDS_SAMPLE_DATA

Table name	Constraint name	Con-strained column	Foreign table
GARDS_CAT_TEM-PLATE	FK_DETECTOR	detector_id	GARDS_DETECTORS
GARDS_CAT_TEM-PLATE	FK_STATION	station_id	GARDS_STATIONS
GARDS_COMMENTS	FK_COMMENTS	sample_id	GARDS_SAMPLE_DATA
GARDS_CSC_MOD-COEFF_LIB	FK_CSC_MODCFF_LIB	detector_id	GARDS_DETECTORS
GARDS_DIST_SAMPLE_QUEUE	FK_DIST_SAMPLE_QUEUE	sample_id	GARDS_SAMPLE_DATA
GARDS_EFFI-CIENCY_CAL	FK_EFFICIENCY_CAL	sample_id	GARDS_SAMPLE_DATA
GARDS_EFFI-CIENCY_ERROR_CAL	FK_EFFICIENCY_ERROR_CAL	sample_id	GARDS_SAMPLE_DATA
GARDS_EFFI-CIENCY_PAIRS	FK_EFFICIENCY_PAIRS	sample_id	GARDS_SAMPLE_DATA
GARDS_EFFI-CIENCY_VGSL_PAIRS	FK_EFFICIENCY_VGSL_PAIRS	detector_id	GARDS_DETECTORS
GARDS_ENERGY_CAL	FK_ENERGY_CAL	sample_id	GARDS_SAMPLE_DATA
GARDS_ENERGY_CAL_COV	FK_ENERGY_CAL_COV	sample_id	GARDS_SAMPLE_DATA
GARDS_ENERGY_CAL_ORIG	FK_ENERGY_CAL_ORIG	sample_id	GARDS_SAMPLE_DATA
GARDS_ENERGY_PAIRS	FK_ENERGY_PAIRS	sample_id	GARDS_SAMPLE_DATA
GARDS_ENERGY_PAIRS_ORIG	FK_ENERGY_PAIRS_ORIG	sample_id	GARDS_SAMPLE_DATA
GARDS_ENVIRON-MENT	FK_ENVIRONMENT	sample_id	GARDS_SAMPLE_DATA
GARDS_FPE	FK_FPE	sample_id	GARDS_SAMPLE_DATA
GARDS_HISTO-GRAM	FK_HISTOGRAM	sample_id	GARDS_SAMPLE_DATA
GARDS_IRF	FK_IRF	detector_id	GARDS_DETECTORS
GARDS_MET_DATA	FK_MET_DATA	station_id	GARDS_STATIONS
GARDS_MET_DATA	FK_MET_GROUP_ID_MET_HEADER	met_group_id	GARDS_MET_HEADER
GARDS_MET_HEADER	FK_MET_HEADER	station_id	GARDS_STATIONS

Table name	Constraint name	Con-strained column	Foreign table
GARDS_NOTIFY	FK_NOTIFY_POC	poc_id	GARDS_POC
GARDS_NUCL_IDED	FK_NUCL_IDED	sample_id	GARDS_SAMPLE_DATA
GARDS_NUCL_IDED_ORIG	FK_NUCL_IDED_ORIG	sample_id	GARDS_SAMPLE_DATA
GARDS_NUCL_IDED_ORIG	FK_SID_NUCLIDEID	name	GARDS_NUCL_IDED
GARDS_NUCL_IDED_ORIG	FK_SID_NUCLIDEID	sample_id	GARDS_NUCL_IDED
GARDS_NUCL_LINES_IDED	FK_NUCL_LINES_IDED	sample_id	GARDS_SAMPLE_DATA
GARDS_NUCL_LINES_IDED_ORIG	FK_NUCL_LINES_IDED_ORIG	sample_id	GARDS_SAMPLE_DATA
GARDS_NUCL_LINES_IDED_ORIG	FK_SID_ET_AL	nuclide_id	GARDS_NUCL_LINES_IDED
GARDS_NUCL_LINES_IDED_ORIG	FK_SID_ET_AL	peak	GARDS_NUCL_LINES_IDED
GARDS_NUCL_LINES_IDED_ORIG	FK_SID_ET_AL	sample_id	GARDS_NUCL_LINES_IDED
GARDS_PEAKS	FK_PEAKS	sample_id	GARDS_SAMPLE_DATA
GARDS_PEAKS_ORIG	FK_PEAKS_ORIG	sample_id	GARDS_SAMPLE_DATA
GARDS_PEAKS_ORIG	FK_SID_PEAKID	peak_id	GARDS_PEAKS
GARDS_PEAKS_ORIG	FK_SID_PEAKID	sample_id	GARDS_PEAKS
GARDS_PROC_PARAMS_TEMPLATE	FK_PPTEMPL_DET	detector_id	GARDS_DETECTORS
GARDS_PROC_PARAMS_TEMPLATE	FK_PPTEMPL_STA	station_id	GARDS_STATIONS
GARDS_PRODUCT	FK_PRODUCT	sample_id	GARDS_SAMPLE_DATA
GARDS_QCHISTORY	FK_QCHISTORY	sample_id	GARDS_SAMPLE_DATA
GARDS_QCPARAMS	FK_QCPARAMS_DET	detector_id	GARDS_DETECTORS
GARDS_QCTARGETS	FK_QCTARGS_DET	detector_id	GARDS_DETECTORS
GARDS_QCTARGETS	FK_QCTARGS_STA	station_id	GARDS_STATIONS
GARDS_QC_RES-ULTS	FK_QC_RESULTS	sample_id	GARDS_SAMPLE_DATA
GARDS_RESOLU-	FK_RESOLUTION_CAL	sample_id	GARDS_SAMPLE_DA

Table name	Constraint name	Con-strained column	Foreign table
TION_CAL			TA
GARDS_RESOLU-TION_CAL_COV	FK_RESOLUTION_CAL_COV	sample_id	GARDS_SAMPLE_DATA
GARDS_RESOLU-TION_CAL_ORIG	FK_RESOLUTION_CAL_ORIG	sample_id	GARDS_SAMPLE_DATA
GARDS_RESOLU-TION_PAIRS	FK_RESOLUTION_PAIRS	sample_id	GARDS_SAMPLE_DATA
GARDS_RESOLU-TION_PAIRS_ORIG	FK_RESOLUTION_PAIRS_ORIG	sample_id	GARDS_SAMPLE_DATA
GARDS_RLR_CON-CLUSIONS	SYS_C0028565	rlr_id	GARDS_RLR
GARDS_RLR_OB-JECTIVE	SYS_C0028566	rlr_id	GARDS_RLR
GARDS_RLR_RA-TIOS	SYS_C0028567	rlr_id	GARDS_RLR
GARDS_RLR_RES-ULTS	SYS_C0028568	rlr_id	GARDS_RLR
GARDS_RLR_SSREB	SYS_C0028569	rlr_id	GARDS_RLR
GARDS_RLR_SSREB	SYS_C0028570	sample_id	GARDS_SAMPLE_DATA
GARDS_ROI_CHAN-NELS	FK_ROI_CHANNELS	sample_id	GARDS_SAMPLE_DATA
GARDS_ROI_CONCS	FK_ROI_CONCS	sample_id	GARDS_SAMPLE_DATA
GARDS_ROI_COUNTS	FK_ROI_COUNTS	sample_id	GARDS_SAMPLE_DATA
GARDS_ROI_LIMITS	FK_ROI_LIMITS	sample_id	GARDS_SAMPLE_DATA
GARDS_ROLES_PER-MISSIONS	SYS_C0028509	permission_id	GARDS_PERMIS-SIONS
GARDS_ROLES_PER-MISSIONS	SYS_C0028510	role_id	GARDS_ROLES
GARDS_SAINT_PRO-CESS_PARAMS	FK_SAINT_PROC_PARAMS	sample_id	GARDS_SAMPLE_DATA
GARDS_SAMPLE_AUX	FK_SAMPLE_AUX	sample_id	GARDS_SAMPLE_DATA
GARDS_SAMPLE_CAT	FK_SAMP_ID	sample_id	GARDS_SAMPLE_DATA
GARDS_SAMPLE_CERT	FK_SAMPLE_CERT	sample_id	GARDS_SAMPLE_DATA
GARDS_SAMPLE_CE	FK_SAMPLE_CERT_LINES	sample_id	GARDS_SAMPLE_DA

Table name	Constraint name	Con-strained column	Foreign table
RT_LINES			TA
GARDS_SAMPLE_DESCRIPTION	FK_SAMPLE_DESCRIPTION	sample_id	GARDS_SAMPLE_DATA
GARDS_SAMPLE_FLAGS	FK_SAMPLE_FLAGS	sample_id	GARDS_SAMPLE_DATA
GARDS_SAMPLE_PROC_PARAMS	FK_SAMPLE_PROC_PARAMS	sample_id	GARDS_SAMPLE_DATA
GARDS_SAMPLE_RATIOS	FK_SAMPLE_RATIOS	sample_id	GARDS_SAMPLE_DATA
GARDS_SAMPLE_STATUS	FK_SAMPLE_STATUS	sample_id	GARDS_SAMPLE_DATA
GARDS_SAMPLE_UPDATE_PARAMS	FK_SAMPLE_UPDATE_PARAMS	sample_id	GARDS_SAMPLE_DATA
GARDS_SAMPLE_XE_PROC_PARAMS	FK_SAMPLE_XE_PROC_PARAMS	sample_id	GARDS_SAMPLE_DATA
GARDS_SOH_CHAR_DATA	FK_SOH_ID_CHAR_DATA	soh_id	GARDS_SOH_HEADER
GARDS_SOH_EVAL-UATION	FK_BGE_SID	sample_id	GARDS_SAMPLE_DATA
GARDS_SOH_EVAL-UATION	FK_GSE_SID	sample_id	GARDS_SAMPLE_DATA
GARDS_SOH_HEADER	FK_SOH_HEADER	station_id	GARDS_STATIONS
GARDS_SOH_NUM_DATA	FK_SOH_ID_NUM_DATA	soh_id	GARDS_SOH_HEADER
GARDS_SOH_SENSOR_DATA	FK_SOH_ID_SENSOR_DATA	soh_id	GARDS_SOH_HEADER
GARDS_SPECTRUM	FK_SPECTRUM	sample_id	GARDS_SAMPLE_DATA
GARDS_STADET	FK_STADET_DET	detector_id	GARDS_DETECTORS
GARDS_STADET	FK_STADET_STA	station_id	GARDS_STATIONS
GARDS_STATIONS_SCHEDULE	FK_STA_SCHEDULE_STAID	station_id	GARDS_STATIONS
GARDS_STATION_ASSIGNMENTS	FK_STA_ASSIGN_STAID	station_id	GARDS_STATIONS
GARDS_STATION_ASSIGNMENTS	FK_STA_ASSIGN_USRID	user_id	GARDS_USERS
GARDS_STATUS_HISTORY	FK_STATUS_HISTORY	sample_id	GARDS_SAMPLE_DATA
GARDS_TOTAL_EFFIC	FK_TOTAL_EFFIC	sample_id	GARDS_SAMPLE_DATA

Table name	Constraint name	Con-strained column	Foreign table
GARDS_UPDATE_PARAMS_TEMPLATE	FK_UPD_PARAMS_TMPL	detector_id	GARDS_DETECTORS
GARDS_UPDATE_REFLINES	FK_UPD_REFLINES_DET	detector_id	GARDS_DETECTORS
GARDS_UPDATE_REFLINES	FK_UPD_REFLINES_STA	station_id	GARDS_STATIONS
GARDS_USERS_ROLES	FK_ROLE_ID	role_id	GARDS_ROLES
GARDS_USERS_ROLES	FK_USER_ID	user_id	GARDS_USERS
GARDS_USER_COM-MENTS	FK_USER_COMMENTS	comment_id	GARDS_COMMENTS
GARDS_USER_COM-MENTS	FK_USER_COMMENTS_SID	sample_id	GARDS_SAMPLE_DATA
GARDS_XE_PROC_PARAMS_TEMPLATE	XE_PPT_DET	detector_id	GARDS_DETECTORS
GARDS_XE_RES-ULTS	FK_XE_RESULTS	sample_id	GARDS_SAMPLE_DATA
GARDS_XE_SAMPLE_CATEGORY	FK_XESAMPLECAT	flag_shortterm	GARDS_XE_SAMPLE_CATEGORY
GARDS_XE_SAMPLE_CATEGORY	FK_XESAMPLECAT	sample_id	GARDS_XE_SAMPLE_CATEGORY
GARDS_XE_UNCOR-RECTED_RESULTS	FK_XE_UNCORRECTED_RES-ULTS	sample_id	GARDS_SAMPLE_DATA

6. FUNCTIONS, PROCEDURES AND PACKAGES

This section describes PL/SQL functions, procedures and packages that are defined in or used by objects in the S/H/I and radionuclide parts of the IDC database.

6.1. Functions

No functions found in the database.

6.2. Procedures

No procedures found in the database.

6.3. Packages

No packages found in the database.

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GLOSSARY

2-D	Two-dimensional.
3-C	Three-components.
abundance	Fraction of a decay event that results in the radiation(s) or interest (for example, a gamma line at a specific energy or a beta-gamma coincidence pair). Intensity is sometimes used to mean abundance.
activation products	Nuclides produced from the absorption of a neutron by a nucleus.
activity	Decay rate of a radionuclide; usually expressed in Becquerels (disintegrations per second), Bq.
amplitude	Zero-to-peak height of a waveform in nanometers.
array	Collection of sensors distributed over a finite area (usually in a cross or concentric pattern) and referred to as a single station.
arrival	Signal that has been associated to an event. First, the Global Association (*GA*) software associates the signal to an event. Later during interactive processing, many arrivals are confirmed and improved by visual inspection
ASCII	American Standard Code for Information Interchange. Standard, unformatted 256-character set of letters and numbers.
attribute	(1) A database column. (2) Characteristic of an item; specifically, a quantitative measure of an S/H/I arrival such as azimuth, slowness, period, and amplitude.
authentication signature	Series of bytes that are unique to a set of data and that are used to verify the authenticity of the data.
background	Contribution to a spectrum from naturally occurring radionuclides as well as interactions between radiation and materials in the vicinity of the detector.
baseline	Contribution to a spectrum from the partial energy deposition of a gamma-ray in a detector.
beta-gamma coincidence event	Nuclear decay that produces both a gamma ray and a beta particle within a very short time scale. May also refer to other photon-electron coincidence events such as an X-ray with a conversion electron.
beta particle	Electron that is produced from a nuclear decay. May also refer to other electron radiations, for example, a conversion electron.
blank subtraction	Process of removing counts from a sample spectrum or a region of interest within a sample spectrum originating from the air filter.
BLANKPHD	Blank Pulse Height Data; ASCII data message containing the pulse height data of an unexposed air filter.
CALIBPHD	Calibration Pulse Height Data; ASCII data message containing the pulse height data of a certified standard source.

calibration coefficients	Numbers that define the energy, resolution, and efficiency equations.
CD	Continuous Delivery.
centroid	Energy (in keV) or channel number at the centre of a fitted peak.
channel	(1 – RN) Energy window (in keV) representing a differential increment of pulse height.
	(2 – SHI) Component of motion or distinct stream of data.
CLF	Concise List of Frames.
coherent	Quality of having a fixed phase relationship; as signals from a wavefront detected on numerous seismic or infrasonic array station elements.
concentration	Activity per unit volume of air.
counts	(1 – RN) Number of pulses observed within a spectrum channel.
	(2 – SHI) Units of digital waveform data.
critical level/limit	Minimum net counts that must be contained in an ROI for nuclide identification (Lc).
CSCI	Computer Software Configuration Item.
CSS	Center for Seismic Studies
CTBT	Comprehensive Nuclear Test-Ban Treaty (the Treaty).
DACS	Distributed Application Control System.
DB	Database.
dB	Decibel.
defining	Arrival attribute, such as arrival time, azimuth, or slowness, which is used in calculating the event's location or magnitude.
defining phase	Associated phase for which features are used in the estimation of the location and origin time of an S/H/I event.
DETBKPHD	Detector Background Pulse Height Data; ASCII data message containing the pulse height data from a background count.
detection limit	The smallest amount of activity that can be reliably detected and quantified in a spectrum. This quantity is used to determine the MDC.
ECR	Energy versus Channel Regression; an equation providing the initial detector-specific relationship between channel number and energy. The equation contains calibration coefficients and is estimated from a transmitted calibration dataset.
EER	Efficiency versus Energy Regression; an equation providing the detector-specific relationship between efficiency and energy.
energy	Usually refers to the measured kinetic energy of radiation quanta deposited in a detector. The unit most appropriate for such measure-

	ments is keV.
epoch(al) time	Number of seconds after January 1, 1970 00:00:00.0. Conventionally used to 1-second resolution, but extended in the context of the IDC Database Schema to a resolution of one millisecond.
ERD	Entity-Relationship Diagram.
event	(1 – RN) Occurrence that displays characteristics indicative of a possible nuclear test.
	(2 – SHI) Unique source of seismic, hydroacoustic, or infrasonic wave energy that is limited in both time and space.
FFT	Fast Fourier Transform.
fission (P)	Particulates created in a fission event.
fission (G)	Gases created in a fission event.
f-k	Frequency versus wavenumber (k) analysis that maps phase power from an array as a function of azimuth and slowness.
FPID	Fission Product Identification.
FTP	File Transfer Protocol; protocol for transferring files between computers.
FULL SPHD	Full Sample Pulse Height Data; ASCII data message containing the pulse height data of a sample acquired for a complete collection interval.
FWHM	Full Width at Half-Maximum; metric of detector resolution and equivalent to the width of a photopeak (in keV) taken at the peak height equal to half the maximum peak counts.
GA	Global Association application. *GA* associates S/H/I phases to events.
gamma	Gamma-ray.
gamma ray	Photon that is produced from a nuclear transition; may also imply other photon radiations, for example, an X-ray.
GARDS	Global Atmospheric Radionuclide Detection System.
GASBKPHD	Gas Background Pulse Height Data. Data type sent by noble gas monitoring systems that observe a memory effect during sample acquisition due to atoms from the previous sample adsorbed onto the walls of the gas cell.
GMT	Greenwich Mean Time.
HASE	Hydroacoustic Azimuth and Slowness Estimator.
hydroacoustic	Pertaining to sound in the ocean.
IDC	International Data Centre.
IIR	Infinite Impulse Response (filters also referred to as recursive filters).
IMS	International Monitoring System.

infrasonic	Pertaining to low-frequency (sub- audible) sound in the atmosphere.
Internet	World-wide network of computers linked by means of the IP protocol.
IP	Internet Protocol.
kB	kilobyte. 1,024 bytes.
keV	kilo-electron Volts; a metric of kinetic energy.
keyline	Photon with the highest detection probability.
Lc	Critical level.
local	(1) (distance) Source to seismometer separations of a few degrees or less. (2) (event) Recorded at distances where the first P and S waves from shallow events have travelled along direct paths within the crust.
m	(1) Meter(s). (2) Megabyte(s); 1,024 kilobytes. (3) Month(s). (4) Minute(s).
mb	Magnitude of a seismic body wave.
mbar	Millibar.
mbmle	Magnitude of an event based on maximum likelihood estimation using seismic body waves.
mBq	MilliBecquerel.
MDA	Minimum Detectable Activity.
MDC	Minimum Detectable Concentration.
ML	Magnitude based on waves measured near the source.
mm	Millimetre.
Ms	Magnitude of seismic surface waves.
Msmle	Magnitude of an event based on maximum likelihood estimation using surface waves.
multiplet	Spectral region of interest comprised of more than one photopeak.
NA	Not Applicable.
NDC	National Data Centre.
NID	Nuclide Identification.
nm	Nanometre.
non-defining	Arrival attribute, such as arrival time, azimuth, or slowness, which is associated, but not used in calculating the event’s location or magnitude.
non-defining phase	Associated phase for which features are not used in the estimating the location and origin time of an S/H/I event.
NSE	Noise Spectrum Equalization.

nuclide	One of many combinations of nucleons that may comprise an atomic nucleus. Because all nuclides of interest with respect to CTBT compliance verification are radioactive, this term is often used to refer specifically to radionuclide.
Oracle	Vendor of IDC database management system.
origin	Hypothesized time and location of a seismic, hydroacoustic, or infrasonic event. Any event may have many origins. Characteristics such as magnitudes and error estimates may be associated with an origin.
parameter (par) file	ASCII file containing values for parameters of a program. Par files are used to replace command line arguments. The files are formatted as a list of [token = value] strings.
peak	Statistically significant increase in counts above a spectrum baseline at an energy associated with a gamma line of a particular radionuclide or other phenomenon.
PHD	Pulse Height Data; a format for spectral data messages. Possible PHD data message types include BLANKPHD, CALIBPHD, DETBKPHD, GASBKPHD, QCPHD, and SAMPLEPHD.
PIDC	Refers to the former Prototype International Data Centre, Arlington, Virginia
polarization	Form of three-component analysis used to derive azimuth and slowness information from non-array stations.
PREL SPHD	Preliminary Sample Pulse Height Data; ASCII data message containing the pulse height data of a sample acquired for less than a complete collection interval.
primary seismic	IMS seismic station(s) or data that is (are) part of the detection network.
PS	Peak Search.
QC	Quality Control.
QCPHD	Quality Control Pulse Height Data; ASCII data message containing the pulse height data of a certified source.
quefrency	Time-delay axis with units of seconds for a cepstrum.
RN	Radionuclide.
radioactivity	See “activity”.
radionuclide	Nuclide that has an unstable nucleus, that is, a radioactive nuclide.
REB	Reviewed Event Bulletin; the bulletin formed of all S/H/I events that have passed analyst inspection and quality assurance review.
region of interest	Region of a radionuclide spectrum or histogram that corresponds to a particular radionuclide.
regional	(1) (distance) Source to seismometer separations between a few degrees and 20 degrees. (2) (event) Recorded at distances where the first P and S waves from shallow events have travelled along paths

	through the uppermost mantle.
RER	Resolution (versus) Energy Regression; an equation providing the initial detector- specific relationship between resolution and energy. This equation contains calibration coefficients and is interpolated from a transmitted calibration spectrum.
residual	Difference in time, azimuth, or slowness between a calculated attribute and its corresponding theoretical value.
RLR	Radionuclide Lab Report; report containing sample analysis results from a certified radionuclide laboratory.
RMS	Radionuclide Monitoring System; the part of the IMS that monitors the atmosphere for radionuclide.
RNPS	Radionuclide Network Product Summary; daily report containing a summary of the Radionuclide Network for a three-day period, including the data received, their products, and any relevant nuclides.
ROI	Region of interest.
RRR	Reviewed Radionuclide Report. Electronic file containing the final results of the interactive review of the automated radionuclide processing. It contains sections on sample information, measurement categorization, measured radionuclide quantities, MDCs, radionuclide identification, analyst editing, processing parameters, data quality flags, event screening flags, calibration equations, and field of regard.
sample	Any physical entity counted on a detector.
SAMPLEPHD	Sample Pulse Height Data; ASCII data message containing pulse height data acquired by counting a gas or particulate sample with a detector system.
S/H/I	Seismic, hydroacoustic, and infrasonic.
SID	Sample ID; unique alphanumeric string assigned to a sample during the automated processing for identification and accounting purposes.
singlet	Spectrum photopeak consisting of counts from one mono-energetic gamma- ray; photopeak containing counts from multiple photons, but fit as if it is comprised of counts from only one because contributions from the individual radiations cannot be separated, as in a multiplet.
SLSD	Standard List of Signal Detections.
SOH	State of Health; indicator of a system's operability.
spectrum	(1 – RN) Plot of the differential number of pulses (in counts) per differential pulse height (in channels or keV).
	(2 – SHI) Plot of the energy contained in waveforms as a function of frequency.
SPHD	Sample Pulse Height Data; ASCII data message type containing the pulse height data of a sample, as well as other information. The two

	types of SPHDs are full and preliminary.
SQL	Structured Query Language; a language for manipulating data in a relational database.
SSREB	Standard Screened Radionuclide Event Bulletin; bulletin generated by the IDC when fission or activation products are detected at a radionuclide station above normal limits. A SSREB contains information on the possible event, source location, fission products, activation products detected, any isotopic ratios calculated, and any certified laboratory results. New event information can be added to the SSREB as it arrives, therefore, multiple revisions of an SSREB are possible.
STA/LTA	Short-term average/long-term average ratio.
Sum/Natural	Artificial entries in the nuclide library that enable the automated processing to identify commonly observed sum peaks in a spectrum.
TCP/IP	Transmission Control Protocol/Internet Protocol.
teleseismic	(1) (distance) Source to seismometer separations of 20 degrees or more. (2) (event) Recorded at distances where the first P and S waves from shallow events have travelled paths through the mantle/core.
time series	Time ordered sequence of data samples. Typically a waveform or derived from waveforms, such as a beam.
Treaty	Comprehensive Nuclear-Test-Ban Treaty (CTBT).
Type I Error	Spectral region of interest falsely identified as a peak by the automated processing.
Type II Error	Peak undetected by the automated processing.

preparatory commission for the comprehensive nuclear-test-ban treaty organization

CTBTO PREPARATORY COMMISSION

Specification

Formats and Protocols for Messages

17 July 2024 | IDC/ENG/SPC/103/Rev.8.1 | Distr.: GENERAL

Summary

This document describes the International Monitoring System 2.0 (IMS2.0) version of the formats and protocols used for discrete message exchange, including requests for subscriptions and data messages.

Contributors

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- See previous revisions of this document.

Amendments

Major changes since the previous revision (Rev. 8) are:

- Regarding the specification:
  - Added #b_Efficiency and #Gaincorr data blocks for Pulse Height Data (p. 177 and 182, respectively)
  - Added #SequenceSensors and #Gainstab data blocks for State of Health data (p. 206 and 207, respectively)
  - Added missing description for the #Histogram data block (p. 207)
- Regarding the content:
  - Added the missing "optional" designation for the #ProcessSensors data block for RMSSOH messages in Table 128 (p. 201)
  - Corrected the third character of the noble gas site codes from `G` to `X` and removed sites that have no noble gas capacity and previously appeared in Table 176 (section II.2, p. 371)
  - Corrected the default values for the following request environment lines:
    * MBMS_SLOPE from 1.25 to 1.0 in subsection 4.6.27 (p. 60)
    * MIN_MOVEOUT_SP from 1.5 to 1.3 in subsection 4.6.33 (p. 63)
    * MIN_NSTA_MS from 1 to 2 in subsection 4.6.37 (p. 65)

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Acronyms and abbreviations

2-D two dimensional.
3-C three-component.

ADDINS Additional Instructions.
ARR Automated Radionuclide Report.
ASCII American Standard Code for Information Interchange.
ATM Atmospheric Transport Modelling.
AutoDRM Automatic Data Request Manager.

BIOT British Indian Ocean Territory.
BLANKPHD Blank Pulse Height Data.

CALIBPHD Calibration Pulse Height Data.
CD compact disk.
CE conversion electron.
CNF Cooperating National Facility.
CPU Central Processing Unit.
CR Carriage Return.
CRL Certificate Revocation List.
CSC Computer Software Component.
CTBT Comprehensive Nuclear-Test-Ban Treaty.
CTBTO Comprehensive Nuclear-Test-Ban Treaty Organization.

DAC Digital to Analogue Converter.
DETBKPHD Detector Background Pulse Height Data.
DFX Detection and Feature Extraction.
DSA Digital Signature Algorithm.
DVD Digital Versatile Disk.

ECR energy vs channel regression.
EER energy vs efficiency regression.
EXECSUM Executive Summary.

FDSN Federation of Digital Seismic Networks.
FIR Finite Impulse Response.
FTP File Transfer Protocol.
FWHM Full Width at Half Maximum.

GA Global Association.
GASBKPHD Gas Background Pulse Height Data.
GCI Global Communications Infrastructure.
GSE Group of Scientific Experts.
GSETT-3 Group of Scientific Experts Third Technical Test.

HPGe High Purity Germanium.
HTML HyperText Markup Language.
HTTP HyperText Transfer Protocol.

IDC International Data Centre.
IEEE Institute of Electrical and Electronics Engineers.
IIR Infinite Impulse Response.
IMS International Monitoring System.
IMS2.0 International Monitoring System 2.0.
IRIS Incorporated Research Institutions for Seismology.
ISC International Seismological Centre.
ISO International Standards Organization.

LABSDN Laboratory Sample Dispatch Notification.
LF Line Feed.
LP long-period.
LSB Least Significant Bit.

MDA Minimum Detectable Activity.
MDC Minimum Detectable Concentration.
MDI Minimum Detectable Intensity.
MESACK Message Receipt Acknowledgement.

MET Meteorological data.
MID Measurement Identification.
MIME Multipurpose Internet Mail Extensions.
MRP Most Recent Prior.
MSB Most Significant Bit.

NCC Net Count Calculation.
NDC National Data Centre.
NEB National Event Bulletin.
NEIC National Earthquake Information Centre.
NSEB National Screened Event Bulletin.

OS Operating System.

PEM Privacy Enhanced Mail.
PHD Pulse Height Data.
PKI Public Key Infrastructure.
PRESDN Preliminary Sample Dispatch Notification.
PTS Provisional Technical Secreteriat.

QC Quality Control.
QCPHD Quality Control Pulse Height Data.
QMS Quality Management System.

RASA Radionuclide Aerosol Sampler/Analyser.
REB Reviewed Event Bulletin.
RER resolution vs energy regression.
RFID Radio-Frequency Identification.
RLR Radionuclide Laboratory Report.
RMS Radionuclide Monitoring System.
RMSSOH Radionuclide Monitoring System State of Health.
RNPS Radionuclide Network Product Summary.
ROI region of interest.
RRR Reviewed Radionuclide Report.

S/H/I seismic, hydroacoustic, and infrasonic.
S/MIME Secure Multipurpose Internet Mail Extensions.
SAMACK Sample Receipt Acknowledgement.
SAMPLEPHD sample pulse height data.
SEB Standard Event Bulletin.
SEED Standard for the Exchange of Earthquake Data.
SEL Standard Event List.
SEL1 Standard Event List 1.
SEL2 Standard Event List 2.
SEL3 Standard Event List 3.
SID Sample IDentification.
SLSD Standard List of Signal Detections.
SNR Signal-to-Noise Ratio.
SOH state of health.
SPHD sample pulse height data.
SPHDF Full Sample Pulse Height Data.
SPHDP Preliminary Sample Pulse Height Data.
SPIKEPHD Spike Pulse Height Data.
SRID Sample Reference Identification.
SROI Spectral Region of Interest.
SRS Source-Receptor Sensitivity.
SSEB Standard Screened Event Bulletin.
SSREB Standard Screened Radionuclide Event Bulletin.
STP Standard Temperature and Pressure.

TCP/IP Transmission Control Protocol/Internet Protocol.

UPS Uninterrupted Power Supply.
USB Universal Serial Bus.
UTC Coordinated Universal Time.

VDMS *Verification Data and products Messaging System.*

XML eXtensible Markup Language.

1

About this document

1.1 Purpose

This document describes the International Monitoring System 2.0 (IMS2.0) version of the formats and protocols used for discrete message exchange, including requests for subscriptions and data messages.

1.2 Scope

This document describes message exchange formats, some of which have not been implemented in International Data Centre (IDC) software. Formats that are not used at the IDC are included in Appendix IV "Unsupported commands at the IDC" on p. 387.

Software for receiving or generating messages or the formats and protocols for continuous data exchange are not described. These topics are described in sources cited below.

1.3 Audience

This document is intended for users, and software developers and engineers of the IDC *Verification Data and products Messaging System* (*VDMS*) Request and Subscription modules.

1.4 Related information

The following documents complement this document:

- Provisional Technical Secretariat of the CTBTO Preparatory Commission (2002). *Formats and protocols for continuous data — CD-1.0*. IDC/ENG/SPC/100/Rev.1. (Available at the SWP)
- Provisional Technical Secretariat of the CTBTO Preparatory Commission (2002). *Formats and protocols for continuous data — CD-1.1*. IDC/OPS/SPC/101/Rev.3. (Available at the SWP)

See Appendix V "History of "Formats and Protocols for Messages"" on p. 392 for a listing of all the sources of information consulted in preparing this document.

1.5 Using this Document

This document is part of the overall documentation architecture for the IDC and provides descriptions of IDC products and their formats.

This document is organized as follows:

- Chapter 2 - Overview: This chapter provides a high-level description of the protocol and formats for messages.
- Chapter 3 - Message structure: This chapter provides a high-level description of the structure of messages used to exchange data.
- Chapter 4 - Request messages: This chapter describes the formats for messages that are used to make requests for data and data products.
- Chapter 5 - Subscription messages: This chapter describes the formats for messages that are used to establish and manipulate subscriptions.
- Chapter 6 - S/H/I Data Messages: This chapter describes the formats for messages that contain seismic, hydroacoustic, and infrasonic (S/H/I) data and data products.
- Chapter 7 - Radionuclide messages: This chapter describes the formats for messages that contain radionuclide data and data products within the Radionuclide Monitoring System (RMS).
- Chapter 8 - Command request and response messages: This chapter describes the formats for messages that contain command request and command response messages.
- Chapter 9 - Summary messages: This chapter describes the formats for messages that contain summary data and data products.
- Chapter 10 - Station *VDMS* basics: This chapter describes the formats that must be supported by auxiliary seismic stations of the International Monitoring System (IMS).
- Appendix I - Data message examples: This appendix contains examples of formatted data messages.
- Appendix II - Codes: This appendix contains codes such as country, station, laboratory and instrument codes used in IDC *VDMS* messages.
- Appendix III - Computer code for CHK2 checksum: This appendix contains C and FORTRAN computer codes for computing the CHK2
glschecksum.
- Appendix IV - Unsupported commands at the IDC: This appendix contains a list of unsupported commands at the IDC.
- Appendix V - History of "Formats and Protocols for Messages": This appendix contains an outline of the development of the formats and protocols for messages.
- History of "Formats and Protocols for Messages": This section lists the sources cited in this document.
- Glossary: This section defines the terms, abbreviations, and acronyms used in this document.

1.6 Conventions

This document uses a variety of conventions, which are described in Tables 1 and 2. Table 1 shows the typographical conventions. Table 2 explains certain technical terms that are not part of the standard Glossary, which is located at the end of this document.

Table 1. Typographical conventions

Element	Font	Example
required environments	**bold**	**time**
computer code and output text that should be typed in exactly as shown	Courier	`msg_type data` `begin ims1.0`
processes and software units, user-defined arguments	*italics*	*VDMS* *msg_id id_string* [*source*]
key words of control lines, environment lines, request lines, data lines, and specific data message types when used in text	CAPITALS	E-MAIL, TIME, ARR, BULLETIN, LOG, UNASSOCIATED, SHORT

Formats in this document represent either American Standard Code for Information Interchange (ASCII) characters or binary fields, depending on the type of data being described. The conventions for ASCII formats include the following format types:

- a: alphanumeric character strings
- i: integers
- f: floating point numbers
- e: exponential numbers

Depending on the format type indicator ("a", "i", "f", "e"), each is followed by either an integer or a decimal number. For alphanumeric character strings and integer numbers, the number following the format type is an integer that describes the maximum number of characters or digits allowed in a field. For example, the format "a5" indicates that the field is represented by five alphanumeric characters (for example, `SE001`), and the format "i4" indicates an integer number with four positions (for example, `4321`). For floating point and exponential numbers, the type indicator is followed by two numbers separated by a period as in "n.m". In both formats, "n" describes the maximum number of characters that may be used to represent the number, including decimal points, exponential indicators, plus or minus signs, and so on. For floating point numbers, "m" is the recommended number of digits that follow the decimal point. The number of digits after the decimal point is allowed to *float* to accommodate anomalous data. For example, "`f5.2`" accommodates numbers from `.0001` to `99999`, but the preferred representation is two digits after the decimal point. For exponential number formats, "m" is the exact number of digits to the right of the decimal. For example, "e11.4" accommodates numbers like `-1.2345e+03`.

Some fixed formats allow combinations of the format types. Time and date formats combine the "a", "f", and "i" format types. A typical format for a date (such as `1998/04/15`) is "i4,a1,i2,a1,i2".

Where binary data are part of a format description, the numbers and characters are expressed as the number of bytes that are used to store them along with the convention that is used for ordering the bytes. The Institute of Electrical and Electronics Engineers (IEEE) byte order convention is used throughout this document.

Table 2. Terminology

Term	Description
*	(asterisk) symbol indicating that any ASCII character(s) may be substituted
[ ]	(square brackets) symbols delineating optional parameters in a syntax description
...	(ellipsis) symbol indicating that lines of an example have been intentionally omitted
|	(vertical bar) symbol indicating "or" in a syntax or environment description
block	group of lines in a data message that constitutes a cohesive unit of information
compressed data	data that have been reduced significantly in size to make transmission more efficient
control lines	request or subscription message lines that specify how/when the response to the request or subscription will be sent
data message	message that contains data, usually sent in response to a request message or a subscription
data products	reports, bulletins, and other products that contain the results of processing
environment lines	request or subscription message lines that establish an environment within which requests or subscriptions are made
identification lines	*VDMS* message lines that identify the VDMS version, message type, and reference numbers
logical line	VDMS instruction or data line that is a complete unit as defined in this document. A logical line may consist of one or more physical lines
physical line	line terminated by a Line Feed (LF) or by a LF followed by a Carriage Return (CR)
request lines	request or subscription message lines that specify the data or data product being requested
request message	VDMS message that requests data or data products
subscription message	VDMS message that establishes or alters regular delivery of data or data products

2

Overview

This chapter provides an overview of the IMS2.0 formats and protocols for messages. It includes the following sections:

2.1 Introduction 27

2.2 Message exchange 27

2.3 Message protocols 28

2.4 Message authentication 28

2.1 Introduction

The International Data Centre (IDC) is the international repository of data monitored under the Comprehensive Nuclear-Test-Ban Treaty (CTBT). It processes and provides the following to State Signatories of the CTBT:

Data seismic, hydroacoustic, and infrasonic (S/H/I) and radionuclide data produced by International Monitoring System (IMS) stations and certified radionuclide laboratories.

Products Reports, such as event lists and bulletins, produced by the IDC through the processing of S/H/I and radionuclide data received from IMS stations and certified radionuclide laboratories.

2.2 Message exchange

The IDC, National Data Centres (NDCs), IMS stations, and certified radionuclide laboratories can communicate with each other via e-mail messages.

The following types of messages are exchanged:

Request This message type contains a request for S/H/I data, radionuclide data, or IDC products.

Subscription This message type establishes (or alters) standing requests for S/H/I data, radionuclide data, or IDC products.

Data This message type contains S/H/I data, radionuclide data, or IDC products. When a request or subscription message is sent, the response consists of a data message. However, not all data messages are prompted by a request or subscription message. For example, data messages sent from an IMS radionuclide station to the IDC are not prompted by request or subscription messages.

Command Request This message contains a series of command lines that provide information about the return message (E-MAIL), set the environment for the requested command (TIME_-STAMP) and specify the type of command that is requested.

Command Response This message is sent by the station in response to a command request. The response may include arguments and command parameters. More than one response may result from a single command request; for example an acknowledgement followed later by some required information or results. An acknowledgement of a command request is expected within one working day.

These message types are described in subsequent chapters.

2.3 Message protocols

Two standard low-level protocols are used for the exchange of messages: electronic mail (email) and HTTP. Differences exist, however, in the circumstances under which these protocols are used for transmitting radionuclide and S/H/I data messages.

For S/H/I-related messages, the use of the available message protocols depends on the message length and content. For example, email is used for exchanging shorter S/H/I-related messages. HTTP is used for exchanging longer S/H/I-related messages.

In contrast, all radionuclide-related messages are exchanged via email. HTTP is used only in extremely limited cases where large radionuclide data files are sent from, for example, the IDC to an NDC.

At the application level, the message protocol requires that request and subscription messages be answered with data messages. Information controlling the format, low-level protocol, and destination for the data message are included in request and subscription messages

2.4 Message authentication

IMS2.0 messages are sent currently via email using the Secure Multipurpose Internet Mail Extensions protocol (see Housley (2002a), Housley (2002b), Rescorla (1999)Ramsdell (1999a), Ramsdell (1999b)) . S/MIME is based on the Internet MIME standard (see Crocker et al. (1995)).

It provides a consistent method of sending and receiving secure MIME mail by adding authentication and privacy. S/MIME can be used by traditional mail user agents to add cryptographic security services to mail that is sent, or to interpret cryptographic security services to mail that is received.

Data and request messages in IMS2.0 may be authenticated using multipart/signed S/MIME format without altering the IMS 2.0 format. The authentication mechanism encapsulates the message body and the digital signature within MIME boundaries. The multipart/signed S/MIME format has the advantage that the message can always be viewed by the receiver, whether the receiver software can verify the signature or not. The current industry standard for cryptographic format is the PKCS #7 (see Housley (1999)). This is a flexible message format for representing the results of cryptographic operations on messages.

Standard mail agents and open source applications have the capability to interpret or create digital signatures. With the appropriate digital certificate installed in sender equipment, a user can create a valid signed message. With the sender public key installed in the receiver equipment, the user can authenticate a digitally signed message.

The signature of the originating parties may be retained when data or products are forwarded from one site to another. In this case, any subsequent signatures would encapsulate the entire previously signed message including the signature into a message body with an additional signature.

3

Message structure

This chapter describes the structure of messages and includes the following sections:

3.1 Introduction 31

3.2 Message preface 32

3.3 Message body 34

3.4 Message conclusion 36

3.5 Message conventions 36

3.1 Introduction

A message consists of a preface, body, and conclusion. A HELP message is the exception to this rule.

The message preface contains the first four lines of all messages. These are the BEGIN, MSG_-TYPE, MSG_ID, and, optionally, either the REF_ID, ACK or PROD_ID lines. Respectively, they provide information on:

- the message format version number,
- the message type,
- the message identifier,
- the message identifier of the referenced message, if any
- whether user wants to receive acknowledgement of receipt of request
- the product identification number and sequence number for the product subscribed to, if any.

The message preface is followed by a body containing requests, responses, subscriptions, confirmations or data specific to the message type.

Finally, the message conclusion ends the message. It consists of the STOP line. The syntax of a message is as follows.

Listing 3.1. General message structure

```
begin version_identifier
msg_type request | subscription | data | labdata |
    command_request | command_response
msg_id id_string[ source]
[ref_id ref_str[ ref_src][ part seq_num[ of tot_num]]] |
[ack true|false] |
[prod_id product_id delivery_id]
...
stop
```

For example, the syntax of a subscription message is described line by line in Table 3.

Table 3. General structure of a subscription message

Line #	Syntax	Example of contents	Description
1	`begin` *message_format*	`begin ims2.0`	message version number
2	fixed (for subscription message)	`msg_type subscription`	specifies the type of message
3	`msg_id` *id_string*`[ source]`	`msg_id abc23 any_ndc`	assigns an identification code to the message for tracking
4	`e-mail address`	`e-mail name@domain_name`	the e-mail address to which the answer should be sent
5 to $N-1$	customizable	environmental lines and request lines	specifies how often responses will be sent, and what data or products will be sent
N	`stop`	`stop`	end of message

3.2 Message preface

3.2.1 BEGIN

The BEGIN line is the first line of a message. The BEGIN line contains the version identifier of the command syntax.

Syntax

```
begin IMS2.0
```

The argument in the BEGIN line of a request message is the default format of the body of the message. If a specific format string is given on a message line, that format specification will override the default.

3.2.2 MSG_TYPE

The MSG_TYPE line is the second line of a message. A message type is required for a distinction to be made between different types of messages. Only one MSG_TYPE is allowed per message. Combining different message types in the same message is prohibited.

Syntax

```
msg_type request | subscription | data | labdata |
   command_request | command_response
```

3.2.3 MSG_ID

The MSG_ID line is the third line of a message. A message identifier code is required for tracking and identifying messages. The MSG_ID line contains the MSG_ID keyword followed by an *id_string* code and a *source* code separated by a blank.

The sender is responsible for providing a unique *id_string*, as well as a descriptive source code. The *id_string* may contain up to 20 alphanumeric characters[1]. The *source* code is optional and may contain up to 16 alphanumeric characters. Blanks or backslash (\) characters are not allowed in either the *id_string* or the *source* codes.

Syntax

```
msg_id id_string[ source]
```

id_string	unique identification code (up to 20 characters)
source	message source code (up to 16 characters)

The *source* of a message can be an IMS station, a certified radionuclide laboratory, an NDC, a Cooperating National Facility (CNF), or the IDC. For radionuclide facilities, the radionuclide station or laboratory code must be used as the *source*. For S/H/I stations and data centres (NDC and the IDC) the *source* is the network code.

3.2.4 REF_ID

The REF_ID line is included in a message in two cases:

- when a message is generated and transmitted to a party in response to a message received from (sent by) the same party, and/or

[1] For tracking purposes, it is recommended to use sequential numbering for the *id_string*.

- when a very large message is split into several separate, smaller messages[2].

Syntax

`ref_id` *ref_str*`[` *ref_src*`][ part` *seq_num*`[ of` *tot_num*`]]`

ref_str	the *id_string* from the MSG_ID line of the request message
ref_src	the message *source* code from the MSG_ID line of the request message
seq_num	sequence number beginning with 1
tot_num	total number of parts for this response

3.2.5 ACK

The ACK line is included in a message when the user decides whether to receive acknowledgement that the request has been received by the *VDMS*. The default is to send back an acknowledgement to the user.

3.2.6 PROD_ID

The PROD_ID line is the fourth line of a data message that is generated for a subscription request. The PROD_ID line comprises the PROD_ID keyword followed by a *product_id* code and a *delivery_id* code, separated by a blank. These numbers help users receiving the subscription know if a delivery has been omitted.

Syntax

`prod_id` *product_id* *delivery_id*

product_id	product identification code
delivery_id	delivery identification

3.3 Message body

The body of a message depends on its type.

3.3.1 REQUEST

The body of a request message contains a series of free-format command lines that provide information about the return message (request control lines), set the environment for subsequent request lines (request environment lines), and specify the type of data that are to be returned within the limits of the environment (request lines). Some request lines must be preceded by environment lines that, by constraining the request, limit the size of the response. For details, see chapter 4 “Request messages” on p. 45.

[2] At the IDC, splitting messages is not implemented for outgoing messages.

3.3.2 SUBSCRIPTION

The body of a subscription message is formatted much the same way as a request message, but because subscription messages provide data on a scheduled basis rather than as a response to an individual request, they are given a separate message type and have additional capabilities that are not found in request messages.

A subscription message contains information about where to send the subscribed data, how often the subscribed data should be sent, and what data (or data products) to send. Like request messages, subscriptions are defined through environment variables that constrain the data to be sent and request lines that specify which data to send. Separate subscriptions are delimited by separate subscription request lines. In other words, each time a subscription request line is encountered, a corresponding subscription will be initiated for the user. For details, see chapter 5 "Subscription messages" on p. 95.

3.3.3 DATA

The body of a data message contains the data generated at an IMS station, CNF or radionuclide laboratory. Data sections must begin with a DATA_TYPE line. The arguments to DATA_TYPE are the type of data that follows (for example, WAVEFORM or BULLETIN) and the format (IMS2.0) and can include subformat depending on the format the requestor wants (for example SC3XML or MS_ST2_512 for miniSEED formats). For details, see chapter 6 "S/H/I Data Messages" on p. 127 and chapter 7 "Radionuclide messages" on p. 163.

3.3.4 LABDATA

The body of a laboratory data message contains additional data required for the analysis at radionuclide laboratories. For details, see chapter 7 "Radionuclide messages" on p. 163.

3.3.5 COMMAND_REQUEST

The body of a command request message contains a series of command lines that provide information about the return message (E-MAIL), set the environment for the requested command and specify the type of command that is requested.

3.3.6 COMMAND_RESPONSE

The body of a command response contains the message sent by the station in response to a command request. The response may include arguments and command parameters. More than one response may result from a single command request; for example an acknowledgement followed later by some required information or results. An acknowledgement of a command request is expected within one working day. The requestor can decide not to receive an acknowledgement by setting the ACQ environment to FALSE.

3.4 Message conclusion

3.4.1 STOP

The STOP line is the last line of an IMS2.0 message. Commands found on the same line after the STOP are ignored. If two or more messages with different MSG_ID *id_strings* are included in one e-mail or file, all lines between the STOP and subsequent BEGIN lines are ignored. A message without a STOP line is considered incomplete and is discarded.

3.5 Message conventions

Basic message conventions are used for both radionuclide- and S/H/I-related messages. However, some differences in conventions exist between the radionuclide- and S/H/I-related messages, including:

- fixed-format field justification
- case sensitivity
- blank lines
- missing data
- station naming
- comment conventions
- version format number

The basic message conventions are as follows.

3.5.1 Message size

The maximum size of a message is least 100 MB[3]. The maximum message size depends on the bandwidth of the connection between the message source and recipient, as well as the space available on computers for storing messages.

Although certain sites may be constrained by system limitations to sending e-mail messages smaller than least 400 kB, TCP/IP-based e-mail systems are generally reliable up to at least 1 MB. To accommodate data messages larger than these limits, a mechanism is provided for a single data message to be split into several parts that can be reconstructed by the recipient (see section 3.2 "Message preface" on p. 32).

[3] This maximum size can vary from one organization to the other

Radionuclide-related messages larger than 1 MB should be broken into several smaller e-mails using the methods described in section 3.2 “Message preface” on p. 32. For S/H/I-related messages, the message size determines the protocol that is most appropriate for message transmission. Messages larger than 1 MB should be transferred via HTTP/FTP.

3.5.2 Line length

A line may be up to 1,024 characters long, excluding the special characters Line Feed (LF) and Carriage Return (CR). An ASCII message line may be terminated by a LF or by a CR followed by a LF.

The format for a message line determines its logical line length. In S/H/I messages, a logical line may be broken into several physical lines. To break a logical line into several physical lines, a backslash (\) is inserted at the desired break point[4]. The logical line is then continued on the next physical line. The backslash may occur in any character position of the line and is counted as one of the physical line characters. The backslash does not hold the place of a blank or any other character. The character preceding the backslash is concatenated with the character in position one of the next physical line. If the logical line length for an ASCII line is longer than 1,024 (such as with ASCII waveform data), then the line break character (\) is not used. Data are simply continued on the next line. Breaking logical lines with backslashes is not allowed in radionuclide-related messages.

3.5.3 Free-format lines

Message lines that are not in fixed format are known as free-format lines. A free-format line may consist of a keyword followed by an argument list or it may contain unformatted free text. Free-format lines are left justified and case insensitive. Free-format lines must have one or more blank spaces between fields. All lines in request and subscription messages are free-format lines.

3.5.4 Fixed-format lines

Fixed-format lines differ from free-format lines in that they have explicitly defined character fields. Most data message lines are in fixed format (header and data lines are examples).

Although many fixed-format lines are case insensitive, some are not. Fixed-format lines that are case sensitive include message lines in waveform data messages after compression by the CM6 compression scheme (see subsubsection 6.3.2.3 “Subformat CM6” on p. 138). No fixed-format lines in radionuclide data messages are case sensitive.

Field contents in radionuclide data messages that are parsed into the IDC database are left justified. Otherwise, field contents are right or left justified according to the field and line formatting. Alphanumeric character fields in fixed-format lines (such as a field with format a12)

[4] The line break character (\) is not implemented at the IDC.

must be left justified. Numeric fields and numeric/alphanumeric character combination fields (such as f10.4 or i4,a1,i2) must be right justified.

3.5.5 Blank lines

Blank lines are not permitted in radionuclide data messages. Blank lines are allowed in free text fields such as those found in a #Comment block and an ALERT data message (see Table 60 on p. 172 and section 7.7 "Alerts" on p. 208, respectively).

In all other message types, blank lines may be added to improve legibility where they do not cause ambiguity.

3.5.6 Splitting data messages

In data messages, the identification (ID) fields from the MSG_ID line of the request message are placed in the REF_ID line. If a data message must be split into smaller messages, the split(s) must occur only at DATA_TYPE boundaries[5]. This method has the following advantages:

- data sections are never broken in the middle; and
- each message split is headed by BEGIN, MSG_TYPE, MSG_ID, and REF_ID lines, and terminated by a STOP line.

Each *id_string* in the MSG_ID lines of the individual split messages must be unique. The REF_-ID lines, however, will have identical *ref_str* and *ref_src* codes. The part *seq_num* command is needed only when a message is split into parts. The of *tot_num* coding is optional for all but the last section of the split message.

Examples

To illustrate the use of REF_ID, suppose the following request for waveform data is sent from the NDC in country ABC to the IDC.

Listing 3.2. Example of request message with MSG_ID

```
begin ims2.0
msg_type request
msg_id 2002/05/21_0001 ABC_NDC
...
stop
```

The IDC's response to the request will have a REF_ID from the IDC and will use the request message MSG_ID string in the REF_ID line.

Listing 3.3. Example of data message with REF_ID

```
begin ims2.0
msg_type data
```

[5] At the IDC, splitting messages is not implemented for outgoing messages.

```
msg_id 00567023 ctbto_idc
ref_id 2002/05/21_0001 ABC_NDC
...
stop
```

The following example shows a data message with four distinct `DATA_TYPES`.

Listing 3.4. Example of data message with multiple DATA_TYPEs

```
begin ims2.0
msg_type data
msg_id 54965 ctbto_idc
ref_id 0002324 ANY_NDC
data_type type1 ims2.0
...
data_type type2 ims2.0
...
data_type type3 ims2.0
...
data_type type4 ims2.0
...
stop
```

The following example shows how a data message can be split. The single message in the previous example is split into two distinct messages using the `part` *seq_num*`[ of` *tot_num*`]` referencing mechanism.

Listing 3.5. Example of a data message split into distinct messages

```
begin ims2.0
msg_type data
msg_id 54965 ctbto_idc
ref_id 0002324 ANY_NDC part 1 of 2
data_type type1 ims2.0
...
data_type type2 ims2.0
...
stop
begin ims2.0
msg_type data
msg_id 54965 ctbto_idc
ref_id 0002324 ANY_NDC part 2 of 2
data_type type3 ims2.0
...
data_type type4 ims2.0
...
stop
```

3.5.7 Missing data

Some fields in a message are required, while others are not. Blank characters can be used for missing data in S/H/I data message but not in radionuclide data messages. For proper data parsing during automatic input processing, radionuclide fields that are not required and are missing data must be filled. The convention for missing radionuclide data depends on the data type. If the missing data are in a pulse height data message (in other words SAMPLEPHD, GASBKPHD, BLANKPHD, DETBKPHD, QCPHD, CALIBPHD) missing data are zero filled (0). If the missing data are in any other message from a radionuclide station or a certified laboratory, then the following convention should be used. Missing radionuclide numerical data (that is, floating point, integer, and exponential numbers) are indicated by a negative sign followed by as many nines as the field formatting will allow. Missing radionuclide character data with formats such as a50 are designated with a single zero (0).

3.5.8 Comments

Comments for S/H/I-related messages are used primarily in LOG and ERROR_LOG data messages. In these messages the comments are free-format lines in which the first character is blank.

Some ISC extensions of the IMS2.0 formats use comment lines to include additional information for some data types. These comment lines are formatted, always including a left parenthesis in the second column, and either a hash (#) or plus (+) in the third column, depending on the usage (see *IASPEI Seismic Format (ISF)* (1999)).

Comments in radionuclide-related messages use a free-format line structure that begins with a #Comment line. The lines following the #Comment line contain the comment text. The end of the comment is designated by a STOP line or another line beginning with a #. The STOP line is interpreted as the end of the message. Comments may appear in all radionuclide data messages, however, only one #Comment block is allowed per message. #Comment blocks cannot occur within other data blocks, but instead must precede or follow a data block.

3.5.9 Date and time formats

The standard format for specifying the date and time contains two fields: one for the date and one for the time, with a blank separating the two fields. The date must always be present, but the time field may be omitted. When no time is specified, the field defaults to 00:00:00.000. Missing date fields are specified with a single zero.

The time field may have varying degrees of precision (that is, decimal places in the seconds attribute). The time format with the highest precision follows.

Syntax

```
yyyy/mm/dd  hhmmss.sss
```

yyyy	year
mm	month number
dd	day of the month
hh	hour in Coordinated Universal Time (UTC)
mm	minutes
ss.sss	seconds

The range of time over a day is from 00:00:00.000 up to (but not including) 00:00:00.000 of the next day. Leading zeros in any of the number fields may be dropped in free-format lines, but they must be present in fixed-format lines. In addition, some of the values may be dropped from the time field in free-format lines. If the seconds, or the minutes and seconds, are dropped, then they are assumed to be `0` (for example, `21:03` is interpreted as `21:03:00.000` and `9` is interpreted as `09:00:00.000`).

The following date-time formats are acceptable for free-format lines

```
1994/01/01 13:04:12.003
```

```
1994/12/23
```

```
1995/07/14   01:05
```

```
1995/09/10 2:15:3
```

3.5.10 Radionuclide station and laboratory codes

Radionuclide station and laboratory codes must consist of five characters. The first two characters are the country code for the country in which the site resides (see Appendix section II.1). The next character identifies the system type installed at the station. System types include `P` for particulate monitoring, `X` for xenon monitoring, and `L` for radionuclide laboratories. The last two characters are the two-digit numbers assigned to the station or laboratory in the text of the CTBT.

3.5.11 Radionuclide detector codes

The detector code enables easy identification of a unique detector and its location. Radionuclide detector codes contain nine characters. The first five characters are the site code. This code is followed by a _ (underscore) and a three-digit integer identifier assigned to a specific detector setup.

3.5.12 S/H/I network codes

With the large number of S/H/I stations distributed globally, unique station names cannot be guaranteed. The S/H/I network naming format supports the concept of duplicate station names and thus requires that stations be affiliated with a network.

The network identifier can be up to nine characters in length and consists of two parts separated by an underscore. The first part is three or four characters in length and is the domain of the network. This code is either an internationally recognized affiliation (such as IDC) or a three-letter ISO standard country code, as shown in the Appendix section II.1 “Country codes”. The second part of the network identifier is the network code (1–4 characters) within that domain. An NDC sending data to the IDC may use the network code NDC. For example, the three-letter ISO code for the Czech Republic is CZE, so the default network code for the NDC of the Czech Republic is `CZE_NDC`.

3.5.13 S/H/I station codes

To guarantee that station names are unique and follow international naming conventions, S/H/I station codes should be registered with the International Seismological Centre (ISC) in the United Kingdom/the National Earthquake Information Centre (NEIC) in the United States.

All station codes must be three to five characters. Array stations have unique station codes for each element of the array as well as a unique array code that refers to the entire array. The code referencing the array should not be the same as the station code of any of the array elements.

3.5.14 S/H/I channel codes

The format for channel designators of S/H/I stations expands upon the format used by the Federation of Digital Seismic Networks (FDSN). Three upper-case characters are used to designate a channel. The first specifies the general sampling rate and the response band of the instrument, as shown in Table 4. The second character specifies the instrument code, as shown in Table 5. The third character specifies the physical configuration of the members of a multiple axis instrument package or other parameters as specified for each instrument, as shown in Table 6.

Table 4. S/H/I channel band codes

Band code	**Band type**	**Sample rate** (Hz)	**Corner period** (s)
E	extremely short period	≤ 80	< 10
S	short period	≤ 10 to < 80	< 10
H	high broadband	≤ 80	≤ 10
B	broadband	≤ 10 to < 80	≤ 10
M	mid period	> 1 to < 10	
L	long period	$= 1$	
V	very long period	$= 0.1$	
U	ultra long period	$= 0.01$	
R	extremely long period	$= 0.001$	
W	weather/environmental		
X	experimental		

Table 5. S/H/I channel instrument codes

Instrument code	Description
H	high-gain seismometer
L	low-gain seismometer
G	gravimeter/accelerometer seismometer
M	mass position seismometer
D	pressure sensor
C	composite trace

Table 6. S/H/I channel orientation codes

Orientation code	Description
Z, N, or E	traditional (vertical, north-south, east-west)
A, B, or C	tri-axial (along the edges of a cube turned up on a corner)
T or R	for transverse and radial rotations
1, 2, or 3	orthogonal components but nontraditional orientations
U, V, or W	optional components
H	hydrophone
F	infrasonic pressure
C	coherent beam
I	incoherent beam
O	origin beam

3.5.15 S/H/I auxiliary codes

The auxiliary designator is used to distinguish between different instruments or data streams that have the same station and channel codes. This four-letter designator is used only when a conflict exists. When not needed, this field is left blank.

3.5.16 Latitude/longitude conventions

All latitudes and longitudes are written as floating point numbers. Latitudes in the southern hemisphere have negative values. Longitudes in the western hemisphere have negative values.

4

Request messages

This chapter describes the request message formats and includes the following sections:

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4.1 Introduction

The request message format provides a framework in which data or products can be requested from the IDC. The data and products available include radionuclide pulse height data and analysis reports, S/H/I waveforms and bulletin products, and more.

Within a single request message, several types of data and products may be requested. For example, requests may be made for a bulletin and associated waveforms or for specific event information from several different regions. The order of the requests in the request message is preserved in the response (data) message.

The data and products that can be received will vary from site to site and will depend on the type of messages and information that is available from the site. The minimum required configuration for a station or NDC *VDMS* is outlined in chapter 10 "Station *VDMS* basics" (p. 257).

4.2 HELP line

The HELP line is considered a request message because it is used to request an *VDMS* User's Guide by email. Only the VDMS email address is required for this protocol to work properly. No other message lines are required in a HELP line message. The same result may be achieved by sending the VDMS an empty message with the word `help` as the email subject (see section I.20 "HELP" on p. 304).

4.3 Request format

With the exception of the HELP request, all request messages require the basic message structure described in section 3.2 "Message preface" on p. 32. If a message is a request message, the MSG_TYPE is set to `request`.

The body of a request message contains a series of command lines that provide information about the return message (request control lines), set the environment for subsequent request lines (request environment lines), and specify the type of data that are to be returned within the limits of the environment (request lines). Some request lines must be preceded by environment lines that, by constraining the request, limit the size of the response. The response to a request is contained in a data message. In the response data message, the identification (ID) fields from the MSG_ID line of the request message should be placed in the REF_ID line.

4.4 Request control lines

Request control lines are commands that specify the protocol of the response data message. The existing options for the response message protocol are only email. This option should be used in accordance with the guidelines described in section 2.3 "Message protocols" on p. 28 and section 3.5 "Message conventions" on p. 36.

If no E-MAIL line is included in the request message, the reply is sent to the address obtained from the mail header. Because the return address from an email header may not be reliable, it is highly recommended to specify the return email address using an E-MAIL line.

The syntax for the E-MAIL request control line is described in the following sections.

4.5 E-MAIL

The E-MAIL line indicates that the response message protocol is email. The argument for the E-MAIL command is the email address to which the response message should be sent.

Syntax

`e-mail` *address*

address email address to send reply to

If no E-MAIL line is included in the request message, the reply is sent to the address obtained from the mail header. Because the return address from an email header may not be reliable, it is highly recommended to specify the return email address using an E-MAIL line.

4.6 Request environment lines

Environment lines identify the variables to which the response to the request line is constrained (for example, TIME or STATION). An environment variable is set by arguments that follow a predetermined keyword and is reset with another environment line including the same keyword. An environment keyword with no arguments resets the constraint on that environmental parameter to the default value. Environment variables may be specified using either ranges or lists.

An environment range constrains the variable to limits specified by two values. The two range limits are separated by the word ` to ` (including the blank spaces).

Syntax

environment_keyword`[[` *low_limit*`]` `to[` *high_limit*`]]`

Open-ended ranges are specified by omitting the *low_limit* or the *high_limit*. A blank may also be used in the *low_limit* or the *high_limit* when a TIME environment variable is being specified.

Examples

All times from 23 February, 1999 at 00:00:00 up to (but not including) 10 March, 1999 at 14:37:02 are specified with the following environment line.

```
time 1999/02/23 to 1999/03/10 14:37:02
```

The following example specifies all magnitudes of 5.0 and above.

```
mag 5.0 to
```

List environment lines contain lists of comma-delimited parameters that specify discrete constraints, such as station names and channels. Some list environments are allowed only one parameter (for example, BULL_TYPE); others may have an unlimited number. Spaces after the commas are optional. The general syntax for a list environment follows.

Syntax

environment_keyword`[` *arg1*`[,` *arg2*`[,` *arg3*`[, \ldots]]]]`

Lists can be long, so a wild card character * may be used as a substitute for any string of arguments and their content in some list environments.

Examples

The following environment line specifies all IMS stations.

```
sta_list *
```

The following environment line specifies all IMS stations beginning with A.

```
sta_list a*
```

The following environment line specifies all IMS channels ending with Z.

```
chan_list *Z
```

The following sections describe specific environment variables. Default settings and examples are given for each variable. Although many environment variables are listed, only certain ones may be applicable to a particular IMS2.0 implementation. Those variables that have been implemented are described in the *VDMS* User's Guide available through the HELP request line (see section 4.2 "HELP line").

The STA_LIST, TIME, and TIME_STAMP environments can be used in requesting either radionuclide or S/H/I data. All other environment variables are used exclusively for requesting S/H/I data.

4.6.1 ARRIVAL_LIST

A unique arrival identification code is assigned to each waveform arrival. This arrival identification number appears in the data types for arrivals and bulletins and may be used to obtain arrival information.

Syntax

```
arrival_list[ arid[, arid[, ... ]]]
```

arid arrival identification code

Default

```
arrival_list *
```

Example

The following environment line limits the arrivals to those with arids 8971234 or 90814.

```
arrival_list 8971234,90814
```

4.6.2 AUX_LIST

Station and channel are not always adequate to completely describe a specific data stream for some seismic stations. An auxiliary identification is supplied for completeness in handling these special cases. The instances in which the auxiliary identifications are necessary should be rare. The wildcard character * is allowed in specifying auxiliary codes.

Syntax

```
aux_list[ aux[, aux[, ... ]]]
```

aux auxiliary code

Default

```
aux_list *
```

Example

The following environment line limits the auxiliary code to chi and med.

```
aux_list chi, med
```

4.6.3 BEAM_LIST

Array station data may be delayed and summed (with weights) to form beams. The BEAM_LIST environment specifies which beams are being requested.

Syntax

```
beam_list[ beam[, beam[, ... ]]]
```

beam beam code

Default

```
none
```

Example

The following line limits the beams to the frequency-wavenumber ($f-k$) beam.

```
beam_list fkb
```

4.6.4 BULL_TYPE

The BULL_TYPE environment provides a means to specify the type of S/H/I bulletin to retrieve. Only one bulletin type may be specified in any BULL_TYPE line. The bulletin types include SEL1, SEL2, SEL3, REB, SEB, SSEB, NEB, and NSEB. In addition, BULL_TYPE is used in a different context to specify an IDC_NEB (one-time NEB produced at the IDC) or an IDC_NSEB (one-time NSEB produced at the IDC).

Syntax

```
bull_type[ bulletin]
```

bulletin bulletin code (sel1, sel2, sel3, reb, seb, sseb, neb/nseb, idc_neb, or idc_-nseb)

Default

```
none
```

Example

The following environment line limits the bulletin type to SEL1.

```
bull_type sel1
```

4.6.5 CHAN_LIST

The S/H/I channel search list is given in the CHAN_LIST environment. The wildcard character (*) is allowed for specifying channel codes.

Syntax

```
chan_list[ chan[, chan[, ... ]]]
```

chan channel code

Default

```
chan_list *Z
```

Examples

The following environment line limits the channels to three short-period channels.

```
chan_list SHZ, SHN, SHE
```

The following environment line limits the channels to all short-period channels.

```
chan_list S*
```

4.6.6 COMM_LIST

The communications list is a list of communication links to include in status reports. Links are defined by the end of the link closest to the station. Thus, for the link between station ABC and the data centre collecting data from that station, the communications link would be designated as ABC.

Syntax

```
comm_list[ comm[, comm[, ... ]]]
```

comm communications link code

Default

```
comm_list *
```

Example

The following environment line limits the communications links to those links from stations ABC and DEF to the data centre.

```
comm_list ABC, DEF
```

4.6.7 DEPTH

S/H/I events may be constrained by their depth using the DEPTH environment. Depth is given in kilometres from the surface.

Syntax

```
depth[[ shallow] to[ deep]]
```

shallow low depth range
deep high depth range

Default

No constraint.

Example

The following environment line limits depths to a range from 0 km to 10 km depth.

```
depth 0.0 to 10.0
```

4.6.8 DEPTH_CONF

The DEPTH_CONF environment defines the confidence level for the seismic depth screening criterion, given as a number between 0.0 and 1.0. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
depth_conf[ conf]
```

conf confidence level of depth screening criterion

Default

```
depth_conf 0.975
```

Example

The following environment line sets the confidence level for the depth screening criterion at 99%.

```
depth_conf 0.990
```

4.6.9 DEPTH_KVALUE

The DEPTH_KVALUE environment defines the depth model uncertainty (km). This value is added to the uncertainty used in the screening criterion for free-depth solutions. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
depth_kvalue[ kvalue]
```

kvalue depth model uncertainty

Default

```
depth_kvalue 20.0
```

Example

The following environment line sets the depth model uncertainty to 30 km.

```
depth_kvalue 30.0
```

4.6.10 DEPTH_MINUS_ERROR

The DEPTH_MINUS_ERROR environment is used to obtain all S/H/I events that have a 90% probability of being within a certain depth range. The ranges must be given in kilometres of depth from the surface.

Syntax

```
depth_minus_error[[ shallow] to[ deep]]
```

shallow low depth range

deep high depth range

Default

No constraint.

Example

The following environment line limits the depth of events to a 90% probability of being within 10 km of the surface.

```
depth_minus_error 0.0 to 10.0
```

4.6.11 DEPTH_THRESH

The DEPTH_THRESH environment defines the depth screening threshold in kilometres of depth from the surface. The value of DEPTH_THRESH must be non-negative. S/H/I events with depth confidence intervals deeper than this threshold are screened out. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
depth_thresh[ threshold]
```

threshold depth threshold

Default

```
depth_thresh 10.0
```

Example

The following environment line sets the depth screening threshold at 20 km.

```
depth_thresh 20.0
```

4.6.12 EVENT_LIST

A unique event identification code is assigned to each S/H/I event. This number appears in S/H/I bulletins and may be used subsequently to request waveforms or comments associated with a specific event.

Syntax

```
event_list[ evid[, evid[, ... ]]]
```

evid event identification code

Default

```
event_list *
```

Example

The following environment line limits the event number to 87623495 and 87.

```
event_list 87623495, 87
```

4.6.13 EVENT_STA_DIST

The EVENT_STA_DIST environment is the distance in degrees between the S/H/I event and the S/H/I station. The environment is applied in context to the request. When requesting waveform data associated with specific S/H/I events, EVENT_STA_DIST helps determine the stations from which the data will be retrieved. When requesting bulletin-type information (bulletins, events, origins, or arrivals), EVENT_STA_DIST helps determine the S/H/I events for which the data will be retrieved.

Syntax

```
event_sta_dist[[ low_dist] to[ high_dist]]
```

low_dist low-distance range
high_dist high-distance range

Default

No constraint.

Examples

The following example limits the request for S/H/I bulletin information to events within 20 deg of stations ABC or DEF.

Listing 4.1. BULLETIN request message with EVENT_STA_DIST

```
sta_list ABC, DEF
event_sta_dist 0 to 20
bull_type REB
bulletin ims2.0
```

The following example limits the request for waveform data to stations within 20 deg of an event.

Listing 4.2. WAVEFORM request message with EVENT_STA_DIST

```
event_sta_dist 0 to 20
bull_type REB
relative_to bulletin
waveform ims2.0
```

4.6.14 GROUP_BULL_LIST

S/H/I events are often common between bulletins. Sometimes it is desirable to list the various solutions (origins) together. GROUP_BULL_LIST is a list of the bulletins that should be combined with the S/H/I bulletin specified in the BULL_TYPE environment. Origin information from these other bulletins will be included in the combined bulletin that is returned. The arrival information will be for the BULL_TYPE bulletin.

Events in the GROUP_BULL_LIST will be grouped with at most one S/H/I event in the BULL_-TYPE bulletin. To be grouped, events must have locations within 3 deg and origin times within 60 s. If the initial criteria are met for more than one S/H/I event, all events within the range are reported.

Syntax

```
group_bull_list[ bulletin[, bulletin[, ... ]]]
```

bulletin bulletin code

Default

None (no grouping).

Example

The following environment lines group SEL3 origins with the SEL1.

```
bull_type SEL1
group_bull_list SEL3
```

4.6.15 HYDRO_CP_THRESH

The HYDRO_CP_THRESH environment defines the hydroacoustic cepstral peak screening threshold. An S/H/I event with a hydroacoustic cepstral peak value greater than this threshold is not screened out, regardless of the other hydroacoustic screening criteria. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
hydro_cp_thresh[ threshold]
```

threshold hydroacoustic total energy threshold

Default

```
hydro_cp_thresh 8.0
```

Example

The following environment line sets the hydroacoustic cepstral peak threshold to 7.0.

```
hydro_cp_thresh 7.0
```

4.6.16 HYDRO_TE_THRESH

The HYDRO_TE_THRESH environment defines the hydroacoustic total energy screening threshold, in decibels (dB). An S/H/I event with hydroacoustic total energy less than this threshold is screened out, provided it also satisfies additional criteria that the entire location error ellipse is offshore, with minimum water depth greater than the value of the MIN_WDEPTH_-THRESH environment, and has a clear path to at least one IMS hydrophone. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
hydro_te_thresh[ threshold]
```

threshold hydroacoustic total energy threshold

Default

```
hydro_te_thresh 10.0
```

Example

The following environment line sets the hydroacoustic total energy threshold to 15.0.

```
hydro_te_thresh 15.0
```

4.6.17 LAT

The LAT environment specifies the range of latitude in degrees. Southern latitudes are negative. The low-range value must be smaller than the high-range value.

In cases where LAT can apply to origins or stations (for example, when requesting a S/H/I bulletin), the constraint will be applied to origins.

Syntax

```
lat[[ low_lat] to[ high_lat]]
```

low_lat low-distance latitude
high_lat high-distance latitude

Default

No constraint.

Example

The following environment line limits latitudes to a range from 12°S up to (and including) 17°N.

```
lat -12 to 17
```

4.6.18 LOC_CONF

The LOC_CONF environment sets the confidence level of location error ellipses, as a number between 0.0 and 1.0, used to

(1) assess whether the error ellipse for an S/H/I event was onshore, offshore, or mixed (in other words, partially onshore and offshore);
(2) estimate the minimum water depth within the error ellipse; and
(3) assess whether or not a hydroacoustic signal from any point within the error ellipse has a clear path to at least one IMS hydrophone.

This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
loc_conf[ conf]
```

conf confidence level for location error ellipses

Default

```
loc_conf 0.90
```

Example

The following environment line sets the confidence level for location error ellipses at 99%.

```
loc_conf 0.99
```

4.6.19 LON

The LON environment specifies the range of longitude in degrees. Western longitudes are negative, and the range is interpreted from west to east. Either both or neither (to return to the default values) of the longitudes must be provided in the LON environment.

In cases where LON can apply to S/H/I origins or stations (for example, when requesting a S/H/I bulletin), the constraint will be applied to origins.

Syntax

```
lon[[ west_lon] to[ east_lon]]
```

west_lon	western longitude
east_lon	eastern longitude

Default

No constraint.

Examples

The following environment line limits the longitude range to the 350° swath from 175°W up to (and including) 175°E.

```
lon -175 to 175
```

The following environment line limits the longitude range to a 10° range spanning the international date line.

```
lon 175 to -175
```

4.6.20 MAG

The MAG environment specifies the range of magnitudes to include in the search for seismic events. The type of magnitude (m_b, M_S, and so on) is specified in the MAG_TYPE environment.

Syntax

```
mag[[ low_mag] to[ high_mag]]
```

low_mag	low-magnitude range
high_mag	high-magnitude range

Default

No constraint

Example

The following environment line limits magnitudes to those with magnitudes 4.5 and above.

```
mag 4.5 to
```

4.6.21 MAG_TYPE

The MAG_TYPE list environment specifies the type of magnitude to search when the MAG environment is provided. Standard accepted magnitude codes are m_b (body wave magnitude), M_S (surface wave magnitude), and M_L (local magnitude). Data centres may report other types of magnitudes, provided an explanation is given in the HELP message.

Syntax

```
mag_type[ mag_type[, mag_type[, ... ]]]
```

mag_type `mb|Ms|ML`

Default

No constraint.

Example

The following environment line limits the magnitude types to m_b and M_S.

```
mag_type mb, Ms
```

4.6.22 MAGPREF_MB

The MAGPREF_MB environment specifies the type of m_b magnitude measurement to use for screening. Valid settings are defined by the **netmag**.*magtype* database attribute. The most common m_b *magtype* are `mb`, `mb_ave` (average m_b), and `mb_mle` (maximum likelihood estimate). This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
magpref_mb[ magpref_mb]
```

magpref_mb type of m_b measurement to consider for screening

Default

```
magpref_mb mb_ave
```

Example

The following environment line sets the type of m_b measurement to use for screening to be the maximum likelihood estimate of m_b.

```
magpref_mb mb_mle
```

4.6.23 MAGPREF_MS

The MAGPREF_MS environment specifies the type of M_S magnitude measurement to use for screening. Valid settings are defined by the **netmag**.*magtype* database attribute. The most common M_S *magtype* are `ms_ave` (average M_S) and `ms_mle` (maximum likelihood estimate). This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
magpref_ms [ magpref_ms]
```

magpref_ms type of M_S measurement to consider for screening

Default

```
magpref_ms  ms_ave
```

Example

The following environment line sets the type of M_S measurement to use for screening to be the maximum likelihood estimate of M_S.

```
magpref_ms  ms_mle
```

4.6.24 MB_ERR

The MB_ERR environment defines the uncertainty term (standard deviation) for single-station m_b magnitude estimates, used in the computation of the confidence interval of the network estimate of m_b minus M_S. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
mb_err [ err]
```

err m_b uncertainty

Default

```
mb_err  0.34
```

Example

The following environment line sets the m_b uncertainty to 0.35.

```
mb_err  0.35
```

4.6.25 MB_MINUS_MS

The difference between m_b and M_S magnitude values specifies the range of magnitude differences to include in the search.

Syntax

```
mb_minus_ms [[ low_mag_diff] to [ high_mag_diff]]
```

low_mag_diff low-magnitude difference
high_mag_diff high-magnitude difference

Default

No constraint.

Example

The following environment line limits the difference of magnitudes to the range from 1 up to (and including) 2.

```
mb_minus_ms 1.0 to 2.0
```

4.6.26 MBMS_CONF

The MBMS_CONF environment defines the confidence level for the $Am_b - M_S$ screening criterion, given as a number between 0.0 and 1.0, where A is the slope. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
mbms_conf[ conf]
```

conf confidence level of the $Am_b - M_S$ screening criterion

Default

```
mbms_conf 0.975
```

Example

The following environment line sets the confidence level of the $Am_b - M_S$ screening criterion at 99%.

```
mbms_conf 0.99
```

4.6.27 MBMS_SLOPE

The MBMS_SLOPE environment defines the slope (A) of the $Am_b - M_S$ relation. The value should be a positive number (typically between 1.0 and 1.5). This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
mbms_slope[ slope]
```

slope the slope (A) of the $Am_b - M_S$ relation

Default

```
mbms_slope 1.0
```

Example

The following environment line sets the slope of the $Am_b - M_S$ relation at 1.50.

```
mbms_slope 1.50
```

4.6.28 MBMS_THRESH

The MBMS_THRESH environment defines the $Am_b - M_S$ screening threshold in units of magnitude. S/H/I events with confidence intervals for $Am_b - M_S$ less than this threshold are screened out. The value of MBMS_THRESH is not restricted. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
mbms_thresh[ threshold]
```

threshold threshold of the $Am_b - M_S$ screening criterion

Default

```
mbms_thresh 2.20
```

Example

The following environment line sets the $Am_b - M_S$ screening threshold at 3.5.

```
mbms_thresh 3.50
```

4.6.29 MIN_DP_SNR_PP

The MIN_DP_SNR_PP environment sets the minimum SNR required for pP depth phases to be acceptable for use in event screening. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
min_dp_snr_pp[ dp_snr_pp]
```

dp_snr_pp pP depth phase snr

Default

```
min_dp_snr_pp  2.0
```

Example

The following environment line sets the minimum pP depth phase SNR to 1.5.

```
min_dp_snr_pp 1.5
```

4.6.30 MIN_DP_SNR_SP

The MIN_DP_SNR_SP environment sets the minimum SNR required for sP depth phases to be acceptable for use in event screening. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
min_dp_snr_sp[ dp_snr_sp]
```

dp_snr_sp sP depth phase snr

Default

```
min_dp_snr_sp 2.0
```

Example

The following environment line sets the minimum sP depth phase SNR to 1.5.

```
min_dp_snr_sp 1.5
```

4.6.31 MIN_MB

The MIN_MB environment sets the minimum m_b magnitude cutoff for an event to be considered for application of the S/H/I event screening criteria. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
min_mb[ mb]
```

mb event screening magnitude cutoff

Default

```
min_mb 3.5
```

Example

The following environment line sets the event screening magnitude cutoff to 4.0.

```
min_mb 4.0
```

4.6.32 MIN_MOVEOUT_PP

The MIN_MOVEOUT_PP environment sets the minimum depth phase move-out of pP–P (in s) in the distance range from 25 deg to 100 deg required for a depth-phase solution to be acceptable for use in event screening. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
min_moveout_pp[ moveout_pp]
```

moveout_pp minimum move-out of pP–P travel times

Default

```
min_moveout_pp 1.5
```

Example

The following environment line sets the minimum pP–P move-out to 2.0 s.

```
min_moveout_pp 2.0
```

4.6.33 MIN_MOVEOUT_SP

The MIN_MOVEOUT_SP environment sets the minimum depth phase move-out of sP–P (in s) in the distance range from 25° to 100° required for a depth-phase solution to be acceptable for use in event screening. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
min_moveout_sp[ moveout_sp]
```

moveout_sp minimum move-out of sP–P travel times

Default

```
min_moveout_sp 1.5
```

Example

The following environment line sets the minimum sP–P move-out to 2.0 s.

```
min_moveout_sp 2.0
```

4.6.34 MIN_NDEF

The MIN_NDEF environment sets the minimum number of defining phases required for an event to be considered for event screening. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
min_ndef[ integer]
```

integer minimum number of time-defining phases

Default

```
min_ndef 3
```

Example

The following environment line sets the minimum number of time-defining phases to 6.

```
min_ndef 6
```

4.6.35 MIN_NDP_PP

The MIN_NDP_PP environment sets the minimum number of pP phases required for a depth-phase solution to be acceptable for use in event screening. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
min_ndp_pp[ integer]
```

integer minimum number of pP depth phases

Default

```
min_ndp_pp 3
```

Example

The following environment line sets the minimum number of pP depth phases to 4.

```
min_ndp_pp 4
```

4.6.36 MIN_NDP_SP

The MIN_NDP_SP environment sets the minimum number of sP phases required for a depth-phase solution to be acceptable for use in event screening. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
min_ndp_sp[ integer]
```

integer minimum number of sP depth phases

Default

```
min_ndp_sp 3
```

Example

The following environment line sets the minimum number of sP depth phases to 4.

```
min_ndp_sp 4
```

4.6.37 MIN_NSTA_MS

The MIN_NSTA_MS environment sets the minimum required number of seismic stations with $\mathrm{M_S}$ measurements for the $Am_\mathrm{b} - M_\mathrm{S}$ screening criterion to be applied. The value of MIN_-NSTA_MS must be a positive integer. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
min_nsta_ms [ integer]
```

integer minimum number of seismic stations required with $\mathrm{M_S}$ measurements

Default

```
min_nsta_ms 1
```

Example

The following environment line sets the minimum number of seismic stations required with $\mathrm{M_S}$ measurements at 3.

```
min_nsta_ms 3
```

4.6.38 MIN_WDEPTH_THRESH

The MIN_WDEPTH_THRESH environment sets the minimum water depth threshold (km). The hydroacoustic screening algorithm will only be executed for S/H/I events with the minimum water depth within the location error ellipse greater than this value. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
min_wdepth_thresh [ threshold]
```

threshold minimum water depth threshold, in kilometres

Default

```
min_wdepth_thresh 0.5
```

Example

The following environment line sets the minimum water depth threshold to 1.0.

```
min_wdepth_thresh 1.0
```

4.6.39 MS_ERR

The MS_ERR environment defines the uncertainty term (standard deviation) for single-station M_S magnitude estimates, used in the computation of the confidence interval of the network estimate of m_b minus M_S. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
ms_err [ err]
```

err M_S uncertainty

Default

```
ms_err 0.23
```

Example

The following environment line sets the M_S uncertainty to 0.35.

```
ms_err 0.35
```

4.6.40 ORIGIN_LIST

A unique origin identification code is assigned to each origin. This origin identification code appears in S/H/I bulletins and may be used subsequently to request waveforms or comments associated with a specific origin.

Syntax

```
origin_list [ orid[, orid[, ... ]]]
```

orid origin identification code

Default

```
origin_list *
```

Example

The following environment line limits the origins to those with orids 132456 or 190672.

```
origin_list 132456,190672
```

4.6.41 REG_CONF

The REG_CONF environment defines the confidence level for the regional P/S screening criterion, given as a number between 0.0 and 1.0. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

Syntax

```
reg_conf[ conf]
```

conf confidence level of the regional screening criterion

Default

```
reg_conf 0.995
```

Example

The following environment line sets the confidence level of the regional P/S screening criterion at 99.0%.

```
reg_conf 0.990
```

4.6.42 RELATIVE_TO

The concept of association provides the ability to tie or associate one S/H/I data type with another. The most common association is between waveforms and events and allows a user to request waveforms associated with a particular set of origins. Note that the current version of *VDMS* does not support this data_type.

RELATIVE_TO has all of the characteristics of a list environment, except that it is active only for the subsequent request line, and the arguments are request keywords.

Syntax

```
relative_to origin|event|bulletin
```

The data type given in the RELATIVE_TO environment line is not returned in the response. That data type must be explicitly requested on another line, which typically precedes the RELATIVE_-TO environment line.

Examples

The following message requests the associated waveforms in CM6 subformat for events found in the bulletin between 1:00 and 1:15 on 9 January, 1999.

Listing 4.3. WAVEFORM request message RELATIVE_TO the REB

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1999/1/9 1:00 to 1999/1/9 1:15
bull_type reb
relative_to bulletin
waveform ims2.0:cm6
stop
```

To also request the REB bulletin for the time period in the example given above, the line `bulletin ims2.0` must be added.

Listing 4.4. WAVEFORM request message RELATIVE_TO the REB including the REB

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1999/1/9 1:00 to 1999/1/9 1:15
bull_type reb
bulletin ims2.0
relative_to bulletin
waveform ims2.0:cm6
stop
```

4.6.43 STA_LIST

The STA_LIST environment provides the station search list. This variable may be used for specifying radionuclide and/or S/H/I stations. If a S/H/I array station is specified, then all elements of the array are implied. Specific array elements may be referenced individually. The wildcard character (*) is allowed in specifying station codes.

When S/H/I bulletins are requested, STA_LIST can be used to specify the events to be included. If an event in the S/H/I bulletin contains at least one of the stations in the STA_LIST, that event, and all arrivals available for that event, will be included in the bulletin.

Syntax

```
sta_list[ sta[, sta[, ...]]]
```

sta station or array code

Default

```
sta_list *
```

Examples

The following environment line limits the station list to four specific S/H/I stations.

```
sta_list WRA, YKA, BOSA, LPAZ
```

The following environment line limits the returned data to that from radionuclide station CAP17.

```
sta_list CAP17
```

The following environment line limits the stations to those beginning with the character A.

```
sta_list A*
```

4.6.44 TIME

The TIME environment is expressed as a range with date and decimal time entries. The time entries are optional. Unlike most range environments, a space is allowed between the date and time entries of the limits. In addition, this environment variable is translated according to the context of the requested data product. For example, TIME applies to the collection start date and time for Standard Screened Radionuclide Event Bulletin (SSREB), sample pulse height data (SAMPLEPHD), Automatic Radionuclide Report (ARR), and Reviewed Radionuclide Report (RRR), but applies to acquisition date and time for gas background pulse height data (GASBKPHD), blank pulse height data (BLANKPHD), Meteorological data (MET), calibration pulse height data (CALIBPHD), detector background pulse height data (DETBKPHD), and quality control pulse height data (QCPHD). TIME also applies to the creation date for the Radionuclide Network Product Summary (RNPS), the Radionuclide Laboratory Report (RLR), and ALERT messages, and the period date for Radionuclide Monitoring System State of Health (RMSSOH) messages. This convention is used only for request messages.

In requests for S/H/I data, only the date and time fields that are necessary to obtain the resolution must be specified; all other fields are assumed to be 0 or 1 as appropriate (1 for month and day, 0 for hour, minute, and second).

Syntax

`time[` *date1* `[` *time1* `]] to[` *date2* `[` *time2* `]]`

date1 time1	low-range date and time
date2 time2	high-range date and time

Default

`time` *(current date and time)* `to` *(current date and time)*

Examples

The following environment line limits the time to a range from 1999/02/01 00:00:00.0 up to (but not including) 1999/03/01 00:00:00.0.

```
time 1999/02/01 to 1999/03/01
```

Either of the following environment lines limits the time to a range from 1999/02/01 23:14:19.7 up to (but not including) 1999/03/01 12:00:00.0.

```
time 1999/02/01 23:14:19.7 to 1999/03/01 12
```

```
time 1999/2/1 23:14:19.7 to 1999/3/1 12
```

4.6.45 TIME_STAMP

The TIME_STAMP environment is used to request that data messages be time stamp. If requested, time stamps will appear at the beginning and end of each data type. Time stamps record the start time and end time that the message entered and exited the processing system.

Syntax

```
time_stamp
```

Default

None (do not time stamp the returned message).

Example

The following environment line turns on the time stamp utility.

```
time_stamp
```

4.7 Request lines

Request lines specify the type of information to be retrieved from the IMS2.0 implementation. All arguments in a request line are optional and include the format for the return message. The format is specified as a generic term, such as `ims2.0`. The arguments *subtype* and *sub_format* are used only in requests for S/H/I data. Radionuclide data are returned in the format specified on the BEGIN line.

Syntax

request_keyword [:*subtype*] [*format* [:*sub_format*]]

request_keyword	The request_keyword specifies the requested data type.
subtype	The S/H/I subtype specifies which subtype to use with this data type. The subtype allows a more precise data selection. The subtype is used primarily for arrival requests.
format	The format specifies the data format to use in the return message (for example, `ims2.0`).
sub_format	The S/H/I sub_format further specifies the precise format to use with this data type.

If the format of the S/H/I return data is not specified, the default format in the BEGIN line will be used.

The subtype argument is concatenated to the request_keyword with a colon (:) (for example, `arrival:automatic`). In addition, sub_format is concatenated to the format with a colon (for example, `ims2.0:cm6`).

For each request, a subset of the environments described in section 4.6 "Request environment lines" must be specified (see Table 7 and Table 8). All required environments are enforced for each request. If an environment is not specified explicitly, then the default is used. Because the default values for some environments specify a zero length range (for example, `time`), a request made without explicitly defining these environments will result in no data being returned. Descriptions of the request lines include the applicable environment variables.

The order of the request lines is significant because the environment established prior to the request line is used to constrain the request. The environment can be changed between request lines to allow multiple requests for the same type of information within the same request message.

Example

The following message requests S/H/I bulletin information for all events in January 1999 within the areas defined by 10 °N to 20 °N and 120 °E to 160 °E and 55 °S to 45 °S and 25 °W to 15 °W.

Listing 4.5. Multiple BULLETIN request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1999/01/01 to 1999/02/01
lat 10.0 to 20.0
lon 120.0 to 160.0
bull_type reb
bulletin ims2.0
lat -55.0 to -45.0
lon -25.0 to -15.0
bulletin ims2.0
stop
```

Table 7. S/H/I data request environment variables

	Request lines															
Environments	ARRIVAL/SLSD	BULLETIN	BULLETIN†	CHANNEL	CHAN_STATUS	COMMENT	COMM_STATUS	EVENT	EXECSUM	NETWORK	ORIGIN	OUTAGE	RESPONSE	STATION	STA_STATUS	WAVEFORM
arrival_list	o	o	o			o										
aux_list				o	o							o	o		o	o
beam_list	o															o
bull_type	r	r	r					r			r					
chan_list	o			o	o							o	o			o
comm_list							o									
depth		o	o					o	o		o					
depth_conf			o													
depth_kvalue			o													
depth_minus_error		o	o					o	o		o					
depth_thresh			o													
event_list		o	o			o		o	o							
event_sta_dist		o	o					o	o		o					

Continues on next page

Table 7 (cont.)

Environments	**Request lines**															
	ARRIVAL/SLSD	BULLETIN	BULLETIN†	CHANNEL	CHAN_STATUS	COMMENT	COMM_STATUS	EVENT	EXECSUM	NETWORK	ORIGIN	OUTAGE	RESPONSE	STATION	STA_STATUS	WAVEFORM
group_bull_list		o						o								
hydro_cp_thresh			o													
hydro_te_thresh			o													
lat		o	o	o				o	o		o			o		
loc_conf			o													
lon		o	o	o				o	o		o			o		
mag		o	o					o	o		o					
magpref_mb			o													
magpref_ms			o													
mag_type		o	o					o	o		o					
mbms_conf			o													
mbms_slope			o													
mbms_thresh			o													
mb_err			o													
mb_minus_ms		o	o					o			o					
min_dp_snr_pp			o													
min_dp_snr_sp			o													
min_mb			o													
min_moveout_pp			o													
min_moveout_sp			o													
min_ndef			o													
min_ndp_pp			o													
min_ndp_sp			o													
min_nsta_ms			o													
min_wdepth_thresh			o													
ms_err			o													
origin_list		o	o			o			o		o					
reg_conf			o													
relative_to																o
sta_list	o	o	o	o	o	o		o	o	o	o	o	o	o	o	r
time††	r	r	r		r	o	r	r	r		r	r	o		r	r
time_stamp	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o

Continues on next page

Table 7 (cont.)

Environments	ARRIVAL/SLSD	BULLETIN	BULLETIN†	CHANNEL	CHAN_STATUS	COMMENT	COMM_STATUS	EVENT	EXECSUM	NETWORK	ORIGIN	OUTAGE	RESPONSE	STATION	STA_STATUS	WAVEFORM

r = required, o = optional

Bulletin†: Custom event screening bulletins IDC_NEB and IDC_NSEB

††Minimum precision is days at the IDC

Table 8. Radionuclide data request environment variables

Environments	ALERT_*	ARR	BLANKPHD	CALIBPHD	DETBKPHD	GASBKPHD	MET	QCPHD	RLR	RMSSOH	RNPS	RRR	SPHDF	SPHDP	SSREB	SAMPML	REVSAMP
sta_list	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
time	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r
time_stamp	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o

r = required, o = optional

The following sections describe the possible request lines and include the applicable environment variables. The variables that must be explicitly specified to obtain a result are in **bold** type.

4.7.1 ALERT_FLOW

This data type is one of several radionuclide data products available from the IDC. The ALERT_-FLOW indicates that a sampler flow rate is above or below a specified threshold. See section 7.7 “Alerts” on p. 208 for a complete description and subsection I.1.1 “ALERT_FLOW” on p. 261 for an example.

Environment

time, `sta_list`, `time_stamp`

Example

The following example requests time-stamped ALERT_FLOW messages for all radionuclide stations during the year 1999. Because the STA_LIST environment is not specified, the default (all stations) is used.

Listing 4.6. ALERT_FLOW request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time_stamp
time 1999/01/01 to 2000/01/01
alert_flow
stop
```

4.7.2 ALERT_SYSTEM

This data type is one of several radionuclide data products available from the IDC. The ALERT_-SYSTEM indicates a problem with major components of the station and is specific to a station type. See section 7.7 “Alerts” on p. 208 for a complete description and subsection I.1.2 “ALERT_-SYSTEM” on p. 261 for an example.

Environment

time, `sta_list`, `time_stamp`

Example

The following example requests ALERT_SYSTEM messages for all radionuclide stations in the Russian Federation from January 1996 through August 2000.

Listing 4.7. ALERT_SYSTEM request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1996/01/01 to 2000/09/01
sta_list RU*
alert_system
stop
```

4.7.3 ALERT_TEMP

This data type is one of several radionuclide data products available from the IDC. The ALERT_-TEMP indicates that a system temperature is outside the required IMS temperature range for that parameter. See section 7.7 “Alerts” on p. 208 for a complete description and subsection I.1.3 “ALERT_TEMP” p. 262 for an example.

Environment

time, `sta_list`, `time_stamp`

Example

The following example requests ALERT_TEMP messages from station ARP01 from 22 November, 2000 through 31 December, 2000.

Listing 4.8. ALERT_TEMP request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 2000/11/22 to 2001/01/01
sta_list ARP01
alert_temp
stop
```

4.7.4 ALERT_UPS

This data type is one of several radionuclide data products available from the IDC. The ALERT_UPS indicates a problem with the power supply. See section 7.7 "Alerts" on p. 208 for a complete description and subsection I.1.4 "ALERT_UPS" on p. 262 for an example

Environment

time, `sta_list`, `time_stamp`

Example

The following example requests time-stamped ALERT_UPS messages from all radionuclide stations in Australia from 25 April, 1999 to 15 October, 1999.

Listing 4.9. ALERT_UPS request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time_stamp
time 1999/04/25 to 1999/10/16
sta_list AU*
alert_ups
stop
```

4.7.5 ARR

This data type is one of several radionuclide data products available from the IDC. The ARR includes results from the automated analysis of a radionuclide sample. See subsection 7.8.1 "ARR" on p. 209 for a complete description and section I.2 "ARR—Noble gas version", and section I.3 "ARR—Particulate version" on pp. 263 and 281, respectively, for examples.

Environment

time, `sta_list`, `time_stamp`

Example

The following message requests time-stamped ARR messages from radionuclide stations FRP27 and RUP54 for the month of March 2001.

Listing 4.10. ARR request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time_stamp
time 2001/03/01 to 2001/04/01
sta_list FRP27, RUP54
arr
stop
```

4.7.6 ARRIVAL/SLSD

The ARRIVAL and SLSD (Standard List of Signal Detections) requests are synonymous. An arrival is defined by excess energy that is identified in S/H/I waveform data. The amount of information about an arrival depends on the amount of processing that has been applied to the data. The different stages of processing are expressed using subtypes to the ARRIVAL or SLSD request lines as follows:

arrival:automatic | *slsd:automatic*	The AUTOMATIC subtype provides the result of the automatic detection process run on waveforms.
arrival:reviewed | *slsd:reviewed*	The REVIEWED subtype provides the arrivals that have been automatically or manually reviewed to the extent that phase names have been assigned.
arrival:grouped | *slsd:grouped*	The GROUPED subtype provides the arrivals that have been assigned phase names and that have also been grouped together with the assumption that they belong to the same event.
arrival:associated | *slsd:associated*	The ASSOCIATED subtype provides the arrivals that have been run through a location program and are associated to an event. ASSOCIATED is the default subtype for ARRIVAL/SLSD.
arrival:unassociated | *slsd:unassociated*	The UNASSOCIATED subtype provides the arrivals that have been detected but not associated with any event.

A specific bulletin type must be specified through the BULL_TYPE environment for associated and unassociated arrivals.

Environment

bull_type, **time**, `arrival_list`, `beam_list`, `chan_list`, `sta_list`, `time_stamp`

Examples

The following message requests automatically determined arrivals from stations ABC and DEF for the month of March 1999.

Listing 4.11. ARRIVAL/SLSD request message (automatic arrivals in the SEL1)

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1999/03/01 to 1999/04/01
sta_list ABC, DEF
bull_type SEL1
arrival:automatic ims2.0
stop
```

The following message requests associated arrivals from the REB from stations ABC and DEF for the month of March 1999.

Listing 4.12. ARRIVAL/SLSD request message (automatic arrivals in the REB)

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1999/03/01 to 1999/04/01
sta_list ABC, DEF
bull_type REB
arrival:automatic ims2.0
stop
```

4.7.7 BLANKPHD

BLANKPHD is one of several Pulse Height Data (PHD) types available for particulate radionuclide samples. It contains the PHD of an unexposed air filter as well as other important information. See section 7.2 "Pulse Height Data" on p. 166 for a description of the various PHD types and section I.6 "BLANKPHD" on p. 289 for an example.

Environment

time, `sta_list`, `time_stamp`

Example

The following message requests time-stamped BLANKPHD messages from all radionuclide stations acquired during the year 2000. Note that the STA_LIST environment is not explicitly specified and therefore defaults to all stations.

Listing 4.13. BLANKPHD request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time_stamp
time 2000/01/01 to 2001/01/01
blankphd
stop
```

4.7.8 BULLETIN

Bulletins are composed of S/H/I origin, event, and associated arrival information. The SSREB cannot be obtained using BULLETIN; it is requested using a SSREB request line.

The IMS2.0 format bulletins, as implemented by the IDC, have two subformats: `ims2.0:short` and `ims2.0:long`. If the subformat is not specified, the SHORT subformat is used.

The environment for BULLETIN is also used to constrain waveforms when the RELATIVE_TO environment is used.

Environment

bull_type, **time**, `arrival_list`, `depth`, `depth_minus_error`, `event_list`, `event_sta_dist`, `group_bull_list`, `lat`, `lon`, `mag`, `mag_type`, `mb_minus_ms`, `sta_list`, `time_stamp`

When requesting a custom screened event bulletin, the BULL_TYPE environment defines the contents of the results (IDC_NEB or IDC_NSEB) and not the source of the bulletin information (REB). The following event screening environments are valid when BULL_TYPE is IDC_NEB or IDC_NSEB.

Environment

bull_type, **time**, `arrival_list`, `depth`, `depth_conf`, `depth_kvalue`, `depth_minus_error`, `depth_thresh`, `event_list`, `event_sta_dist`, `hydro_cp_thresh`, `hydro_te_thresh`, `lat`, `loc_conf`, `lon`, `mag`, `mag_type`, `magpref_mb`, `magpref_ms`, `mb_err`, `mb_minus_ms`, `mbms_conf`, `mbms_slope`, `mbms_thresh`, `min_dp_snr_pp`, `min_dp_snr_sp`, `min_mb`, `min_moveout_pp`, `min_moveout_sp`, `min_ndef`, `min_ndp_pp`, `min_ndp_sp`, `min_nsta_ms`, `min_wdepth_thresh`, `ms_err`, `reg_conf`, `sta_list`, `time_stamp`

Examples

The following message requests the REB for 25 December, 1998.

Listing 4.14. BULLETIN request message (REB)

```
begin ims2.0
msg_type request
msg_id example any_ndc
```

```
e-mail name@my.computer
time 1998/12/25 to 1998/12/26
bull_type reb
bulletin ims2.0
stop
```

The following message requests the REB and associated Standard Event List 2 origins for 25 December, 1998.

Listing 4.15. BULLETIN request message (REB with associated SEL2 origins)

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/12/25 to 1998/12/26
bull_type reb
group_bull_list sel2
bulletin ims2.0
stop
```

The following message requests the REB and associated SEL2 origins whose DEPTH_MINUS_-ERROR is less than 10 Km in the LONG subformat for 25 December, 1998.

Listing 4.16. BULLETIN request message specifying depth and subformat

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/12/25 to 1998/12/26
depth_minus_error to 10
bull_type reb
group_bull_list sel2
bulletin ims2.0
stop
```

The following message requests the REB and associated SEL2 origins for 25 December, 1998 with DEPTH_MINUS_ERROR less than 10 km and MB_MINUS_MS 0.5 or greater.

Listing 4.17. BULLETIN request message specifying depth and MB_MINUS_MS

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/12/25 to 1998/12/26
depth_minus_error to 10
mb_minus_ms 0.5 to
bull_type reb
group_bull_list sel2
bulletin ims2.0
stop
```

The following message requests a custom screened event bulletin (IDC_NEB) for events in the REB on 10 June 1998, between magnitudes 4.0 and 6.0, within an area defined by latitude and longitude ranges, and using custom depth and m_b minus M_S screening criteria.

Listing 4.18. BULLETIN request message using custom screening criteria

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/06/10 to 1998/06/11
bull_type idc_neb
mag_type mb
mag 4.0 to 6.0
lat 60 to 90
lon 45 to 75
depth_thresh 20.0
depth_conf 0.99
mbms_slope 1.5
mbms_thresh 3.5
mbms_conf 0.99
min_nsta_ms 2
bulletin ims2.0
stop
```

4.7.9 CALIBPHD

This data type is one of several PHD types available for radionuclide samples. It contains the PHD of a standard calibration source, as well as other important information. See section 7.2 "Pulse Height Data" on p. 166 for a description of the various PHD types and section I.9 "CALIBPHD" on p. 293 for an example.

Environment

time, `sta_list`, `time_stamp`

Example

The following message requests time-stamped CALIBPHD messages from all radionuclide stations acquired during the year 2000. Because the STA_LIST environment is not specified the default (all stations) is used.

Listing 4.19. CALIBPHD request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time_stamp
time 2000/01/01 to 2001/01/01
calibphd
```

```
stop
```

4.7.10 CHANNEL

Channel is a complete set of information about the location, emplacement, and type of seismometers at a station.

Environment

`aux_list, chan_list, lat, lon, sta_list, time_stamp`

Example

The following message requests the short-period channel information for stations in South America using the appropriate LAT and LON environment range. Note that the STA_LIST environment is not explicitly specified; the default for this variable is all stations.

Listing 4.20. CHANNEL request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
lat -60 to 10.0
lon -81 to -34
chan_list s*
channel ims2.0
stop
```

4.7.11 CHAN_STATUS

Channel status is given for the channels in the CHAN_LIST environment for the stations in the STA_LIST environment. The TIME environment defines the report period. The minimum report period is one day.

Environment

time[1], `aux_list, chan_list, sta_list, time_stamp`

Example

The following message requests the channel status reports over a four-day period.

Listing 4.21. CHAN_STATUS request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
```

[1] The minimum precision of the TIME environment for CHAN_STATUS requests is days.

```
e-mail name@my.computer
time 1998/11/14 to 1998/11/18
chan_status ims2.0
stop
```

4.7.12 COMMENT

Comments may be associated with a S/H/I station, a S/H/I event, an origin, or an arrival. To retrieve comments, the station code or the identifications (IDs) of the arrival, origin, or event can be used. These codes or IDs are listed in the bulletins and are obtained with a request (or subscription to) a bulletin or event list.

Environment

arrival_list | **event_list** | **origin_list** | **sta_list**, `time`, `time_stamp`

Example

The following message requests the comments for events 510 and 512.

Listing 4.22. COMMENT request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
event_list 510, 512
comment ims2.0
stop
```

4.7.13 COMM_STATUS

Communications status is given for the communications links listed in the COMM_LIST environment. The TIME environment defines the report period. The minimum report period is one day. The sub_format field is used to indicate a verbose communications status report.

Syntax

```
comm_status[ ims2.0[:verbose]]
```

Environment

time, `comm_list`, `time_stamp`

Example

The following message requests the verbose communications status reports for the link from any_ndc over a one-week period.

Listing 4.23. COMM_STATUS request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/11/14 to 1998/11/21
comm_list any_ndc
comm_status ims2.0:verbose
stop
```

4.7.14 DETBKPHD

This data type is one of several PHD types available for radionuclide samples. It contains the PHD of an empty detector chamber as well as other important information. See section 7.2 "Pulse Height Data" on p. 166 for a description of the various PHD types and section I.15 "DETBKPHD" on p. 298 for an example.

Environment

time, `sta_list`, `time_stamp`

Example

The following message requests time-stamped DETBKPHD messages acquired during the year 2000 from radionuclide stations DEP33, SEP63, and GBP66.

Listing 4.24. DETBKPHD request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time_stamp
time 2000/01/01 to 2001/01/01
sta_list DEP33, SEP63, GBP66
detbkphd
stop
```

4.7.15 EVENT

An S/H/I event is the physical occurrence that was detected through the network of S/H/I sensors. S/H/I events can have many estimates of their time and location; these estimates are known as origins. Only those estimates given in the BULL_TYPE and GROUP_BULL_LIST environments are provided. The origin estimates in BULL_TYPE provide the basis for associating the origins in the GROUP_BULL_LIST.

Environment

bull_type, **time**, `depth`, `depth_minus_error`, `event_list`, `event_sta_dist`, `group_bull_list`, `lat`, `lon`, `mag`, `mag_type`, `mb_minus_ms`, `sta_list`, `time_stamp`

Example

The following message requests all of the March 1998 REB events within regional distance (20 deg) of stations ABC and/or DEF. The list is also requested to include the Standard Event List 2 events that can be grouped with the REB events.

Listing 4.25. EVENT request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/03/01 to 1998/04/01
bull_type reb
group_bull_list sel2
sta_list abc, def
event_sta_dist 0.0 to 20.0
event ims2.0
stop
```

4.7.16 EXECSUM

The Executive Summary (EXECSUM) contains summary statistics of the number of events in the SEB and those in the various event screening categories, the number of radionuclide detections and those categorized as Level 4 or Level 5, and the number of events with cross-referenced radionuclide and seismic-acoustic data. It also contains status metrics regarding the IMS network.

Environment

time, `depth`, `depth_minus_error`, `event_list`, `event_sta_dist`, `lat`, `lon`, `mag`, `mag_type`, `origin_list`, `sta_list`, `time_stamp`

Example

The following message requests the EXECSUM for 25 December, 1998.

Listing 4.26. EXECSUM request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/12/25 to 1998/12/26
execsum ims2.0
stop
```

4.7.17 GASBKPHD

This data type is one of several radionuclide data products available from the IDC. The GASBKPHD contains the pulse height data of an empty plastic scintillation gas cell from stations that observe a memory effect. At present, only noble gas monitoring systems that utilize β-γ coincidence counting have plastic scintillation gas cells. The GASBKPHD is acquired after a sample has been evacuated from the gas cell and before the next sample acquisition. The purpose of the GASBKPHD is to enable the quantification of radio-xenon atoms that are adsorbed onto the walls of the plastic scintillation gas cell. See section 7.2 “Pulse Height Data” on p. 166 for a complete description and section I.19 “GASBKPHD” on p. 301 for an example.

Environment

time, `sta_list`, `time_stamp`

Example

The following example requests GASBKPHD messages for station DEX33 for 22 January, 2001.

Listing 4.27. GASBKPHD request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 2001/01/22 to 2001/01/23
sta_list DEX33
gasbkphd
stop
```

4.7.18 MET

This data type is one of several radionuclide data products available from the IDC. The MET message contains meteorological data recorded at a radionuclide station. See section 7.6 “Meteorological data” on p. 207 for a complete description and section I.22 “MET” on p. 305 for an example.

Environment

time, `sta_list`, `time_stamp`

Example

The following example requests time-stamped MET messages for station CAP14 for the month of January 2000.

Listing 4.28. MET request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
```

```
e-mail name@my.computer
time_stamp
time 2000/01/01 to 2000/02/01
sta_list CAP14
met
stop
```

4.7.19 NETWORK

The NETWORK request line is used to obtain network information for stations in the STA_LIST environment.

Environment

`sta_list, time_stamp`

Example

The following example requests time-stamped network information for station ARCES.

Listing 4.29. NETWORK request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time_stamp
sta_list ARCES
network
stop
```

4.7.20 ORIGIN

Origins are solutions to the location and time of a S/H/I event. Several origins may be determined for any one S/H/I event.

Environment

bull_type, **time**, `depth`, `depth_minus_error`, `event_sta_dist`, `lat`, `lon`, `mag`, `mag_type`, `mb_minus_ms`, `origin_list`, `sta_list`, `time_stamp`

Examples

The following message requests origin information for the REB origins for 8 August, 1998.

Listing 4.30. ORIGIN request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
```

```
e-mail name@my.computer
time 1998/08/08 to 1998/08/09
bull_type reb
origin ims2.0
stop
```

The following message limits the previous request to a specific magnitude and depth range by including more environment lines.

Listing 4.31. ORIGIN request message with depth and magnitude requirements

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/08/08 to 1998/08/09
mag_type mb
mag 4.5 to 5.5
depth 0 to 10
bull_type reb
origin ims2.0
stop
```

4.7.21 OUTAGE

OUTAGE requests reports on S/H/I data that are not available for the specified time range.

Environment

time, `chan_list`, `sta_list`, `time_stamp`

Example

The following message requests the outage reports for all S/H/I stations and channels for the month of March 1998. If the station and channels of interest are not explicitly specified, then the default station list (*) and channel list (*Z) are used.

Listing 4.32. OUTAGE request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/03/01 to 1998/04/01
outage ims2.0
stop
```

4.7.22 QCPHD

This data type is one of several PHD types available for radionuclide samples. It contains the PHD of the daily quality control measurement as well as other important information. See section 7.2 "Pulse Height Data" on p. 166 for a description of the various PHD types and section I.26 "QCPHD" on p. 308 for an example.

Environment

time, `sta_list`, `time_stamp`

Example

The following message requests QCPHD messages from KWP40 acquired on 14 December, 1999.

Listing 4.33. QCPHD request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1999/12/14 to 1999/12/15
sta_list KWP40
qcphd
stop
```

4.7.23 RESPONSE

The response is the instrument response of the specified S/H/I network/station/channel identification code. Responses are valid at any given time and may change through time.

Environment

`chan_list`, `sta_list`, `time`, `time_stamp`

Example

The following message requests all the instrument responses for the broadband vertical channel of station ABC used in January 1999.

Listing 4.34. RESPONSE request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1999/01/01 to 1999/02/01
sta_list abc
chan_list bhz
response ims2.0
stop
```

4.7.24 RLR

This data type is one of several radionuclide data products available from the IDC. The RLR contains sample analysis results from a certified radionuclide laboratory. See section 7.3 "Radionuclide laboratory reports" on p. 182 for a complete description and subsection I.29.1 "β-γ coincidence systems", subsection I.29.2 "HPGe systems" and section I.30 "RLR—Particulate version" on pp. 320, 322 and section I.30 "RLR—Particulate version", respectively, for examples.

Environment

time, `sta_list`, `time_stamp`

Example

The following example requests time-stamped RLR messages for the month of September 2001 from radionuclide lab AUL02.

Listing 4.35. RLR request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time_stamp
time 2001/09/01 to 2001/10/01
sta_list AUL02
rlr
stop
```

4.7.25 RMSSOH

This data type is one of several radionuclide data products available from the IDC. The message describes the state of health of the collection, processing, and acquisition equipment at the IMS radionuclide stations. See section 7.5 "State of Health data" on p. 200 for a complete description and section I.31 "RMSSOH" on p. 328 for an example.

Environment

time, `sta_list`, `time_stamp`

Example

The following example requests RMSSOH messages from all radionuclide stations in the United Kingdom of Great Britain and Northern Ireland for the period 6 February, 2001 to 5 March, 2001.

Listing 4.36. RMSSOH request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
```

```
e-mail name@my.computer
time 2001/02/06 to 2001/03/06
sta_list GB*
rmssoh
stop
```

4.7.26 RNPS

This data type is one of several radionuclide data products available from the IDC. The RNPS is a compilation of the status of collection, processing, and analysis of particulate and noble gas data from all radionuclide stations, (IDC/WGB/TL-11). The RNPS is produced daily and summarizes the results for each station over the past three days. See subsection 7.8.4 “RNPS” on p. 232 for a complete description and section I.32 “RNPS” on p. 329 for an example.

Environment

time, `sta_list`, `time_stamp`

Example

The following example requests time-stamped RNPSs from all radionuclide stations from January 2001 through June 2001. Because the STA_LIST environment is not specified, the default (all stations) is used.

Listing 4.37. RNPS request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time_stamp
time 2001/01/01 to 2001/07/01
rnps
stop
```

4.7.27 RRR

This data type is one of several radionuclide data products available from the IDC. The Reviewed Radionuclide Report (RRR) is a revised version of the Automatic Radionuclide Report (ARR) and is generated after manual review of a radionuclide sample is complete. See subsection 7.8.2 “RRR” on p. 228 for a complete description, and section I.33 “RRR—Noble gas version” and section I.34 “RRR—Particulate version” on pp. 330 and 347, respectively, for examples.

Environment

time, `sta_list`, `time_stamp`

Example

The following message requests time-stamped RRR messages from all US radionuclide stations for the month of June 2000.

Listing 4.38. RRR request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time_stamp
time 2000/06/01 to 2000/07/01
sta_list US*
rrr
stop
```

4.7.28 SAMPML/REVSAMP

This data type is one of several radionuclide data products available from the IDC. The SAMPML/REVSAMP contains the sample PHDs as well as IDC analysis results in XML format. There are two types, i.e. SAMPML and REVSAMP, pertaining to the Automated Radionuclide Report, Reviewed Radionuclide Report respectively. See section I.28 "REVSAMP/SAMPML—Noble gas systems" on p. 310 for examples.

Environment

time, `sta_list`, `time_stamp`

Example

The following message requests time-stamped REVSAMP messages from all US radionuclide stations for the month of June 2000.

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time_stamp
time 2000/06/01 to 2000/07/01
sta_list US*
revsamp
stop
```

4.7.29 SLSD

SLSD is a synonym for arrival. See subsection 4.7.6 "ARRIVAL/SLSD" on p. 76.

4.7.30 SPHDF/P

The SAMPLEPHD is one of several PHD types available for radionuclide samples and has two different qualifiers, e.g. FULL (SPHDF) or PREL (SPHDP). The PREL SAMPLEPHD contains PHD from a sample acquired for a time shorter than that of the full acquisition time. The FULL SAMPLEPHD contains PHD from a sample acquired for the IDC-defined full acquisition time. Like the other PHD types, the PREL and FULL SAMPLEPHD also include other important information. See section 7.2 "Pulse Height Data" on p. 166 for a description of the various PHD types and subsection I.35.1 "SAMPLEPHD—β-γ coincidence data version" on p. 351, and section I.36 "SAMPLEPHD—Particulate systems" on p. 354 for examples.

The data_type SPHDP and SPHDF should be used when users request the PREL and FULL SAMPLEPHDs, respectively.

Environment

time, `sta_list`, `time_stamp`

Example

The following message requests SPHDP messages and SPHDF messages from all Australian radionuclide stations for 22 June, 2000.

Listing 4.39. SPHD request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 2000/06/22 to 2000/06/23
sta_list AU*
sphdp
sphdf
stop
```

4.7.31 SSREB

This data type is one of several radionuclide data products available from the IDC. The Standard Screened Radionuclide Event Bulletin (SSREB) is generated by the IDC when fission or activation products are detected at a radionuclide station above normal limits. An SSREB contains RRRs messages from the samples in which fission products were detected, information identifying the fission product(s), an estimate of the source location and time, as well as any sample analysis results from certified laboratories. See subsection 7.8.3 "SSREB" on p. 230 for a description of the SSREB and section I.37 "SSREB—Noble gas systems" and section I.38 "SSREB—Particulate version" on pp. 355 and 358, respectively, for examples.

Environment

time, `sta_list`, `time_stamp`

Example

The following message requests all SSREB messages generated by the IDC during the first quarter of 2000.

Listing 4.40. SSREB request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 2000/01/01 to 2000/04/01
ssreb
stop
```

4.7.32 STATION

S/H/I station information includes station codes, locations, elevations, station type (array, 3-C), and dates for which waveform or arrival data are available from an IMS2.0 implementation. Additional station codes may be reported for which neither waveform nor arrival data are available, but this can present problems.

Environment

```
lat, lon, sta_list, time_stamp
```

Examples

The following message requests station information for all S/H/I stations serviced by this IMS2.0 implementation.

Listing 4.41. STATION request message (all stations)

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
station ims2.0
stop
```

The following message requests station information for S/H/I stations in the southern hemisphere.

Listing 4.42. STATION request message (selected stations)

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
lat -90 to 0.0
station ims2.0
stop
```

4.7.33 STA_STATUS

Station status is given for the S/H/I stations in the STA_LIST environment. The TIME environment defines the report period. The minimum report period is one day.

Environment

time[2], `aux_list`, `sta_list`, `time_stamp`

Example

The following message requests the S/H/I station status reports for all stations over a one-week period.

Listing 4.43. STA_STATUS request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/11/14 to 1998/11/21
sta_status ims2.0
stop
```

4.7.34 WAVEFORM

Waveforms are digital time series data (S/H/I). The WAVEFORM request format will typically accept subformats that specify how the digital data are formatted within the general format of the waveform data type. The subformats include int, cm6, cm8, and csf for IMS2.0 data.

Environment

time, `aux_list`, `beam_list`, `chan_list`, `sta_list`, `time_stamp`

Example

The following message requests data in 6-bit compressed subformat from all channels of station ABC from 03:25 up to (but not including) 03:40 on 1 March, 1998.

Listing 4.44. WAVEFORM request message

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/03/01 03:25 to 1998/03/01 03:40
sta_list abc
chan_list *
waveform ims2.0:CM6
stop
```

[2] The minimum precision of the TIME environment for STA_STATUS requests is days.

5

Subscription messages

This chapter describes the formats for subscription messages and includes the following sections:

5.1 Introduction 95

5.2 Subscription procedures 96

5.3 Subscription format 97

5.4 Subscription control lines 97

5.5 Subscription environment lines 98

5.6 Subscription request lines 102

5.1 Introduction

Subscription messages can be used as follows:

- to initiate a subscription,
- to change a subscription,
- to request an inventory of personal subscriptions,
- to request that an issue(s) of a subscription be resent,
- to terminate a subscription, or
- to establish national bulletin products (NEBs and NSEBs).

The messages containing the subscription data are sent as data messages.

Subscriptions allow authorized users to have IMS data and IDC products automatically forwarded to them on a regular basis. The S/H/I products available through subscriptions include continuous data from primary S/H/I stations. The radionuclide products available through subscriptions include all those available by request:

ALERT_FLOW, ALERT_SYSTEM, ALERT_TEMP, ALERT_UPS, ARR, BLANKPHD, CALIBPHD, DETBKPHD, GASBKPHD, MET, QCPHD, RLR, RMSSOH messages, RNPS, RRR, SPHDF, SPHDP, and SSREB.

Subscriptions may be established for continuous delivery (for continuous data), when immediately available at the IDC (for example, discrete waveform or radionuclide data and data products), on a daily basis (for example, daily S/H/I bulletins and status reports or radionuclide data and data products), or at a user-specified frequency/time.

5.2 Subscription procedures

A subscription is made by sending a subscription message to the IDC *VDMS*. Upon receipt, the source of a subscription message is first validated for its authenticity. Next the volume of data to be generated by the request is checked. Subscription messages that are not sent by an authorized user are rejected. After validation, the new subscription is added to the existing subscriptions for that user, and notification of the new subscription is sent to the subscriber in the form of a LOG data message. (See subsection 6.6.2 “LOG” on p. 162 for a description of the LOG message and section I.21 “LOG” on p. 304 for an example.) Each subscription is assigned a unique identification number at the IDC for internal tracking purposes.

Examples

A subscription message is sent to the IDC requesting the daily REB

Listing 5.1. BULLETIN subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
bull_type reb
bulletin ims2.0
stop
```

The subscriber receives the following LOG data message as confirmation of the subscription. The subscription ID and product ID numbers are included in the message.

Listing 5.2. LOG data message, response to the message of Listing 5.1

```
begin ims2.0
msg_type data
msg_id response_example ctbto_idc
```

```
ref_id example any_ndc
data_type log ims2.0
subscription id: 52
product id: 74
added at 1997/01/12 19:36:00
freq daily
bull_type reb
bulletin ims2.0
stop
```

After the subscription begins, data messages sent to the subscriber include the PROD_ID line that includes the product identification (ID) and a delivery ID number along with the subscription data.

5.3 Subscription format

All subscription messages require the basic message structure described in section 3.2 “Message preface” on p. 32. If a message is a request for subscription, the MSG_TYPE must be set to `subscription`.

A subscription message contains information about where to send the subscribed data, how often the subscribed data should be sent, and what data (or products) to send. Like request messages, subscriptions are defined through environment variables that constrain the data to be sent and request lines that specify which data to send. Separate subscriptions are delimited by separate subscription request lines. In other words, each time a subscription request line is encountered, a corresponding subscription will be initiated for the user.

5.4 Subscription control lines

Subscription control lines specify

- the protocol of the response data message,
- the time duration and frequency of the subscription, and
- whether or not a message should be sent if there are no data to send.

Like request messages, the existing options for the response message protocol is email. This option should be used in accordance with the guidelines described in section 2.3 “Message protocols” on p. 28 and subsection 3.5.1 “Message size” on p. 36. The formats for E-MAIL control line is identical to that in request messages and can be found in section 4.4 “Request control lines” on p. 46.

As in request messages, only one response message protocol can be specified in a subscription message. If different protocols are desired for the response data, separate subscription messages must be submitted. A subscription message that does not specify a response message protocol will be answered by email using the return address of the sender.

Control lines that are unique to subscription messages are described below.

5.4.1 FREQ

The FREQ control line specifies how often the data or products should be sent to the subscriber. The FREQ line may appear only once in a subscription message.

Three frequencies are allowed: `continuous`, `immediate`, `daily`. When requesting continuous waveform data, FREQ is set to `continuous`[1]. If it is desired for data or products to be delivered as soon as they become available, FREQ is set to `immediate`. When FREQ is set to `daily`, data and products are delivered once every day.

Syntax

```
freq[ continuous|immediate|daily]
```

Default

```
freq daily
```

5.4.2 TIME

In a subscription message, the TIME control line refers to the active time of a subscription. The active time is given as a range. The format of TIME is similar to that in the request environment line (see subsection 4.6.44 "TIME" on p. 69). In a subscription control line, however, the start time may have the value `now` (the current date and time), and the end time may have the value `forever` (the subscription will run indefinitely). These time limits are not valid for use in request messages.

Default

```
time now to forever
```

In the event that a subscription includes a start time before `now`, a request message will be generated for the data or product from `time` *start time* `to now`, and the actual subscription will run from `now` to the specified end date.

5.5 Subscription environment lines

Subscription environment lines are used to define and limit the response to subscription request lines (see section 5.6 "Subscription request lines" on p. 102) and to establish national bulletin products such as an NEB or NSEB. Many of the request environment variables in section 4.6 "Request environment lines" on p. 47 are also used as general subscription environment variables. These environment lines include:

[1] Special arrangements between Member States and the IDC are required due to the hardware and communications requirements of continuous data transmission.

BULL_TYPE, CHAN_LIST, DEPTH, DEPTH_MINUS_ERROR, EVENT_STA_DIST, LAT, LON, MAG, MAG_TYPE, MB_MINUS_MS, RELATIVE_TO, and STA_LIST.

Environment variables that define screening criteria for national bulletins (NEBs and NSEBs) and National Executive Summaries include:

DEPTH_CONF, DEPTH_KVALUE, DEPTH_THRESH, HYDRO_CP_THRESH, HYDRO_TE_THRESH, LOC_CONF, MAGPREF_MB, MAGPREF_MS, MB_ERR, MBMS_CONF, MBMS_SLOPE, MBMS_THRESH, MIN_DP_SNR_PP, MIN_DP_SNR_SP, MIN_MB, MIN_MOVEOUT_PP, MIN_MOVEOUT_SP, MIN_NDEF, MIN_NDP_PP, MIN_NDP_SP, MIN_NSTA_MS, MIN_WDEPTH_THRESH, MS_ERR, and REG_CONF

Some environment variables for request messages are not used in subscription messages. These include ARRIVAL_LIST, BEAM_LIST, EVENT_LIST, ORIGIN_LIST, and TIME (for subscriptions, TIME is a control line). Still other environment variables are unique to subscription messages, and the formats for these environment variables are provided in the following sections. Environment variables used in both request and subscription messages are not repeated in this chapter. See section 4.6 "Request environment lines" on p. 47 for descriptions of these environment variables.

Of the environment variables unique to subscriptions, four are used when manipulating existing subscriptions or establishing subscriptions to standard products (DELIVID_LIST, SUBSCR_LIST, SUBSCR_NAME, and PRODID_LIST). The other environment variable unique to subscriptions is the BULL_TYPE environment, which has a dual nature for subscriptions. BULL_TYPE either defines the bulletin to use in constraining data, or it is used to establish the name of the NEB or NSEB that is being created.

5.5.1 DELIVID_LIST

The DELIVID_LIST environment is a list of delivery identifiers. The delivery identifier is a number that appears as the third argument in the PROD_ID line for each message sent to a user for a given subscription. The second argument in the PROD_ID line is the product identifier, which denotes a specific product. These numbers are consecutive. This feature allows a user to identify a missing issue to a subscription. This environment is used only with the command SUBSCR_RESEND.

Syntax

```
delivid_list[ deliv_id[, deliv_id[, ... ]]]
```

deliv_id delivery identification number

Default

None.

Example

The following subscription example demonstrates how delivery identification numbers are provided through the PROD_ID line.

Three consecutive messages received by a subscriber over three days contain sequential delivery identification numbers: 30, 31, and 32.

Listing 5.3. BULLETIN data messages with consecutive delivery identification numbers

```
begin ims2.0
msg_type data
msg_id example_a ctbo_idc
prod_id 74 30
data_type bulletin ims2.0:short
...
(bulletin information)
...
stop

begin ims2.0
msg_type data
msg_id example_b ctbo_idc
prod_id 74 31
data_type bulletin ims2.0:short
...
(bulletin information)
...
stop

begin ims2.0
msg_type data
msg_id example_c ctbo_idc
prod_id 74 32
data_type bulletin ims2.0:short
...
(bulletin information)
...
stop
```

5.5.2 PRODID_LIST

The PRODID_LIST environment is a list of product ID numbers. A product ID number is a unique identifier for a certain IDC product and may be shared by multiple subscribers. All of the products identified in the PRODID_LIST will be processed for a subscription when the subscription request line is reached.

Syntax

```
prodid_list[ prod_id[, prod_id[, ... ]]]
```

prod_id identification number of the product

Default

The default values for this subscription environment variable depends on the subscription request line. The subscription request lines are as follows:

- none for `unsubscribe` (see UNSUBSCRIBE)
- all for `subscr_prod` (see SUB)
- all for `subscr_log` (see SUB)

5.5.3 SUBSCR_LIST

The SUBSCR_LIST environment lists subscription ID numbers. A subscription ID is a unique identifier for a particular subscription. All of the subscriptions specified in the SUBSCR_LIST will be processed for a subscription when the subscription request line is reached.

Syntax

```
subscr_list [ subscr_id[, subscr_id[, ... ]]]
```

subscr_id identification number of the subscription

Default

The default values for this subscription environment variable depends on the subscription request line. The subscription request lines are as follows:

- none for `unsubscribe` (see UNSUBSCRIBE)
- all for `subscr_prod` (see SUB)
- all for `subscr_log` (see SUB)

5.5.4 SUBSCR_NAME

The SUBSCR_NAME environment lists the names of certain IDC data products. All IDC data products specified in the SUBSCR_NAME line will be processed for a subscription when the subscription request line is reached. These names may be used instead of subscription identifiers or product identifiers.

Syntax

```
subscr_name [ name[, name[, ... ]]]
```

name name of the subscription

Default

None.

5.5.5 BULL_TYPE

The BULL_TYPE environment provides a means to specify the name of a bulletin. In the context of subscribing to a bulletin product, BULL_TYPE is the name of the bulletin and can be the name of any standard bulletin (for example, `sel1`, `sel2`, `sel3`, `reb`, `seb`, or `sseb`) or a previously established NEB or NSEB. In the context of establishing a national bulletin, BULL_TYPE sets the name for the new national bulletin product. `neb` and `nseb` bulletin types must include either `neb_` (for NEB) or `nseb_` (for NSEB) as the first characters of the bulletin code. Only one name may be specified in the BULL_TYPE line.

The following syntax is used to subscribe to an existing bulletin product.

Syntax

```
bull_type [ bulletin]
```

bulletin	bulletin code (`sel1`, `sel2`, `sel3`, `reb`, `seb`, `sseb`, `neb_`*identifier*, `nseb_`*identifier*)
identifier	NEB or NSEB identifier

The following syntax is used to establish a NEB or NSEB.

Syntax

```
bull_type n[s]eb_identifier
```

identifier	two-letter country code (see Appendix section II.1 “Country codes” on p. 361) and number (for example, FR for a national bulletin of France)

Default

None.

Example

The following environment line sets the bulletin name to NSEB_FR.

```
bull_type NSEB_FR
```

5.6 Subscription request lines

Subscription message request lines specify the information to send in the return data message. The general formats used for request lines are described in section 4.3 “Request format” on p. 46.

Some subscription request lines are the same as those used in request messages. NETWORK, STATION, CHANNEL, BEAM, RESPONSE, OUTAGE, and COMMENT are not used at all in subscriptions. SUBSCRIBE, UNSUBSCRIBE, SUBSCR_PROD, CHANGE, SUBSCR_-RESEND, and SUBSCR_LOG are unique to subscriptions. Tables 10–12 give the applicable environments for the subscription request lines.

Table 10. S/H/I subscription request environments

Environments	Request lines													
	ARRIVAL	BULLETIN	CHANGE	CHAN_STATUS	COMM_STATUS	EVENT	ORIGIN	STA_STATUS	SUBSCRIBE	SUBSCR_LOG	SUBSCR_PROD	SUBSCR_RESEND	UNSUBSCRIBE	WAVEFORM
BULL_TYPE	r	r				r	r							
CHAN_LIST														o
DELIVID_LIST												r		
DEPTH		o†				o	o							
DEPTH_CONF		o††												
DEPTH_KVALUE		o††												
DEPTH_MINUS_ERROR		o†				o	o							
DEPTH_THRESH		o††												
EVENT_STA_DIST		o†				o	o							
HYDRO_CP_THRESH		o††												
HYDRO_TE_THRESH		o††												
LAT		o†				o	o							
LOC_CONF		o††												
LON		o†				o	o							
MAG		o†				o	o							
MAGPREF_MB		o††												
MAGPREF_MS		o††												
MAG_TYPE		o†				o	o							
MBMS_CONF		o††												
MBMS_SLOPE		o††												
MBMS_THRESH		o††												
MB_ERR		o††												
MB_MINUS_MS		o†				o	o							
MIN_DP_SNR_PP		o††												
MIN_DP_SNR_SP		o††												
MIN_MB		o††												
MIN_MOVEOUT_PP		o††												
MIN_MOVEOUT_SP		o††												
MIN_NDEF		o††												
MIN_NDP_PP		o††												
MIN_NDP_SP		o††												

Continues on next page

Table 10 (cont.)

Environments	ARRIVAL	BULLETIN	CHANGE	CHAN_STATUS	COMM_STATUS	EVENT	ORIGIN	STA_STATUS	SUBSCRIBE	SUBSCR_LOG	SUBSCR_PROD	SUBSCR_RESEND	UNSUBSCRIBE	WAVEFORM
	Request lines													
MIN_NSTA_MS		o††												
MIN_WDEPTH_THRESH		o††												
MS_ERR		o††												
PRODID_LIST			*							o	o	*	*	
REG_CONF		o††												
RELATIVE_TO														o
STA_LIST	r	o†				o	o	o						r
SUBSCR_LIST			*							o	o	*	*	
SUBSCR_NAME			*						r	o	o	*	*	

r: required, *: one required, o: optional

†Used only for subscribing to NEB or NSEB products.

††Used only to establish a NEB or NSEB.

Table 11. Radionuclide-related subscription request environments (pt. 2)

Environments	ALERT_*	ARR	BLANKPHD	CALIBPHD	CHANGE	DETBKPHD	GASBKPHD	QCPHD	RMSSOH	RNPS	RLR	RRR	SPHDF	SPHDP	SSREB	SAMPML	REVSAMP
	Request lines																
DELIVID_LIST																	
PRODID_LIST					*												
STA_LIST	o	o	o	o		o	o	o	o	o	o	o	o	o	o	o	o
SUBSCR_LIST					*												
SUBSCR_NAME					*												

r = required, * = one required, o = optional

Table 12. Radionuclide-related subscription request environments (pt. 2)

	Request lines				
Environments	SUBSCRIBE	SUBSCR_LOG	SUBSCR_PROD	SUBSCR_RESEND	UNSUBSCRIBE
DELIVID_LIST				r	
PRODID_LIST		o	o	*	*
STA_LIST					
SUBSCR_LIST		o	o	*	*
SUBSCR_NAME	r	o	o	*	*

r = required, * = one required, o = optional

The following sections describe the possible request lines and the applicable environment variables. The environment variables that must be explicitly specified to obtain a result are in **bold** type.

5.6.1 ALERT_FLOW

This data type is one of several radionuclide products available from the IDC. The ALERT_-FLOW indicates that a sampler flow rate is above or below a specified threshold. See section 7.7 "Alerts" on p. 208 for a complete description and subsection I.1.1 "ALERT_FLOW" on p. 261 for an example.

Environment

```
sta_list
```

Example

The following example requests ALERT_FLOW messages for all radionuclide stations. Because the STA_LIST environment is not specified, the default (all stations) is used.

Listing 5.4. ALERT_FLOW subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
alert_flow
stop
```

5.6.2 ALERT_SYSTEM

This data type is one of several radionuclide products available from the IDC. The ALERT_-SYSTEM indicates a problem with major equipment. See section 7.7 "Alerts" on p. 208 for a complete description and subsection I.1.2 "ALERT_SYSTEM" on p. 261 for an example.

Environment

sta_list

Example

The following example requests ALERT_SYSTEM messages for all radionuclide stations in the Russian Federation.

Listing 5.5. ALERT_SYSTEM subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list RU*
alert_system
stop
```

5.6.3 ALERT_TEMP

This data type is one of several radionuclide products available from the IDC. The ALERT_-TEMP indicates that a system temperature is outside the required IMS temperature range for that parameter. See section 7.7 "Alerts" on p. 208 for a complete description and subsection I.1.3 "ALERT_TEMP" on p. 262 for an example.

Environment

sta_list

Example

The following example requests ALERT_TEMP messages from station ARP01.

Listing 5.6. ALERT_TEMP subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list ARP01
alert_temp
stop
```

5.6.4 ALERT_UPS

This data type is one of several radionuclide products available from the IDC. The ALERT_UPS indicates a problem with the power supply. See section 7.7 “Alerts” on p. 208 for a complete description and subsection I.1.4 “ALERT_UPS” on p. 262 for an example.

Environment

`sta_list`

Example

The following example requests time-stamped ALERT_UPS messages from all radionuclide stations in Australia.

Listing 5.7. ALERT_UPS subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list AU*
alert_ups
stop
```

5.6.5 ARR

This data type is one of several radionuclide products available from the IDC. The Automatic Radionuclide Report (ARR), includes results from the automated analysis of a radionuclide sample. See subsection 7.8.1 “ARR” on p. 209 for a complete description and section I.2 “ARR—Noble gas version” and section I.3 “ARR—Particulate version” on pp. 263 and 281, respectively, for examples.

Environment

`sta_list`

Example

The following message requests ARR messages with no restraints.

Listing 5.8. ARR subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
ARR
stop
```

5.6.6 ARRIVAL

An ARRIVAL line requests arrival information from specific S/H/I stations relative to events in a S/H/I bulletin. The amount of information that is returned depends on the amount of processing that has been applied to the data. The different stages of processing are expressed using subtypes to the arrival request lines as follows: `arrival:automatic`, `arrival:reviewed`, `arrival:associated`, `arrival:grouped`, and `arrival:unassociated` (see subsection 4.7.6 "ARRIVAL/SLSD" on p. 76 for definitions).

Environment

bull_type, **sta_list**

Example

The following subscription message requests automatic arrivals from S/H/I stations ABC and DEF from the SEL1 bulletin each day.

Listing 5.9. ARRIVAL subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list ABC, DEF
bull_type sel1
arrival:automatic ims2.0
stop
```

5.6.7 BULLETIN

A BULLETIN request line in a subscription message can either request bulletin information for S/H/I events satisfying the environmental conditions or establish the screening parameters for an National Event Bulletin (NEB) or National Screened Event Bulletin (NSEB).

When subscribing to an existing bulletin product (with the exception of NEBs and NSEBs), the following environments are valid.

Environment

bull_type, `depth`, `depth_minus_error`, `event_sta_dist`, `lat`, `lon`, `mag`, `mag_type`, `mb_minus_ms`, `sta_list`

When subscribing to a NEB or NSEB, only the BULL_TYPE environment is valid.

Environment

bull_type

When establishing an NEB or NSEB bulletin product, the following environments are valid.

Environment

bull_type, `depth`, `depth_conf`, `depth_kvalue`, `depth_minus_error`, `depth_thresh`, `event_sta_dist`, `hydro_cp_thresh`, `hydro_te_thresh`, `lat`, `loc_conf`, `lon`, `mag`, `mag_type`, `magpref_mb`, `magpref_ms`, `mb_err`, `mb_minus_ms`, `mbms_conf`, `mbms_slope`, `mbms_thresh`, `min_dp_snr_pp`, `min_dp_snr_sp`, `min_mb`, `min_moveout_pp`, `min_moveout_sp`, `min_ndef`, `min_ndp_pp`, `min_ndp_sp`, `min_nsta_ms`, `min_wdepth_thresh`, `ms_err`, `reg_conf`, `sta_list`

Examples

The following subscription message requests the daily REB with no constraints.

Listing 5.10. BULLETIN subscription message (REB)

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
bull_type reb
bulletin ims2.0
stop
```

The following subscription message requests the immediate SEL1 and SEL2. Soon after an event has been located (about 2 h after real time for the SEL1 and about 6 h after real time for the SEL2), the subscription software forwards the results to the user. In the example, messages would be sent to the user as often as once every 20 min, because the request has no constraints. This arrangement would be appropriate for a Member State that processes the data automatically.

Listing 5.11. BULLETIN subscription message (SEL1 and SEL2)

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
bull_type sel1
bulletin ims2.0
bull_type sel2
bulletin ims2.0
stop
```

The following subscription message requests the daily REB for events with depths less than 30 km, between magnitudes 3.5 and 4.5, and within the two areas defined by the latitude and longitude ranges.

Listing 5.12. BULLETIN subscription message with depth and magnitude constraints

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
```

```
bull_type reb
mag 3.5 to 4.5
depth to 30
lat -30 to -20
lon -180 to -140
bulletin ims2.0
lat 75 to 79
lon 110 to 140
bulletin ims2.0
stop
```

The following subscription message establishes a NEB for France (NEB_FR). Event characterization parameters will be based on the environments given in this message and the default values of the environments not listed.

Listing 5.13. BULLETIN subscription message (NEB)

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
depth_conf 0.990
depth_kvalue 30.0
depth_thresh 20.0
loc_conf 0.99
mb_err 0.35
mbms_conf 0.99
mbms_slope 1.50
mbms_thresh 3.50
min_dp_snr 1.5
min_mb 4.0
min_moveout 2.5
min_ndef 1
min_ndp 1
min_nsta_ms 2
min_wdepth_thresh 0.7
ms_err 0.35
reg_conf 0.990
reg_min_psnr 1.5
reg_min_ssnr 1.5
time_stamp
bull_type NEB_FR
bulletin ims2.0
stop
```

5.6.8 CALIBPHD

This data type is one of several PHD types available for radionuclide samples. It contains the PHD of a standard calibration source as well as other information. See section 7.2 “Pulse Height

Data" on p. 166 for a description of the PHD types and section I.9 "CALIBPHD" on p. 293 for an example.

Environment

`sta_list`

Example

The following message requests CALIBPHD messages from all radionuclide stations to be sent as they become available.

Listing 5.14. CALIBPHD subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
calibphd
stop
```

5.6.9 CHANGE

After a subscription is established, it can be modified through the CHANGE request line. The subscription being changed is specified in the SUBSCR_LIST, PRODID_LIST, or SUBSCR_-NAME environment. This line is followed by the CHANGE request line, then a listing of the changed environments and new values, and finally the applicable product. After the change, the subscription identifier will remain the same, but the product identifier and the delivery identifier will change.

Environment

`prodid_list | subscr_list | subscr_name`

Example

The following subscription message requests a change to the LAT and LON environments for the BULLETIN subscription number 52.

Listing 5.15. CHANGE subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
subscr_list 52
change
lat 12 to 22
lon 18 to 28
bulletin ims2.0
stop
```

5.6.10 CHAN_STATUS

CHAN_STATUS requests channel status information.

Environment

`chan_list, freq, sta_list`

Example

The following subscription message requests the daily channel status reports.

Listing 5.16. CHAN_STATUS subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
chan_status ims2.0
stop
```

5.6.11 COMM_STATUS

COMM_STATUS requests communications status information for the S/H/I communications links. A verbose communications status report listing individual circuit dropouts is obtained by using the verbose subformat.

Environment

`freq, sta_list`

Example

The following subscription message requests the verbose communications status reports for all links.

Listing 5.17. COMM_STATUS subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
comm_status ims2.0:verbose
stop
```

5.6.12 DETBKPHD

This data type is one of several PHD types available for radionuclide samples. It contains the PHD of an empty detector chamber as well as other important information. See section 7.2

"Pulse Height Data" on p. 166 for a description of the PHD types and section I.15 "DETBKPHD" on p. 298 for an example.

Environment

sta_list

Example

The following message requests DETBKPHDs from all Russian stations to be sent as they become available.

Listing 5.18. DETBKPHD subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list RU*
detbkphd
stop
```

5.6.13 EVENT

EVENT requests S/H/I event information for preferred origins satisfying the environmental constraints.

Environment

bull_type, depth, depth_minus_error, event_sta_dist, lat, lon, mag, mag_type, mb_minus_ms, sta_list

Example

The following subscription message requests all of the REB events within regional distance (20 deg) of stations ABC and DEF.

Listing 5.19. EVENT subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
bull_type reb
sta_list ABC, DEF
event_sta_dist 0.0 to 20.0
event ims2.0
stop
```

5.6.14 GASBKPHD

This data type is one of several radionuclide products available from the IDC. The GASBKPHD contains the pulse height data of an empty plastic scintillation gas cell from a station that observes a memory effect. At present, only noble gas monitoring systems that utilize β-γ coincidence counting have plastic scintillation gas cells. The GASBKPHD is acquired after a sample has been evacuated from the gas cell and before the next sample acquisition. The purpose of the GASBKPHD is to enable the quantification of radio-xenon atoms that are adsorbed onto the walls of the plastic scintillation gas cell. See section 7.2 "Pulse Height Data" on p. 166 for a description of the PHD types and section I.19 "GASBKPHD" on p. 301 for an example.

Environment

sta_list

Example

The following example requests GASBKPHD messages for station DEX33.

Listing 5.20. GASBKPHD subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list DEX33
gasbkphd
stop
```

5.6.15 MET

This data type is one of several radionuclide products available from the IDC. The MET message contains meteorological data recorded at a radionuclide station. See section 7.6 "Meteorological data" on p. 207 for a complete description and section I.22 "MET" on p. 305 for an example.

Environment

sta_list

Example

The following example requests MET messages for station CAP14.

Listing 5.21. MET subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list CAP14
```

```
met
stop
```

5.6.16 ORIGIN

Origins are solutions to the location and time of a S/H/I source. Several origins may be determined for any one source. The ORIGIN line requests information for those origins that satisfy the environment constraints.

Environment

`bull_type, depth, depth_minus_error, event_sta_dist, lat, lon, mag, mag_type, mb_minus_ms, sta_list`

Examples

The following subscription message requests origin information for the daily REB delivered when the REB is ready for distribution.

Listing 5.22. ORIGIN subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
bull_type reb
origin ims2.0
stop
```

The following subscription message requests origin information for events in the daily REB limited to a specific geographic region.

Listing 5.23. ORIGIN subscription message limited in space

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
lat -60 to 10.0
lon -81 to -34
bull_type reb
origin ims2.0
stop
```

5.6.17 QCPHD

This data type is one of several PHD types available for radionuclide samples. It contains the PHD of the daily quality control measurement as well as other important information. See section 7.2 "Pulse Height Data" on p. 166 for a description of the PHD types and section I.26 "QCPHD" on p. 308 for an example.

Environment

`sta_list`

Example

The following message requests QCPHD messages from TZP64 to be sent as they become available.

Listing 5.24. QCPHD subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list TZP64
qcphd
stop
```

5.6.18 RLR

This data type is one of several radionuclide products available from the IDC. The RLR contains sample analysis results from a certified radionuclide laboratory. See section 7.3 "Radionuclide laboratory reports" on p. 182 for a complete description and subsection I.29.1 "β-γ coincidence systems", subsection I.29.2 "HPGe systems" and section I.30 "RLR—Particulate version" on pp. 320, 322 and section I.30 "RLR—Particulate version", respectively, for examples.

Environment

`sta_list`

Example

The following example requests time-stamped RLR messages from radionuclide lab AUL02.

Listing 5.25. RLR subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
sta_list AUL02
rlr
stop
```

5.6.19 RMSSOH

This data type is one of several radionuclide products available from the IDC. The RMSSOH message describes the state of health of the collection, processing, and acquisition equipment at the IMS radionuclide stations. See section 7.5 "State of Health data" on p. 200 for a complete description and section I.31 "RMSSOH" on p. 328 for an example.

Environment

sta_list

Example

The following example requests RMSSOH messages from all radionuclide stations in the United Kingdom of Great Britain and Northern Ireland.

Listing 5.26. RMSSOH subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
sta_list GB*
rmssoh
stop
```

5.6.20 RNPS

This data type is one of several radionuclide products available from the IDC. The RNPS is a compilation of the status of collection, processing, and analysis of particulate and noble gas data from all radionuclide stations (IDC/WGB-11/TL-2/45). The RNPS is produced daily and summarizes the results for each station over the past three days. See subsection 7.8.4 "RNPS" on p. 232 for a complete description and section I.32 "RNPS" on p. 329 for an example.

Environment

sta_list

Example

The following example requests RNPSs from all radionuclide stations. Because the STA_LIST environment is not specified, the default (all stations) is used.

Listing 5.27. RNPS subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
rnps
stop
```

5.6.21 RRR

This data type is one of several radionuclide products available from the IDC. The Reviewed Radionuclide Report (RRR) is a revised version of the Automated Radionuclide Report, or ARR, and is generated after manual review of a radionuclide sample is complete. See subsection 7.8.2 "RRR" on p. 228 for a complete description, and section I.33 "RRR—Noble gas version" and section I.34 "RRR—Particulate version" on pp. 330 and section I.34 "RRR—Particulate version", respectively, for examples.

Environment

```
sta_list
```

Example

The following subscription message requests daily RRRs messages from stations in New Zealand. The frequency is not specifically identified because the default transmittal rate is daily.

Listing 5.28. RRR subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
sta_list NZ*
RRR
stop
```

5.6.22 SAMPML/REVSAMP

This data type is one of several radionuclide data products available from the IDC. The SAMPML/REVSAMP contains the sample PHDs as well as IDC analysis results in XML format. There are two types, i.e. SAMPML and REVSAMP, pertaining to the Automated Radionuclide Report and Reviewed Radionuclide Report, respectively. See section I.28 "REVSAMP/SAMPML—Noble gas systems" on p. 310 for examples.

Environment

```
sta_list
```

Example

The following subscription message requests daily SAMPML messages from stations in New Zealand. The frequency is not specifically identified because the default transmittal rate is daily.

Listing 5.29. SAMPML subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
```

```
sta_list NZ*
SAMPML
stop
```

5.6.23 SPHDF/P

The sample pulse height data (SAMPLEPHD) is one of several PHD types available for radionuclide samples and has two different qualifiers, e.g. FULL (SPHDF) or PREL (SPHDP). The PREL SAMPLEPHD contains PHD from a sample acquired for a time shorter than that of the full acquisition time. The FULL SAMPLEPHD contains PHD from a sample acquired for the IDC-defined full acquisition time. Like the other PHD types, the FULL and PREL SAMPLEPHDs also include other important information. See section 7.2 "Pulse Height Data" on p. 166 for a description of the PHD types and subsection I.35.1 "SAMPLEPHD—β-γ coincidence data version" on p. 351, and section I.36 "SAMPLEPHD—Particulate systems" on p. 354 for examples.

The data_type SPHDP and SPHDF should be used when users request the PREL and FULL , respectively.

Environment

sta_list

Example

The following message requests SPHDF messages from radionuclide stations located in Australia.

Listing 5.30. SPHDF subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list AU*
sphdf
stop
```

5.6.24 SSREB

This data type is one of several radionuclide products available from the IDC. The Standard Screened Radionuclide Event Bulletin (SSREB) is generated by the IDC when fission or activation products are detected at a radionuclide station above normal limits. An SSREB contains RRRs from the stations that detect the fission product(s), information identifying the fission product(s), an estimate of the source location and time, as well as any sample analysis results from certified laboratories. See subsection 7.8.3 "SSREB" on p. 230 for a description of the SSREB, subsection 7.8.3 "SSREB" on p. 230 for a description of the SSREB and section I.37

"SSREB—Noble gas systems" and section I.38 "SSREB—Particulate version" on pp. 355 and 358, respectively, for examples. See subsection 7.8.3 "SSREB" on p. 230 for a description of the SSREB and section I.37 "SSREB—Noble gas systems" and section I.38 "SSREB—Particulate version" on pp. 355 and 358, respectively, for examples.

Environment

`sta_list`

Example

The following message requests all SSREB messages to be sent immediately.

Listing 5.31. Subscription message requesting immediate sending of SSREB

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
ssreb
stop
```

5.6.25 STA_STATUS

STA_STATUS requests the station status for the S/H/I stations in the STA_LIST environment.

Environment

`sta_list`

Example

The following subscription message requests the daily station status report for all S/H/I stations.

Listing 5.32. Subscription message requesting daily station status report

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
sta_list *
sta_status ims2.0
stop
```

5.6.26 SUBSCRIBE

SUBSCRIBE is a request to initiate a new subscription for each standard product given by the SUBSCR_NAME environment.

Environment

```
subscr_name
```

Example

The following subscription message requests a subscription to the standard product SEB.

Listing 5.33. Subscription message requesting subscription to SEB

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
subscr_name seb
subscribe
stop
```

5.6.27 SUBSCR_LOG

SUBSCR_LOG requests a log of all of the user's changes to the subscriptions. The subscriber's email address determines the subscriptions to which a user is subscribed. Based on the email address, a log of all changes is sent out. The SUBSCR_LOG can be further constrained by use of the environments SUBSCR_LIST, PRODID_LIST, or SUBSCR_NAME.

Environment

```
subscr_list | prodid_list | subscr_name
```

Examples

The following subscription message requests a log of subscription 74.

Listing 5.34. Subscription message requesting the log of subscriptions

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
subscr_list 74
e-mail name@my.computer
subscr_log
stop
```

The response to the preceding message is as follows.

Listing 5.35. Data message response to the message of Listing 5.34

```
begin ims2.0
msg_type data
msg_id response_example ctbo_idc
ref_id example any_ndc
data_type log ims2.0
  subscription id: 74
  product id: 52
```

```
      was added at 1997/01/09 19:36:00
      freq immediate
      bull_type reb
      bulletin ims2.0
  subscription id: 74
  product id: 94
      was changed at 1997/01/21 15:24:13
      the new product constraints are:
      freq immediate
      lat 12.00 to 22.00
      lon 18.00 to 28.00
      bull_type reb
      bulletin ims2.0
stop
```

5.6.28 SUBSCR_PROD

SUBSCR_PROD requests a list of the products currently subscribed to by the user. The response to this request includes the subscription identifier, product identifier, subscription name (where applicable), and a listing of the environment and request lines that define the specific product. The response is sent as a LOG data message. If SUBSCR_LIST, PRODID_LIST, or SUBSCR_-NAME environments are not specified, then all products currently subscribed to by the user are provided.

Environment

```
subscr_list | prodid_list | subscr_name
```

Examples

The following subscription message requests the current list of subscriptions that are in effect for the user.

Listing 5.36. Subscription message requesting the current list of subscriptions

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
subscr_prod
stop
```

The response to this message is a LOG data message from the IDC.

Listing 5.37. LOG data message, response to the message of Listing 5.36

```
begin ims2.0
msg_type data
msg_id response_example ctbo_idc
ref_id example any_ndc
data_type log ims2.0
```

```
 the following data products are subscribed
 to by name@my.computer:
 subscription id: 52
 product id: 74
   freq daily
   bull_type reb
   bulletin ims2.0
 subscription id: 57
 product id: 78
   freq immediate
   lat 0.0 to 10.0
   lon 120.0 to 140.0
   bull_type sel2
   bulletin ims2.0
stop
```

5.6.29 SUBSCR_RESEND

The SUBSCR_RESEND request causes a subscribed product to be re-delivered. This command gives the subscriber the ability to re-request delivery of a product.

Environment

```
delivid_list, prodid_list | subscr_list | subscr_name
```

Example

The following subscription message requests that delivery 32 of subscription 52 be resent to the user.

Listing 5.38. Subscription message requesting a delivery to be resent

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
subscr_list 52
delivid_list 32
subscr_resend
stop
```

5.6.30 UNSUBSCRIBE

The UNSUBSCRIBE request informs the IDC that the user wishes to remove the subscriptions referenced by the SUBSCR_LIST, PRODID_LIST, or SUBSCR_NAME environments. A LOG data message is sent confirming that the subscription has been cancelled.

Environment

```
subscr_list | prodid_list | subscr_name
```

Examples

The following subscription message requests that subscriptions 52 and 57 be discontinued.

Listing 5.39. UNSUBSCRIBE subscription message

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
subscr_list 52, 57
unsubscribe
stop
```

A confirming LOG data message from the IDC to the subscription user will be sent verifying that the subscription has been terminated.

Listing 5.40. LOG data message, response to the message of Listing 5.39

```
begin ims2.0
msg_type data
msg_id response_example ctbo_idc
ref_id example any_ndc
data_type log ims2.0
 the following data products have been removed
 by name@my.computer:
 subscription id: 52
 product id: 94
   freq daily
   bull_type reb
   bulletin ims2.0
 subscription id: 57
 product id: 101
   freq immediate
   bull_type sel2
   bulletin ims2.0
stop
```

5.6.31 WAVEFORM

Waveforms are digital time series data. WAVEFORM requests will typically accept subformats that specify the format of digital data within the general format of the waveform data type. The available formats for waveform data from the IDC subscription service are continuous data format for continuous data and IMS2.0 format for all other waveform data. The available subformats are `int`, `cm6`, `cm8`, and `csf`.

Environment

```
chan_list, sta_list, relative_to
```

Examples

The following subscription message requests continuous data[2] from the short-period, high-gain, vertical channels of the ABAR array and from the central site (CDA0) of the CDAR array.

Listing 5.41. WAVEFORM subscription message requesting continuous data waveforms

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq continuous
sta_list ABAR, CDA0
chan_list shz
waveform ims2.0
stop
```

The following subscription message requests any waveform segments from auxiliary station ABC as soon as they are received by the IDC.

Listing 5.42. WAVEFORM subscription message requesting waveform segments

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list ABC
waveform ims2.0
stop
```

[2] Special arrangements between States Signatories and the IDC are required due to the hardware and communications requirements of continuous data transmission.

6

S/H/I Data Messages

This chapter describes the request message formats and includes the following sections:

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6.2 Station information 128

6.3 Waveform data 131

6.4 Processing products 141

6.5 Status information 156

6.6 Logs 162

6.1 Introduction

IMS2.0 data formats provide a common format for data and data product exchange. The data formats all contain ASCII options that allow the exchange of information via email (even for waveforms). Waveforms in binary format may also be sent using the IMS2.0 message format, but the transmission of data messages with binary information must be via HTTP or as attachment to the message.

All data messages require the basic message structure described in section 3.2 "Message preface" on p. 32. If a message is a data message, the MSG_TYPE is set to `data`. Within the message body, several data types may be present. The type of data included in a data section is designated with a DATA_TYPE line. Each data section is composed of distinct data blocks that contain required and supplemental data.

6.1.1 DATA_TYPE

Data sections must begin with a DATA_TYPE line. The arguments to DATA_TYPE are the type of data that follows (for example, WAVEFORM or BULLETIN) and the format (IMS2.0). The *subtype* and *sub_format* allow more precise selection of the data type and format, respectively.

Syntax

`data_type` *data_type*[:*subtype*] *format*[:*sub_format*]

data_type	type of data that follows; typical examples are WAVEFORM, BULLETIN, and RESPONSE
subtype	subtype to use with this data type. subtype is used primarily for ARRIVAL data types.
format	general format of the data (IMS2.0)
sub_format	internal format to use with this data type. sub_format is used primarily for BULLETIN and WAVEFORM data types. Supported subformats are MS_ST2_512 form WAVEFORM in miniSEED format and SC3XML for STA_INFO and BULLETIN.

Examples

```
data_type waveform IMS2.0:cm6
```

```
data_type waveform ims2.0:ms_st2_512
```

```
data_type bulletin IMS2.0:SC3XML
```

The end of a data section is implied by another DATA_TYPE line or a STOP line.

The following sections give the formats for data messages. Examples of these data formats are provided in Appendix I “Data message examples” on p. 261.

6.2 Station information

Data types for S/H/I stations describe the stations through their locations, instrumentation, channels, and so on.

6.2.1 CHANNEL

The CHANNEL data type contains information describing the sensors and their emplacement. Table 13 gives the format for the CHANNEL data message, and an example is provided in section I.11 “CHANNEL” on p. 296.

Table 13. Channel format

Record	Position	Format	Description
1 (header)	1–3	a3	`Net`
	11–13	a3	`Sta`
	16–19	a4	`Chan`
	21–23	a3	`Aux`
	27–34	a8	`Latitude`
	37–45	a9	`Longitude`
	47–55	a9	`Coord Sys`
	61–64	a4	`Elev`
	66–70	a5	`Depth`
	74–77	a4	`Hang`
	80–83	a4	`Vang`
	85–95	a11	`Sample_Rate`
	97–100	a4	`Inst`
	107–113	a7	`On Date`
	118–125	a8	`Off Date`
2–n (data)	1–9	a9	network code
	11–15	a5	station code
	17–19	a3	FDSN channel code
	21–24	a4	auxiliary code
	26–34	f9.5	latitude (in degrees, south is negative)
	36–45	f10.5	longitude (in degrees, west is negative)
	47–58	a12	coordinate system (for example, WGS-84)
	60–64	f5.3	elevation (km)
	66–70	f5.3	emplacement depth (km)
	72–77	f6.1	horizontal angle of emplacement (positive degrees clockwise from north, `-1.0` if vertical)
	79–83	f5.1	vertical angle of emplacement (degrees from vertical, 90.0° if horizontal)
	85–95	f11.6	sample rate (samples/sec)
	97–102	a6	instrument type
	104–113	i4,a1,i2,a1,i2	start date of channel operation (*yyyy/mm/dd*)
	116–125	i4,a1,i2,a1,i2	end date of channel operation (*yyyy/mm/dd*)

6.2.2 NETWORK

The NETWORK data type provides a descriptive name for each network code. Table 14 shows the format for the NETWORK data message. An example is provided in section I.23 "NETWORK" on p. 306.

Table 14. Network format

Record	Position	Format	Description
1 (header)	1–3	a3	`Net`
	11–21	a11	`Description`
2–n (data)	1–9	a9	network code
	11–74	a64	descriptive network name

6.2.3 STATION

The STATION data type describes the site, location, and dates of operation. For arrays, the unique array code that defines a reference point (used for beam) is given along with the information from each element. Table 15 shows the format for the STATION data message. An example is provided in section I.39 "STATION" on p. 359.

Table 15. Station format

Record	Position	Format	Description
1 (header)	1–3	a3	`Net`
	11–13	a3	`Sta`
	17–20	a4	`Type`
	23–30	a8	`Latitude`
	33–41	a9	`Longitude`
	43–51	a9	`Coord Sys`
	57–60	a4	`Elev`
	64–70	a7	`On Date`
	74–81	a8	`Off Date`
2–n (data)	1–9	a9	network code
	11–15	a5	station code
	17–20	a4	`1C`: single-component `3C`: three-component `hfa`: high-frequency array `lpa`: long-period array
	22–30	f9.5	latitude (in degrees, south is negative)
	32–41	f10.5	longitude (in degrees, west is negative)
	43–54	a12	coordinate system (e.g. WGS-84)
	56–60	f5.3	elevation (km)
	62–71	i4,a1,i2,a1,i2	start of station operation (*yyyy/mm/dd*)
	73–82	i4,a1,i2,a1,i2	end of station operation (*yyyy/mm/dd*)

6.3 Waveform data

Data types for waveforms include the response of the instrumentation and the waveform data formats.

6.3.1 RESPONSE

The RESPONSE data type allows the complete response to be given as a series of response groups that can be cascaded. Modern instruments are composed of several different components, each with its own response. This format mimics the actual configuration of the instrumentation.

A complete response description is made up of the CAL2 block (Table 16) plus one or more of the PAZ2, FAP2, GEN2, DIG2, and FIR2 response blocks in any order (Tables 17–21). The response blocks should be given sequential stage numbers (beginning with 1) in the order that they occur in the system response.

Each response block comprises a header line and sufficient occurrences of the values lines to provide all required coefficients. The DIG2 block may occur only once per response. Comments may be inserted after the CAL2 block and after any response section as desired, provided that they are enclosed with parenthesis beginning in column 2. Successive channel responses should also be separated by blank lines for readability.

The input of the Earth to seismic stations is in nanometres of displacement (all of the responses are displacement responses). For hydroacoustic and infrasonic, the input is pressure (in µPa). The RESPONSE data describes the response as output units/ input units (e.g. counts/nm for a seismic recording system; V/nm for a seismic sensor; counts/V for a digitizer). Velocity or acceleration responses can be obtained by dividing the response curve by $i\omega$ or $-\omega^2$, respectively. An example of a RESPONSE data message is provided in section I.27 "RESPONSE" on p. 309.

The CAL2 block gives general information about the response information that follows (see Table 16).

Table 16. Calibration identification block format

Record	Position	Format	Description
1 (data)	1–4	a4	`CAL2`
	6–10	a5	station code
	12–14	a3	FDSN channel code
	16–19	a4	auxiliary identification code
	21–26	a6	instrument type
	28–42	e15.8	system sensitivity (nm/count) at calibration reference period†

Continues on next page

Table 16 (cont.)

Record	Position	Format	Description
	44–50	f7.3	calibration reference period (s)
	52–62	f11.5	system output sample rate (Hz)
	64–73	i4,a1,i2,a1,i2	effective start date (*yyyy*/*mm*/*dd*)
	75–79	i2,a1,i2	effective start time (*hh*:*mm*)
	81–90	i4,a1,i2,a1,i2	effective end date (*hh*:*mm*:*ss*.*s*)††
	92–96	i2,a1,i2	effective end time (*hh*:*mm*)

†System sensitivity, calibration reference period, and sample rate should be the same as in the wid2 block.

††The start/end date/times specify the time period for which the response is valid. If the response is still valid, the end date/time should be left blank.

A Poles and Zeros block (PAZ2) can be used for either an analogue filter or an Infinite Impulse Response (IIR) filter. In the data section, poles are always given first followed by zeros (see Table 17).

Table 17. Poles and Zeros lock format

Record	Position	Format	Description
1 (data)	1–4	a4	`PAZ2`
	6–7	i2	stage sequence number
	9	a1	output units code (`V`: Volts, `A`: amps, `C`: counts)
	11–25	e15.8	scale factor
	27–30	i4	decimation (blank if analogue)
	32–39	f8.3	group correction applied (s)
	41–43	i3	number of poles
	45–47	i3	number of zeros
	49–73	a25	description
2–n (data)	2–16	e15.8	real part of pole or zero
	18–32	e15.8	imaginary part of pole or zero

Like PAZ2, the Frequency, Amplitude, Phase (FAP2) block can be used to specify the response of analogue or digital filters, or some combination of them including a complete system response (see Table 18).

Table 18. Frequency, amplitude, and phase block format

Record	Position	Format	Description
1 (data)	1–4	a4	`FAP2`
	6–7	i2	stage sequence number
	9	a1	output units code (`V`: Volts, `A`: amps, `C`: counts)

Continues on next page

Table 18 (cont.)

Record	Position	Format	Description
	11–14	i4	decimation (blank if analogue)
	16–23	f8.3	group correction applied (s)
	25–27	i3	number of frequency, amplitude, phase triplets
	29–53	a25	description
2–n (data)	2–11	f10.5	frequency (Hz)
	13–27	e15.8	amplitude (output units/input units)
	29–32	i4	phase delay (°)

The generic response block (GEN2) can specify the response of analogue or digital filters, or some combination of them, including a complete system response (see Table 19).

Table 19. Generic response block format

Record	Position	Format	Description
1 (data)	1–4	a4	`GEN2`
	6–7	i2	stage sequence number
	9	a1	output units code (`V`: Volt, `A`: amps, `C`: counts)
	11–25	e15.8	section sensitivity (input units/output units)
	27–32	f7.3	calibration reference period (s)
	35–38	i4	decimation (blank if analogue)
	40–47	f8.3	group correction applied (s)
	49–51	i3	number of corners
	53–77	a25	description
2–n (data)	2–12	f11.5	corner frequency (Hz)
	14–19	f6.2	slope above corner (dB/decade)

The digitizer block (DIG2) specifies the digitizer sample rate and sensitivity. It also provides a description field to identify the model of digitizer being used (Table 20).

Table 20. Digitizer response block format

Record	Position	Format	Description
1 (data)	1–4	a4	`DIG2`
	6–7	i2	stage sequence number
	9–23	e15.8	sensitivity (counts/input unit)
	25–35	f11.5	digitizer sample rate (Hz)
	37–61	a25	description

The finite impulse response block (FIR2) is used to describe the response of Finite Impulse Response (FIR) digital filters (Table 21).

Table 21. Finite impulse response block format

Record	Position	Format	Description
1 (data)	1–4	a4	`FIR2`
	6–7	i2	stage sequence number
	9–18	e10.2	filter gain (relative factor, not in dB)
	20–23	i4	decimation (blank if analogue)
	25–32	f8.3	group correction applied (s)
	34	a1	symmetry flag (`A`: asymmetric, `B`: symmetric [odd], `C`: symmetric [even])
	36–39	i4	number of factors
	41–65	a25	description
	2–16	e15.8	factor(i)
	18–32	e15.8	factor(i+1)
2–n (data)	34–48	e15.8	factor(i+2)
	50–64	e15.8	factor(i+3)
	66–80	e15.8	factor(i+4)

Comments on the response of an instrument are enclosed in parentheses (Table 22).

Table 22. Response comment block format

Record	Position	Format	Description
1	2	a1	(
	3–n	a{−1}	comment
	n+1	a1	)

6.3.2 WAVEFORM

The format for WAVEFORM data messages consists of a waveform identification (WID2) block (Table 23), followed by the station (STA2) block (Table 24), the waveform data (DAT2) block (Table 25), and a checksum (CHK2) block (Table 26). Each DAT2 block should be followed by a CHK2 block so that the validity (or otherwise) of the data can be verified.

Table 23. Waveform identification block format

Record	Position	Format	Description
1	1–4	a4	`WID2`
	6–15	i4,a1,i2,a1,i2	date of the first sample (*yyyy/mm/dd*)
	17–28	i2,a1,i2,a1,f6.3	time of the first sample (*hh:mm:ss.sss*)
	30–34	a5	station code
	36–38	a3	FDSN channel code

Continues on next page

Table 23 (cont.)

Record	Position	Format	Description
	40–43	a4	auxiliary identification code
	45–47	a3	`INT`, `CM`*n*, or `CSF` `INT` is free-format integers as ASCII characters. `CM` denotes compressed data, and *n* is either `6` (6-bit compression), or `8` (8-bit binary compression) `CSF` is a signed format
	49–56	i8	number of samples
	58–68	f11.6	data sampling rate (Hz)
	70–79	e10.2	system sensitivity (nm/count) at the calibration reference period, the ground motion in nanometres per digital count at calibration period (*calper*)
	81–87	f7.3	calibration reference period; the period in s at which the system sensitivity is valid; calper should be near the flat part of the response curve (in most cases, 1 s)
	89–94	a6	instrument type
	96–100	f5.1	horizontal orientation of sensor, measured in positive degrees clockwise from north (`-1.0` if vertical)
	102–105	f4.1	vertical orientation of sensor, measured in degrees from vertical (90.0° if horizontal)

Table 24. Station block format

Record	Position	Format	Description
1	1–4	a4	`STA2`
	6–14	a9	network identifier
	16–24	f9.5	latitude (in degrees, south is negative)
	26–35	f10.5	longitude (in degrees, west is negative)
	37–48	a12	reference coordinate system (e.g. WGS-84)
	50–54	f5.3	elevation (km)
	56–60	f5.3	emplacement depth (km)

Table 25. Waveform data block format

Record	Position	Format	Description
1	1–4	a4	DAT2
2–n (data)	1–1024 variable	i, a, or f	data values

Table 26. Checksum block format

Record	Position	Format	Description
1 (data)	1–4	a4	CHK2
	6–13	i8	checksum

The WID2 block gives the following information:

- date and time of the first data sample
- station, channel, and auxiliary codes
- subformat of the data
- number of samples and sample rate
- calibration of the instrument represented as the number of nanometres per digital count at the calibration period
- type of instrument
- horizontal and vertical orientation of the instrument

The auxiliary code will be blank in most cases; the code is only used when two data streams with the same station and channel codes conflict. Instrument response information must be obtained separately using a RESPONSE request.

Data following the DAT2 block may be in any of four different subformats recognized in the IMS2.0 waveform format: int, cm6, cm8, and csf. int in a simple ASCII subformat; the cm6 and cm8 subformats are for compressed data, and the csf subformat is for authenticated data. All of the IMS2.0 formats represent the numbers as integers.

A checksum must be computed for the waveform data in the IMS2.0 waveform format. The checksum is computed from integer data values prior to converting them to any of the subformats. A Fortran and a C subroutines for computing CHK2 checksum can be found in Appendix III “Computer code for CHK2 checksum” on p. 385. To prevent overflow, the checksum is computed modulo 100,000,000 and stored as an eight-digit integer without a sign.

The line length limits for messages are enforced for the IMS2.0 data formats; no line may be longer than 1,024 bytes. The line continuation character (\) is not used in waveform data lines.

Examples of the cm6 and int subformats of the WAVEFORM data message are provided in section I.39 “STATION” on p. 359 and section I.42 “WAVEFORM (IMS2.0:int format)” on p. 360.

Using the OUT2 and DLY2 blocks, the WAVEFORM data type can also be used to respond that no data are available for a request or that the response to the request will be delayed. Table 27 shows how the blocks are used (see also Table 28 and Table 29). In addition, the STA2 block contains station information. This block is mandatory and must immediately follow the WID2, OUT2, and DLY2 blocks.

Table 27. Applicable blocks for waveform messages

	Blocks							
Waveform message	**WID2**	**OUT2**	**DLY2**	**STA2**	**EID2**	**BEA2**	**DAT2**	**CHK2**
waveform data message	r			r	o	o	r	r
no data message		r		r				
data delayed message			r	r				

r = required, o = optional

Table 28. OUT2 block format

Record	Position	Format	Description
1	1–4	a4	OUT2
	6–15	i4,a1,i2,a1,i2	date of the first missing sample (*yyyy*/*mm*/*dd*)
	17–28	i2,a1,i2,a1,f6.3	time of the first missing sample (*hh*:*mm*:*ss*.*sss*)
	30–34	a5	station code
	36–38	a3	FDSN channel code
	40–43	a4	auxiliary identification code
	45–55	f11.3	duration that data are unavailable (s)

Table 29. DLY2 block format

Record	Position	Format	Description
1	1–4	a4	DLY2
	6–15	i4,a1,i2,a1,i2	date of the first delayed sample (*yyyy*/*mm*/*dd*)
	17–28	i2,a1,i2,a1,f6.3	time of the first delayed sample (*hh*:*mm*:*ss*.*sss*)
	30–34	a5	station code
	36–38	a3	FDSN channel code
	40–43	a4	auxiliary identification code
	45–55	f11.3	estimated duration of queue (s)

The optional EID2 block specifies to which event(s) a waveform is associated (see Table 30). This block is used when waveforms are requested from a bulletin with the RELATIVE_TO environment. The EID2 block may be repeated for each event to which a waveform is associated.

Table 30. EID2 block format

Record	Position	Format	Description
1	1–4	a4	EID2
	6–13	a8	event identification of associated event
	15–23	a9	bulletin type

The optional BEA2 block specifies how a beamed waveform was formed (see Table 31). This block is only used when the waveform is the result of beaming.

Table 31. BEA2 block format

Record	Position	Format	Description
1	1–4	a4	BEA2
	6–17	a12	beam identification for the waveform
	19–23	f5.1	azimuth used to steer the beam (measured in positive degrees clockwise from north)
	25–29	f5.1	slowness used to steer the beam (s/deg, `-999.0`, if vertical beam)

6.3.2.1 Subformat INT

The INT waveform subformat represents integer data as blank or newline delimited ASCII characters. The number of blank spaces between samples is unspecified, and an individual sample value may not be continued on the next line.

6.3.2.2 Waveform compression schemes

Two different compression schemes are used in the IMS2.0 standard: CM6 and CM8. IMS2.0 waveform formats, however, include the CM6 subformat and a subformat for signed data (CSF) based on the continuous data format for channel subframes.

For waveform data, the difference between data samples is usually much smaller than the instantaneous magnitudes. The difference of the differences (the second difference) is even smaller. Transmitting the second difference requires fewer significant bits. Reductions in the message length can be achieved if the number of bits to convey the information is reduced when the signal level is small and expanded when the signal level rises. Because samples will take a variable number of bits, an index is required to specify the number of bits in each sample.

Both compression schemes use second differences as a first step in reducing the number of significant bits required to convey the information in the time series. A first difference is computed as the difference between successive samples. A second difference is the difference between the differences. The first value in both steps keeps its absolute value (see the following sections).

The following paragraphs describe the compression schemes to reduce the number of bits and/or to make transmission easy.

6.3.2.3 Subformat CM6

The CM6 compression scheme is a six-bit compression of second differences. The advantage of this method is in its conversion of binary integer data to ASCII characters that can be successfully transmitted using email. The compression algorithm converts waveforms into a set of printable ASCII characters carefully avoiding those that have been found to cause problems to either communications circuits or the computers connected to them. The algorithm uses only the 64 characters +, –, 0–9, A–Z and a–z.

Initially, all data samples in the packet are represented as 32-bit, 2's complement integers, with a range of $-(2^{31})$ to $2^{31}-1$. Second difference samples are encoded as the difference between the first differences and can be computed for the j-th sample using the following formula.

$$D_2(j) = S(j) - 2S(j-1) + S(j-2) \tag{1}$$

where zero and negative indices are ignored. Thus, the second difference data for N samples are as follows:

$$S(1), S(2) - 2S(1), S(3) - 2S(2) + S(1), \ldots, S(N) - 2S(N-1) + S(N-2) \tag{2}$$

To compress the numbers, the second differences are converted from 2's complement to sign and magnitude. These numbers are then fit into a variable number of bytes in which only the six Most Significant Bits (MSBs) are used. The most significant usable bit of each byte is used as a flag or control bit, which, if set, signifies that the following byte also contains information relating to the same sample. The second MSB is used as a sign bit in the first byte pertaining to a sample and as a data bit in all following bytes of the sample. All other bits are used to represent the value of the second difference of the sample. These numbers are then fit into a variable number of bytes in which only the six MSBs are used (see Table 32).

Table 32. Bit positions for CM6

MSB							LSB
control	sign/data	data	data	data	data	unused	unused

These six-bit bytes are then used to refer to a lookup table (Table 33) from which one of 64 different ASCII characters (+, –, 0–9, A–Z, a–z) is extracted.

Table 33. ASCII representation of bit patterns for CM6

Bit pattern	Char	Bit pattern	Char
000000	+	100000	U
000001	–	100001	V
000010	0	100010	W
000011	1	100011	X
000100	2	100100	Y
000101	3	100101	Z
000110	4	100110	a
000111	5	100111	b
001000	6	101000	c
001001	7	101001	d

Continues on next page

Table 33 (cont.)

Bit pattern	Char	Bit pattern	Char
001010	8	101010	e
001011	9	101011	f
001100	A	101100	g
001101	B	101101	h
001110	C	101110	i
001111	D	101111	j
010000	E	110000	k
010001	F	110001	l
010010	G	110010	m
010011	H	110011	n
010100	I	110100	o
010101	J	110101	p
010110	K	110110	q
010111	L	110111	r
011000	M	111000	s
011001	N	111001	t
011010	O	111010	u
011011	P	111011	v
011100	Q	111100	w
011101	R	111101	x
011110	S	111110	y
011111	T	111111	z

6.3.2.4 Subformat CM8

The CM8 subformat is similar to the CM6 subformat. The same algorithm is used, but the compression is more efficient than the 6-bit subformat because all bits are used. The 8-bit scheme is a binary format that cannot be transmitted using email; FTP must be used.

The second-difference integers are first converted from 2's complement to sign and magnitude. These numbers are then fit into a variable number of bytes in which all eight significant bits are used. The most significant usable bit of each byte is used as a flag or control bit, which, if set, is used to signify that the following byte also contains information relating to the same sample. The second most significant bit is used as a sign bit in the first byte pertaining to a sample and as data in all following bytes. All other bits are used to represent the value of the second difference (Table 34).

Table 34. Bit positions for CM8

MSB	LSB

control	sign/data	data	data	data	data	data	data

6.3.2.5 Subformat CSF

Waveform data that have been signed for data verification must contain the raw data that were authenticated along with the digital signatures. To deliver the data as authenticated at the station (or sensor), the incoming continuous data format for channel subframes (see SAIC (1999)) must be used. To send the channel subframes in an email message, the sequence of channel subframes are sent as base-64 representation of the binary data.

6.4 Processing products

Data types used for the processing products include the results of the various stages of S/H/I processing from arrivals through events.

6.4.1 ARRIVAL

The ARRIVAL data types are divided into five subtypes (AUTOMATIC, REVIEWED, GROUPED, ASSOCIATED, and UNASSOCIATED) to reflect the different processing stages.

Automatic arrivals

The AUTOMATIC subtype provides the result of a detection process run on waveforms. The format for the AUTOMATIC data subtype are given in Table 35, and an example is provided in subsection I.4.2 “ARRIVAL:AUTOMATIC” on p. 286.

Table 35. Automatic arrival format

Record	Position	Format	Description
1 (header)	1–3	a3	`Net`
	11–13	a3	`Sta`
	17–22	a6	`BeamID`
	33–36	a4	`Date`
	44–47	a4	`Time`
	54–58	a5	`Phase`
	64–67	a4	`Azim`
	70–73	a4	`Slow`
	77–79	a3	`SNR`
	87–89	a3	`Amp`

Continues on next page

Table 35 (cont.)

Record	Position	Format	Description
	93–95	a3	`Per`
	99–101	a3	`STA`
	105–107	a3	`Dur`
	109–114	a6	`Author`
	122–126	a5	`DetID`
2–n (data)	1–9	a9	network code
	11–15	a5	station code
	17–28	a12	beam identifier
	30–39	i4,a1,i2,a1,i2	detection date (*yyyy*/*mm*/*dd*)
	41–52	i2,a1,i2,a1,f6.3	detection time (*hh*:*mm*:*ss*.*sss*)
	54–61	a8	preliminary phase code
	63–67	f5.1	observed azimuth (°)
	69–73	f5.1	observed slowness (s/deg)
	75–79	f5.1	signal-to-noise ratio
	81–89	f9.1	amplitude (nm)
	91–95	f5.2	period (s)
	97–101	f5.1	short-term average
	103–107	f5.1	detection duration (s)
	109–117	a9	author of the detection
	119–127	a9	detection identifier

Reviewed arrivals

The REVIEWED subtype is used for arrivals that have been reviewed and assigned phase names. Phase names are not expected to have been verified by location. Table 36 gives the format for the REVIEWED data subtype, and an example is provided in subsection I.4.4 “ARRIVAL:REVIEWED” on p. 287.

Table 36. Reviewed arrival format

Record	Position	Format	Description
1 (header)	1–3	a3	`Net`
	11–13	a3	`Sta`
	16–19	a4	`Chan`
	22–24	a3	`Aux`
	30–33	a4	`Date`
	40–43	a4	`Time`
	50–54	a5	`Phase`
	60–63	a4	`Azim`

Continues on next page

Table 36 (cont.)

Record	Position	Format	Description
	66–69	a4	`Slow`
	73–75	a3	`SNR`
	83–85	a3	`Amp`
	89–91	a3	`Per`
	93–96	a4	`Qual`
	98–103	a6	`Author`
	110–114	a5	`ArrID`
2–n (data)	1–9	a9	network code
	11–15	a5	station code
	17–19	a3	FDSN channel code
	21–24	a4	auxiliary identification code
	26–35	i4,a1,i2,a1,i2	arrival date (*yyyy/mm/dd*)
	37–48	i2,a1,i2,a1,f6.3	arrival time (*hh:mm:ss.sss*)
	50–57	a8	phase code
	59–63	f5.1	observed azimuth (°)
	65–69	f5.1	observed slowness (s/deg)
	71–75	f5.1	signal-to-noise ratio
	77–85	f9.1	amplitude (nm)
	87–91	f5.2	period (s)
	93–95	a1,a1,a1	type of pick: `a`: automatic, `m`: manual; direction of short-period motion; `c`: compression, `d`: dilatation, `_`: null; detection character; `i`: impulsive, `e`: emergent, `q`: questionable, `_`: null (see Table 37)
	97–105	a9	author of the arrival
	107–115	a9	arrival identification

Table 37. Detection character from uncertainty

Detection character	Uncertainty for local phases	Uncertainty for regional/teleseismic phases
`i`	$< 0.05\,s$	$< 0.2\,s$
`e`	$< 0.25\,s$	$< 1.0\,s$
`q`	$> 0.25\,s$	$> 1.0\,s$

Grouped arrivals

The GROUPED subtype is used for arrivals that have phase names and have been grouped together, with the implication that they were generated by the same seismic event. Table 38 gives the format for the GROUPED data subtype, and an example is provided in subsection I.4.3 "ARRIVAL:GROUPED" on p. 286.

Table 38. Grouped arrival format

Record	Position	Format	Description
1 (header)	1–3	a3	`Net`
	11–13	a3	`Sta`
	16–19	a4	`Chan`
	21–23	a3	`Aux`
	29–32	a4	`Date`
	39–42	a4	`Time`
	50–54	a5	`Phase`
	60–63	a4	`Azim`
	66–69	a4	`Slow`
	73–75	a3	`SNR`
	83–85	a3	`Amp`
	89–91	a3	`Per`
	93–96	a4	`Qual`
	100–104	a5	`Group`
	106	a1	`C`
	108–113	a6	`Author`
	121–125	a5	`ArrID`
2–n (data)	1–9	a9	network code
	11–15	a5	station code
	17–19	a3	FDSN channel code
	21–24	a4	auxiliary identification code
	26–35	i4,a1,i2,a1,i2	arrival date (*yyyy*/*mm*/*dd*)
	37–48	i2,a1,i2,a1,f6.3	arrival time (*hh*:*mm*:*ss*.*sss*)
	50–57	a8	phase code
	59–63	f5.1	observed azimuth (°)
	65–69	f5.1	observed slowness (s/deg)
	71–75	f5.1	signal-to-noise ratio
	77–85	f9.1	amplitude (nm)
	87–91	f5.2	period (s)
	93–95	a1,a1,a1	type of pick; `a`: automatic, `m`: manual; direction of short-period motion; `c`: compression, `d`: dilatation, `_`: null; detection character: `i`: impulsive, `e`: emergent, `q`: questionable, `_`: null (see Table 37])
	97–104	a8	group identification
	106	i1	conflict flag (number of times an arrival belongs to more than one group; blank if arrival only belongs to one group)

Continues on next page

Table 38 (cont.)

Record	Position	Format	Description
	108–116	a9	author of the arrival
	118–126	a9	arrival identification

Associated arrivals

The ASSOCIATED subtype is used for arrivals that have been run through a location program and have formed a seismic event. If multiple magnitude measurements have been made on an arrival, the subsequent magnitudes will appear on lines immediately after the arrival. Table 39 gives the format for the ASSOCIATED data subtype, and an example is provided in subsection I.4.2 "ARRIVAL:AUTOMATIC" on p. 286.

Table 39. Associated arrival format

Record	Position	Format	Description
1 (header)	1–3	a3	`Net`
	11–13	a3	`Sta`
	19–22	a4	`Dist`
	25–28	a4	`EvAz`
	34–38	a5	`Phase`
	41–44	a4	`Date`
	53–56	a4	`Time`
	64–67	a4	`TRes`
	70–73	a4	`Azim`
	75–79	a5	`AzRes`
	82–85	a4	`Slow`
	88–91	a4	`SRes`
	93–95	a3	`Def`
	99–101	a3	`SNR`
	109–111	a3	`Amp`
	115–117	a3	`Per`
	119–122	a4	`Qual`
	124–132	a9	`Magnitude`
	136–141	a6	`OrigID`
	143–148	a6	`Author`
	156–160	a5	`ArrID`
2–n (data)	1–9	a9	network code
	11–15	a5	station code
	17–22	f6.2	station to event distance (deg)
	24–28	f5.1	event to station azimuth (°)

Continues on next page

Table 39 (cont.)

Record	Position	Format	Description
	30–37	a8	phase code
	39–48	i4,a1,i2,a1,i2	arrival date (*yyyy/mm/dd*)
	50–61	i2,a1,i2,a1,f6.3	arrival time (*hh:mm:ss.sss*)
	63–67	f5.1	time residual (s)
	69–73	f5.1	observed back azimuth (°)
	75–79	f5.1	azimuth residual (°)
	81–85	f5.1	observed slowness (s/deg)
	87–91	f5.1	slowness residual (s/deg)
	93–95	a1,a1,a1	time defining flag (T or _), azimuth defining flag (A or _), slowness defining flag (S or _)
	97–101	f5.1	signal-to-noise ratio
	103–111	f9.1	amplitude (nm)
	113–117	f5.2	period (s)
	119–121	a1,a1,a1	type of pick; a: automatic, m: manual; direction of short-period motion; c: compression, d: dilatation, _: null; detection character; i: impulsive, e: emergent, q: questionable, _: null (see Table 37)
	123–127	a5	magnitude type (mb, Ms, ML, mbmle, msmle)
	128	a1	min max indicator (<, >, or blank)
	129–132	f4.1	magnitude value
	134–141	a8	origin identification
	143–151	a9	author of the arrival
	153–161	a9	arrival identification

Unassociated arrivals

The UNASSOCIATED subtype is used for arrivals that have been detected and reviewed, but have not been not associated with a seismic origin. The format of the UNASSOCIATED subtype line is the same as the format for the AUTOMATIC subtype as shown in Table 35. An example is provided in subsection I.4.5 "ARRIVAL:UNASSOCIATED" on p. 287.

6.4.2 BULLETIN

Bulletins are composed of origin and arrival information. The information is provided in a series of data blocks as shown in Table 40[1] bulletin title block (Table 41), event title block (Table 42), origin block (Table 43), phase block[2] (Table 44), event screening block (Table 45), and event

[1] The *IASPEI Seismic Format (ISF)* (1999) defines additional block formats including effects and reference.
[2] *IASPEI Seismic Format (ISF)* (1999) defines a phase information sub-block to compliment the phase block.

characterization arrival block (autoreftab:event-characterisation-block-format). The verbosity of a bulletin can be controlled by specifying the subformat, which can be SHORT or LONG. The default is SHORT.

The BULL_TYPE environment and the subformat control the blocks of information that appear in a bulletin. Table 40 lists the blocks that are included for each BULL_TYPE and subformat.

A BULLETIN data message contains one bulletin title block and one set of the other block types for each event. The blocks in a BULLETIN data message appear in the order given in Table 40. Examples of the SHORT and LONG subformats for bulletins are provided in section I.7 "BULLETIN (IMS2.0:short format)" on p. 291 and section I.8 "BULLETIN (IMS2.0:long Format)" on p. 292.

Table 40. Blocks used in bulletin formats

	SEL1, SEL2, SEL3, REB subformats		SEB, SSEB, NEB, NSEB subformats	
Block name	**short**	**long**	**short**	**long**
bulletin title block	r	r	r	r
event title block	r	r	r	r
origin block	r	r	r	r
phase block	r	r	r	r
phase correction block		r		r
event screening block			r	r
event characterisation arrival block				r

Table 41. Bulletin title block format

Record	Position	Format	Description
1	1–136	a136	bulletin title

Table 42. Event title block format

Record	Position	Format	Description
1	1–5	a5	`EVENT`
	7–15	a9	event identification
	17–80	a64	geographic region

Table 43. Origin block format

Record	Position	Format	Description
Origin sub-block			
1 (header)	4–7	a4	`Date`
	15–18	a4	`Time`
	27–29	a3	`Err`
	33–35	a3	`RMS`
	37–44	a8	`Latitude`
	46–54	a9	`Longitude`
	57–60	a4	`Smaj`
	63–66	a4	`Smin`
	69–70	a2	`Az`
	72–76	a5	`Depth`
	80–82	a3	`Err`
	84–87	a4	`Ndef`
	89–92	a4	`Nsta`
	94–96	a3	`Gap`
	99–103	a5	`mdist`
	106–110	a5	`Mdist`
	112–115	a4	`Qual`
	119–124	a6	`Author`
	131–136	a6	`OrigID`
2–n (data)	1–10	i4,a1,i2,a1,i2	epicentre date (*yyyy*/*mm*/*dd*)
	12–22	i2,a1,i2,a1,f5.2	epicentre time (*hh*:*mm*:*ss*.*ss*)
	23	a1	fixed flag (`f`: fixed origin time solution, blank if not a fixed origin time)
	25–29	f5.2	origin time error (seconds; blank if fixed origin time)
	31–35	f5.2	root mean square of time residuals (s)
	37–44	f8.4	latitude (negative for south)
	46–54	f9.4	longitude (negative for west)
	55	a1	fixed flag (`f`: fixed epicentre solution, blank if not a fixed epicentre solution)
	56–60	f5.1	semi-major axis of 90% ellipse or its estimate (km, blank if fixed epicentre)
	62–66	f5.1	semi-minor axis of 90% ellipse or its estimate (km, blank if fixed epicentre)
	68–70	i3	strike ($0 \leq x < 360$) of error ellipse clockwise from north (°)
	72–76	f5.1	depth (km)
	77	a1	fixed flag (`f`: fixed depth location, `d`: depth phases, blank if not a fixed depth)

Continues on next page

Table 43 (cont.)

Record	Position	Format	Description
	79–82	f4.1	depth error 90% (km; blank if fixed depth)
	84–87	i4	number of defining phases
	89–92	i4	number of defining stations
	94–96	i3	gap in azimuth coverage (°)
	98–103	f6.2	distance to closest station (deg)
	105–110	f6.2	distance to furthest station (deg)
	112	a1	analysis type: (`a`: automatic, `m`: manual, `g`: guess)
	114	a1	location method: (`i`: inversion, `p`: pattern recognition, `g`: ground truth, `o`: other)
	116–117	a2	event type: `ke`: known earthquake, `ki`: known induced event, `km`: known mine explosion, `kn`: known nuclear explosion, `kr`: known rock burst, `kx`: known experimental explosion, `ls`: landslide, `se`: suspected earthquake, `si`: suspected induced event, `sm`: suspected mine explosion, `sn`: suspected nuclear explosion, `sr`: suspected rock burst, `sx`: suspected experimental explosion, `uk`: unknown
	119–127	a9	author of the origin
	129–136	a8	origin identification
Magnitude sub-block			
1 (header)	1–9	a9	`Magnitude`
	12–14	a3	`Err`
	16–19	a4	`Nsta`
	21–26	a6	`Author`
	33–38	a6	`OrigID`
2–n (data)	1–5	a5	magnitude type (e.g. `mb`, `Ms`, `ML`, `mbmle`, `msmle`)
	6	a1	min max indicator (<, >, or blank)
	7–10	f4.1	magnitude value
	12–14	f3.1	standard magnitude error
	16–19	i4	number of stations used to calculate magnitude
	21–29	a9	author of the origin
	31–38	a8	origin identification
Comment sub-block			
1	2	a1	(
	3–m	a{m-2}	comment

Continues on next page

Table 43 (cont.)

Record	Position	Format	Description
	m+1	a1	)

Table 44. Phase block format

Record	Position	Format	Description
1 (header)	1–3	a3	`Sta`
	9–12	a4	`Dist`
	15–18	a4	`EvAz`
	20–24	a5	`Phase`
	33–36	a4	`Time`
	43–46	a4	`TRes`
	49–52	a4	`Azim`
	54–58	a5	`AzRes`
	62–65	a4	`Slow`
	69–72	a4	`SRes`
	74–76	a3	`Def`
	80–82	a3	`SNR`
	90–92	a3	`Amp`
	96–98	a3	`Per`
	100–103	a4	`Qual`
	105–113	a9	`Magnitude`
	118–122	a5	`ArrID`
2–n (data)	1–5	a5	station code
	7–12	f6.2	station-to-event distance (deg)
	14–18	f5.1	event-to-station azimuth (°)
	20–27	a8	phase code
	29–40	i2,a1,i2,a1,f6.3	arrival time (*hh:mm:ss.sss*)
	42–46	f5.1	time residual (s)
	48–52	f5.1	observed azimuth (°)
	54–58	f5.1	azimuth residual (°)
	60–65	f6.1	observed slowness (s/deg)
	67–72	f6.1	slowness residual (s/deg)
	74–76	a1,a1,a1	time defining flag (`T` or `_`), azimuth defining flag (`A` or `_`), slowness defining flag (`S` or `_`)
	78–82	f5.1	signal-to-noise ratio
	84–92	f9.1	amplitude (nm)
	94–98	f5.2	period (s)

Continues on next page

Table 44 (cont.)

Record	Position	Format	Description
	100–102	a1,a1,a1	type of pick (a: automatic, m: manual); direction of short-period motion (c: compression, d: dilatation, _: null); onset quality (i: impulsive, e: emergent, q: questionable, _: null)
	104–108	a5	magnitude type (e.g. mb, Ms, ML, mbmle, msmle)
	109	a1	min max indicator (<, >, or blank)
	110–113	f4.1	magnitude value
	115–123	a9	arrival identification

The format of the EVENT SCREENING block follows in Table 45. The block has been extended to include station-specific hydroacoustic and regional measurements. In the table, assume n: number of hydro measurement stations, m: number of regional measurement stations.

Table 45. Event screening block format

Record	Position	Format	Description
Event screening summary sub-block			
1 (title)	1–15	a15	`EVENT SCREENING`
2 (header)	1–8	a8	`Category`
	11–15	a5	`Score`
	17–22	a6	`Dscore`
	24–29	a6	`Mscore`
	31–36	a6	`Rscore`
	38–43	a6	`Hscore`
	45–51	a7	`Smaj_sc`
	53–59	a7	`Smin_sc`
	61–65	a5	`Depth`
	68–71	a4	`Sdep`
	74–77	a4	`mbms`
	79–83	a5	`Smbms`
	91–96	a6	`Foffsh`
	98–102	a5	`MinWD`
	104–106	a3	`Clr`
3 (data)	1–2	a2	screening category: `NC`: not considered, `IS`: insufficient data, `NS` not screened out, `SO`: screened out
	3	a1	`/`
	4–8	a5	`Offsh`: Offshore, `Onsh`: Onshore, `Mixed`: Mixed onshore and offshore
	10–15	f6.2	combined screening score
	17–22	f6.2	depth screening score

Continues on next page

Table 45 (cont.)

Record	Position	Format	Description
	24–29	f6.2	$Am_b - M_S$ screening score
	31–36	f6.2	regional seismic score
	38–43	f6.2	hydroacoustic screening score
	45–51	f7.1	scaled semi-major axis of location error ellipse
	53–59	f7.1	scaled semi-minor axis of location error ellipse
	61–65	f5.1	depth estimate (km)
	67–71	f5.1	depth confidence interval (km)
	73–77	f5.2	$Am_b - M_S$ (including slope term, A)
	79–83	f5.2	$Am_b - M_S$ confidence interval
	93–96	f4.2	fraction of scaled location error ellipse offshore
	98–102	f5.0	minimum water depth in scaled error ellipse
	106	i1	clear path flag for hydroacoustic signal(s) (clear = `1`, not clear = `0`)
4			(blank line)
Hydroacoustic screening sub-block			
1 (title)	1–23	a23	`HYDROACOUSTIC SCREENING`
2 (header)	1–3	a3	`sta`
	8–11	a4	`cps8`
	15–18	a4	`snr7`
	22–25	a4	`noi7`
3–n (data)	1–5	a5	station name
	8–13	f6.2	cepstral peak from band 8 (2–80 Hz)
	15–20	f6.2	SNR of hydroacoustic total energy measurement
	22–27	f6.2	noise of hydroacoustic total energy measurement
n+1			(blank line)
Regional screening sub-block			
1 (title)	1–18	a18	`REGIONAL SCREENING`
2 (header)	1–3	a3	`sta`
	8–13	a6	`pnsmax`
	17–20	a4	`corr`
	25–27	a3	`err`
3–n (data)	1–5	a5	station name
	8–13	f6.2	pnsmax value in the 6–8 Hz band
	15–20	f6.2	pnsmax correction value in the 6–8 Hz band
	22–27	f6.2	pnsmax error estimate in the 6–8 Hz band
n+1			(blank line)

Table 46. Event characterisation arrival block format

Record	Position	Format	Description
Cepstral peak analysis sub-block			
1 (title)	1–22	a22	`CEPSTRAL PEAK ANALYSIS`
2 (header)	1–3	a3	`Sta`
	8–14	a7	`PeakAmp`
	16–23	a8	`PeakQuef`
3–n (data)	1–5	a5	station code
	8–14	f7.5	peak amplitude
	16–23	f8.4	peak quefrency
Energy ratio sub-block			
1 (title)	1–37	a37	`SHORT-PERIOD/LONG-PERIOD ENERGY RATIO`
2 (header)	1–3	a3	`Sta`
	13–17	a5	`Ratio`
3–n (data)	1–5	a5	station code
	8–17	f10.8	short-period/long-period energy ratio
Frequency-dependent phase amplitude sub-block			
1 (title)	1–41	a41	`FREQUENCY-DEPENDENT PHASE AMPLITUDE BLOCK`
	44–46	i3	block number (ith block)
	48–49	a2	`of`
	51–53	i3	total number of frequency-dependent phase amplitude sub-blocks
2 (header)	1–3	a3	`Sta`
	7–11	a5	`Phase`
	18–20	a3	`Amp`
	28–30	a3	`SNR`
	38–40	a3	`Amp`
	48–50	a3	`SNR`
	58–60	a3	`Amp`
	68–70	a3	`SNR`
	78–80	a3	`Amp`
	88–90	a3	`SNR`
3 (header)	17–22	f6.1	min(FreqBand(i-1)*4+1)
	24–25	a2	`to`
	27–32	f6.1	max(FreqBand(i-1)*4+1)
	37–42	f6.1	min(FreqBand(i-1)*4+2)
	44–45	a2	`to`
	47–52	f6.1	max(FreqBand(i-1)*4+2)
	57–62	f6.1	min(FreqBand(i-1)*4+3)
	64–65	a2	`to`
	67–72	f6.1	max(FreqBand(i-1)*4+3)

Continues on next page

Table 46 (cont.)

Record	Position	Format	Description
	77–82	f6.1	min(FreqBand(n-1)*4+4)
	84–85	a2	to
	87–92	f6.1	max(FreqBand(n-1)*4+4)
4–n (data)	1–5	a5	station code
	7–10	a8	associated phase (Note: an ! indicates that reported values are based on predicted values instead of observed values)
	12–20	f9.1	amplitude in FreqBand(i-1)*4+1
	26–30	f5.1	SNR in FreqBand(i-1)*4+1
	32–40	f9.1	amplitude FreqBand(i-1)*4+2
	46–50	f5.1	SNR in FreqBand(i-1)*4+2
	52–60	f9.1	amplitude in FreqBand(i-1)*4+3
	66–70	f5.1	SNR in FreqBand(i-1)*4+3
	72–80	f9.1	amplitude in FreqBand(i-1)*4+4
	86–90	f5.1	SNR in FreqBand(i-1)*4+4
Spectral variance sub-block			
1 (title)	1–47	a47	SPECTRAL VARIANCE OF THE DETRENDED LOG SPECTRUM
2 (header)	1–3	a3	Sta
	7–11	a5	Phase
	13–19	a7	MinFreq
	21–27	a7	MaxFreq
	35–41	a7	SpecVar
3–n (data)	1–5	a5	station code
	7–11	a5	associated phase
	13–19	f7.2	minimum frequency
	21–27	f7.2	maximum frequency
	30–41	f12.6	spectral variance of detrended log spectrum
Complexity sub-block			
1 (title)	1–10	a10	COMPLEXITY
2 (header)	1–3	a3	Sta
	7–11	a5	Phase
	14–23	a10	Complexity
	32–34	a3	SNR
3–n (data)	1–5	a5	station code
	7–11	a5	associated phase
	13–23	f11.4	complexity
	25–34	f10.4	SNR of complexity
Third moment of frequency sub-block			
1 (title)	1–25	a25	THIRD MOMENT of FREQUENCY
2 (header)	1–3	a3	Sta

Continues on next page

Table 46 (cont.)

Record	Position	Format	Description
	12–14	a3	TMF
3–n (data)	1–5	a5	station code
	7–14	f8.1	third moment of frequency
Time-frequency sub-block			
1 (title)	1–25	a25	TIME FREQUENCY PARAMETERS
2 (header)	1–3	a3	Sta
	9–14	a6	zavpct
	20–25	a6	zavcep
	31–36	a6	zavcor
3–n (data)	1–5	a5	station code
	9–14	f6.4	average ratio of bad points to the total of the vertical component traces
	20–25	f6.1	average maximum value of the 2-D cepstrum of the vertical component traces
	31–35	f5.3	average autocorrelation along the time axis across all frequencies excluding randomized points of the vertical component traces

6.4.3 COMMENT

The first line of the COMMENT data type provides a mechanism for associating the comment to a station, arrival, origin, event, and so on. If no association is needed, then this line may be left blank. The comment is written in free format and can be up to 1,024 characters. Table 47 gives the format for the COMMENT data message, and an example is provided in section I.13 "COMMENT" on p. 297.

Table 47. Comment format

Record	Position	Format	Description
1	1–10	a10	identification type (Station, Arrival, Origin, Event)
	12–19	a8	identification string of the identification type
2	1–1024	a1024	free-format comment

6.4.4 EVENT

Any S/H/I event can have several estimates of the location, origin time, and size (origins). The format for events places these different origins into separate origin blocks. The bulletin title block at the beginning of the data section must include the name of the bulletin used as the basis for associating the separate origin estimates. The events data messages include:

- one bulletin title block (Table 41)

- *n* origin blocks (Table 43)

An example of an EVENT data message is provided in section I.17 “EVENT” on p. 299

6.4.5 ORIGIN

The ORIGIN data type consists of a number of origin blocks (Table 43). Multiple magnitudes may be given for the same origin. An example of an ORIGIN data message is provided in section I.24 “ORIGIN” on p. 306.

6.5 Status information

Several data types provide status information. Status information is available for authentication, stations, channels, communications, and data availability.

6.5.1 AUTH_STATUS

Some data channels contain authentication signatures that are verified at the IDC. The AUTH_-STATUS data type provides statistics on the authentication process over the time of the report. The first block of the report gives the number of packets tested, the number that passed, and the number that failed by station (Table 48). The second block contains a list of the failures grouped as intervals for each data channel that failed to verify the authentication signature (Table 49). An example of an AUTH_STATUS data message is provided in section I.5 “AUTH_STATUS” on p. 289.

Table 48. Report period block format

Record	Position	Format	Description
1	1–18	a18	`Report period`
	20–29	i4,a1,i2,a1,i2	date (*yyyy/mm/dd*)
	31–40	i2,a1,i2,a1,f4.1	time (*hh:mm:ss.s*)
	42–43	a2	`to`
	45–54	i4,a1,i2,a1,i2	date (*yyyy/mm/dd*)
	56–65	i2,a1,i2,a1,f4.1	time (*hh:mm:ss.s*)
2 (header)	1–3	a3	`Net`
	11–13	a3	`Sta`
	16–19	a4	`Chan`
	21–23	a3	`Aux`
	27–40	a14	`Packets_Tested`
	43–56	a14	`Packets_Failed`

Continues on next page

Table 48 (cont.)

Record	Position	Format	Description
3–n (data)	1–9	a9	network code
	11–15	a5	station code
	17–19	a3	FDSN channel code
	21–24	a4	auxiliary identification code
	22–40	i8	number of packets tested
	49–56	i8	number of packets failing verification

Table 49. Authentication list block format

Record	Position	Format	Description
1 (title)	1–23	a23	`Failed Packet Intervals`
2 (header)	1–3	a3	`Net`
	11–13	a3	`Sta`
	16–19	a4	`Chan`
	21–23	a3	`Aux`
	31–40	a10	`Start_Time`
	55–61	a8	`End_Time`
	71–77	a7	`Comment`
3–n (data)	1–9	a9	network code
	17–19	a3	channel code
	21–24	a4	auxiliary identification code
	26–35	i4,a1,i2,a1,i2	start date of failure interval (*yyyy/mm/dd*)
	37–46	i2,a1,i2,a1,f4.1	start time of failure interval (*hh:mm:ss.s*)
	49–58	i4,a1,i2,a1,i2	end date of failure interval (*yyyy/mm/dd*)
	60–69	i2,a1,i2,a1,f4.1	end time of failure interval (*hh:mm:ss.s*)
	71–132	a62	comment

6.5.2 CHAN_STATUS

The CHAN_STATUS data type gives specific information on the data that have been received at the IDC by station and channel. Detailed statistics on data gaps and timeliness are included (see Table 50).

An example of a CHAN_STATUS data message is provided in section I.12 “CHAN_STATUS” on p. 296.

Table 50. Channel status block format

Record	Position	Format	Description
1	1–18	a18	`Report period from`
	20–29	i4,a1,i2,a1,i2	date (*yyyy*/*mm*/*dd*)
	31–40	i2,a1,i2,a1,f4.1	time (*hh*:*mm*:*ss*.*s*)
	42–43	a2	`to`
	45–54	i4,a1,i2,a1,i2	date (*yyyy*/*mm*/*dd*)
	56–65	i2,a1,i2,a1,f4.1	time (*hh*:*mm*:*ss*.*s*)
2 (title)	1–14	a14	`Channel Status`
3 (header)	1–3	a3	`Net`
	11–13	a3	`Sta`
	17–20	a4	`Chan`
	22–28	a7	`%_Recvd`
	30–36	a7	`%_AvaUA`
	38–44	a7	`%_Avail`
	47–50	a4	`Gaps`
	54–60	a7	`Samples`
	63–70	a8	`Constant`
	79–82	a4	`Mean`
	92–94	a3	`RMS`
4–n (data)	1–9	a9	network code
	11–15	a5	station code
	17–20	a4	FDSN channel code
	22–28	f7.3	% of data received
	30–36	f7.3	% of data available (unauthenticated)
	38–44	f7.3	% of data available that passed authentication
	46–50	i5	number of data gaps
	52–60	i9	number of samples
	62–70	i9	number of constant values
	72–82	f11.1	mean amplitude (nm)
	84–94	f11.1	root mean square amplitude (nanometres)

6.5.3 COMM_STATUS

Communications status is given over the time interval specified in the TIME or FREQ environments for IMS2.0 or subscription requests, respectively. The report comprises a communications statistics block giving the report period and a summary section in which each link is described with statistics of link performance for the reporting period (Table 51). The next block is a list of the link outages for each link (Table 52). The link outages block is included only in the long subformat. An example of a COMM_STATUS data message is provided in section I.14 "COMM_STATUS" on p. 297.

Table 51. Communications statistics block format

Record	Position	Format	Description
1	1–18	a18	`Report period from`
	20–29	i4,a1,i2,a1,i2	start date (*yyyy/mm/dd*)
	31–40	i2,a1,i2,a1,f4.1	start time (*hh:mm:ss.s*)
	42–43	a2	`to`
	45–54	i4,a1,i2,a1,i2	end date (*yyyy/mm/dd*)
	56–65	i2,a1,i2,a1,f4.1	end time (*hh:mm:ss.s*)
2 (header)	1–4	a4	`Link`
	22–29	a8	`Nom_kbps`
	32–35	a4	`Mode`
	38–41	a4	`%_up`
	44–47	a4	`From`
	54–57	a4	`Util`
	60–63	a4	`From`
	70–73	a4	`Util`
3–n (data)	1–9	a9	link code (farthest from IDC)
	11	a1	-
	13–21	a9	link code (closest to IDC)
	24–29	f6.1	nominal speed of link in kbps
	32–35	a4	full for full-duplex or half for half-duplex
	37–41	f5.1	% uptime
	44–52	a9	link code (farthest from IDC)
	54–57	f4.2	use of link (dat_rate/speed)
	60–68	a9	link code (closest to IDC)
	70–73	f4.2	use of link (dat_rate/speed)

Table 52. Communications outage block format

Record	Position	Format	Description
1 (title)	1–9	a8	link code (farthest from IDC)
	11	a1	-
	13–21	a9	link code (closest to IDC)
	23–34	a12	`link outages`
2 (header)	10–13	a4	`From`
	30–36	a7	`Through`
	50–57	a8	`Duration`
3–n (data)	1–10	i4,a1,i2,a1,i2	date of beginning of outage (*yyyy/mm/dd*)
	12–21	i2,a1,i2,a1,f4.1	time of beginning of outage (*hh:mm:ss.s*)
	24–33	i4,a1,i2,a1,i2	date of end of outage (*yyyy/mm/dd*)

Continues on next page

Table 52 (cont.)

Record	Position	Format	Description
	35–44	i2,a1,i2,a1,f4.1	time of end of outage (*hh*:*mm*:*ss*.*s*)
	47–60	i3,a1,i2,a1,i2,a1,f4.1	duration of outage (*ddd hh*:*mm*:*ss*.*ss*)

6.5.4 OUTAGE

The OUTAGE data type provides information on the dates and times of data gaps. Table 53 gives the format for the OUTAGE data message, and an example is provided in section I.25 "OUTAGE" on p. 307.

Table 53. Outage format

Record	Position	Format	Description
1 (title)	1–18	a18	`Report period from`
	20–29	i4,a1,i2,a1,i2	date (*yyyy*/*mm*/*dd*)
	31–42	i2,a1,i2,a1,f6.3	time (*hh*:*mm*:*ss*.*sss*)
	44–45	a2	`to`
	47–56	i4,a1,i2,a1,i2	date (*yyyy*/*mm*/*dd*)
	58–67	i2,a1,i2,a1,f6.3	time (*hh*:*mm*:*ss*.*sss*)
2 (header)	1–3	a3	`Net`
	11–13	a3	`Sta`
	16–19	a4	`Chan`
	21–23	a3	`Aux`
	30–44	a15	`Start Date Time`
	55–67	a13	`End Date Time`
	76–83	a8	`Duration`
	85–91	a7	`Comment`
3–n (data)	1–9	a9	network code
	11–15	a5	station code
	17–19	a3	FDSN channel code
	21–24	a4	auxiliary identification code
	26–35	i4,a1,i2,a1,i2	date of last sample before outage interval or start date of report period[†]
	37–48	i2,a1,i2,a1,f6.3	time of last sample before outage interval
	50–59	i4,a1,i2,a1,i2	date of first sample after outage interval[††]
	61–72	i2,a1,i2,a1,f6.3	time of first sample after outage interval or end time of the report period
	74–83	f10.3	duration of interval (s)
	85–132	a48	comment

[†]Time of last available sample preceding the outage or the start time of the report period.

[††]Time of first available sample after the outage or the end time of the report period.

6.5.5 STA_STATUS

Station status is given over the time interval specified in the TIME or FREQ environments for IMS2.0 or subscription requests, respectively. The report contains statistics that can be used to evaluate the overall performance of one or more stations. The first record of the report gives the report period.

The status records give the station code, the maximum data time (the cumulative amount of time for which data are expected for this station), followed by the station capability entries for the minimum set of channels necessary to maintain mission capability as well as for the geophysical channels. Definitions for the statistics can be found in the Operational Manual for the IDC (IDC/WGB/TL-11). Table 54 gives the station status format, and an example is provided in section I.39 “STATION” on p. 359.

Table 54. STA_STATUS format

Record	Position	Format	Description
1	1–18	a18	`Report period from`
	20–29	i4,a1,i2,a1,i2	start date (*yyyy/mm/dd*)
	31–40	i2,a1,i2,a1,f4.1	start time (*hh:mm:ss.s*)
	42–43	a2	`to`
	45–54	i4,a1,i2,a1,i2	end date (*yyyy/mm/dd*)
	56–65	i2,a1,i2,a1,f4.1	end time (*hh:mm:ss.s*)
2 (title)	1–14	a14	`Station Status`
3 (header)	1–3	a3	`Sta`
	7–18	a12	`Max_Exp_Time`
	21–67	a47	`__________ Minimum Channels ___________`
	69–115	a46	`________ Geophysical Channels _________`
4 (header)	26–63	a38	`Data Timely Data Mission`
	74–109	a36	`Data Data Data`
5 (header)	22–66	a45	`Availability Availability Capability (%)`
	70–113	a44	`Received (%) Availability Availability`
6 (header)	27–45	a19	`(%) (%)`
	85–109	a25	`Unauthenticated (%)`
7 (header)	91–93	a3	`(%)`
8–n (data)	1–5	a5	station code
	7–19	i4,a1,i2,a1,i2,a1,i2	maximum data time possible (*dddd hh:mm:ss.s*)
	25–31	f7.3	data availability of the minimum channels (% of report period)
	41–47	f7.3	timely data availability of the minimum channels (% of report period)
	57–63	f7.3	mission capability of the minimum channels (% of report period)

Continues on next page

Table 54 (cont.)

Record	Position	Format	Description
	73–79	f7.3	data received percentage of the geophysical channels (% of report period)
	89–95	f7.3	data availability (unauthenticated) of the geophysical channels (% of report period)
	105–111	f7.3	data availability of the geophysical channels (% of report period)

6.6 Logs

LOG data types are used primarily as administrative messages.

6.6.1 ERROR_LOG

The ERROR_LOG data type are reserved for responses to request messages that contain errors. Specific formats have not been defined at this time, although the request message can be given with the line or lines causing the error identified. The information is provided in free-format comment lines in which the first character is blank. An example of an ERROR_LOG is provided in section I.16 “ERROR_LOG” on p. 298.

6.6.2 LOG

The LOG data type includes free-format comment lines in which the first character of the line is blank. The exact content of the logs is unspecified. An example of a LOG data message is provided in section I.21 “LOG” on p. 304.

7

Radionuclide messages

This chapter describes the radionuclide message formats and includes the following sections:

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7.2 Pulse Height Data . . . 166

7.3 Radionuclide laboratory reports . . . 182

7.4 Other laboratory messages . . . 198

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7.8 IDC products . . . 209

7.1 Introduction

IMS2.0 data formats provide a common format for IMS data and IDC product exchange. Many different types of radionuclide data and products may be exchanged using the message formats described herein.

Radionuclide messages can be generated at a radionuclide station, a certified laboratory, or at the Provisional Technical Secreteriat (PTS). Data types for radionuclide messages and their sources are described in Table 55, Table 56 and Table 57. Descriptions of formats for each data type are included in this chapter. Examples of each data type can be found in Appendix I.

Table 55. IMS data types for radionuclide messages from stations

Data type	Data message	Section	Msg type
ALERT_FLOW	airflow alert	alert	D
ALERT_SYSTEM	system alert	alert	D
ALERT_TEMP	temperature alert	alert	D
ALERT_UPS	power supply alert	alert	D
BLANKPHD	blank spectrum	Pulse Height Data	D
CALIBPHD	calibration spectrum	Pulse Height Data	D
DETBKPHD	detector background spectrum	Pulse Height Data	D
GASBKPHD	gas background spectrum	Pulse Height Data	D
MET	meteorological data	meteorological data	D
QCPHD	quality control spectrum	Pulse Height Data	D
RMSSOH	state of health data	state of health	D
SAMPLEPHD	sample spectrum	Pulse Height Data	D
SPIKEPHD	spike spectrum	Pulse Height Data	D

D: Data message type

Table 56. IMS data types for radionuclide messages from laboratories

Data type	Data message	Section	Msg type
ADDINS	request for additional instructions	other laboratory messages	L
BLANKPHD	blank spectrum	Pulse Height Data	D
CALIBPHD	calibration spectrum	Pulse Height Data	D
DETBKPHD	detector background spectrum	Pulse Height Data	D
RLR	Radionuclide Laboratory Report	RLR	D
MESACK	Message Receipt Acknowledgement	other laboratory messages	L
MISC	message does not fit any other type	other laboratory messages	L
QCPHD	quality control spectrum	Pulse Height Data	D
SAMACK	Sample Receipt Acknowledgement	other laboratory messages	L
SAMPLEPHD	sample spectrum	Pulse Height Data	D
TECSDN	sample dispatch notification to the PTS	other laboratory messages	L

D: data, L: lab data message type

Table 57. Data types of IMS data and IDC products for radionuclide messages from the PTS

Data type	Data message	Principal recipient	Section
ADDINS	Additional instructions	Laboratory	Other laboratory messages [L]

Continues on next page

Table 57 (cont.)

Data type	Data message	Principal recipient	Section
ARR	Automated Radionuclide Report	States Signatories	IDC Product [D]
DATREQ	Request for missing report or other information	Laboratory	Other Laboratory Messages [L]
LABSDN	Laboratory Sample Dispatch Notification	Laboratory	Other Laboratory Messages [L]
MISC	Message does not fit any other type	Laboratory	Other Laboratory Messages [L]
PRESDN	Preliminary Sample Dispatch Notification	Laboratory	Other Laboratory Messages [L]
RNPS	Radionuclide Network Product Summary	States Signatories	IDC Product [D]
RRR	Reviewed Radionuclide Report	States Signatories	IDC Product [D]
SAMACK	Sample Receipt Acknowledgement	Laboratory	Other Laboratory Messages [L]
SAMPML	Sample PHD plus Automated Radionuclide Report	States Signatories	IDC Product [D]
REVSAMP	Sample PHDs plus Reviewed Radionuclide Report	States Signatories	IDC Product [D]
SSREB	Standard Screened Radionuclide Event Bulletin	States Signatories	IDC Product [D]

D: data, L: lab data message type

All IMS data messages require the basic message structure described in section 3.2 “Message preface” on p. 32.

Within the message body, several data types may be present. The type of data included in a data section is designated with a DATA_TYPE line. The argument of the DATA_TYPE command designates the type of data that are included in the message section:

Syntax

```
data_type data_type
```

data_type the type of IMS data that follows

Each data section is composed of distinct data blocks that contain required and supplemental data. The start of a data block is designated by a line containing the block name. All data block names begin with the pound (#) sign. Additional data can be included in a radionuclide message through the addition of new blocks. The name of any new block must start with a pound sign, followed by any combination of characters not already used for a predefined block.

The #Header block must be the first data block in any radionuclide message because it specifies the system type. No requirements on the order of the remaining data blocks are necessary. Data blocks may require several records for completion, for example, at least five records must be present in a #g_Energy block for it to be valid.

All uncertainties shall be reported with a coverage factor k=1 unless specified otherwise.

If a required data block is shown as having an undetermined number of possible records (denoted by, for example, `2-n`), the minimum number of records is one, unless specified otherwise.

7.2 Pulse Height Data

The different types of Pulse Height Data (PHD) are:

- SAMPLEPHD: This data type contains PHD acquired by counting a noble gas or particulate sample.
- BLANKPHD: This data type contains pulse height data acquired by counting an unexposed filter on a particulate monitoring system.
- DETBKPHD: This data type contains PHD acquired by performing a background measurement of a detector system.
- GASBKPHD: This data type is sent by a noble gas monitoring system that is subject to memory effects during sample acquisition due to nuclide from the previous sample adsorbed onto the walls of the gas cell.
- CALIBPHD: This data type contains PHD acquired by counting a known standard source with a detector system.
- QCPHD: This data type contains PHD acquired from a brief count of a known standard source with a detector system for quality control purpose.
- SPIKEPHD: This data type contains PHD acquired from a spiked sample for example at a noble gas monitoring system.

Each PHD type is composed of a number of data blocks. Depending on the DATA_TYPE and the detector acquisition system, some data blocks are required, and some are optional.

If a data message does not contain the required data blocks, it cannot be processed. Table 58 lists the required and optional data blocks for PHD messages from both particulate and noble gas systems employing high-resolution γ-spectrometry and noble gas systems reporting β-γ coincidence data.

Table 58. PHD data block from sites sending spectrometry data

Data blocks	γ-spectroscopy						β-γ coincidence					
	SAMPLEPHD	BLANKPHD	DETBKPHD	CALIBPHD	QCPHD	SPIKEPHD	SAMPLEPHD	GASBKPHD	DETBKPHD	CALIBPHD	QCPHD	SPIKEPHD
#Header	r	r	r	r	r	r	r	r	r	r	r	r
#Comment	o	o	o	o	o	o	o	o	o	o	o	o
#Collection	r					r	r					r
#Acquisition	r	r	r	r	r	r	r	r	r	r	r	r
#Processing†	r†	r†				r†	r	r				r
#Sample	o	o		o	o	o	o	o		o	o	o
#g_Energy	r	r	r	r	r	r	r	r	r	r	r	r
#b_Energy							r	r	r	r	r	r
#g_Resolution	r	r	r	r	r	r	r	r	r	r	r	r
#b_Resolution							r	r	r	r	r	r
#g_Efficiency	r	r	r	r	r	r	o	o	o	o	o	o
#ROI_Limits							r	r	r	r	r	r
#b-gEfficiency							r	r	r	r	r	r
#g_TotalEfficiency	o	o	o	o	o	o	o	o	o	o	o	o
#Ratios							r	r	r	r	r	r
#g_Spectrum	r	r	r	r	r	r	r††	r††	r††	r††	r††	r††
#b_Spectrum							r††	r††	r††	r††	r††	r††
#Histogram							r	r	r	r	r	r
#Calibration	o	o	o	r	r	o	o	o	o	r	r	o
#Certificate				r	r	o				r	r	o
#Gaincorr											o	

r = required, o = optional

†This data block only applies to noble gas systems

††This data block should contain singles spectrum including coincident and non-coincident β or γ.

The formats of the data blocks listed in Table 58 are described in Tables 59–81. Clarifications of parameters and records are included after each table when necessary. Examples of each PHD message type are included in Appendix I.

Table 59. #Header block format for PHD message types

Record	Position	Format	Description
1	1–7	a7	`#Header`

Continues on next page

Table 59 (cont.)

Record	Position	Format	Description
	9–18	a10	designator (format version identifier from the IDC)
2	1–5	a5	system code, see subsection 3.5.10
	7–15	a9	detector code (unique for each detector)†, see subsection 3.5.11
	17	a1	system type: `P` for particulate; `B` for noble gas with β-γ coincidence detection; and `G` for noble gas with high-resolution γ-spectrometry
	19–35	a17	sample geometry
	37–40	a4	spectral qualifier: preliminary (PREL) or full (FULL)
3	1–16	a16	sample reference identification (see below)
4	1–31	a31	measurement identification (see below)
	33–63	a31	detector background measurement identifier††
	65–95	a31	gas background measurement identifier (memory effect)‡
5	1–10	i4,a1,i2,a1,i2	transmit date (*yyyy*/*mm*/*dd*)
	12–21	i2,a1,i2,a1,f4.1	transmit time (*hh*:*mm*:*ss*.*s*)

†For β-γ coincidence systems with multiple gas cells, each gas cell is considered a separate detector and should be assigned a unique detector code.

††The detector background measurement identifier specifies the MID of the PHD message containing the relevant background counting data. If no relevant detector background exists, this field should be filled with a zero. For particulate systems, this should be the latest blank filter measurement identification.

‡This field is required only for β-γ coincidence systems that have memory effect. To account for the activity remained in the gas cell, a detector acquisition is performed upon sample evacuation and before the next sample counting. The data from this acquisition is reported in the GASBKPHD. The gas background measurement identifier field contains the MID of the GASBKPHD associated with the current sample.

The Measurement Identification (MID) describes the detector acquisition. The first nine characters are the detector code, the tenth character is a dash, and the remaining characters are the date and time of the acquisition start combined by a dash.

The Sample Reference Identification (SRID) aids in the identification of a sample. This allows the matching of a physical entity to the data that describes it. For radionuclide stations equipped with bar-coding systems, Radio-Frequency Identification (RFID) systems or any other coding system, the code for each sample must match the SRID reported in radionuclide messages.

The format of the SRID is a 14 or 15-character code, depending on the source of the PHD (either a particulate system, noble gas system or laboratory). The first two numbers of the SRID are the CTBT number as defined in the CTBT text. The syntax for the remaining digits differs for samples, blanks, detector background, gas background, Quality Control (QC) check sources, calibration sources, spike samples and special IMS samples sent to laboratories. The various SRID syntaxes are described below.

7.2.1 SAMPLEPHD

Syntax

ccyyyymmddhhPpT

cc	CTBT station/laboratory number
yyyymmddhh	year, month, date, and nearest full hour of collection start
Pp	split identifier: *P*: split number, *p*: total number of splits
T	system type: `X` for xenon noble gas systems[1], for particulate systems leave blank

The split identifier (*Pp*) is coded 11 for the whole radionuclide sample before any splitting is performed. When a sample is split into multiple parts, the split number *P* is the part number and *p* is the total number of pieces. For example, a sample split into two parts is assigned the following split identifiers: 12 for the first piece and 22 for the second piece. If all the sample splits are counted together, the split number *P* is assigned the number 9. Therefore, if the two sample splits from the previous example are counted together, the split identifier reported in the SRID field is 92.

7.2.2 GASBKPHD

Syntax

ccyyyymmddhh00X

cc	CTBT station/laboratory number
yyyymmddhh	year, month, date, and nearest full hour of collection start
00X	identifier that indicates a xenon gas background

7.2.3 BLANKPHD

Syntax

cc`00000000`*xxxx*

cc	CTBT station/laboratory number
`00000000`	identifier that indicates a blank filter
xxxx	a sequential number (0001, 0002, . . .)

7.2.4 DETBKPHD

Syntax

[1] The previously used `G` code describing noble gas samples is being replaced gradually as `X` as of 2016.

`cc11111111xxxxT`

cc	CTBT station/laboratory number
`11111111`	identifier that indicates a detector background
xxxx	a sequential number (0001, 0002, . . .)
T	system type: `X` for noble gas system, otherwise leave blank

7.2.5 SPIKEPHD

Syntax

`ccyyyymmddhhPpK`

cc	CTBT station/laboratory number
yyyymmddhh	year, month, date, and nearest full hour of collection start
Pp	split identifier. *P*: split number, *p*: total number of splits
`K`	identifier that indicates spike[2]

7.2.6 Special IMS samples

Syntax

`cc77777777xxxx`

cc	CTBT station/laboratory number
`77777777`	identifier that indicates a special IMS sample
xxxx	a sequential number (0001, 0002, . . .)

For noble gas samples from a CTBT laboratory, such as intercomparison or proficiency test sample, the SRID is defined as following.

`cc7777YYMMSPBNX`

where

cc	lab code (01, 02, 03, . . . , 16 for IMS labs and for non-IMS labs 31 . . . 99)
`7777`	identifier that indicates a special IMS sample
YY	year, e.g. 16 for 2016
MM	month, e.g. 12 for December
S	system type for labs with more than one system (e.g. HPGe and β-γ coincidence counting system)
P	provider of the reference samples
B	batch to which a sample belongs
N	sample number in the batch.

[2] The identifier for a spike sample was `G` describing noble gas originally but is replaced as `K`.

7.2.7 QC check sources, QCPHD

Syntax

```
cc88888888xxxxT
```

cc	CTBT station/laboratory number
`88888888`	identifier that indicates a QC check source
xxxx	a sequential number (0001, 0002, . . .)
T	system type: `X` for noble gas system, otherwise leave blank

7.2.8 Calibration sources, CALIBPHD

Syntax

```
cc99999999xxxxT
```

cc	CTBT station/laboratory number
`99999999`	identifier that indicates a calibration source
xxxx	a sequential number (0001, 0002, . . .)
T	system type: `X` for noble gas system, otherwise leave blank

7.2.9 SRID examples

The following is a SRID for a particulate sample sampled at the IMS station in Rio de Janeiro, Brazil. The collection start time and date is 1 April, 2001 at 06:00 UTC.

```
04200104010611
```

The following is a SRID for a blank filter counted at the IMS station in Quezon City, Philippines, and is the third blank counted at that station.

```
52000000000003
```

The following is a SRID for a QC check source counted by a xenon noble gas system at the IMS station in Reunion, France, and is the first unique QC check source counted at that station.

```
29888888880001X
```

The following is a SRID for a calibration source counted by a xenon noble gas system at the IMS station at Oahu, Hawaii, and is the third unique calibration source counted at that station.

```
79999999990003X
```

7.2.10 MID examples

The following is a possible MID for a noble gas sample from the IMS station in Rio de Janeiro, Brazil. The sample acquisition start is 6 February, 2000 at 20:00 UTC.

```
BRX11_001-2000/02/06-20:00
```

The following is a possible MID for a calibration count performed on a HPGe detector at AWE Blacknest in Chilton, England. The acquisition start is 2 November, 2010 at 9:37:30.0 UTC.

```
GBL15_005-2010/11/02-09:37:30
```

7.2.11 Block formats

The `#Comment` block (Table 60) is optional for all radionuclide messages.

Table 60. #Comment block format

Record	Position	Format	Description
1	1–8	a8	`#Comment`
2–n	1–80	a80	free text

Table 61. #Collection block format

Record	Position	Format	Description
1	1–11	a11	`#Collection`
2	1–10	i4,a1,i2,a1,i2	collection start date (*yyyy/mm/dd*)
	12–21	i2,a1,i2,a1,f4.1	collection start time (*hh:mm:ss.s*)
	23–32	i4,a1,i2,a1,i2	collection stop date (*yyyy/mm/dd*)
	34–43	i2,a1,i2,a1,f4.1	collection stop time (*hh:mm:ss.s*)
	45–54	f10	total air volume sampled (m^3 at STP)

Table 62. #Acquisition block format

Record	Position	Format	Description
1	1–12	a12	`#Acquisition`
2	1–10	i4,a1,i2,a1,i2	acquisition start date (*yyyy/mm/dd*)
	12–21	i2,a1,i2,a1,f4.1	acquisition start time (*hh:mm:ss.s*)
	23–36	f14	acquisition real-time (s)
	38–51	f14	acquisition live-time (s)

For noble gas systems, the sample volume of stable xenon (Xe) must be used to calculate the total air volume sampled. This is because some of the collected air may be used for unit processes.

The following equation determines the total air volume from the sample Xe volume:

$$V_{air} = \frac{V_{Xe}}{0.087} \tag{3}$$

where V_{air} is the total air volume in m^3 at STP (273.15 K and 101.325 kPa, unless otherwise specified) and V_{Xe} is the sample volume of ambient Xe in cm^3 (see #Processing block in Table 63 for sample volume of Xe).

Table 63. #Processing block format

Record	Position	Format	Description
1	1–11	a11	`#Processing`
2	1–8	f8.5	sample volume of Xe (cm^3)
	10–17	f8.5	uncertainty (cm^3)
3†	1–8	f8.5	Xe collection yield
	10–17	f8.5	uncertainty of the Xe collection yield
4	19–20	a2	archive bottle identification

†The fields of this record are optional and may be zero-filled if the information is unavailable.

The #Sample Block (Table 64) is optional and describes the physical dimensions of the sample during measurement as instructed in Table 65. Other relevant sample information can be included in the #Comment block. Counting geometry is reported in the #Header block.

Table 64. #Sample block format

Record	Position	Format	Description
1	1–7	a7	`#Sample`
2	1–5	f5.2	dimension 1 (cm)
	7–11	f5.2	dimension 2 (cm)

Table 65. Sample dimension matrix

Sample geometry	Dimension 1	Dimension 2
cylindrical filter samples	diameter	height
unpressed filter samples	width	length
noble gas samples	cell inner diameter	cell length

The #g_Energy data block (Table 66) is required for all detector systems, regardless of sample type. The g prefix indicates that this block contains the energy/channel pairs required to formulate a relationship between channel and γ-energy. The data contained in this block should be actual peak energies with their corresponding centroid channels or PTS validated data points as appropriate. These may include both empirical and numerical elements.

Table 66. #g_Energy block format

Record	Position	Format	Description
1	1–9	a9	`#g_Energy`
2–n†	1–16	f16	γ-energy (keV)
	18–33	f16	centroid channel
	35–50	f16	uncertainty (channels)

†There should be at least five records for γ spectroscopy samples and at least three records for β-γ coincidence samples in a #g_Energy block.

The #b_Energy block (Table 67) is required only for systems reporting β-γ coincidence data. Contained within the block are the energy channel pairs needed to create a relationship between channel and β-energy.

Table 67. #b_Energy block format

Record	Position	Format	Description
1	1–9	a9	`#b_Energy`
2–n†	1–16	f16	electron energy (keV)
	18	a1	decay mode descriptor: `B` for β-particle, `C` for conversion electron (CE)
	20–35	f16	channel corresponding to β energy
	37–52	f16	uncertainty (channels)

†There must be at least five records in a #b_Energy block.

The #g_Resolution block (Table 68) is required for all detector systems, regardless of sample type. The g prefix indicates that this block contains the energy/FWHM pairs required to formulate a relationship between resolution and γ-energy. These must be original data pairs or PTS validated data points as appropriate. These may include both empirical and numerical elements.

Table 68. #g_Resolution block format

Record	Position	Format	Description
1	1–13	a13	`#g_Resolution`
2–n†	1–16	f16	γ-energy (keV)
	18–33	f16	FWHM (keV)
	35–50	f16	uncertainty (keV)

†There should be at least five records for γ spectroscopy samples and at least three records for β-γ coincidence samples in a #g_Energy block.

The #b_Resolution block (Table 69) is required only for systems reporting β-γ coincidence data. Contained within the block are the energy/FWHM pairs needed to create a relationship between resolution and β-energy. These must be original data pairs and not points from a fitted calibration equation.

Table 69. #b_Resolution block format

Record	Position	Format	Description
1	1–13	a13	`#b_Resolution`
2–n†	1–16	f16	electron energy (keV)
	18–33	f16	FWHM (keV)
	35–50	f16	uncertainty (keV)

†There must be at least five records in a #b_Resolution block.

The #g_Efficiency block (Table 70) is required for all detector systems, regardless of sample type, except those reporting β-γ coincidence data. The g prefix indicates that this block contains the energy/efficiency pairs required to formulate a relationship between full photopeak efficiency and γ-energy. These must be original data pairs or PTS validated data points as appropriate. These may include both empirical and numerical elements.

Table 70. #g_Efficiency block format

Record	Position	Format	Description
1	1–13	a13	`#g_Efficiency`
2–n†	1–16	f16	γ-energy (keV)
	18–33	f16	efficiency (counts in peak/photon emitted)
	35–50	f16	uncertainty (counts in peak/photon emitted)

†There must be at least five records in a #g_Efficiency block for γ systems.

The #ROI_Limits block in Table 71 is required only for systems reporting β-γ coincidence data. Counts from such systems are primarily recorded in the #Histogram block.

Table 71. #ROI_Limits

Record	Position	Format	Description
1	1–14	a14	`#ROI_Limits`
2–n†	1–2	a2	ROI number
	4–13	f10	2-D ROI β-range start, x1 (keV)
	15–24	f10	2-D ROI β-range stop, x2 (keV)
	26–35	f10	2-D ROI γ-range start, y1 (keV)
	37–46	f10	2-D ROI γ-range stop, y2 (keV)

†There must be six records for the numbered ROIs.

The activity concentration can be determined from the net counts in a 2-D ROI. The #ROI_Limits block contains the 2-D coordinates that define the ROI, that is, the equivalents of x1, x2, y1, and y2 in Figure 1.

In Table 72, the ROI number is a unique identifier for the required ROI. These numbers are assigned and illustrated in Figure 2.

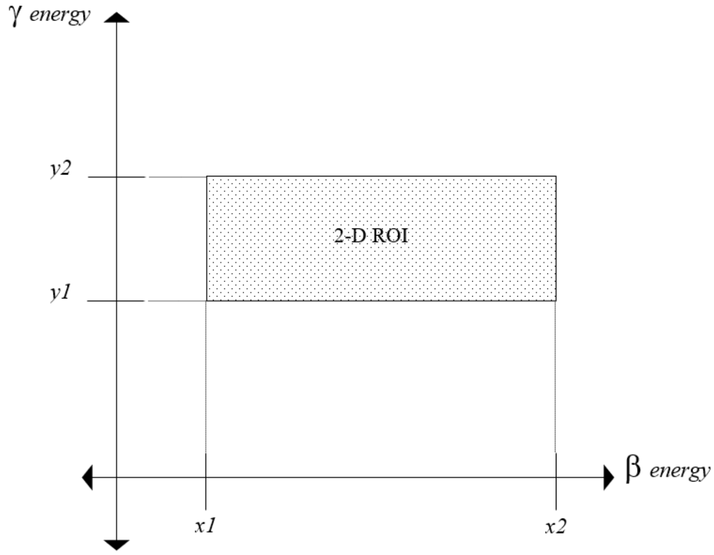

Figure 1. Two-dimensional ROI in β-γ energy space.

Table 72 summarizes the possible nuclide signals in each ROI and the nuclide quantified by determining the net counts. The exact values for the ROI γ- and β-energy ranges are not defined explicitly in this document because they depend on each detector's calibration, capabilities and characteristics (for example, resolution). The ROI limits specified in the #ROI_Limits block must be the same as those used for determining the β-γ coincidence efficiencies reported in the #b-gEfficiency block (Table 74).

Table 72. ROI characterization

ROI no.	Nuclides possible	Quantification use	Centroid γ-energy (keV)	Centroid β-energy (keV)
1	^{214}Pb	n/a†	351.9	671 (End point)
2	^{214}Pb, ^{135}Xe	^{135}Xe	249.8	901 (End point)
3	^{214}Pb, ^{133}Xe	^{133}Xe	81.0	346 (End point)
4	^{131m}Xe, ^{133m}Xe, ^{133}Xe, ^{135}Xe	^{133}Xe††	30.0	391 (End point)
5	^{131m}Xe, ^{133}Xe	^{131m}Xe	30.0	129.4
6	^{133m}Xe, ^{133}Xe	^{133m}Xe	30.0	198.7
7	^{131m}Xe, ^{133}Xe	^{133}Xe††	30.0	n/a
8	^{133m}Xe, ^{133}Xe	^{133}Xe††	30.0	n/a
9	^{133m}Xe, ^{133}Xe	^{133}Xe††	30.0	n/a
10	^{131m}Xe, ^{133}Xe	^{133}Xe††	30.0	n/a

†The number of counts in this ROI is used only for determining interference from ^{214}Pb in ROIs 2 to 10.
††This ROI is probably used with ROIs 3 and 5 to 10 for quantification of ^{133}Xe.

The #b_Efficiency block (Table 73) is an optional block of βefficiency for β-γ coincidence systems. The "b" prefix indicates that this block contains the ROI/efficiency pairs, which could the full electron peak efficiency at the conversion electron energy or the total β efficiency in the given ROI. These must be original data pairs or PTS-validated data points as appropriate. These may include both empirical and numerical elements.

Table 73. #b_Efficiency block format

Record	Position	Format	Description
1	1–14	a14	`#bEfficiency`
2–n†	1–10	a10	nuclide name††
	12–19	a8	ROI number
	21–30	f10	β efficiency (counts in the ROI/electrons pair emitted)
	32–41	f10	uncertainty (counts in the ROI/electrons emitted)

†There must be 5 records in a #b_Efficiency block.
††The nuclide name is the xenon isotope which is associated with the ROI and its activity is estimated by the number of counts in the ROI, see the ROI characterization in Table 72.

The #b-gEfficiency block is required only for β-γ coincidence systems. It contains efficiency values for the detection of specific β-γ pairs within the predefined 2-D ROI energy bounds. This information is required to quantify radio-xenon activity concentrations from the net 2-D ROI counts.

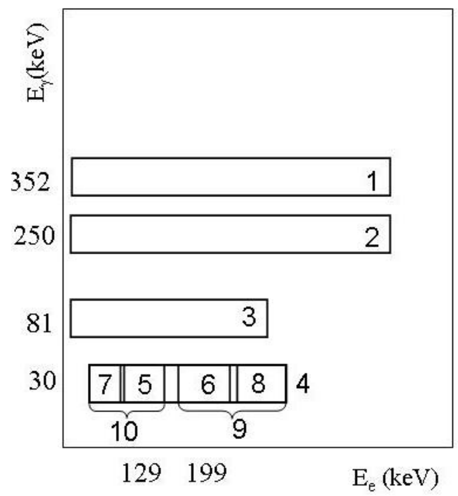

Figure 2. ROIs with their unique ROI numbers (not to scale) for β-γ coincidence systems.

Table 74. #b-gEfficiency block format

Record	Position	Format	Description
1	1–14	a14	`#b-gEfficiency`
2–n†	1–10	a10	nuclide name††
	12–19	a8	ROI number
	21–30	f10	β-γ coincidence efficiency (counts in the ROI/β-γ pair emitted)

32–41	f10	uncertainty (counts in the ROI/β-γ pair emitted)

†There must be four records for the ROIs associated with four CTBT xenon isotopes in a #b-gEfficiency block.
††The nuclide name is the xenon isotope which is associated with the ROI and its activity is estimated by the number of counts in the ROI.

The #g_TotalEfficiency block (Table 75) is optional. The total efficiency is the ratio of the number of pulses in the entire energy spectrum due to a photon of a given energy to the number of photons emitted by a source for a specified measurement geometry. The data pairs can be the results of an empirical or non-empirical process.

Table 75. #g_TotalEfficiency block format

Record	Position	Format	Description
1	1–9	a9	`#g_TotalEfficiency`
2–n†	1–16	f16	γ-energy (keV)
	18–33	f16	total efficiency (counts/photon emitted)
	35–50	f16	uncertainty (counts/photon emitted)

†There must be at least five records in a #g_TotalEfficiency block.

The #Ratios block (Table 76) is required only for β-γ coincidence systems. It contains the information necessary for stripping counts due to interfering isotopes from the signals of interest.

Table 76. #Ratios block format

Record	Position	Format	Description
1	1–7	a7	`#Ratios`
2–n	1–15	a15	ratio identifier
	17–18	a2	ROI number of the higher γ-energy ROI
	20–21	a2	ROI number of the lower γ-energy ROI
	23–32	f10	count ratio (counts in the lower γ-energy ROI/counts in the higher γ-energy ROI)
	34–39	f6	count ratio uncertainty (%)

The ratio identifier is the unique name for the count ratio, and is composed of the interfering nuclide followed by the higher γ-energy and the lower γ-energy that characterize the ROIs. The two γ-energies are separated by a colon while the nuclide name is separated from the γ-energies by an underscore. In cases where a nuclide has more than one interference ratio for the same set of γ-energies but different γ/β-energies (for example, ^{133}Xe interference from 80 keV to 30 keV), the number of the lower energy ROI is affixed after an underscore to distinguish between them.

For HPGe systems, the #g_Spectrum block contains the γ-spectrum acquired during counting (Table 78). For β-γ coincidence systems, this block contains the singles spectrum, including the non-coincident and coincidence γ both, e.g. the total γ-spectrum.

Table 77. #g_Spectrum block format

Record	Position	Format	Description
1	1–11	a11	`#g_Spectrum`
2	1–5	i5	number of γchannels
	7–10	i4	γ-energy span (keV)†
3–n	1–5	i5	channel††
	7–16	i10	count at channel + 0
	18–27	i10	count at channel + 1
	29–38	i10	count at channel + 2
	40–49	i10	count at channel + 3
	51–60	i10	count at channel + 4

†The maximum photon energy that the γ-spectrum represents.

††The spectrum should start with channel 0 for noble gas β-γ coincidence systems. The channel could start with 1 for particulate sample spectra.

For β-γ coincidence systems, the singles spectrum (including both non-coincident β and coincidence β) is reported in the #b_Spectrum data block (Table 78).

Table 78. #b_Spectrum block format

Record	Position	Format	Description
1	1–11	a11	`#b_Spectrum`
2	1–5	i5	number of β channels
	7–10	i4	β-energy span (keV)
3–n	1–5	i5	channel†
	7–16	i10	count at channel + 0
	18–27	i10	count at channel + 1
	29–38	i10	count at channel + 2
	40–49	i10	count at channel + 3
	51–60	i10	count at channel + 4

†The spectrum should start with channel 0.

The #Histogram data block (Table 79) is required for systems reporting β-γ coincidence data. This block contains the counts (up to 10 characters) in each β-γ energy bin within a 2-D matrix format. Each row consists of a single γ-channel over the entire span of the β-channel axis. Each column consists of a single β-channel over the entire span of the γ-channel axis. To reduce the size of the PHD message, only one blank space is required between reported counts in consecutive energy bins (β-channels) within the same row (γ-channel). See the examples in subsection I.35.1 “SAMPLEPHD—β-γ coincidence data version” on p. 351 for reference. Do not include non-coincident data in the #Histogram block. All non-coincident data should be reported using the #g_Spectrum or #b_Spectrum data blocks.

Table 79. #Histogram block Format

Record	Position	Format	Description
1	1–10	a10	`#Histogram`
2	1–5	i5	γ-channels (=b)
	7–11	i5	β-channels (=a)
	13–16	i4	γ-energy span (keV)
	18–21	i4	β-energy span (keV)
3	1–variable†	i1-i10	counts at channels (x,y) = (1,1)††
	variable	i1–i10	counts at channels (2,1)
	variable	i1–i10	counts at channels (3,1)
	variable	i1–i10	...
	variable	i1–i10	counts at channels (a,1)
4	1–variable†	i1-i10	counts at channels (1,2)
	variable	i1–i10	counts at channels (2,2)
	variable	i1–i10	counts at channels (3,2)
	variable	i1–i10	...
	variable	i1–i10	counts at channels (a,2)
b+2	1–variable†	i1-i10	counts at channels (1,b)
	variable	i1–i10	counts at channels (2,b)
	variable	i1–i10	counts at channels (3,b)
	variable	i1–i10	...
	variable	i1–i10	counts at channels (a,b)

No requirements on the number of γ and β channels to be reported are currently mandated.
†Fields are separated by at least one blank space. Records are ended with a carriage return.
††`x`: β-channel ordinate, `y`: γ-channel ordinate. β and γ channels should start at 1.

The size of the block #Histogram for the βγ coincidence systems with large number of β and γ channels might be beyond the minimum size of 1 MB required in subsection 3.5.1 “Message size” on p. 36. In order to reduce the size of the SPHD message, the original block of #Histogram is compressed with zip and base64 encode. During spectrum analysis at the IDC or NDCs, the block #Histogram can be recovered using unzip and base64 decode accordingly.

The #Calibration block (Table 80) allows the reporting of calibration references for various systems/components. Where a reference to a particular calibration measurement is possible (e.g. the CALIBPHD for γ detectors), the MID of this measurement is to be reported as well. Possible system/components to be reported include:

- γ detector
- β-γ detector
- Stable xenon measurement system
- Airflow meter

For radionuclide PHDs, this block contains the date and time when the calibration calculation was performed during the latest detector calibration instead of the acquisition date and time of the calibration spectra. For example, there are more than one calibration spectra during the calibration of β-γ coincidence systems.

Table 80. #Calibration block format

Record	Position	Format	Description
1	1–12	a12	`#Calibration`
2	1–10	i4,a1,i2,a1,i2	date of last calibration (*yyyy*/*mm*/*dd*)
	12–21	i2,a1,i2,a1,f4.1	time of last calibration (*hh*:*mm*:*ss*.*s*)

The #Certificate block (Table 81) allows the reporting of information on the standard radioactive source used in the acquisition of energy (RN), resolution, efficiency, ratios and total efficiency calibration data. This block is required in QCPHD and CALIBPHD data messages; it is optional for SPIKEPHD data messages.

For γ-only sources, the last three fields in records 3–n should be zero-filled. For β-only sources, the γ-energy and γ-intensity fields in records 3–n should be zero-filled. For β-γ coincidence sources, all fields should be filled with data.

Table 81. #Certificate block format

Record	Position	Format	Description
1	1–15	a15	`#Certificate`
2	1–10	i10	total source activity (Bq)
	12–21	i4,a1,i2,a1,i2	assay date (*yyyy*/*mm*/*dd*)
	23–32	i2,a1,i2,a1,f4.1	assay time (*hh*:*mm*:*ss*.*s*)
3–n	1–8	a8	nuclide name
	10–22	a13	half-life of the nuclide (value and time unit)†
	24–31	f8.3	activity of nuclide at assay time
	33–39	f7.3	uncertainty (%)
	41–48	f8.3	γ-energy (keV)
	50–56	f7.3	γ-intensity (%)
	58	a1	electron decay mode descriptor: `B` for β particle or `C` for CE, `0` for none (that is, γ-only source)
	60–67	f8.3	maximum β-particle energy or CE energy (keV)
	69–75	f7.3	intensity of β-particle (%)

†Half-lives are reported with the time value followed by the time unit (`S` for seconds, `H` for hours, `D` for days, or `Y` for years), with the two separated by a single space (i.e. `34 Y`, `12.345 D`, `1.89E+05 S`, etc.).

The nuclide name is formed by listing the 2-character element symbol from the periodic table of the elements followed by a dash (`-`), and then the mass number. An `M` may be placed at the end to designate a metastable state. For example, `XE-131M`, `XE-133`, `XE-133M`, `XE-135`, `PB-214`.

There are two blocks related to gain drift corrections, one in PHDs and the other one in RMS-SOHs, which are only applicable for SAUNA III systems deployed in the IMS radionuclide network.

QC measurements are used to correct detector drifts automatically. The software of QC drift correction uses SRIDs of the latest QC and the template if applicable.

There are two floating-point numbers per channel. The first one shows the change in the gain parameter VGain compared to the previous setting as a result of the last drift analysis (ratio VGain(QC)/VGain(QC-1); the second one reflects the cumulative change of VGain compared to the template setting (ratio VGain(QC)/VGain(tpl)). The three-digit 'flags' are the respective CorrFlag words described in the configuration of the system database for the relevant 'monitored' QC measurement. Below is the table in PHDs.

Table 82. #Gaincorr block format

Record	Position	Format	Description
1	1–9	a9	`#Gaincorr`
2	1–31	a31	template MID
	12–21	a31	monitored MID
3	1–3	a3	NaI flag
	5–11	f7.4	gain correction compared to the previous setting
	13–20	f7.4	gain correction compared to the previous setting
	22	a1	correction (`1`) or not (`0`)
4	1–3	a3	β 1 flag
	5–11	f7.4	gain correction compared to the previous setting
	13–20	f7.4	gain correction compared to the previous setting
	22	a1	correction (`1`) or not (`0`)
5	1–3	a3	β 2 flag
	5–11	f7.4	gain correction compared to the previous setting
	13–20	f7.4	gain correction compared to the previous setting
	22	a1	correction (`1`) or not (`0`)

7.3 Radionuclide laboratory reports

The two types of radionuclide laboratory reports are:

- Preliminary Radionuclide Laboratory Report (PRE)
- Final Radionuclide Laboratory Report (FIN)

The RLR comprises 32 block types. The required number of blocks in a RLR is described in Table 83. Blocks marked in **bold** are provided to the laboratories by the PTS in LABSDN messages. They are sent back to the PTS in the RLRs so that those subscribed to that message type will have all of the information necessary to interpret the analysis. Blocks with a prefix of P or X refer to particulate or noble gas samples respectively while blocks without any prefix refer to both particulate and noble gas samples.

Table 83. Data blocks required in RLR (PRE & FIN)

Block name	**Particulate (P)**	**Noble gas**	
		γ (X)	**β-γ (X)**
#Header	r	r	r
#LabDataVersion	r	r	r
#Objective	**r**	**r**	**r**
#IDCActivitySummary†	**o**	**o**	**o**
#IDCEventScreeningFlags†	**o**	**o**	**o**
#Collection	**r**	**r**	**r**
#StationSample†	**r**	**r**	**r**
#Split†,††	**o**	**o**	**o**
#SampleReceipt	r	r	r
#LabSample†	r	r	r
#Test	r	r	r
#EnergyCalibrationEquation	r	r	o
#ShapeCalibrationEquation	r	r	o
#EfficiencyCalibrationEquation	r	r	o
#TotalEfficiencyCalibrationEquation	r	o	o
#PeaksMethod	r	r	o
#PeakSearch	r	r	o
#PeakFitPart1	r	r	o
#PeakFitPart2	r	r	o
#AnalysisMethods	r	r	r
#PeakAssociation	r	r	o
#References	r	r	r
#InteractiveAnalysisLog	r	r	r
#Results†	r	r	r
#NuclideRatios	r	r	r
#X_Processing	n/a	r	r
#CoincidenceCorrection	r	o	o
#UncertaintyBudget	r	r	r
#Lc	o	o	r
#MDA/MDC†	r	r	r

r = required, o = optional

†Blocks will be prefixed with `P_` for particulate, and `X_` for noble gas

††#Split block will only be present if the sample has been split.

Formats for the data blocks listed in Table 83 are described in Tables 84–121. If a required data block is shown as having an undetermined number of possible records (denoted by, for example, `4-n`), the minimum number of records is one, unless specified otherwise.

The Sample Reference Identification (SRID) given in the #Header block is for the entire sample before any splitting. The SRID given by the PTS in the #Recipient block (which could be from a split sample and therefore different) must be cross-checked by the laboratory when the sample is received to ensure that the station sent the correct sample. The SRID on the sample, as actually received by the laboratory, must be reported in the #SampleReceipt block.

The sample category is given by a full string, `Category` *n* for particulate samples and `Category X`*n* for noble gas samples, where *n* is a letter that denotes the category:

For particulate samples:

- A: network quality control sample
- B: sample from IMS network categorized by IDC as Level 5 or other sample of interest
- C: proficiency test sample
- D: station back-up sample (measured by a lab)
- E: other (e.g. station parallels)
- K: radioactive spikes

For noble gas samples:

- XA: network quality control sample
- XC: intercomparison or proficiency test sample
- XD: station back-up sample (measured by a lab)
- XE: other (e.g. station certification sample, special analysis including samples categorized as Level C)
- XK: radioactive xenon spikes

Table 84. #Header block format of RLR

Record	Position	Format	Description
1	1–7	a7	`#Header`
2	1–7	a7	priority level [`Urgent` | `Routine`]
3	1–5	a5	system code of the station at which the sample was collected
	7–22	a16	SRID of the sample
4	1–5	a5	code of the laboratory selected for analysis [`ARL01`, . . . , `USL16`]
	7–15	a9	laboratory detector code
5	1–3	a3	report type (`FIN`|`PRE`)
	5–6	i2	report number

Continues on next page

Table 84 (cont.)

Record	Position	Format	Description
6	1–11	a11	sample category (`Category A`, ..., `Category XK`)
7	1–10	i4,a1,i2,a1,i2	message transmission date (*yyyy/mm/dd*)
	12–21	i2,a1,i2,a1,f4.1	message transmission time (*hh:mm:ss.s*)

Table 85. #LabDataVersion block format

Record	Position	Format	Description
1	1–15	a15	`#LabDataVersion`
2	1–12	a12	format version code (IMS2.0 for this revision)
3–n	1–80	a80	free text notes regarding the format version (optional)

Table 86. #Objective block format

Record	Position	Format	Description
1	1–10	a10	`#Objective`
2	1–16	a16	`~AnalysisPurpose`
3–n	1–80	a80	free text comment describing the purpose of analysis (Level 5, intercomparison, network QC, etc.)
n+1	1–16	a16	`~TestsAuthorized`
n+2–m	1–80	a80	free text describing the tests authorized (high-resolution γ spectrometry, β-γ coincidence counting etc.)
m+1	1–20	a20	`~SpecialInstructions`
m+2–l	1–80	a80	free text describing any special instructions (optional).)

n, m and l are the undetermined numbers of possible records if applicable.

Table 87. #P_IDCActivitySummary block format

Record	Position	Format	Description
1	1–21	a21	`#P_IDCActivitySummary`
2	1–22	a22	`~NuclidesNotQuantified`
3–n	1–80	a80	list of nuclideidentified and not quantified
n+1	1–16	a16	`~NaturalNuclides`
n+2–m	1–8	a8	quantified natural nuclide name
	10–22	a13	half-life of the nuclide (value and time unit)†
	24–34	e11.4	activity concentration (Bq/m^3)
	36–40	f5.2	relative uncertainty (%)
m+1	1–19	a19	`~ActivationProducts`
m+2–l	1–8	a8	activation product name
	10–22	a13	half-life of the nuclide (value and time unit)†

Continues on next page

Table 87 (cont.)

Record	Position	Format	Description
	24–34	e11.4	activity concentration (Bq/m^3)
	36–40	f5.2	relative uncertainty (%)
l+1	1–16	a16	`~FissionProducts`
l+2–p	1–8	a8	fission product name
	10–22	a13	half-life of the nuclide (value and time unit)†
	24–34	e11.4	activity concentration (Bq/m^3)
	36–40	f5.2	relative uncertainty (%)

n, m, l and p are the undetermined numbers of possible records if applicable.
†Half-lives are reported with the time value followed by the time unit, with the two separated by a single space (i.e. `3.627 D`, `12.345 D`, `0.45623 S`, etc.).

Table 88. #X_IDCActivitySummary block format

Record	Position	Format	Description
1	1–21	a21	`#X_IDCActivitySummary`
2	1–16	a16	`~other`
3–n	1–8	a8	name of other isotope (such as radon)
	10–20	e11.4	counts
	24–28	f5.2	relative uncertainty (%)
n+1	1–16	a16	`~Radio-xenon`
n+2–m	1–8	a8	name of the xenon isotope
	10–22	a13	half-life of the xenon (value and time unit)†
	24–34	e11.4	activity (mBq)
	36–40	f5.2	relative uncertainty (%)
	42–52	e11.4	activity concentration (mBq/m^3)
	54–58	f5.2	relative uncertainty (%)

n and m are the undetermined numbers of possible records if applicable.
†Half-lives are reported with the time value followed by the time unit, with the two separated by a single space (i.e. `3.627 D`, `12.345 H`, `0.45623 S`, etc.).

Table 89. #P_IDCEventScreeningFlags block format

Record	Position	Format	Description
1	1–25	a25	`#P_IDCEventScreeningFlags`
2	1	a1	activation products present in the sample [`Y` or `N`]
	3–12	a10	number of days since last activation product seen†
3	1	a1	only one fission product in the sample [`Y` or `N`]
	3–12	a10	number of days since last fission product†
4	1	a1	two or more fission products in the sample [`Y` or `N`]

Continues on next page

Table 89 (cont.)

Record	Position	Format	Description
	3–12	a10	number of days since two or more fission products last seen†
5	1	a1	^{137}Cs present in the sample [Y or N]
	3–12	a10	number of times ^{137}Cs was seen in the last 30 days†

†The number of days/number of times fields in the records above will be reported with different types of data depending on the state of the sample. A number in decimal format will be used to report the number of days or number of times. The text `Never Seen` will indicate that the fission product was not seen at that location previously. A `0` will indicate that this field is blank and does not apply for the sample in question.

Table 90. #X_IDCEventScreeningFlags block format

Record	Position	Format	Description
1	1–25	a25	`#X_IDCEventScreeningFlags`
2	1	a1	xenon isotopes present in the sample (Y or N)
3	1	a1	only one xenon isotope in the sample (Y or N)
4	1–10	i10	number of days since last xenon detection
5	1	a1	two or more xenon isotopes in the sample (Y or N)
6	1	a1	^{133}Xe present in the sample (Y or N)
	3–12	i10	number of times ^{133}Xe was seen in the last 365 days
7	1	a1	short term flag (Y or N)
8	1	a1	`Xe-133m/131m > 2` (Y or N)
9	1	a1	`Xe-135/133 > 5` (Y or N)
10	1	a1	`Xe-133m/133 > 0.3` (Y or N)

The #Collection block in RLR is the same as defined in Table 61.

Table 91. #X_Processing block format

Record	Position	Format	Description
1	1–13	a13	`#X_Processing`
2	1–8	f8.5	Xe volume in the archive bottle (STP corrected, cm^3) measured at the lab†
	10–17	f8.5	relative uncertainty (%)
3	1	i1	number of volume measurements
4–n	1–8	f8.5	Xe volume in the lab detector measurement cell (STP corrected, cm^3)
	10–17	f8.5	relative uncertainty (%)
	19–26	f8.5	Xe transfer efficiency from the station archive bottle to the lab detector measurement cell††(%)
	28–35	f8.5	relative uncertainty (%)
n+1	1–2	a2	station archive container identification (optional)

Continues on next page

Table 91 (cont.)

Record	Position	Format	Description
	4–11	f8	archive bottle pressure (Pa) (optional)
	13–32	a20	gas composition (optional)

†This can be a quantity derived from Xe volume in the lab measurement cell and transfer efficiency.

††A description of how this is calculated shall be provided in the #AnalysisMethod block.

Table 92. #P_StationSample block format

Record	Position	Format	Description
1	1–14	a14	`#P_StationSample`
2	1–30	a30	activity category of the sample (according to international shipping regulations)
3	1–5	f5.2	diameter | length (cm)†
	7–11	f5.2	thickness (cm)
	13–17	f5.2	width (cm) (optional for some sample geometries)
4	1–5	f5.2	mass of the sample (g)
5	1–8	f8.4	container density (if one is used; optional for some samples)
	10–14	f5.2	container thickness (if one is used; optional for some samples)
	16–55	a40	container material (if one is used; optional for some samples)
6	1–60	a60	short text description of the sample geometry [RASA, Cinderella, compressed cylinder]

†Diameter is reported for cylindrical samples (e.g. those that have been compressed) and width is not reported. For rectangular samples (e.g. RASA and other uncompressed samples), length is reported along with the width of the sample. These dimensions are based on the standard sample geometries but may slightly differ from station the actual sample.

Table 93. #X_StationSample block format

Record	Position	Format	Description
1	1–14	a14	`#X_StationSample`
2	1–30	a30	activity category of the sample (according to international shipping regulations)
3	1–5	f5.2	reported stable xenon volume measured at station (cm^3)
	7–11	f5.2	relative uncertainty (%)
4	1–15	a15	container type [SAUNA, SPALAX, etc.]
	17–56	a40	short text description of the sample archive bottle (e.g. system version number, etc.)

Table 94. #P_Split block format

Record	Position	Format	Description
1	1–6	a6	`#P_Split`
2	1–5	f5.2	mass of the split sample (g)
	7–16	f10	calculated air volume of the split sample (m^3 at STP)
	18–22	f5.2	relative uncertainty (%)
3–n	1–80	a80	free text description of how the sample was split

Table 95. #X_Split block format

Record	Position	Format	Description
1	1–6	a6	`#X_Split`
2	1–5	f5.2	stable xenon volume of split sample (cm^3)
	7–11	f5.2	uncertainty of stable xenon (cm^3)
	13–17	f5.2	calculated air volume of the split sample (standard cubic metres)
	19–23	f5.2	relative uncertainty (%)
3–n	1–80	a80	free text description of how the sample was split

Table 96. #SampleReceipt block format

Record	Position	Format	Description
1	1–14	a14	`#SampleReceipt`
2	1–16	a16	sample reference identification
3	1–14	a14	seal number
4	1–10	i4,a1,i2,a1,i2	sample receipt date (*yyyy/mm/dd*)
	12–21	i2,a1,i2,a1,f4.1	sample receipt time (*hh:mm:ss.s*)
5	1–17	a17	`~PackageCondition`
6–n	1–80	a80	general free text comment describing package condition
n+1	1–14	a14	`~SealCondition`
n+2-m	1–80	a80	general free text comment describing seal condition
m+1-p	1–16	a16	`~SampleCondition`
p+1-q	1–80	a80	general free text comment describing sample condition

On Tables 97 and 98, the sample dimensions and mass are to report the sample's state after any geometry modifications at the laboratory.

Table 97. #P_LabSample block format

Record	Position	Format	Description
1	1–12	a12	`#P_LabSample`
2	1–11	e11.4	overall activity level of the sample (Bq) (for proper handling during shipment and receipt)
3	1–5	f5.2	diameter ∣ length (cm)[†]
	7–11	f5.2	thickness (cm)
	13–17	f5.2	width (cm) (optional for some sample geometries)
4	1–5	f5.2	mass of the sample (g) repeated for each equation in the same calibration
5	1–8	f8.4	container density (if one is used) (optional for some samples)
	10–14	f5.2	container thickness (if one is used) (optional for some samples)
	16–55	a40	container material (if one is used) (optional for some samples)
6–n	1–80	a80	free text description of how the sample was prepared for analysis

[†]Diameter is reported for cylindrical samples (e.g. those that have been compressed) and width is not reported. For rectangular samples (e.g. RASA and other uncompressed samples), length is reported along with the width of the sample.

Table 98. #X_LabSample block format

Record	Position	Format	Description
1	1–12	a12	`#X_LabSample`
2	1–11	e11.4	overall activity level of the sample (Bq) (for proper handling during shipment and receipt)
3	1–5	f5.2	stable xenon volume measured at the lab (cm^3)
4–n	1–80	a80	free text description of how the sample was prepared for analysis

Table 99. #Test block format

Record	Position	Format	Description
1	1–5	a5	`#Test`
2	1–40	a40	type of test performed (high-resolution γ spectrometry, β-γ coincidence, etc.)
3	1–10	i4,a1,i2,a1,i2	test completion date (*yyyy/mm/dd*)
4–n	1–80	a80	free text describing the purpose of the test

Table 100. Codes for calibration equations

Code	Type	Description
1	interpolation	no fitting

Continues on next page

Code	Type	Description
2	polynomial	$y(x) = a_0 + a_1 x + a_2 x^2 + \ldots$
3	square root polynomial	$y(x) = a_0 + a_1 x^{1/2} + a_2 x + \ldots$
4	square root of polynomial	$y(x) = \sqrt{a_0 + a_1 x + a_2 x^2 + \ldots}$
5	exponential efficiency function	$\varepsilon(E) = A f_1(E) f_2(E)$
6	polynomial in $\log \varepsilon$ against $\log E_\gamma$	$\log \varepsilon = a_0 + a_1 \log E_\gamma + a_2 (\log E_\gamma)^2 + \ldots + a_n (\log E_\gamma)^n$
7	polynomial in $\log \varepsilon$ against E_γ	$\log \varepsilon = a_1 E_\gamma + a_2 + a_3 E_\gamma^{-1} + a_4 E_\gamma^{-2} + \ldots$
8	polynomial in $\log \varepsilon$ against $\log \frac{1}{E_\gamma}$	$\log \varepsilon = a_0 + a_1 \log \frac{c}{E_\gamma} + a_2 \left(\log \frac{c}{E_\gamma}\right)^2 + \ldots$
9	inverse exponential	$\varepsilon = \frac{1}{a E_\gamma^{-x} + b E_\gamma^{-y}}$
99	other	description

Table 101. #EnergyCalibrationEquation block format

Record	Position	Format	Description
1	1–28	a28	`#EnergyCalibrationEquation`
2	1	i1	number of equations used
3	1–2	i2	equation type code, see Table 100
	4–5	i2	number of parameters in equation
	7–13	f7.2	start of energy range
	15–21	f7.2	end of energy range
4–n	1–11	e11.4	parameter 1
	13–23	e11.4	parameter 2
	25–35	e11.4	parameter 3
	37–47	e11.4	parameter 4

Records 3 and 4–n are repeated for each equation used in the calibration.

Table 102. #ShapeCalibrationEquation block format

Record	Position	Format	Description
1	1–28	a28	`#ShapeCalibrationEquation`
2	1	i1	number of equations used
3	1–2	i2	equation type code, see Table 100
	4–5	i2	number of parameters in equation
	7–13	f7.2	start of energy range
	15–21	f7.2	end of energy range
4–n	1–11	e11.4	parameter 1
	13–23	e11.4	parameter 2
	25–35	e11.4	parameter 3
	37–47	e11.4	parameter 4

Continues on next page

Table 102 (cont.)

Record	Position	Format	Description

Records 3 and 4–n are repeated for each equation used in the calibration.

Table 103. #EfficiencyCalibrationEquation block format

Record	Position	Format	Description
1	1–28	a28	`#EfficiencyCalibrationEquation`
2	1	i1	number of equations used
3	1–2	i2	equation type code, see Table 100
	4–5	i2	number of parameters in equation
	7–13	f7.2	start of energy range
	15–21	f7.2	end of energy range
4–n	1–11	e11.4	parameter 1
	13–23	e11.4	parameter 2
	25–35	e11.4	parameter 3
	37–47	e11.4	parameter 4

Records 3 and 4–n are repeated for each equation used in the calibration.

Table 104. #TotalEfficiencyCalibrationEquation block format

Record	Position	Format	Description
1	1–28	a28	`#TotalEfficiencyCalibrationEquation`
2	1	i1	number of equations used
3	1–2	i2	equation type code, see Table 100
	4–5	i2	number of parameters in equation
	7–13	f7.2	start of energy range
	15–21	f7.2	end of energy range
4–n	1–11	e11.4	parameter 1
	13–23	e11.4	parameter 2
	25–35	e11.4	parameter 3
	37–47	e11.4	parameter 4

Records 3 and 4–n are repeated for each equation used in the calibration.

Table 105. #PeaksMethod block format

Record	Position	Format	Description
1	1–13	a13	`#PeaksMethod`
2	1–30	a30	software used (SWGenie-2000 v3.3, *Interwinner 5.0*, etc.)
3–n	1–80	a80	free text description of the peak location algorithm, peak search threshold, baseline type, etc.

Table 106. #PeakSearch block format

Record	Position	Format	Description
1	1–11	a11	`#PeakSearch`
2–n	1–5	i5	peak index
	7–14	f8.3	centroid channel
	16–20	f5.2	centroid channel uncertainty (%)
	22–29	f8.3	energy (keV)
	31–41	f5.2	energy uncertainty (%)
	43–49	f7.3	peak search sensitivity (not present for inserted peaks)
	51–52	a2	peak comment (`A` for automatic, `I` for inserted, `M` for multiplet, `IM` for inserted peak in a multiplet)†

†It is acceptable to use `M` to indicate the first peak in a multiplet and `m` for each additional peak in that multiplet.

Table 107. #PeakFitPart1 block format

Record	Position	Format	Description
1	1–13	a13	`#PeakFitPart1`
2–n	1–5	i5	peak index
	7–11	f5.2	FWHM (keV)
	13–20	f8.3	start of ROI (channel number)
	22–29	f8.3	end of ROI (channel number)
	31–41	e11.4	mean baseline at the location of the peak (counts/channel)
	43–47	f5.2	uncertainty in mean baseline (%)
	49–60	a12	background type (`Detector, Blank`, etc.)
	62–72	e11.4	background net count rate (counts/s) (optional)†
	74–78	f5.2	background net count rate uncertainty (%) (optional)

†The background net count rate is the peak count rate in the relevant background spectrum, which may be subtracted from the peak count rate in the sample spectrum as necessary.

Table 108. #PeakFitPart2 block format

Record	Position	Format	Description
1	1–13	a13	`#PeakFitPart2`
2–n	1–5	i5	peak index
	7–17	e11.4	peak area (counts)†
	19–23	f5.2	peak area uncertainty (%)
	25–35	e11.4	net count rate††
	37–41	f5.2	net count rate uncertainty (%)
	43–53	e11.4	critical level (LC)
	55–60	f6.2	peak significance (area/LC)
	62–72	e11.4	efficiency
	74–78	f5.2	efficiency uncertainty (%)

†The peak area in the sample spectrum is the number of counts reported by the analysis software for use in calculating activity and is reported without background correction (subtraction).

††The net count rate is the peak area divided by the live time with background correction (subtraction) applied as necessary.

Table 109. #AnalysisMethods block format

Record	Position	Format	Description
1	1–18	a18	`#AnalysisMethods`
2	1–30	a30	software used (`Genie-2000`, etc.)
3	1–12	a12	`~NuclidesMethod`
4–n	1–80	a80	free text description of the nuclide identification algorithm, threshold, tolerance, etc
n+1	1–15	a15	`~BaselineMethod`
n+2-m	1–80	a80	free text description of the mean baseline calculation method
m+1	1–9	a9	`~LcMethod`
m+2-p	1–80	a80	free text description of the LC method
p+1	1–18	a18	`~CalibrationMethod`
p+2-q	1–80	a80	free text description of the calibration method

Table 110. #PeakAssociation block format

Record	Position	Format	Description
1	1–16	a16	`#PeakAssociation`
2–n	1–5	i5	peak index
	7–13	f7.3	percentage | fraction (peak explanation level)
	15–22	a8	nuclide name

Optional for β-γ coincidence systems.

Table 111. #References block format

Record	Position	Format	Description
1	1–8	a8	`#References`
2	1–10	a10	`~SAMPLEPHD`
3	1–31	a31	MID of the sample spectrum for this RLR†
4	1–9	a9	`~CALIBPHD`
5–n	1–31	a31	MID of the efficiency calibration spectrum or spectra (relevant spectrum or spectra for the geometry used in the test), if applicable†
n+1	1–18	a18	`~PhysicalConstants`
n+2-m	1–80	a80	physical constants reference (ENSDF-Brookhaven National Laboratory, revision number, year, etc.)

†The MID fields indicate the measurement identification for the sample and calibration spectra as assigned by the laboratory. See the format of the MID code (subsection 7.2.10 “MID examples” on p. 172).

Table 112. #InteractiveAnalysisLog block format

Record	Position	Format	Description
1	1–23	a23	`#InteractiveAnalysisLog`
2–n	1–80	a80	free text description of all actions taken during the interactive analysis process (list of rejected peaks, etc.)

Table 113. #P_Results block format

Record	Position	Format	Description
1	1–8	a8	`#P_Results`
2	1–10	i4,a1,i2,a1,i2	activity reference date (*yyyy/mm/dd*)
	12–21	i2,a1,i2,a1,f4.1	activity reference time (*hh:mm:ss.s*)
	23–32	i4,a1,i2,a1,i2	activity concentration reference date (*yyyy/mm/dd*)
	34–43	i2,a1,i2,a1,f4.1	activity concentration reference time (*hh:mm:ss.s*)
3–n	1–8	a8	nuclide name
	10–20	e11.4	activity (Bq) (decay-corrected to acquisition start of the lab)
	22–26	f5.2	activity uncertainty (%)
	28	i1	coverage factor, e.g. $k = 2$, $k = 3$ (optional, only used if the reported activity uncertainty is an expanded uncertainty)
	30–40	e11.4	activity concentration (Bq/m^3) (decay-corrected to sampling period, taking into account decay during spectral acquisition, sampling and during the period between sampling and acquisition; assume constant activity concentration and deposition during sampling)
	42–46	f5.2	activity concentration uncertainty (%)

Continues on next page

Table 113 (cont.)

Record	Position	Format	Description
	48	i1	coverage factor, e.g. $k = 2$, $k = 3$ (optional, only used if the reported activity concentration uncertainty is an expanded uncertainty)

Table 114. #X_Results block format

Record	Position	Format	Description
1	1–8	a8	`#X_Results`
2	1–10	i4,a1,i2,a1,i2	activity reference date (*yyyy*/*mm*/*dd*)
	12–21	i2,a1,i2,a1,f4.1	activity reference time (*hh*:*mm*:*ss*.*s*)
	23–32	i4,a1,i2,a1,i2	activity concentration reference date (*yyyy*/*mm*/*dd*)
	34–43	i2,a1,i2,a1,f4.1	activity concentration reference time (*hh*:*mm*:*ss*.*s*)
3–n	1–8	a8	nuclide name
	10–20	e11.4	activity (mBq) (decay-corrected to acquisition of the lab)
	22–26	f5.2	activity uncertainty (%)
	28	i1	coverage factor, e.g. $k = 2$, $k = 3$ (optional, only used if the reported activity uncertainty is an expanded uncertainty)
	30–40	e11.4	activity concentration (mBq/m^3) (decay-corrected to sampling period, taking into account decay during spectral acquisition, sampling and during the period between sampling and acquisition; assume constant activity concentration and deposition during sampling)
	42–46	f5.2	activity concentration uncertainty (%)
	48	i1	coverage factor, e.g. $k = 2$, $k = 3$ (optional, only used if the reported activity concentration uncertainty is an expanded uncertainty)

Table 115. #NuclideRatios block format

Record	Position	Format	Description
1	1–14	a14	`#NuclideRatios`
2–n	1–8	a8	nuclide 1
	10–17	a8	nuclide 2
	19–26	f8.3	activity ratio of nuclide 2 to 1
	28–32	f5.2	activity ratio uncertainty (%)
	34–43	i4,a1,i2,a1,i2	reference date for ratio (*yyyy*/*mm*/*dd*)
	45–54	i2,a1,i2,a1,f4.1	reference time for ratio (*hh*:*mm*:*ss*.*s*)
	56–65	i4,a1,i2,a1,i2	zero date (*hh*:*mm*:*ss*.*s*) (optional in some cases)†
	67–76	i2,a1,i2,a1,f4.1	zero time (*hh*:*mm*:*ss*.*s*) (optional in some cases)

	78–85	f8.3	zero date/time uncertainty (in days)

†The zero date and time are the start of in-growth of the daughter nuclides when nuclide 1 and nuclide 2 are a mother-daughter pair, respectively. These data are reported only when applicable and only for particulate samples. Its uncertainty should be expressed in days.

Table 116. #CoincidenceCorrection block format

Record	Position	Format	Description
1	1–24	a24	`#CoincidenceCorrection`
2–n	1–8	a8	nuclide name
	10–17	f8.3	energy
	19–26	f8.3	peak correction factor†
	28–32	f5.2	uncertainty of the peak correction factor (%)

†Peak correction factor defined as $A \sim \frac{1}{C_p}$. (CTBT/PTS/INF.96/Rev.10).

Table 117. #UncertaintyBudget block format

Record	Position	Format	Description
1	1–20	a20	`#UncertaintyBudget`
2	1–14	a14	`~Uncertainties`
3–n	1–8	a8	nuclide name (not needed for some descriptors)
	10–14	f5.2	uncertainty (%)
	16–55	a40	descriptor†
n+1	1–30	a30	`~UncertaintyCalculationMethods`
n+2-m	1–80	a80	free text description of the methods used for calculating uncertainties and combined uncertainty, and a description of the method for determining the level of confidence

†The Description field in records 3–n will be filled according to the categories for uncertainty, e.g. `Net-Count Rate` or Rn.

Table 118. #Lc block format

Record	Position	Format	Description
1	1–4	a4	`#LC`
2–n	1–8	a8	nuclide name
	10–20	e11.4	critical level (LC) in activity (mBq) (decay corrected to acquisition start of the lab)

Table 119. #P_MDA/MDC block format

Record	Position	Format	Description
1	1–4	a4	`#P_MDA/MDC`
2–n	1–8	a8	nuclide name
	10–20	e11.4	MDA (Bq) (decay corrected to acquisition start)
	22–32	e11.4	MDC (Bq/m^3) (decay-corrected to sampling period, taking into account decay during spectral acquisition, sampling and during the period between sampling and acquisition; assume constant activity concentration and deposition during sampling)

Table 120. #X_MDA/MDC block format

Record	Position	Format	Description
1	1–10	a10	`#X_MDA/MDC`
2–n	1–8	a8	nuclide name
	10–20	e11.4	MDA (mBq) (decay corrected to acquisition start)
	22–32	e11.4	MDC (mBq/m^3) (decay-corrected to sampling period, taking into account decay during spectral acquisition, sampling and during the period between sampling and acquisition; assume constant activity concentration and deposition during sampling)

Table 121. #Conclusions block format

Record	Position	Format	Description
1	1–12	a12	`#Conclusions`
2	1–11	a11	`~IDCSummary`
3–n	1–80	a80	free text summary of IDC findings
n+1	1–11	a11	`~LabSummary`
n+2-m	1–80	a80	free text summary of lab findings and conclusions
m+1	1–17	a17	`~ResultComparison`
m+2-p	1–80	a80	free text comparison of IDC and laboratory results

Table 122. #Comment block format

Record	Position	Format	Description
1	1–8	a8	`#Comment`
2–n	1–80	a80	free text

7.4 Other laboratory messages

The eight other laboratory messages are:

- PRESDN: Notification that a sample will be sent to a laboratory from station.
- TECSDN: Notification that a sample was sent from the laboratory to the PTS.
- LABSDN: Notification that a sample has been sent to a laboratory.
- MESACK: Acknowledgement that a message was received and read.
- SAMACK: Notification that a sample was received and an indication of its condition.
- DATREQ: Request for analysis results or any additional information.
- ADDINS: Instructions for the laboratory or a request for additional instructions from the PTS.
- MISC: Free format to cover any message that does not fit one of the other types.

Table 123. Data blocks in other laboratory messages

Data blocks	PRESDN	TECSDN	LABSDN	MESACK	SAMACK	DATREQ	ADDINS	MISC
#Header	r	r	r	r	r	r	r	r
#LabDataVersion	r	r	r	r	r	r	r	r
#Recipient		r	r				o	
#Transport		r	r				o	
#Collection			r				o	
#StationSample			r				o	
#IDCActivitySummary			o				o	
#IDCEventScreeningFlags			o				o	
#Split			o				o	
#Objective			r				o	
#MessageReceipt				r			o	
#SampleReceipt					r		o	
#Comment	o	o	o	o	o	o	o	o

r = required, o = optional

Formats for data blocks of #LabDataVersion, #Collection, #StationSample, #IDCActivitySummary, #IDCEventScreeningFlags, #Split, #Objective and #Comment are the same as those described in section 7.3 "Radionuclide laboratory reports", respectively. Formats for the other data blocks listed in Table 123 are described in Tables 124–127.

Table 124. #Header block format for other laboratory messages

Record	Position	Format	Description
1	1–7	a7	`#Header`
2	1–7	a7	priority level [`Urgent`|`Routine`]

Continues on next page

Table 124 (cont.)

Record	Position	Format	Description
3	1–5	a5	code of the laboratory selected for analysis `[ARL01, ..., USL16]`
	7–22	a16	Sample Reference Identification (SRID) of the sample
4	1–11	a11	sample category (`Category A...XK`)
5	1–10	i4,a1,i2,a1,i2	message transmission date (*yyyy/mm/dd*)
	12–21	i2,a1,i2,a1,f4.1	message transmission time (*hh:mm:ss.s*)

Table 125. #Recipient block format

Record	Position	Format	Description
1	1–10	a10	`#Recipient`
2	1–16	a16	sample reference identification
3	1–60	a60	point of contact
4	1–30	a30	point of contact phone number
5	1–60	a60	organization
6–n	1–60	a60	address

Table 126. #Transport block format

Record	Position	Format	Description
1	1–10	a10	`#Transport`
2	1–20	a20	courier company
3	1–10	i4,a1,i2,a1,i2	date of handover (*yyyy/mm/dd*)
	12–21	i2,a1,i2	time of handover (*hh:mm*)
4	1–10	i4,a1,i2,a1,i2	estimated date of arrival (*yyyy/mm/dd*)
	12–21	i2,a1,i2	estimated time of arrival (*hh:mm*)
5	1–30	a30	airway bill number
6	1–14	a14	seal number

Table 127. #MessageReceipt block format

Record	Position	Format	Description
1	1–10	a10	`#MessageReceipt`
2	1–10	i4,a1,i2,a1,i2	date of receipt (*yyyy/mm/dd*)
	12–21	i2,a1,i2	time of receipt (*hh:mm*)

7.5 State of Health data

Data messages of DATA_TYPE RMSSOH contain blocks of data that describe or allow the evaluation of the state of health (SOH) of the collection, processing, and acquisition equipment at an IMS radionuclide station.

Each RMSSOH data message is composed of a number of data blocks. The start of a data block is designated by a line containing the block name. Like PHD messages, all RMSSOH data block names begin with the pound (#) sign. The specific data blocks required in an RMSSOH message depend on the configuration of the radionuclide system. RMSSOH messages that do not contain all required data block cannot be processed by the IDC software. Table 128 summarizes the data block required in a RMSSOH message according to the equipment inventory at a site.

The #Header block (Table 129) must be the first data block in any RMSSOH message; however, no requirements on the order of the remaining data blocks are necessary. See I.31 on p. 328 for an example of an RMSSOH message.

Table 128. Data blocks for RMSSOH messages

Data blocks	Particulate data	Noble gas data
#Header	r	r
#AirSamplerFlow	r	r
#AirSamplerEnv†	r	
#Comment	o	o
#DetEnv	r	r
#PowerSupply	r	r
#EquipStatus	r	r
#TamperEnv	o	o
#ProcessSensors	o	r
#Chromatogram		o

r = required, o = optional

†This data block is required for stations where air is heated at the inlet.

Table 129. #Header block format for state of health data

Record	Position	Format	Description
1	1–7	a7	`#Header`
	9–18	a10	designator
2	1–5	a5	station code
	7–15	a9	detector code or `NA` if there is none or more than one detector
3	1–10	i4,a1,i2,a1,i2	SOH data sampling period start date (*yyyy/mm/dd*)
	12–21	i2,a1,i2,a1,f4.1	SoH data sampling period start time (*hh:mm:ss.s*)
	23–32	i4,a1,i2,a1,i2	SoH data sampling period end date (*yyyy/mm/dd*)
	34–43	i2,a1,i2,a1,f4.1	SoH data sampling period end time (*hh:mm:ss.s*)
	45–54	i4,a1,i2,a1,i2	transmit date (*yyyy/mm/dd*)
	56–65	i2,a1,i2,a1,f4.1	transmit time (*hh:mm:ss.s*)

An SOH data sampling period is defined as the total time duration in which the SOH data in the entire RMSSOH message are acquired. SOH is characterized by a start date and time as well as an end date and time. The SOH data sampling period consists of consecutive data sampling intervals. The interval start date and time indicates when the sampling interval begins. The interval duration describes how long the sampling interval lasts until the next one starts. An IMS station writes records at regular intervals (e.g. every 10 min) and upon a change of a status (e.g. power supplies, shielding, etc.).

Table 130. #AirSamplerFlow block format

Record	Position	Format	Description
1	1–15	a15	`#AirSamplerFlow`
2–n	1–10	f10.4	average flow rate (m^3/h at STP)
	12–22	f11.6	flow rate standard deviation (m^3/h at STP)
	24–33	i4,a1,i2,a1,i2	SOH data sampling interval start date (*yyyy/mm/dd*)
	35–44	i2,a1,i2,a1,f4.1	SOH data sampling interval start time (*hh:mm:ss.s*)
	46–51	i6	SOH data sampling interval duration (s)

Table 131. #AirSamplerEnv block format

Record	Position	Format	Description
1	1–14	a14	`#AirSamplerEnv`
2–n	1–5	f5.1	average air temperature after filter (°C)
	7–13	f7.2	average static air pressure after filter (kPa)
	15–24	i4,a1,i2,a1,i2	date (*yyyy/mm/dd*)
	26–35	i2,a1,i2,a1,f4.1	time (*hh:mm:ss.s*)
	37–42	i6	SOH data sampling interval duration (s)

Table 132. #DetEnv block format

Record	Position	Format	Description
1	1–7	a7	`#DetEnv`
2–n	1–5	f5.1	average room temperature (°C)
	7–12	a6	detector shield status (`OPEN` or `CLOSED`)
	14–16	i3	average room humidity (in % relative humidity)
	18–22	i5	detector high voltage (V)[†]
	24–27	i4	average crystal temperature (°C)
	29–31	a3	electric cooler status (`ON` or `OFF`)
	33–36	f4.2	liquid nitrogen fill-fraction or cooling power (W)[††]
	38–43	f6.3	detector leakage current (nanoamperes [nA])[‡]
	45–54	i4,a1,i2,a1,i2	date (*yyyy/mm/dd*)
	56–65	i2,a1,i2,a1,f4.1	time (*hh:mm:ss.s*)
	67–72	i6	SOH data sampling interval duration (s)

Continues on next page

Table 132 (cont.)

Record	Position	Format	Description

†This field contains the voltage that is applied across the detector crystal by the high voltage power supply and sometimes called the bias voltage.

††This field contains the volume fraction of liquid nitrogen remaining (usually in a dewar) for cooling the detector crystal or power consumption (W) for electrical cooling equipment. For example, a full dewar would have a liquid nitrogen fill-fraction of 1.00. A half-full dewar would have a liquid nitrogen fill-fraction of 0.50. For electrical cooling equipment, the field displays power consumption as a rounded value with four digits from 0.0 W up to 9999 W.

‡This field contains the steady-state leakage current of the detector crystal during normal operations.

Example

An IMS station writes a record in the #DetEnv block (Table 132) every 10 min or upon a change in the shield status and electric cooler status. The events in Table 133 occurred from 9:00:00 to 10:00:00 UTC on 13 December, 2000.

Table 133. Example detector environment events at an IMS station

Time	Event
9:10:45	the detector shield is opened
9:21:30	the detector shield is closed
9:34:30	the electro cooler fails

During this time, the average room temperature was 21.0 °C, the average room humidity was 54.0%, and the average crystal temperature was −196 °C. Accordingly, the following records are written in the #DetEnv block.

```
21.0  CLOSED 54  13   -196  ON  -999 5.9   2000/12/13 9:10:45   540
21.0  OPEN   54  13   -196  ON  -999 5.9   2000/12/13 9:19:45   105
21.0  CLOSED 54  13   -196  ON  -999 5.9   2000/12/13 9:21:30   600
21.0  CLOSED 54  13   -196  ON  -999 5.9   2000/12/13 9:31:30   180
21.0  CLOSED 54  13   -196  OFF -999 6.0   2000/12/13 9:34:30   600
21.0  CLOSED 54  13   -196  OFF -999 6.0   2000/12/13 9:34:30   600
```

The liquid nitrogen fill-fraction is not applicable to a detector system that is electrically cooled. Then the field displays power consumption as a rounded value with four digits from 0.0 W up to 9999 W. The field, however, must be filled with data or else the parsing program will fail. In case neither nitrogen fill-fraction nor power consumption are available, it is considered to be a case of missing data. The field is replaced with −999 as described in subsection 3.5.7 “Missing data” on p. 40 of this document.

Table 134. #PowerSupply block format

Record	Position	Format	Description
1	1–12	a12	`#PowerSupply`

Continues on next page

Table 134 (cont.)

Record	Position	Format	Description
2–n	1–4	a4	`MAIN` (for MAIN power supply)
	6–8	a3	status of main power supply (`ON`/`OFF`)
	10–12	a3	`AUX` (for AUXiliary power supply)
	14–16	a3	status of auxiliary power supply (`ON`/`OFF`)†
	18–20	a3	`UPS` (for Uninterrupted Power Supply)
	22–24	a3	status of uninterruptedly power supply (`ON`/`OFF`)††
	26–35	i4,a1,i2,a1,i2	date (*yyyy*/*mm*/*dd*)
	37–46	i2,a1,i2,a1,f4.1	time (*hh*:*mm*:*ss*.*s*)
	48–53	i6	SOH data sampling interval duration (s)

†This parameter is required when an auxiliary generator is installed.

††A UPS status of `ON` indicates the internal UPS batteries are being used to power the station.

Table 135. #Equipstatus block format

Record	Position	Format	Description
1	1–12	a12	`#Equipstatus`
2–n	1–2	a2	`C:` (for collection/sampling system)
	4–19	a16	status of sampling system (`ON`/`OFF`) or the SRID of the sample being collected
	21–22	a2	`P:` (for sample preparation, processing or decay)
	24–39	a16	status of sample preparation, processing or decay (`ON`/`OFF`) or the SRID of the sample being processed or decayed
	41–42	a2	`A:` (for data acquisition)
	44–59	a16	status of detector system (`ON`/`OFF`) or the SRID of the sample being counted
	61–70	i4,a1,i2,a1,i2	date (*yyyy*/*mm*/*dd*)
	72–81	i2,a1,i2,a1,f4.1	time (*hh*:*mm*:*ss*.*s*)
	83–88	i6	SOH data sampling interval duration (s)

Table 136. #TamperEnv block format

Record	Position	Format	Description
1	1–10	a10	`#TamperEnv`
2–n	1–20	a20	tamper sensor name
	22–27	a6	tamper sensor status (`OPEN` or `CLOSED`)
	29–38	i4,a1,i2,a1,i2	date (*yyyy*/*mm*/*dd*)
	40–49	i2,a1,i2,a1,f4.1	time (*hh*:*mm*:*ss*.*s*)
	51–56	i6	SOH data sampling interval duration (s)

Valid names for tamper sensors are listed in Table 137. Stations should send data for the tamper sensors they have. Some stations may have more tamper sensors than those currently recognized by the IDC. If an invalid name or extra sensor is listed in the #TamperEnv block (Table 136), the record will saved at the IDC but not parsed into the database tables. In the future, more sensor names may be added.

Table 137. Tamper sensor names recognized by IDC parsing software

Name	Tamper sensor location
door1	main entrance
door2	second door
door3	third door
fence	fence entrance
aslid	air sampler lid
aspanel	air sampler panel
fscab	filter storage cabinet
decaycab	decay cabinet
equipcab	equipment cabinet —primarily for automated stations

Table 138 is required for noble gas and optional for particulate RMSSOH messages. It facilitates the reporting of SOH data from various sensors throughout the units during different processes. Each noble gas unit may report any number of sensor readings using this data block, for example, temperatures, pressures, flows, voltages and count rates. Stations report data only for those sensors they have. Unique sensor names are required to distinguish between sensors of the same type. Each station type can create its own sensor names up to 20 alphanumeric characters long. Sensor readings must be reported in the units listed.

Table 138. #ProcessSensors block format

Record	Position	Format	Description
1	1–13	a13	`#ProcessSensors`
2–n	1–15	a15	sensor type (`TEMP`, `PRESSURE`, `PROCESSFLOW`, `VOLTAGE`, `COUNTRATES`, `DEWPOINT`, `CO2VOLUME`)
	17–36	a20	sensor name
	38–57	f10.4	sensor reading (`TEMP` in °C, `PRESSURE` in Pa, `PROCESSFLOW` in m^3/h, `VOLTAGE` in V, `COUNTRATE` in counts/s, `DEWPOINT` in °C, `CO2VOLUME` in cm^3)
	59–68	i4,a1,i2,a1,i2	date (*yyyy/mm/dd*)
	70–79	i2, a1,i2, a1, f4.1	time (*hh:mm:ss.s*)
	81–86	i6	SOH duration (s)

During noble gas system development, new blocks regarding sequence sensors in SOH messages are introduced. A #SequenceSensors block is defined, especially regarding a new system SPALAX NG.

Table 139 is optional for noble gas RMSSOH messages. It facilitates the reporting of SoH data from sequence sensors throughout the units during different processes. Each noble gas unit may report any number of sensors which might be used for maintenance and troubleshooting. Systems report data only for those sensors they have. Unique sensor names are required to distinguish between sensors of the same type.

Table 139. #SequenceSensors block format

Record	Position	Format	Description
1	1–16	a16	`#SequenceSensors`
2–n	1–12	a12	sequence sensor name (`SEQ_G20`, `SEQ_G1`, `SEQ_G3`, . . .)
	14–16	i3	sequence code #1
	18–20	i3	sequence code #2
	22–27	a6	sequence status (`AUTO`, `MANUAL`, `MAINT` or any)
	29–32	i4	Other parameter, if applicable
	34–43	i4,a1,i2,a1,i2	date (*yyyy*/*mm*/*dd*)
	45–54	i2,a1,i2,a1,f4.1	time (*hh*:*mm*:*ss*.*s*)
	56–61	i6	SOH sampling interval duration (s)

An example of a #SequenceSensors block follows.

```
#SequenceSensors
Seq_G20 000 001 AUTO -999 2021/03/15 16:30:00.2 600
Seq_G20 000 001 AUTO -999 2021/03/15 16:40:00.2 600
Seq_G20 000 001 AUTO -999 2021/03/15 16:50:00.2 600
Seq_G01 007 001 AUTO -999 2021/03/15 15:00:00.2 001
Seq_G01 008 001 AUTO -999 2021/03/15 15:00:01.0 599
...
```

The #Chromatogram block is used only for RMSSOH messages from noble gas stations with chromatograms.

Table 140. #Chromatogram block format

Record	Position	Format	Description
1	1–11	a11	`#Chromatogram`
2	1–80	a80	the SRID of the sample being counted
3	1–5	i5	total number of chromatogram readings (equal to the total number of channels)
4–n	1–5	i5	interval[†]number (starts at 1)
	6–15	i10	interval start channel
	16–29	f14	duration between chromatogram readings (in s)
n+1–m	1–5	i5	channel[††]
	7–16	i10	detector response at channel + 0
	18–27	i10	detector response at channel + 1
	29–38	i10	detector response at channel + 2
	40–49	i10	detector response at channel + 3

Continues on next page

Table 140 (cont.)

Record	Position	Format	Description
	51–60	i10	detector response at channel + 4

†A group of chromatogram readings with the same time duration between each.

††Each detector reading is assigned a sequential number that is the channel number.

There are two blocks related to gain drift corrections, one in PHDs and the other one in RMSSOH, which are only applicable for SAUNA III systems deployed in the IMS radionuclide network. Below is the table in SOHs.

Table 141. #Gainstab block format

Record	Position	Format	Description
1	1–9	a9	`#Gainstab`
2–n	1–31	a31	template MID
	33–63	a31	monitored MID
	65–67	a3	NaI flag
	69–75	f7.4	gain correction compared to the previous setting
	77–83	f7.4	gain correction compared to the previous setting
	85	a1	correction (`1`) or not (`0`)
	87–89	a3	β 1 flag
	91–97	f7.4	gain correction compared to the previous setting
	99–105	f7.4	gain correction compared to the previous setting
	107	a1	correction (`1`) or not (`0`)
	109–111	a3	β 2 flag
	113–119	f7.4	gain correction compared to the previous setting
	121–127	f7.4	gain correction compared to the previous setting
	129	a1	correction (`1`) or not (`0`)
	131–140	i4,a1,i2,a1,i2	date (*yyyy/mm/dd*)
	142–151	i2,a1,i2,a1,f4.1	time (*hh:mm:ss.s*)
	153–158	i6	SoH data sampling interval duration (s)

7.6 Meteorological data

Data messages of DATA_TYPE MET contain the meteorological data recorded at an IMS radionuclide station. The format for the MET data type is given in Table 142 “Meteorological data” on p. 208 and an example is provided in section I.22 “MET” on p. 305. There must be at least one record in a MET message.

Table 142. MET data format

Record	Position	Format	Description
1	1–5	a5	station code
2–n	1–10	i4,a1,i2,a1,i2	met start date (*yyyy*/*mm*/*dd*)
	12–21	i2,a1,i2,a1,f4.1	met start time (*hh*:*mm*:*ss*.*s*)
	23–32	i4,a1,i2,a1,i2	met end date (*yyyy*/*mm*/*dd*)
	34–43	i2,a1,i2,a1,f4.1	met end time (*hh*:*mm*:*ss*.*s*)
	45–49	f5.1	average outside temperature (°C)
	51–53	i3	average wind-direction (degrees from north)
	55–59	f5.1	average wind-speed (m/s)
	61–67	f7.2	average barometric reading (hPa)
	69–71	i3	average relative humidity (% relative humidity)
	73–77	f5.1	rainfall (mm)

7.7 Alerts

Currently five types of ALERT messages are implemented.

- ALERT_FLOW: This type of data message indicates that the sampler flow rate is above or below a specified threshold.
- ALERT_SYSTEM: This type of data message indicates a problem with major equipment.
- ALERT_TEMP: This type of data message indicates that a temperature sensor is above or below a specified threshold.
- ALERT_POWER: This type of data message indicates a problem with the power supply (e.g. loss of main power).
- ALERT_PRESSURE: This type of data message indicates that a pressure sensor reading is above or below a specified threshold.

Table 143 describes the general format of an ALERT message. Examples of ALERT messages can be found in Appendix I "Data message examples" on p. 261.

Table 143. General ALERT message format

Record	Position	Format	Description
1	1–5	a5	station code
	7–18	a12	alert type (`ALERT_FLOW`, `ALERT_SYSTEM`, `ALERT_TEMP`, `ALERT_POWER` or `ALERT_PRESSURE`)
	20–29	i4,a1,i2,a1,i2	date (*yyyy*/*mm*/*dd*)
	31–40	i2,a1,i2,a1,f4.1	time (*hh*:*mm*:*ss*.*s*)
2–n[†]	1–80	a80	free text describing alert

[†]There must be at least one line of free text describing the problem.

7.8 IDC products

The following data products are generated by the IDC and are made available to subscribers:

- Automatic Radionuclide Report (ARR): The ARR contains results from the automated analysis of a particulate or noble gas sample.
- Reviewed Radionuclide Report (RRR): The RRR is a revised version of the ARR and is generated after the manual analysis of a particulate or noble gas sample is complete.
- Standard Screened Radionuclide Event Bulletin (SSREB): The SSREB is produced for particulate samples categorized as level 4 and level 5 and noble gas samples categorized as level C. This report contains the RRRs from stations contributing to the event, information on fission or activation products identified and an enhanced field of regard. The SSREBs may be updated as the laboratory analysis results arrive.
- Radionuclide Network Product Summary (RNPS): The RNPS contains a compilation of the status of collection, processing and analysis of all the data received from the IMS stations during a period.
- SAMPML/REVSAMP (sample PHD data plus analysis results in XML format): The SAMPML/REVSAMP contains noble gas spectra PHDs and analysis results in XML format, including the SAMPML and REVSAMP for ARR and RRR, respectively. For β-γ coincidence event samples, it includes all four kind spectra of the sample, detector background, gas background and QCPHDs. It is not a standard IDC product but can be requested from the *VDMS*. And it is only available for noble gas monitoring systems.

The DATA_TYPE of these reports is ARR, RRR, SSREB, RNPS, SAMPML or REVSAMP, respectively.

7.8.1 ARR

7.8.1.1 ARR—Particulate version

An ARR for particulate systems contains the following sections:

- Sample Information
- Measurement Categorization
- Activity Summary
- Minimum Detectable Concentration for Key Nuclides
- Peak Search Results
- Processing Parameters
- Calibration Parameters
- Data Timeliness and Availability Flags
- Data Quality Flags
- Calibration Equations.

- Field of Regard

The Sample Information section includes information on the sample collection and data acquisition (Table 144).

Table 144. ARR Sample Information section format for particulate systems

Record	Position	Format	Description
1(title)	1–73	a73	`SAMPLE INFORMATION =====================`
3	1–12	a11	`Station ID:`
	21–26	a6	system code
	41–52	a12	`Detector ID:`
	61–70	a10	detector code
4	1–14	a14	`Authenticated:`
	21–23	a3	`YES` or `NO`
6	1–17	a17	`Station Location:`
	19–48	a30	place and county location of the station
7	1–21	a21	`Detector Description:`
	23–73	a49	detector number and location
9	1–10	a10	`Sample ID:`
	23–30	i8	unique number assigned to a PHD message by the IDC. This number is referenced in all data products resulting from the PHD set with that SID
	41–56	a16	`Sample Geometry:`
	61–70	a10	station type and sample dimensions
10	1–16	a16	`Sample Quantity:`
	23–30	f8.2	total atmospheric air volume sampled (m^3 at STP)
	32–33	a2	`m3`
	41–52	a12	`Sample Type:`
	61–71	a11	`particulate` or `gas`
13	1–17	a17	`Collection Start:`
	21–30	i4,a1,i2,a1,i2	collection start date (*yyyy*/*mm*/*dd*)
	32–36	i2, a1, i2	w time (*hh*:*mm*)
	41–54	a14	`Sampling Time:`
	63–67	f5.2	sample collection duration and is equal to the difference in the collection stop and collection start times
	69–73	a5	`hours`
14	1–16	a16	`Collection Stop:`
	21–30	i4,a1,i2,a1,i2	collection stop date (*yyyy*/*mm*/*dd*)
	32–36	i2, a1, i2	collection start time (*hh*:*mm*)
	41–51	a11	`Decay Time:`
	63–67	f5.2	decay time in h
	69–73	a5	`hours`

Continues on next page

Table 144 (cont.)

Record	Position	Format	Description
15	1–18	a18	`Acquisition Start:`
	21–30	i4,a1,i2,a1,i2	sample start date (*yyyy*/*mm*/*dd*)
	32–36	i2, a1, i2	sample start time (*hh*:*mm*)
	41–57	a17	`Acquisition Time:`
	63–67	f5.2	detector count duration in h
	69–73	a5	`hours`
16	1–17	a17	`Acquisition Stop:`
	21–30	i4,a1,i2,a1,i2	acquisition stop date (*yyyy*/*mm*/*dd*)
	32–26	i2, a1, i2	acquisition stop time (*hh*:*mm*)
	41–54	a14	`Avg Flow Rate:`
	62–67	f6.2	average blower flow rate in m^3/h for IMS particulate stations. For particulate IMS stations, the average flow rate is equivalent to the Sample Quantity divided by the Sampling Time
	69–73	a5	`m3/hr`
18	1–28	a28	`Collection Station Comments:`
19 – *k*	1–73	a73	free text comments
20	1–30	a30	`IDC Analysis General Comments:`
20 – *k*	1–73	a73	free text comments

The Measurement Categorization section contains a legend of categorizations levels as well as the sample category (Table 145).

Table 145. ARR Measurement Categorization section format for particulate systems

Record	Position	Format	Description
1 (title)	1–73	a73	`MEASUREMENT CATEGORIZATION` `======================`
3 (header)	1–22	a22	`Categorization Legend`
	1–21	a21	`-----------`
	1–41	a41	`Level 1 = Typical Background Rad. Meas.`
	1–43	a43	`Level 2 = Anomalous Background Rad. Meas.`
	1–44	a44	`Level 3 = Typical Anthropogenic Rad. Meas.`
	1–46	a46	`Level 4 = Anomalous Anthropogenic Rad. Meas.`
	1–52	a52	`Level 5 = Mult. Anomalous Anthropogenic Rad. Meas.`
11 (data)	1–19	a19	`Spectrum Category (`
	20	i1	spectrum category of the sample
	21–25	a5	`) -`
	26–56	a40	short description of the spectrum category
13	1–23	a23	`Categorization Summary:`

Continues on next page

Table 145 (cont.)

Record	Position	Format	Description
15(header)	1–4	a4	`Name`
	12–19	a8	`Category`
	23–44	a22	`Categorization Comment`
	1–4	a4	`--`
17 (data)	1–6	a6	isotope name
	15	i1	isotope category
	24–45	a22	comments to the isotope category

The Activity Summary section displays the activity concentrations and relative uncertainties of the radionuclides detected in the sample (Table 146). The following blocks are included: Natural Radioactivity, Activation-Products Radioactivity and Fission-Product Radioactivity. Quantified relevant and non-CTBT-relevant radionuclides are listed in the Activation-Products Radioactivity and Fission-Product Radioactivity blocks.

Table 146. ARR Activity Summary section format for particulate systems

Record	Position	Format	Description
1 (title)	1–16	a16	`ACTIVITY SUMMARY`
3	1–22	a22	`NATURAL RADIOACTIVITY:`
5	1–45	a45	`Nuclides Identified and not Quantified:`
7		free text	list of nuclide present in the sample for which the activity has not been determined
11	1–20	a20	`Nuclides Quantified:`
13 (header)	1–7	a7	`Nuclide`
	20–28	a9	`Half-Life`
	41–52	a12	`Conc(uBq/m3)`
	61–68	a8	`RelErr(%)`
	77–88	a12	`Activ(uBq)`
	97–104	a8	`RelErr(%)`
15–n (data)†	1–7	a7	nuclide name
	20–22	a13	half-life in seconds, hours, days or years
	41–51	e11.2	activity concentration ($\mu Bq/m^3$)
	61–65	f5.2	uncertainty of the activity concentration in percentage
	77–87	e11.2	activity (µBq) at the acquisition start
	97–101	f5.2	uncertainty of the activity in percentage
n+1	1–33	a33	`ACTIVATION-PRODUCT RADIOACTIVITY:`
n+3 (header)	1–7	a7	`Nuclide`
	20–28	a9	`Half-Life`
	41–52	a12	`Conc(uBq/m3)`
	61–68	a8	`RelErr(%)`

Continues on next page

Table 146 (cont.)

Record	Position	Format	Description
	77–88	a12	`Activ(uBq)`
	97–104	a8	`RelErr(%)`
	113–123	a11	`Coincidence`
n+5-m (data)†	1–7	a7	nuclide name
	20–22	a13	half-life in seconds, hours, days, or years
	41–51	e11.2	activity concentration (µBq/m^3)
	61–65	f5.2	uncertainty of the activity concentration in percentage
	77–87	e11.2	activity (µBq)
	97–101	f5.2	uncertainty of the activity in percentage
	113–115	a3	`YES` or `NO`
m+1	1–33	a33	`FISSION-PRODUCT RADIOACTIVITY:`
m+3 (header)	1–7	a7	`Nuclide`
	20–28	a9	`Half-Life`
	41–52	a12	`Conc(uBq/m3)`
	61–68	a8	`RelErr(%)`
	77–88	a12	`Activ(uBq)`
	97–104	a8	`RelErr(%)`
	113–123	a11	`Coincidence`
m+5-p (data)†	1–7	a7	nuclide name
	20–22	a13	half-life in seconds, hours, days, or years
	41–51	e11.2	activity concentration (µBq/m^3)
	61–65	f5.2	uncertainty of the activity concentration in percentage
	77–87	e11.2	activity (µBq)
	97–101	f5.2	uncertainty of the activity in percentage
	113–115	a3	`YES` or `NO`

†The records in the data block are the number of the detected isotopes.

The Minimum Detection Concentration for Key Nuclides section (Table 147) lists the half-lives and MDCs of CTBT-relevant radionuclides.

Table 147. ARR Minimum Detectable Concentration for key nuclides section format for particulate systems

Record	Position	Format	Description
1 (title)	1–45	a45	`MINIMUM DETECTABLE CONCENTRATION FOR KEY NUCLIDES`
2 (header)	1–7	a7	`Nuclide`
	20–28	a9	`Half-Life`
	44–54	a11	`MDC(uBq/m3)`
	64–74	a11	`MDA(uBq)`
3 (data)	1–7	a7	nuclide name

Continues on next page

Table 147 (cont.)

Record	Position	Format	Description
	20–32	a13	half-life in seconds, hours, days, or years
	44–54	e11.2	MDC (µBq/m^3)
	64–74	e11.2	MDA (µBq)

The Peak Search Results section (Table 148) lists information on the peaks identified during automated analysis of high-resolution γ-spectrometry data.

Table 148. ARR Peak Search Results section format for particulate systems

Record	Position	Format	Description
1 (title)	1–30	a30	`PEAK SEARCH RESULTS`
3	6–8	i3	number of peaks found in the spectrum by automated peak search
	10–68	a59	`peaks found in spectrum by automated peak search.`
4	6–8	i3	number of peaks associated with nuclide by automated processing
	10–68	a59	`peaks associated with nuclide by automated processing.`
5	6–8	i3	number of peaks not associated with nuclide by automated processing
	10–68	a59	`peaks not associated with nuclide by automated processing.`
6	7–8	i2	% of peaks were associated with nuclide
	10–68	a59	`% of peak were associated with nuclide.`
8	2–64	a63	`Note: "*" indicates that a peak was a component of a multiplet.`
10 (headers)	2–12	a11	`Energy(keV)`
	16–23	a8	`Centroid`
	26–30	a5	`Width`
	33–41	a9	`FWHM(keV)`
	45–50	a6	`Eff(%)`
	58–61	a4	`Area`
	67–74	a8	`Bkgnd(%)`
	78–86	a9	`RelErr(%)`
	92–98	a7	`Nuclide`
	103–105	a3	`Nts`
12–n (data)	1–13	f7.2	energy at peak centroid in keV
	16–23	f7.2	peak centroid channel
	28–30	i2	peak width (FWHM) in channel

Continues on next page

Table 148 (cont.)

Record	Position	Format	Description
	37–42	f6.2	FWHM in keV
	46–51	f6.2	detection efficiency in percentage
	55–64	f10.2	peak net area in counts corrected for background
	70–75	f7.2	ratio of the peak area to the normalized background peak area in percentage
	82–87	f7.2	uncertainty of the peak net area in percentage
	92–99	a7	nuclide id
	103–	free text	free text notes

The Processing Parameters section (Table 149) includes the settings used by the software to identify peaks and quantify peak characteristics.

Table 149. ARR Processing Parameters section format for particulate systems

Record	Position	Format	Description
1 (title)	1–21	a21	`PROCESSING PARAMETERS`
3	1–32	a13	`Risk level k:`
	34–50	f5.2	risk of making an incorrect judgment that a channel represents part of a real peak when it does not
4	1–32	a19	`Baseline algorithm:`
	34–50	a17	algorithm used for estimating the shape of the background under a peak
5	1–32	a32	`Nucl Id Detectability Threshold:`
	34–50	f4.2	quality threshold for declaring a peak
6	1–32	a20	`Energy Id Tolerance:`
	34–50	a10	maximum allowed difference in keV for automatic association of a peak to a nuclide
7	1–32	a22	`Background subtraction:`
	34–50	a3	`YES` or `NO`
8	1–32	a22	`Background spectrum ID:`
	34–51	a8	sample ID of the background spectrum used
9	1–32	a22	`Background data type:`
	34–50	a8	data type of the background spectrum, e.g. blank or detector background
10	1–32	a30	`Background acquisition start:`
	34–50	a3	date and time of the acquisition start
11	1–32	a22	`Background acquisition time:`
	34–38	f5.2	acquisition time (h) of the background spectrum
	40–44	a5	`hours`
12	1–32	a16	`IRF for Pb-212F:`

Continues on next page

Table 149 (cont.)

Record	Position	Format	Description
	34–50	a3	YES or NO

The Calibration Parameters section (Table 150) includes the types of energy, resolution and efficiency calibration parameters used during automated analysis.

Table 150. Calibration Parameters section format for particulate systems

Record	Position	Format	Description
1 (title)	1–23	A23	CALIBRATION PARAMETERS
3	1–15	a15	Area Threshold:
	29–31	i3	area threshold
4	1–16	a16	Confidence Level:
	29–31	i3	confidence level used
5	1–11	a11	ECR updated:
	29–31	a3	energy vs channel regression (ECR) updated
6	1–11	a11	RER updated:
	29–31	a3	resolution vs energy regression (RER) updated
7	1–8	a8	Used ECR:
	29–38	a10	ECR type
8	1–9	a9	Used RER:
	29–38	a10	RER type

The Data Timeliness and Availability Flags section (Table 151) contains information about the presence or absence of the previous sample; the acceptability of the duration of sample collection, sample decay and sample acquisition; and the time difference between receipt of raw data and report creation.

Table 151. ARR Data Timeliness and Availability Flags section format for particulate systems

Record	Position	Format	Description
1 (header)	1–38	a38	DATA TIMELINESS AND AVAILABILITY FLAGS
3	1–24	a24	Previous Sample Present?
	56–58	a3	YES or NO
4	1–38	a38	Collection time within 24 hours +/- 10%?
	56–58	a3	YES or NO
5	1–29	a29	Acquisition time >= 20 hours?
	56–58	a3	YES or NO
6	1–23	a23	Decay time <= 24 hours?
	56–58	a3	YES or NO

Continues on next page

Table 151 (cont.)

Record	Position	Format	Description
7	1–50	a50	`Sample received within 72 hours of collect start?`
	56–58	a3	`YES` or `NO`

The Data Quality Flags section lists values for SOH and data quality parameters, acceptable values for these parameters, and test results (`PASS/FAIL`)(Table 152).

Table 152. ARR Data Quality Flags section format for particulate systems

Record	Position	Format	Description
1 (title)	1–18	a18	`DATA QUALITY FLAGS`
3 (header)	1–4	a4	`Name`†
	32–40	a9	`Pass/Fail`
	43–47	a5	`Value`
	59–61	a4	`Test`
5	1–30	a30	`Ba140_MDC`
	32–35	a4	`PASS` or `FAIL`
	43–53	e11.5	value of the ^{140}Ba MDC (µBq/m^3)
	59–74	a16	`<30`
6	1–30	a30	`K40_LocationDifference`
	32–35	a4	`PASS` or `FAIL`
	43–53	e11.5	value of the difference between the centroid location for the 40 K peak in the current spectrum and the location of the 40 K peak in the MRP spectrum
	59–74	a16	`<3*standard deviation`
7	1–30	a30	`NormalizedGainDifference`
	32–35	a4	`PASS` or `FAIL`
	43–53	e11.5	value of the difference between the normalized gain for the current spectrum and that of the MRP spectrum
	59–74	a16	`<0.0001`
8	1–30	a30	`Be7_FWHM`
	32–35	a4	`PASS` or `FAIL`
	43–53	e11.5	value of the ^{7}Be FWHM (keV)
	59–74	a16	`<1.7`
9	1–30	a30	`FlowRate`
	32–35	a4	`PASS` or `FAIL`
	43–53	e11.5	value of the sampling flow rate (m^3/h)
	59–74	a16	`>500`

†The five flags are listed in the table but only flags which are available will be given in A/RRRs.

The Calibration Equations section includes the energy, resolution, and efficiency calibration equations generated during automated analysis (Table 153).

Table 153. ARR Calibration Equations section format for particulate systems

Record	Position	Format	Description
1 (title)	1–21	a21	`CALIBRATION EQUATIONS`
3	1–18	a18	`Energy vs. Channel`
5	1–42	a42	energy calibration equation
7	3–19	a16	`E = energy (keV)`
8	3–20	a18	`c = channel number`
11	1–18	a18	`Resolution vs. Energy`
13	1–42	a42	resolution calibration equation
15	3–35	a32	`FWHM = Full Width Half Max (keV)`
16	3–18	a16	`E = energy (keV)`
19	1–21	a21	`Efficiency vs. Energy`
21	2–11	a10	type of efficiency calibration
22 (header)	11–46	a36	`Energy Efficiency Uncertainty`
23	13–16	i4	energy
	22–31	f10	efficiency
	37–46	f10	uncertainty

The Field of Regard section contains the URL link to the field of regard associated with the sample.

An example of an Automated Radionuclide Report is provided in section section I.3 “ARR—Particulate version” on p. 281.

7.8.1.2 ARR—Noble gas systems

An ARR noble gas report contains following sections:

- Report title
- Sample Information
- Measurement Categorization
- Activity Summary and Minimum Detectable Concentration for Xenon Isotopes
- Processing Specific Parameters and Results
- Processing Parameters
- Calibration Parameters
- Data Timeliness and Availability Flags
- Data Quality Flags
- Event Screening Flags
- Calibration Equations.

ARR noble gas reports are given in both plain text and HTML formats. Since the structure and content of both plain text and HTML formats are the same, only the latter will be described. The only difference between the two is that the HTML format contains also time development and frequency distribution plots. The HTML format consists of HTML tags, that specify the appearance of the content. The title and section names are defined as bold letters with different font sizes. The report contents are displayed either in a line style with two parts of a header and specific data or in a table style with headers and data rows in a few columns. The detailed description of the HTML tags is beyond the scope of this document. Two complete typical examples from an HPGe system and a β-γ coincidence event system with detailed HTML tags are provided in subsection I.2.2 "β-γ coincidence systems (HTML format)" and subsection I.2.4 "HPGe systems (HTML format)" on pp. 267 and 276, respectively. Formats of report contents are described below.

The Title section includes the ARR title along with the date and time information about the sample spectrum and report. A screenshot of the Title section of the ARR example from the station AUX33 is shown in Figure 3. The title block displays a bold free text of "IDC Generated Report", "Automatic Radionuclide Report" and "Noble Gas Version" in three lines, respectively. The second block displays the "Creation Date", "Sample Arrival Time" and "Time difference from receipt of the sample spectra to the report creation" in three distinct lines. Each message line contains two parts, i.e. the header and the specific data. For example, the header of the first message line is the Creation Date: which will be the same for all spectra analysis and the report specific data is 2021-12-08 17:54:49, which is the specific date and time when this report was created. All message lines in the title section are centre aligned.

IDC Generated Report
Automatic Radionuclide Report
Noble Gas Version

Creation Date: 2022-06-01 03:53:55
Sample Arrival Time: 2022-06-01 03:53:40
Time difference from receipt of raw data to report creation: 15.0 s

Figure 3. ARR title section for noble gas (common in both β-γ coincidence event and HPGe) systems.

The contents of the Sample Information section are more or less the same as those in subsubsection 7.8.1.1 "ARR—Particulate version" (Table 144 on p. 210), except for the stable xenon volume instead of the total sampling volume for the particulate systems. It contains four blocks as shown in Figure 4:

- The first block lists the station ID, detector code and authenticated flag in four columns by two rows.
- The second block lists the station location, detector description and system technology in two columns by three rows.
- The third block displays the sample reference ID, sample ID, stable xenon volume and sample type in four columns by three rows.
- The last block contains the time information like the collection start date and time, sampling time, processing time, acquisition start and acquisition stop date and time, and acquisition time in four columns by four rows.

All messages are left-aligned unless otherwise noted.

Sample Information

Station ID:	USX75	Detector Code:	USX75_007
Authenticated:	YES		
Station Location:	NG Charlottesville, VA, USA		
Detector Description:	Detector #7 in Charlottesville, VA, USA		
System Technology:	SAUNA		
Sample Reference ID:	75202205302111X		
Sample ID:	6738612		
Stable Xe Volume:	3.20 ml	Sample Type:	Gas
Collection Start:	2022-05-30 21:42:10	Sampling Time:	12 h
Collection Stop:	2022-05-31 09:42:10	Processing Time:	6 h 59 m 2 s
Acquisition Start:	2022-05-31 16:41:12	Acquisition Time:	11 h 10 m
Acquisition Stop:	2022-06-01 03:51:12		

Figure 4. ARR Sample Information section for noble gas (common in both β-γ coincidence event and HPGe) systems.

The Measurement Categorization section contains three blocks as shown in Figure 5:

- The first block is the Categorization Legend for noble gas samples and is presented in two columns, e.g. Level A, B and C and their short descriptions, respectively.
- The second block is the isotope category for each xenon isotope in a table style. Headers of the table are shown in Table 154.
- The last block is an one line message about the Spectrum Category, which is dependent on the highest level of the isotope category, including the category level and its short description.

Measurement Categorization

Categorization Legend

Level A = Clean spectrum - No Xenon is present in the sample.
Level B = Xenon detection within the typical range for the station.
Level C = Anomalous Xenon detection.

Isotope category

Isotope	Nuclide detected	Abnormal_limit *(mBq/m3)*	Category
Xe-131m	YES	1.67E-01	B
Xe-133m	NO	1.14E-01	A
Xe-133	NO	5.24E-01	A
Xe-135	NO	7.94E-01	A

Spectrum Category: B - Xenon detection within the typical range for the station

Figure 5. ARR Measurement Categorization section for noble gas (common in both β-γ coincidence event and HPGe) systems.

Table 154. ARR Isotope category block columns

Column	Content	Description
1	`Isotope`	xenon isotope name
2	`Nuclide Detected`	flags of the detected xenon isotopes, `YES` or `NO`

Continues on next page

Table 154 (cont.)

Column	Content	Description
3	`Abnormal_Limit`	abnormal limit (mBq/m^3)
4	`Category`	category for the xenon isotope

The Activity Summary and minimum detectable concentration for Xenon Isotopes section displays the radon counts, activity concentrations and relative uncertainties of four radio-xenon isotopes detected in the sample, which has different formats for β-γ coincidence event and HPGe based systems, respectively.

- For HPGe stations, it contains two blocks as shown in Figure 6a.
  - The first block is the Radon Level in Xenon Sample listing the nuclide (e.g. `Rn-222`), the half-life (e.g. `3.82 D`), the area (peak net area of 352 keV (counts) and the relative uncertainty of the net area as a percentage (RelErr (%)).
  - The second block is the Xenon Isotopes displaying the analysis results in two sub-blocks, which responding the two different analysis methods, e.g. the Peak Fit Method and Decay Analysis Method as shown in Figure 6a and Table 155.
- For β-γcoincidence event stations, this section contains two blocks. The Activity Summary section of an ARR example is shown in Figure 6b. The first block lists the radon counts in the xenon sample, which is the net counts in ROI 1. The second one displays analysis results for xenon isotopes with a subtitle “Xenon Isotopes — NET Count Calculation (NCC) analysis method” as shown in Table 156.

Table 155. ARR Activity Summary section columns for HPGe spectrum analysis

Column	Content	Description
1	`Nuclide`	xenon name
2	`Half-life`	half-life of xenon isotopes
3	`Activity(mBq)`	activity (mBq)
4	`StatErr(%)`	relative statistical uncertainty of the activity (%)
5	`SysErr(%)`	relative systematic uncertainty of the activity (%)
6	`RelErr(%)`	relative total uncertainty of the activity (%)
7	`Conc(mBq/m3)`	activity concentration (mBq/m^3)
8	`StatErr(%)`	relative statistical uncertainty of the activity concentration (%)
9	`SysErr(%)`	relative systematic uncertainty of the activity concentration (%)
10	`RelErr(%)`	relative total uncertainty of the activity concentration (%)
11	`MDI/MDC`	MDC (mBq/m^3) for ^{133}Xe and ^{135}Xe; MDI (mphoton/s/m^3) for ^{131m}Xe and ^{133m}Xe

Table 156. ARR Activity Summary section columns for β-γ coincidence spectra analysis

Column	Content	Description
1	`Nuclide`	xenon name
2	`Half-life`	half-life of xenon isotopes
3	`Activity(mBq)`	activity (RN) at acquisition start (mBq/m^3)
4	`StatErr(%)`	relative statistical uncertainty of the activity (%)
5	`SysErr(%)`	relative systematic uncertainty of the activity (%)
6	`RelErr(%)`	relative total uncertainty of the activity (%)
7	`Conc(mBq/m3)`	activity concentration (mBq/m^3)
8	`StatErr(%)`	relative statistical uncertainty of the activity concentration (%)
9	`SysErr(%)`	relative systematic uncertainty of the activity concentration (%)
10	`RelErr(%)`	relative total uncertainty of the activity concentration (%)
11	`LC`	critical level of the activity concentration (mBq/m^3)
12	`MDC`	MDC of the xenon isotope (mBq/m^3)

The Processing Specific Parameters and Results section includes information on the peaks identified during spectra analysis and is different between β-γ coincidence event and HPGe systems.

- For HPGe spectra, the section contains only one block, the Xenon Peak Data, as shown in Figure 7a and Table 157. It is noted that this section is populated only if the sample has xenon peaks.
- For β-γ coincidence event spectra, the section includes three blocks as shown Figure 7b:
  - The first one is a line message about the analysis method displayed as Method 1 (Net Count Calculation).
  - The second block is the ROI Net Count Results described in Table 158.
  - The third block is the ROI Limits described in Table 159.

Table 157. ARR Processing Specific Parameters section: Xenon Peak Data block columns for HPGe spectra analysis

Column	Content	Description
1	`Energy (keV)`	peak energy (keV)
2	`Centroid`	peak centroid (channels)
3	`Width`	peak width (actually the FWHM) (channels)
4	`FWHM(keV)`	full width at half maximum (keV)
5	`Eff(%)`	peak detection efficiency (%)
6	`Net Area`	peak net area (counts)
7	`RelErr(%)`	relative uncertainty of the peak net area (%)

Activity Summary and Minimum Detectable Concentration for Xenon Isotopes

Radon level in Xenon sample

Nuclide	Half-Life	Area	RelErr (%)
Rn-222	3.82 D	315.68	7.39

Xenon isotopes

Peak Fit Method

Nuclide	Half-Life	Activity (mBq)	StatErr (%)	SysErr (%)	TotalErr (%)	Conc (mBq/m3)	StatErr (%)	SysErr (%)	TotalErr (%)	MDI/MDC
XE-131M	11.962 D	2.12E+00	925.66	2.68	925.66	4.26E-02	925.66	4.02	925.66	2.62E-01
XE-133M	2.198 D	2.26E+01	90.14	2.72	90.18	5.23E-01	90.14	4.05	90.23	2.62E-01
XE-133	5.2441 D	9.26E+00	28.91	2.50	29.02	1.94E-01	28.91	3.91	29.18	2.88E-01
XE-135	9.143 H	2.53E+00	187.34	2.72	187.36	1.19E-01	187.34	4.05	187.38	1.14E+00

Decay Analysis Method

Nuclide	Half-Life	Activity (mBq)	StatErr (%)	SysErr (%)	TotalErr (%)	Conc (mBq/m3)	StatErr (%)	SysErr (%)	TotalErr (%)	MDI/MDC
XE-131M	11.962 D	-1.35E+01	149.16	2.68	149.18	-2.72E-01	149.16	4.02	149.21	2.62E-01
XE-133M	2.198 D	2.96E+01	70.93	2.72	70.98	6.84E-01	70.93	4.05	71.05	2.62E-01
XE-133	5.2441 D	1.21E+01	22.06	2.50	22.20	2.53E-01	22.06	3.91	22.40	2.88E-01
XE-135	9.143 H	6.42E+00	69.80	2.72	69.85	3.01E-01	69.80	4.05	69.92	1.14E+00

(a) Activity Summary and Minimum Detectable Concentration for Xenon Isotopes for a HPGe noble gas station.

Activity Summary and Minimum Detectable Concentration for Xenon Isotopes

Radon counts in Xenon sample: 113

Xenon isotopes - Beta gamma matrix (BGM) analysis method

Nuclide	Half-Life	Activity (mBq)	StatErr (%)	SysErr (%)	TotalErr (%)	Conc (mBq/m3)	StatErr (%)	SysErr (%)	TotalErr (%)	LC (mBq/m3)	MDC (mBq/m3)
XE-131M	11.962 D	9.80E-01	45.80	4.71	46.04	2.75E-02	45.80	11.05	47.11	1.69E-02	3.91E-02
XE-133M	2.198 D	2.88E-01	98.04	5.70	98.21	9.30E-03	98.04	11.51	98.72	1.29E-02	3.21E-02
XE-133	5.2441 D	7.42E-01	119.12	10.88	119.61	2.17E-02	119.12	14.78	120.03	4.04E-02	8.86E-02
XE-135	9.143 H	-7.51E-01	120.20	10.50	120.65	-5.29E-02	120.20	14.50	121.07	1.08E-01	2.28E-01

(b) Activity Summary and MDC for Xenon Isotopes section for a β-γ coincidence event noble gas station.

Figure 6. ARR Activity Summary and Minimum Detectable Concentration for Xenon Isotopes sections of noble gas systems.

Table 158. ARR Processing Specific Parameters section: ROI Net Count Results block columns for β-γ coincidence event spectra analysis

Column	Content	Description
1	`ROI`	ROI number
2	`Nuclide`	xenon isotopes like `XE-131M, XE-133M, XE-133 and XE-135`
3	`Net Counts`	net counts in the ROI
4	`Abs Net Error`	absolute uncertainty of the net counts
5	`LC`	critical level of the net counts
6	`Efficiency`	detection efficiency of the β-γ coincidence event
7	`Abs Eff Error`	absolute uncertainty of the coincidence efficiency

Processing Specific Parameters and Results

Xenon Peak Data

Energy (keV)	Centroid	Width	FWHM (keV)	Eff (%)	Net Area	RelErr (%)
29.74	135.38	3.00	0.60	12.79	99.90	27.85
80.92	368.42	3.00	0.66	26.07	74.66	28.03

(a) Processing Specific Parameters and Results section of an HPGe noble gas station.

Processing Specific Parameters and Results

Beta gamma matrix (BGM) analysis method

ROI Net Count Results

ROI	Nuclide	Net Counts	Abs Net Error	LC	Efficiency	Abs Eff Error
1	PB-214	53.10	3.33	13.68	N/A	N/A
2	XE-135	-11.02	3.64	22.46	0.60	0.01
3	XE-133	7.54	3.00	14.06	0.70	0.01
4	XE-133	10.17	2.49	8.78	0.71	0.01
5	XE-131M	14.16	2.55	8.70	0.67	0.01
6	XE-133M	4.00	1.98	5.56	0.67	0.01

ROI Limits (channels)

ROI	BetaLow *(channels)*	BetaHigh *(channels)*	GammaLow *(channels)*	GammaHigh *(channels)*
1	1	195	115	136
2	1	251	79	101
3	1	122	26	36
4	1	136	8	16
5	28	54	8	16
6	63	92	8	16
7	1	25	8	16
8	95	136	8	16
9	63	136	8	16
10	1	54	8	16

(b) Processing Specific Parameters and Results section of a β-γ coincidence event noble gas station.

Figure 7. ARR Processing Specific Parameters and Results sections of noble gas systems.

Table 159. ARR Processing Specific Parameters section: ROI Limits block columns for β-γ coincidence event spectra analysis

Column	Content	Description
1	`ROI`	ROI number
2	`BetaLow (channels)`	low β energy limit in channels
3	`BetaHigh (channels)`	high β energy limit in channels
4	`GammaLow (channels)`	low γ energy limit in channels
5	`GammaHigh (channels)`	high γ energy limit in channels

The Processing Parameters section includes settings used to identify peaks and quantify peak characteristics.

- For HPGe spectra, the section lists only two parameters, e.g. risk level K and baseline algorithm in two rows by two columns, as shown in Figure 8a.
- For β-γ coincidence event spectra, the section lists five parameters, e.g. risk level K, gas

background used (YES or NO), detector background used (YES or NO), interference corrections (YES or NO) and analysis method (NCC or others) in five rows by two columns, as shown in Figure 8b.

```
Processing Parameters

Risk level K:        4.26489
Baseline algorithm: Smoothing / Lawn Mowers
```

(a) Processing Parameters section of an HPGe noble gas station.

```
Processing Parameters

Risk level k:               1.6449
Gas background used:        YES
Detector background used: YES
Interference corrections:   YES
Analysis method:            BGM
```

(b) Processing Parameters section of a β-γ coincidence event noble gas station.

Figure 8. ARR Processing Parameters section of noble gas systems.

The Calibration Parameters section displays the information about calibration parameters used during the spectra analysis.

- For the HPGe analysis, the Calibration Parameters section is the same as that of the ARR—Particulate version (Table 150 on p. 216), including the area threshold, confidence level, ECR updated, RER updated, used ECR and used RER in six rows by two columns as shown in Figure 9a.
- For the β-γ coincidence event spectra analysis, the section is about updating flags if calibration parameters are updated, including the γ energy calibration updated (YES/NO) and β energy calibration updated (YES/NO) in two rows by two columns as shown in Figure 9b.

```
Calibration Parameters

SAreaThreshold: 100
ConfidenceLevel: 95
ECR updated:     Yes
RER updated:     Yes
Used ECR:        INITIAL
Used RER:        MRPM
```

(a) Calibration Parameters section of an HPGe noble gas station.

```
Calibration Parameters

Gamma energy calibration updated: YES
Beta energy calibration updated:     YES
```

(b) Calibration Parameters section of a β-γ coincidence event noble gas station.

Figure 9. ARR Calibration Parameters sections of noble gas system.

The Data Timeliness and Availability Flags section is the same as that of the ARR—Particulate version (Table 151 on p. 216). It gives the information about the four flags and testing results as shown in Figure 10, Table 160 and Table 161.

```
Data Timeliness and Availability Flags

Name                     Pass/Fail  Value  Test
Previous Sample Present  Fail       N/A    -1/2 day sample available
Collection Time          Pass       12.00  12h +- 10%
Acquisition Time         Pass       11.17  12h +- 10%
Response Time            Pass       30.19  sample received within 96h of collect start
```

Figure 10. ARR Data Timeliness and Availability Flags section of noble gas stations.

Table 160. ARR Data Timeliness and Availability Flags section columns

Column	Content	Description
1	`Name`	flag name
2	`Pass/Fail`	test result, `Pass` or `Fail`
3	`Value`	value of the monitoring metrics
4	`Test`	criterion of the test

Table 161. ARR Data Timeliness and Availability Flags section flag names

Column	Content	Description
1	`Previous Sample Present`	flag of previous sample present, the value is the sample ID of the previous sample
2	`Collection Time`	flag if the collection time is within the requirement
3	`Acquisition Time`	flag if the acquisition time is within the requirement
4	`Response Time`	flag if the sample reporting time is within the requirement

The Data Quality Flags section lists quality testing values for different monitoring metrics as shown in Figure 11, Table 162 and Table 163. The testing criteria might be different for the HPGe and β-γ coincidence event spectra, respectively.

```
Data Quality Flags

Name                 Pass/Fail  Value  Test
Stable Xenon Volume  Pass       3.20   greater than 0.44 ml
SOH                  N/A        N/A    N/A
Xe-133 MDC           PASS       0.09   less than 1 mBq/m3
```

Figure 11. ARR Data Quality Flags section of noble gas stations.

Table 162. ARR Data Quality Flags block columns

Column	Content	Description
1	`Name`	flag name
2	`Pass/Fail`	test result, `Pass` or `Fail`
3	`Value`	value of the monitoring metrics

Continues on next page

Table 162 (cont.)

Column	Content	Description
4	`Test`	criterion of the test

Table 163. ARR Data Quality Flags block format flag names

Column	Content	Description
1	`Stable Xenon Volume`	value of the sample xenon volume (ml)
2	`SOH`	N/A
3	`Xe-133 MDC`	^{133}Xe MDC (mBq/m^3)

The Event Screening Flags section contains the information of radio-xenon isotopes present in the spectrum and ratios between xenon isotopes as shown in Figure 12 and Table 164.

Table 164. ARR Event Screening Flags section columns

Column	Content	Description
1	`Xenon Isotopes present in this spectrum`	`YES` or `NO`
2	`Only one Xenon Isotope in spectrum`	`YES` or `NO`
3	`Number of days since last Xenon detection`	value of the days
4	`2 or more Xenon Isotopes present in this spectrum`	`YES` or `NO`
5	`Xe-133 present in spectrum`	`YES` or `NO`
6	`Number of times Xe-133 seen in last 365 days`	number of samples
7	`Short term flag`	sample category based on short term (30 days) history
8	`Isotopic ratios:`	
	`- Xe-133m/131m > 2`	`YES` or `NO`
	`- Xe-135/133 > 5`	`YES` or `NO`
	`- Xe-133m/133 > 0.3`	`YES` or `NO`

The Calibration Equations section includes: (a) energy and resolution calibration coefficients for HPGe noble gas and (b) γ and β energy calibration coefficients for β-γ noble gas. The latter is shown in Figure 13.

The efficiency information is given in the Processing Specific Parameters and Results section.

Event Screening Flags

Name	**YES/NO/Value**
Xenon Isotopes present in this spectrum	YES
Only one Xenon Isotope in spectrum	NO
Number of days since last Xenon detection	0
2 or more Xenon Isotopes present in this spectrum	YES
Xe-133 present in spectrum	NO
Number of times Xe-133 seen in last 365 days	156
Short term flag	b - Xenon detection within the typical range for the station
Isotopic ratios:	
- Xe-133m/131m > 2	NO
- Xe-135/133 > 5	NO
- Xe-133m/133 > 0.3	NO

Figure 12. ARR Event Screening Flags section of noble gas stations.

Calibration Equations

Beta Energy To Channel : C(E)= t0 + t1 E + t2 E^2
t0 : -7.72307
t1 : 0.414462
t2 : -0.0001607

Gamma Energy To Channel : C(E)= t0 + t1 E + t2 E^2
t0 : 0.0703898
t1 : 0.382508
t2 : -0.0000566

Figure 13. ARR Calibration Equations section β-γ noble gas.

Examples of ARR reports for noble gas systems are provided in section I.2 “ARR—Noble gas version” on p. 263.

7.8.2 RRR

The RRR is the product of the manual review of the automated results by an IDC analyst.

For noble gas systems, the items and formats are the same between ARR and RRR but the values, like activity concentrations and categorizations, might be different due to the re-processing of the spectra during the interactive review. A block of the IDC Analysis General Comments is included in the RRR Sample Information section, which contains the date and time and a free text of comments entered by analysts. Like the ARR noble gas reports, the RRR noble gas reports are also given in both plain text and HTML formats.

For the particulate systems, all sections in the ARR are also found in the RRR, including the three additional sections listed below:

- The Spectral Region of Interest Editing section summarizes the number of peaks added, deleted, and modified by the analyst through the interactive analysis tool (Table 165).
- The Peak Search Notes section contains the comments associated with the sample peaks (Table 166). These are added via the interactive analysis tool by analysts and other reviewers.
- The Event Screening Flags section contains the flags about the specified fission and activation products (Table 167).

Examples of RRR are provided in section I.33 "RRR—Noble gas version" on p. 330 and section I.34 "RRR—Particulate version" on p. 347.

Table 165. RRR Spectral Region of Interest (SROI) Editing section format

Record	Position	Format	Description
1 (title)	1–50	a50	`SPECTRAL-REGION-OF-INTEREST (SROI) EDITING`
3†	1–13	a19	`Peak Changes:`
	16–19	a4	`YES` or `none`
4	3–20	a18	`Peaks Added:` or `Peaks Discarded:`
5 (headers)	2–12	a11	`Energy(keV)`
	16–23	a8	`Centroid`
	26–34	a9	`FWHM(keV)`
	40–43	a4	`Area`
	47–54	a8	`Bkgnd(%)`
	59–67	a9	`RelErr(%)`
6–n (data)	1–13	f7.2	energy at peak centroid in keV
	16–23	f7.2	peak centroid channel
	28–33	f6.2	FWHM in keV
	37–46	f10.2	peak net area in counts corrected for background
	52–57	f7.2	ratio of the peak area to the normalized background peak area in percentage
	64–69	f7.2	uncertainty of the peak net area in percentage
n+2†	1–19	a19	`Nuclide Changes:`
	39–42	a4	`YES` or `none`
	3–20	a18	`Nuclides Added:` or `Nuclide Discarded:`
n+3 (header)	1–7	a7	`Nuclide`
	20–28	a9	`Half-Life`
	41–52	a12	`Conc(uBq/m3)`
	61–68	a9	`RelErr(%)`
	77–86	a10	`Activ(uBq)`
	97–105	a9	`RelErr(%)`
n+4–s (data)	1–7	a7	nuclide name
	20–22	a13	half-life in seconds, hours, days or years
	41–51	e11.2	activity concentration (μBq/m^3)
	61–65	f5.2	uncertainty of the activity concentration in percentage
	77–87	e11.2	activity (μBq) at the acquisition start
	97–101	f5.2	uncertainty of the activity in percentage

†The subsequent records appear if changes from the ARR are reported. The length of the data blocks is the number of added or discarded peaks and nuclides, as appropriate.

Table 166. RRR Peak Search Notes section format

Record	Position	Format	Description
1 (title)	1–17	a17	`PEAK SEARCH NOTES`
3	1–4	a4	`NOTE`
	6–7	i2	number of the note
4	1–13	a13	`Date entered:`
	15–24	i4,a1,i2,a1,i2	entered date (*yyyy*/*mm*/*dd*)
	26–33	i2, a1, i2	entered time (*hh*:*mm*)
5	1–8	a8	`Analyst:`
	10-	a8	analyst information
	1–80	a80	free text of the comment entered by analyst

Table 167. RRR Event Screening Flags section format

Record	Position	Format	Description
1 (header)	1–21	a21	`EVENT SCREENING FLAGS`
3	6–49	a44	`Activation Products present in this spectrum`
	67–69	a3	`YES` or `NO`
5	6–41	a36	`Only one fission product in spectrum`
	67–69	a3	`YES` or `NO`
7	6–43	a38	`2 or more fission products in spectrum`
	67–69	a3	`YES` or `NO`
9	6–31	a26	^{137}Cs `present in spectrum`
	67–69	a3	`YES` or `NO`

7.8.3 SSREB

7.8.3.1 SSREB—Particulate version

The SSREB is designated as DATA_TYPE SSREB. The SSREB comprises the following sections:

- The Event Detection Summary section lists the station where the sample originated, the collection stop date and time, the IDC-generated sample ID, the level 4 CTBT-relevant radionuclides or radio-xenon isotopes that resulted in the event, and several event screening flags (Table 168).
- The Enhanced Field of Regard section contains the URL link to an enhanced field of regard for the sample, for example

```
ENHANCED FIELD OF REGARD
    ==========================================================
https://swp.ctbto.org/FOR/ARP01/2016/11/13
```

- The Certified Laboratory Results section includes sample analysis results performed at a certified radionuclide laboratory. Contents include the #Header and #Conclusion block of the associated RLR.

- The Additional Information section contains information added through the use of the SSREB editor. Appended data may contain additional information on the event as it is detected at other stations over time.

An example of the particulate systems of the SSREB is provided in section I.38 "SSREB—Particulate version" on p. 358.

Table 168. SSREB Event Detection Summary block format—Particulate version

Record	Position	Format	Description
1 (title)	1–23	a23	`Event Detection Summary`
3 (header)	6–12	a7	`Station`
	17–28	a12	`Collect Stop`
	38–46	a9	`Sample ID`
	49–52	a4	`Name`
	60–81	a22	`Categorization Comment`
5 (data)	6–10	a5	station code
	17–26	i4,a1,i2,a1,i2	collection stop date (*yyyy*/*mm*/*dd*)
	28–35	i2,a1,i2,a1,a2	collection stop time (*hh*:*mm*:*ss*.*s*)
	38–44	i7	sample ID
	49–52	a6	isotope name
	60–79	a20	free text about the categorization comment
6	6–49	a44	`Activation Products present in this spectrum`
	67–69	a3	`Yes` or `No`
7	11–54	a44	`Number of days since last activation product`
	67–68	i2	number of days
8	6–41	a36	`Only one fission product in spectrum`
	67–69	a3	`Yes` or `No`
9	11–51	a41	`Number of days since last fission-product`
	67–68	i2	number of days
10	6–43	a38	`2 or more fission product in spectrum`
	67–69	a3	`Yes` or `No`
11	6–31	a26	^{137}Cs `present in spectrum`
	67–69	a3	`Yes` or `No`
12	11–46	a36	`Number of times seen in last 30 days`
	67–68	a2	number of times

7.8.3.2 SSREB—Noble gas systems

The SSREB noble gas report is the same for both β-γ coincidence event and HPGe systems and is given in both HTML and plain text formats like the ARR and RRR for noble gas samples. Since the structure and content of both plain text and HTML formats is the same (the only difference being that the HTML format contains also time development and frequency distribution plots), only the latter will be described.

The Event Detection Summary section contains three blocks, e.g. Sample Information, Sample Categorization and Event Screening Flags, which are more or less the same as the sections in RRR, respectively.

- The block of Sample Information lists the station ID, detector code, Sample Reference Identification and collection stopstop date and time, which is a short version of the Sample Information section in the RRR.
- The block of Measurement Categorization is the same as the Measurement Categorization section in the RRR.
- The block of Event Screening Flags contains all contents of the Event Screening Flags section in the RRR in addition to the values of the isotope ratios in Table 169.

Table 169. SSREB Isotopic Ratio block format

Isotopic ratio	Value	YES/NO	Test
^{133m}Xe/^{131m}Xe		YES/NO	^{133m}Xe/^{131m}Xe > 2
^{135}Xe/^{133}Xe		YES/NO	^{135}Xe/^{133}Xe > 5
^{133m}Xe/^{133}Xe		YES/NO	^{133m}Xe/^{133}Xe > 0.3
^{133}Xe/^{131m}Xe		YES/NO	^{133}Xe/^{131m}Xe > 1000

The other sections like the Enhanced Field of Regard, Certified Laboratory Results and Additional Information are all the same as the SSREB—Particulate version.

Examples of the SSREB—Noble gas systems are provided in section I.37 “SSREB—Noble gas systems” on p. 355.

7.8.4 RNPS

The Radionuclide Network Product Summary (RNPS) provides a summary of all the radionuclide network activity over a period. This report is produced daily and includes a listing of all of the radionuclide products received at the IDC —ARRs, RRRs, SSREBs, SAMPMLs and REVSAMPs Table 170. An example of a RNPS is provided on p. 329.

Table 170. Station block format

Record	Position	Format	Description
1 (header)	1–7	a7	`Station`
	9–16	a8	`SID`
	18	a4	`Type`
	24–37	a12	`Cstart(GMT)`
	40–53	a11	`Cstop(GMT)`
	56–62	a8	`Category`
	65	a1	`Status`
	73–83	a8	`Products`
	84–end of line	free text	`CTBT Relevant`
2–n (data)	1–7	a7	station code
	9–16	i8	sample ID
	18	a1	type of station. `P`: particulate station, `G`: noble gas station based on γ spectroscopy, `B`: noble gas station based on β-γ coincidence event, `X`: noble gas station based on β-γ coincidence event with high resolution
	24–35	i2,a1,i2,a1, i2,i2,a1,i2	collection start date and time (*yy*/*mm*/*dd* *hh*:*mm*)
	40–53	i2,a1,i2,a1, i2,i2,a1,i2	collection stop date and time (*yy*/*mm*/*dd* *hh*:*mm*)
	56–62	a7	categorization level of the sample (for particulates, Level 1 to Level 5; for noble gas, from Level A to Level C)
	65	a1	sample status; it can be `A`: Automatic or `R`: Reviewed
	73–83	a11	type of radionuclide reports available for the sample. This is a comma-delimited list, with the following possible codes: `A`: ARR, `R`: RRR, `S`: SSREB, `XA`: SAMPML, `XR`: REVSAMP
	84-end of line		list of relevant radionuclide found in the sample

8

Command request and response messages

This chapter describes the command request and response message formats and includes the following sections:

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8.2 E-MAIL . . . 236

8.3 TIME_STAMP . . . 236

8.4 Command request and response lines . . . 237

8.5 Operation change S/H/I stations . . . 237

8.6 Operation change radionuclide stations . . . 241

8.7 Operational mode change . . . 242

8.8 Send sample to a laboratory . . . 243

8.9 Update of HPGe detector calibration information . . . 246

8.10 Generate new keypair . . . 247

8.11 Start a new keypair . . . 248

8.12 Update the CRL . . . 250

8.1 Introduction

All command requests require the basic message structure described in section 3.2 “Message preface” on p. 32. If a message is a command request or command response message, the MSG_TYPE is set to `command_request` or `command_response`, respectively.

```
begin IMS2.0
msg_type command_request | command_response
msg_id id_string[ source]
ref_id ref_str[ ref_src]
e-mail name@my.computer
time_stamp yyyy/mm/dd hh:mm:ss
cmnd_req | cmnd_resp
command parameter lines
stop
```

The body of a command request message contains a series of free-format command lines that provide information about the return message (E-MAIL), specify the type of command that is requested, and set the environment for the requested command.

The reply to a command request is contained in a command response message. In the COMMAND_RESPONSE message the identification (ID) fields from the MSG_ID line of the request message are placed in the REF_ID line.

8.2 E-MAIL

The E-MAIL line contains the address where responses to the command request should be sent.

Syntax

```
email address
```

address e-mail address to send response

8.3 TIME_STAMP

The TIME_STAMP line specifies the time when the command request or response is issued. This line is mandatory for command requests and responses. Stations will use this time to determine if the command request is recent and that it is reasonable to process the request. This time is in UTC and in the *yyyy/mm/dd hh:mm:ss* format specified in ISO 8601 (1988).

Syntax

```
time_stamp yyyy/mm/dd hh:mm:ss
```

8.4 Command request and response lines

Command request lines specify the type of command to be performed at the station. Some command requests have arguments that are specified in the same line or as specific environment lines.

Command response lines provide an acknowledgement of the execution of a command and may include the information resulting from command execution.

Table 171 lists the command request lines and the corresponding command response lines.

Table 171. Command types and corresponding responses

Command request	Command response	Command type
CALIBRATE_START	CALIBRATE_CONFIRM, CALIBRATE_RESULT	operation change S/H/I stations
DETBKPHD_START	DETBKPHD_CONFIRM	operation change radionuclide stations
BLANKPHD_START	BLANKPHD_CONFIRM	operation change radionuclide stations
CALIBPHD_START	CALIBPHD_CONFIRM	operation change radionuclide stations
CHANGE_DECAY	DECAY_CHANGED	operation change radionuclide stations
SEND_SAMPLE	SAMPLE_SENT, SAMPLE_NOTSENT, SAMPLE_RECEIVED	Operation change radionuclide stations
UPDATE_CALIBPAIRS	CALIBPAIRS_UPDATED	operation change radionuclide stations
GENERATE_KEYPAIR	KEYPAIR_GENERATED	key management
START_KEYPAIR	KEYPAIR_STARTED	key management
UPDATE_CRL	CRL_UPDATED	key management

8.5 Operation change S/H/I stations

8.5.1 Station calibration

To calibrate an IMS seismic, hydroacoustic or infrasonic station the command request, CALIBRATE_START, is issued, which indicates the time of the calibration and details as to how the calibration should be conducted.

The command response is first to confirm the calibration, CALIBRATE_CONFIRM and then later the calibration results are sent, CALIBRATE_RESULT.

8.5.2 CALIBRATE_START

Syntax

```
begin IMS2.0
msg_type command_request
msg_id id_string[ source]
e-mail address
time_stamp yyyy/mm/dd hh:mm:ss
start_time yyyy/mm/dd hh:mm:ss
stn_list station_code
chan_list channels
sensor yes | no
type random | sine
calib_param seconds[ volts]| hertz seconds [volts]
calibrate_start
...
stop
```

The *station_code* is the station name of the station receiving the command request. If the station has more than one site and channel, the desired channel to be calibrated can be specified in CHAN_LIST.

The requested start time for the calibration is given on a single line starting with START_TIME, for example

```
START_TIME yyyy/mm/dd hh:mm:ss
```

Time is specified following ISO 8601 (1988) in UTC.

Whether the sensor should be included in the calibration is given on a single line starting with SENSOR, for example

```
SENSOR YES
```

or

```
SENSOR NO.
```

The type of calibration is either sine or random. This is given on a single line starting with TYPE, for example

```
TYPE RANDOM
```

or

```
TYPE SINE
```

8.5.2.1 Random calibration signals

For a calibration of the TYPE RANDOM, a duration shall be specified. This is given on a single line starting with CALIB_PARAM, for example

```
CALIB_PARAM xx
```

specifies the duration of the random binary signal in s.

Optionally, the amplitude of the calibration signal can be specified for a random calibration. The amplitude is given as a second argument to the line CALIB_PARAM, for example

```
CALIB_PARAM xx yy
```

specifies the amplitude (yy) in Volts.

8.5.2.2 Sine calibration signals

For sine calibration signals, TYPE SINE, the command parameters field is a sequence of one or more CALIB_PARAM lines. The first of these specifies frequency in Hz, duration in s and (optionally) the amplitude in V of the calibrating signal. Any further lines specify the frequency in Hz, duration in s, time in s after the end of the previous sine wave and (optionally) the amplitude in Volts of the calibrating signal. For example,

```
CALIB_PARAM  1.0 30.0        10.0
CALIB_PARAM  5.0 30.0 120.0 10.0
CALIB_PARAM 10.0 30.0  60.0 10.0
CALIB_PARAM 25.0 30.0  20.0 10.0
```

8.5.2.3 Pulse calibration signals

For pulse calibration signals, TYPE PULSE, the command parameters field is a sequence of one or more CALIB_PARAM lines. The first of these specifies the duration of the pulse in s and (optionally) the amplitude in Volts of the calibrating signal. Any further lines specify the duration of each subsequent pulse in s, time in s after the end of the previous pulse and (optionally) the amplitude in Volts of the calibrating signal. For example,

```
CALIB_PARAM  2.0        10.0
CALIB_PARAM  2.0 20.0 - 10.0
CALIB_PARAM  2.0 20.0   10.0
CALIB_PARAM  2.0 20.0 - 10.0
```

8.5.2.4 Sweep calibration signals

For sweep calibration signals, TYPE SWEEP, the signal should be a sinusoidal sweep whose phase increases with the logarithm of time (so that the frequency decreases by a constant factor within each period). The CALIB_PARAM line specifies the initial frequency in Hz, the duration of the sweep in s and (optionally) the amplitude in V of the calibrating signal. For example,

```
CALIB_PARAM      0.5 0.02 320.0 10.0
```

IMS stations may not support all four types of calibration. If a requested calibration cannot be performed because of this, this will be indicated in the START_TIME line as a START_TIME_-NOT_CONFIRMED.

8.5.3 CALIBRATE_CONFIRM

Syntax

Listing 8.1. Syntax of the CALIBRATE_CONFIRM command request

```
begin ims2.0
msg_type command_response
msg_id id_string[ source]
ref_id ref_str[ ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
[chan_list chan]
start_time yyyy/mm/dd hh:mm:ss | not_confirmed
calibrate_confirm
stop
```

The *station_code* is the station name of the station receiving the command request. If the station has more than one site and channel, the channel to be calibrated can be specified in CHAN_LIST.

The calibration is confirmed by providing a time that the calibrations will start. This may be the requested start time, given in the CALIBRATE_START message or a different time. This is given on a single line starting with START_TIME, for example

```
START_TIME yyyy/mm/dd hh:mm:ss
```

Time is specified following ISO 8601 (1988) in UTC.

If the calibration cannot be performed at the requested time and if a new time for the calibration cannot be provided, this will be indicated in the START_TIME line as START_TIME NOT_-CONFIRMED.

8.5.4 CALIBRATE_RESULT

Syntax

Listing 8.2. Syntax of the CALIBRATE_RESULT command request

```
begin ims2.0
msg_type command_response
msg_id id_string[ source]
ref_id ref_str[ ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
[chan_list channel]
calibrate_result
in_spec yes | no
[calib value]
[calper value]
[system response in ims2.0]
stop
```

The *station_code* is the station name of the station receiving the command request. If the station has more than one site and channel, the code for the site/channel results being provided can be specified in CHAN_LIST.

This message reports whether the calibration was within specifications or not. This is accomplished on a single line starting with IN_SPEC, for example

```
IN_SPEC YES
```

or

```
IN_SPEC NO
```

If the calibration was not within specifications then a new response shall be calculated. In some cases a new response may be calculated even if the calibration was within specification.

In the case of a single-frequency calibration, this consists of a pair of values for CALIB, the calibration constant, and CALPER, the period (s) at which the calibration constant was calculated. These are given on single lines starting with CALIB and CALPER, for example

```
CALIB 105.0
```

or

```
CALPER 1.0
```

The units of CALIB for seismic stations are given in ISO 8601 (1988); the units for hydroacoustic and infrasound stations are µPa/count and Pa/count respectively.

For a full-frequency calibration, it consists of a full system response in IMS2.0 RESPONSE format (ISO 8601, 1988).

8.6 Operation change radionuclide stations

8.6.1 Special measurements

The request for special measurements includes the three command requests, DETBKPHD_-START, BLANKPHD_START, and CALIBPHD_START. The response to these commands is DETBKPHD_CONFIRM, BLANKPHD_CONFIRM, or CALIBPHD_CONFIRM respectively.

8.6.2 DETBKPHD_START / BLANKPHD_START / CALIBPHD_START

Syntax

Listing 8.3. Syntax of the special measurement command requests

```
begin ims2.0
msg_type command_request
```

```
msg_id id_string[ source]
e-mail address
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
detbkphd_start | blankphd_start | calibphd_start
start_time yyyy/mm/dd hh:mm:ss
duration hours
stop
```

The station_code is the station name of the station receiving the command request. The start time in UTC of the measurement as *yyyy/mm/dd hh:mm:ss* is provided in the START_TIME line.

The DURATION parameter line contains length of the measurement in h.

8.6.3 DETBKPHD_CONFIRM / BLANKPHD_CONFIRM / CALIBPHD_-CONFIRM

Syntax

Listing 8.4. Command response to special measurement command requests

```
begin ims2.0
msg_type command_response
msg_id id_string[ source]
ref_id ref_str[ ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
detbkphd_confirm | blankphd_confirm | calibphd_confirm
start_time yyyy/mm/dd hh:mm:ss | not_confirmed
stop
```

The station_code is the station name of the station that received the command request.

The START_TIME parameter line indicates the start time of the measurement in UTC as *yyyy/mm/dd hh:mm:ss*.

If the command cannot be performed at the requested time and if a new time for the measurement cannot be provided, the response will indicate this in the START_TIME line as START_TIME NOT_CONFIRMED.

8.7 Operational mode change

To request an operational mode change at an IMS radionuclide station the command request is CHANGE_DECAY, which indicates the time of the requested change. The command response to confirm the change is DECAY_CHANGED and some additional information.

8.7.1 CHANGE_DECAY

Syntax

Listing 8.5. Syntax of the CHANGE_DECAY command request

```
begin ims2.0
msg_type command_request
msg_id id_string[ source]
e-mail address
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
change_decay
[start_time yyyy/mm/dd hh:mm:ss ]
decay_time hours
stop
```

The *station_code* is the station name of the station receiving the command request. The start time in UTC of the decay time change can be specified in the START_TIME line as *yyyy/mm/dd hh:mm:ss*.

The DECAY_TIME parameter line contains the new decay time in h.

8.7.2 DECAY_CHANGED

Syntax

Listing 8.6. Syntax of the DECAY_CHANGED command request

```
begin ims2.0
msg_type command_response
msg_id id_string[ source]
ref_id ref_str[ ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
decay_changed
new_decay_time hours srid
stop
```

The station_code is the station name of the station that received the command request.

The NEW_DECAY_TIME line indicates the new decay time in h and the Sample Reference Identification (SRID) separated by a space, for example *xx ccyyyymmddhhPp*.

8.8 Send sample to a laboratory

To request the dispatch of a sample for further analysis, or for quality control, the command request is SEND_SAMPLE, which identifies the sample and where it should be sent. The command response to confirm the dispatch is SAMPLE_SENT and some additional information. After arrival at the laboratory the response is SAMPLE_RECEIVED, which indicates that the station operator is no longer responsible for the sample. If the requested sample cannot be sent, the command response SAMPLE_NOTSENT is sent.

8.8.1 SEND_SAMPLE

Syntax

Listing 8.7. Syntax of the SEND_SAMPLE command request

```
begin ims2.0
msg_type command_request
msg_id id_string[ source]
e-mail address
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
send_sample
priority urgent|routine
srid ccyyyymmddhhpp
poc somebody
organization somewhere
address address1
address address2
address address3
stop
```

The *station_code* is the station name of the station receiving the command request. The priority of the shipment is either urgent or routine. This is given on a single line starting with PRIORITY, for example

```
PRIORITY URGENT
```

or

```
PRIORITY ROUTINE
```

Which sample, or which part of the split sample, has to be shipped is indicated with the sample reference ID.

The Point-of-Contact, the Organization and the Address where to ship the sample is indicated by the lines: POC, ORGANIZATION and (if necessary multiple) ADDRESS.

8.8.2 SAMPLE_SENT

Syntax

Listing 8.8. Syntax of the SAMPLE_SENT command request

```
begin ims2.0
msg_type command_response
msg_id id_string[ source]
ref_id ref_str[ ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
sample_sent
srid ccyyyymmddhhpp
mass ms_full|ms_split
poc somebody
organization somewhere
address address1
address address2
address address3
courier courier company
handover yyyy/mm/dd hh:mm:ss
arrival yyyy/mm/dd hh:mm:ss
awb airwaybillnumber
seal cccccnnnnnnnn
stop
```

The station_code is the station name of the station that received the command request.

The sample, or the split sample, that was shipped is indicated with the sample reference ID. The mass of the unsplit sample and the split mass is indicated by a line MASS followed by the numbers of the two masses (in grams).

Additional information on the courier company, handover date/time, estimated arrival date/time, airway bill number and the stations seal number are given.

8.8.3 SAMPLE_NOTSENT

Syntax

Listing 8.9. Syntax of the SAMPLE_NOTSENT command request

```
begin ims2.0
msg_type command_response
msg_id id_string[ source]
ref_id ref_str[ ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
sample_notsent
srid ccyyyymmddhhpp
free text describing why the sample could not be sent
stop
```

8.8.4 SAMPLE_RECEIVED

Syntax

Listing 8.10. Syntax of the SAMPLE_RECEIVED command request

```
begin ims2.0
msg_type command_response
msg_id id_string[ source]
ref_id ref_str[ ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
sample_received
srid ccyyyymmddhhpp
arrival yyyy/mm/dd hh:mm:ss
stop
```

The station_code is the station name of the station that received the command request. The sample, or the split sample, that was shipped is indicated with the sample reference ID. Additional information on the arrival date/time is given.

8.9 Update of HPGe detector calibration information

To request an update of the HPGe detector calibration information sent with the PHD messages, the command request UPDATE_CALIBPAIRS is sent, which includes the updated data pairs. The command response to confirm the implementation of the new data pairs is CALIBPAIRS_-UPDATED.

8.9.1 UPDATE_CALIBPAIRS

Syntax

Listing 8.11. Syntax of the UPDATE_CALIBPAIRS command request

```
begin ims2.0
msg_type command_request
msg_id id_string[ source]
e-mail address
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code[ detector_code]
update\_calibpairs
\#g\_Energy
...
#g_Resolution
...
#g_Efficiency
...
#g_TotalEfficiency
```

```
...
stop
```

The station_code is the station name of the station receiving the command request. The detector code may be specified if a station operates more detectors.

8.9.2 CALIBPAIRS_UPDATED

Syntax

Listing 8.12. Syntax of the CALIBPAIRS_UPDATED command request

```
begin ims2.0
msg_type command_response
msg_id id_string[ source]
ref_id ref_str[ ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code[ detector_code]
calibpairs_updated
stop
```

8.10 Generate new keypair

To generate new keypairs at the station authenticators the command request GENERATE_KEY-PAIR is sent. The response KEYPAIR_GENERATED acknowledged the successful execution of the command request along with a certificate request for the new keys.

8.10.1 GENERATE_KEYPAIR

Syntax

Listing 8.13. Syntax of the GENERATE_KEYPAIR command request

```
begin ims2.0
msg_type command_request
msg_id id_string[ source]
e-mail address
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
[chan_list chan]
[auth_id id]
generate_keypair
[pem dsa parameters]
stop
```

The *station_code* is the station name of the station receiving the command request. If the station has more than one site and channel, the code for the site/channel results being provided can be specified in CHAN_LIST.

If the site or channel has more than one authentication unit, the desired authenticator can be specified using the AUTH_ID line.

Optionally, the values for the DSA parameters (P, Q and G) to be used for the new keys can be specified in PEM format.

8.10.2 KEYPAIR_GENERATED

Syntax

Listing 8.14. Syntax of the KEYPAIR_GENERATED command request

```
begin ims2.0
msg_type command_response
msg_id id_string[ source]
ref_id ref_str[ ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
[chan_list chan]
[auth_id id]
keypair_generated
[signature signature]
{certificate request}
stop
```

The *station_code* is the station name of the station receiving the command request. If the station has more than one authentication unit, the channel code for the authenticator affected by the keypair change shall be specified. If the channel has more than one authentication unit, the desired authenticator can be specified using the AUTH_ID line. In this case multiple KEYPAIR_-GENERATED messages must be sent from the station, each including the information of one authenticator.

The signature of the new key signed with the old key, in hex representation is included in the SIGNATURE line. This line can be omitted if the corresponding old key or the key of the authorized device manager is used to sign the e-mail message.

The response message includes the certificate request for the new key, in PEM format.

8.11 Start a new keypair

To start using a new keypair at the station authenticators the command request START_KEY-PAIR is sent along with the newly created certificate. The KEYPAIR_STARTED response acknowledges the successful execution of the command request.

8.11.1 START_KEYPAIR

Syntax

Listing 8.15. Syntax of the START_KEYPAIR command request

```
begin ims2.0
msg_type command_request
msg_id id_string[ source]
e-mail address
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
[chan_list chan]
[auth_id id]
[start_time yyyy/mm/dd hh:mm:ss ]
start_keypair
x509 certificate
stop
```

The *station_code* is the station name of the station receiving the command request. If the station has more than one site, the site/channel code for the desired authenticator can be specified. If the channel has more than one authentication unit, the desired authenticator can be specified using the AUTH_ID line.

The time to start using the new keypair can be specified in the START_TIME line. If not specified the station should start using the new keypair immediately upon reception of the command request.

The X.509 certificate (PEM) is included in the message, for reference and future use at the station.

8.11.2 KEYPAIR_STARTED

Syntax

Listing 8.16. Syntax of the KEYPAIR_STARTED command request

```
begin ims2.0
msg_type command_response
msg_id id_string[ source]
ref_id ref_str[ ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
[chan_list chan]
[auth_id id]
keypair_started
stop
```

Station_code is the station name of the station where the command request was implemented.

If the station has more than one site, the site/channel code for the authenticator affected by the keypair start shall be specified. If the site has more than one authentication unit, the desired authenticator can be specified using the AUTH_ID line.

8.12 Update the CRL

To send a new Certificate Revocation List (CRL) to the station and request them to update the station copy, the command request UPDATE_CRL is sent along with the information to update the CRL. The response CRL_UPDATED acknowledges the successful execution of the command request.

8.12.1 UPDATE_CRL

Syntax

Listing 8.17. Syntax of the UPDATE_CRL command request

```
begin ims2.0
msg_type command_request
msg_id id_string[ source]
e-mail address
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
update_crl
x509 crl
stop
```

Station_code of the station receiving the command request can be specified in the command line. The station must use the latest CRL for all sites and authenticators.

The certificate revocation list in X.509 (PEM) format is included.

8.12.2 CRL_UPDATED

Syntax

Listing 8.18. UPDATE_CRL command request

```
begin ims2.0
msg_type command_response
msg_id id_string[ source]
ref_id ref_str[ ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
[chan_list chan]
[auth_id id]
```

```
[start_time yyyy/mm/dd hh:mm:ss ]
crl_updated
stop
```

Station_code is the station name of the station receiving the command request.

If the station has more than one site and/or authenticator, the site/channel and auth_id code for the authenticator affected by the command request shall be specified.

9

Summary messages

This chapter describes the request message formats and includes the following sections:

9.1 Introduction 253

9.2 Executive Summary 254

9.1 Introduction

IMS2.0 data formats provide a common format for data and data product exchange. The data messages described in this chapter are for summary data products such as the Executive Summary.

Each data message contains the required information for all IMS2.0 messages. All data messages must contain the BEGIN line and be followed by a MSG_TYPE line and a MSG_ID line using the proper formats for the arguments. The MSG_TYPE for data messages is data. Because a data message may be a response to a request, a REF_ID line may also appear. If the data message is a response to a subscription, then a PROD_ID line will be included. Sections of data-specific information follow the identification line(s).

The data format for summary messages is IMS2.0. The type of data that is included in a data section and the format of the data are designated with a DATA_TYPE line.

9.1.1 DATA_TYPE

Data sections must begin with a DATA_TYPE line. The arguments to DATA_TYPE are the type of data that follows (for example, EXECSUM) and the format (IMS2.0).

Syntax

```
data_type data_type format
```

data_type type of data that follows; typical examples are EXECSUM, BULLETIN, and RESPONSE

format general format of the data (IMS2.0)

Example

```
data_type execsum ims2.0
```

The end of a data section is implied by another DATA_TYPE line or a STOP line.

The following sections give the formats for data messages. Examples of these data formats are provided in Appendix I "Data message examples" on p. 261.

9.2 Executive Summary

The Executive Summary contains summary statistics of the number of events in the SEB and those in the various event screening categories, the number of radionuclide detections and those categorized as Level 4 or Level 5, and the number of event with cross-referenced radionuclide and seismic-acoustic data. It also contains status metrics regarding the IMS network, GCI communications, IDC processing, and Radionuclide Laboratories. It includes the time interval for which the results were requested, the time at which it was generated, and the times at which the latest seismic-acoustic and radionuclide processing were performed. The format is defined in Table 172, and an example is provided in subsection 4.7.16 "EXECSUM" on p. 84.

Table 172. Executive summary format

Record	Position	Format	Description
1 (title)	2–22	a21	`Executive Summary for`
	24–33	i4,a1,i2,a1,i2	start date of requested interval (*yyyy/mm/dd*)
	35–42	i2,a1,i2,a1,i2	start time of requested interval (*hh:mm:ss.s*)
	44–45	a2	`to`
	47–56	i4,a1,i2,a1,i2	end date of requested interval (*yyyy/mm/dd*)
	58–65	i2,a1,i2,a1,i2	end time of requested interval (*hh:mm:ss.s*)
2 (time stamp)	2–13	a12	generated at
	15–24	i4,a1,i2,a1,i2	date generated (*yyyy/mm/dd*)
	26–33	i2,a1,i2,a1,i2	time generated (*hh:mm:ss.s*)
3			(blank line)
4 (header)	1–48	a48	`LATEST PROCESSING TIME (for requested interval)`
5 (header)	4–19	a16	`Seismic-Acoustic`
	31–42	a12	`Radionuclide`
6 (time stamps)	1–10	i4,a1,i2,a1,i2	date of latest S/H/I processing (*yyyy/mm/dd*)

Continues on next page

Table 172 (cont.)

Record	Position	Format	Description
	12–19	i2,a1,i2,a1,i2	time of latest SHI processing (*hh*:*mm*:*ss*.*s*)
	24–33	i4,a1,i2,a1,i2	date of latest RN processing (*yyyy*/*mm*/*dd*)
	35–42	i2,a1,i2,a1,i2	time of latest RN processing (*hh*:*mm*:*ss*.*s*)
7			(blank line)
8 (header)	1–24	a24	`SEISMIC-ACOUSTIC SUMMARY`
9 (header)	1–11	a11	`TotalEvents`
	13–22	a10	`Considered`
	24–34	a11	`InsufftData`
	36–46	a11	`NotScreened`
	48–58	a11	`ScreenedOut`
10 (data)	8–11	i4	total number of events in the SEB
	19–22	i4	number of events that were considered for screening
	31–34	i4	number of events that had insufficient data for screening
	43–46	i4	number of events that were not screened out
	55–58	i4	number of events in time block that were screened out
11			(blank line)
12 (header)	1–20	a20	`RADIONUCLIDE SUMMARY`
13 (header)	1–10	a10	`Detections`
	13–18	a6	`Level4`
	21–26	a6	`Level5`
14 (data)	7–10	i4	total number of radionuclide detections
	15–18	i4	number of Level 4 radionuclide detections
	23–26	i4	number of Level 5 radionuclide detections
15			(blank line)
16 (header)	1–14	a14	`FUSION SUMMARY`
17 (header)	1–11	a11	`FusedEvents`
18 (data)	8–11	i4	number of fused seismic, hydroacoustic, infrasound, radionuclide events
19			(blank line)
20 (header)	1–22	a22	`SYSTEMS STATUS SUMMARY`
21 (header)	2–4	a3	`IMS`
	7–9	a3	`GCI`
	12–14	a3	`IDC`
	16–20	a5	`RNLab`
22 (data)	2–4	i3	IMS network status summary
	7–9	i3	GCI communications status summary
	12–14	i3	IDC processing status summary

Continues on next page

Table 172 (cont.)

Record	Position	Format	Description
	18–20	i3	radionuclide laboratory status summary
23			(blank line)
24 (header)	1–24	a24	`IMS STATUS BY TECHNOLOGY`
25 (header)	4–5	a2	`PS`
	9–10	a2	`AS`
	15	a1	`H`
	20	a1	`I`
	24–25	a2	`RN`
26 (data)	3–5	i3	primary seismic (PS) network status
	8–10	i3	auxiliary seismic (AS) network status
	13–15	i3	hydroacoustic (H) network status
	18–20	i3	infrasound (I) network status
	23–25	i3	radionuclide (RN) network status

10

Station *VDMS* basics

This chapter describes the basic *Verification Data and products Messaging System* (*VDMS*) capabilities that are needed for auxiliary seismic stations and includes the following sections:

10.1 Introduction 257

10.2 Basic message support 257

10.3 Environment lines 258

10.4 Request lines 258

10.5 Data types 258

10.6 Help Recommendations 259

10.1 Introduction

Stations and NDCs providing station data must have a minimum capability to provide data to the IDC through the message system. Clearly, all of the functionality of the request and data messages cannot be supported by these stations to the full extent, and a minimal *VDMS* capability is all that is necessary. This chapter describes the minimal *VDMS* configuration necessary to fulfil the duties of an auxiliary station supplying data in IMS 2.0 format.

10.2 Basic message support

A station/NDC providing segmented data must adhere to all of the basic message conventions on size, line length, date-time formats, station and channel naming, and use of units. The following describe the basic message formats that must be supported.

- **BEGIN line** All messages must contain the BEGIN line and must support IMS2.0 format.
- **MSG_TYPE** The `request` message type must be supported for receiving requests; the `data` message type must be supported for sending data messages.
- **MSG_ID** The message identifier string and optional source in the MSG_ID line must be recognized in request messages, and a unique message identifier string must be generated for data messages.
- **ACK** The ACK environment is used to enable or disable the *VDMS* to send an acknowledgement message to the requestor. The default value is true
- **REF_ID** The message identifier of the request message must be used as the reference identifier of the returned data message.
- **E-MAIL line** E-mail must be supported as a data return mechanism.

10.3 Environment lines

Many of the environment lines described in chapter 4 “Request messages” are not applicable to a limited station capability for *VDMS*. The only variable that must be explicitly specified is TIME. If STA_LIST and CHAN_LIST are not explicitly specified, the default values of all stations and all channel are assumed. The AUX_LIST environment is required only if necessary to distinguish between two different data streams. Using these environments, simple requests can be made that obtain data from a particular station and channel within a specified time interval.

10.4 Request lines

The request lines specify the data that can be obtained from the *VDMS*. A simple station *VDMS* should be able to provide WAVEFORM, STATION, CHANNEL, RESPONSE, and OUTAGE data.

Request lines may have one or more arguments that specify subtype, formats, and subformats. A simple *VDMS* must support the IMS2.0 format as the main format for all requests as well as one of the *VDMS* subformats (INT, CM6, or CSF) for waveforms.

10.5 Data types

Data messages are sent in response to requests sent to the *VDMS*. Thus, WAVEFORM, STATION, CHANNEL, RESPONSE, and radionuclide data types must be supported by a simple *VDMS* in the IMS2.0 format.

- ***VDMS* implementation safeguards.** Responding to requests in an automatic system requires safeguards against repeated requests, excessive numbers of requests, excessively large requests, and failures of the e-mail system (for example, returned mail). Although each installation of the *VDMS* will be different, some general guidelines are suggested to avoid major problems.

- **Message size.** Messages returned by e-mail will have a maximum size of 1 MB.
- **Request echo.** The original request message should be echoed in the returned data message as a LOG data type.
- **Returned messages.** An error in the address for a data message sent out by an *VDMS* will result in an e-mail returned to the *VDMS* by the e-mail system. The sender's name (before the @ character in the mail address) for such an e-mail will be either mailer-daemon or postmaster (with any combination of upper- and lowercase letters). The *VDMS* will forward these messages to the local *VDMS*-operator; no other action is taken and no response is sent. The *VDMS* may also recognize returned messages by the MSG_TYPE, which will be `data`, or by the presence of a REF_ID line, which is not used in request messages.
- **Syntax errors.** If any syntax error is detected while processing a request message, a ERROR_-LOG data message is returned. Also, if a request is made with a keyword that has not been implemented, a ERROR_LOG data message is sent. A serious syntax error anywhere in a message should abort the entire message, but local policy can override this suggestion.
- ***VDMS* internal problem logging.** Any problem other than a syntax error revealed during processing of a request message is appropriately logged and the Processing Engineers should take appropriate action. All request messages must be answered; an ERROR_LOG data message is sent as response for these types of errors.
- ***VDMS* operation logs.** All local *VDMS* installations should keep logs of incoming and outgoing messages, parameters of MSG_ID lines, volume of data transferred, and Coordinated Universal Time (UTC) of message receipt and dispatch.

10.6 Help Recommendations

The HELP mechanism can be used to convey a variety of information. The following topics can be included in an *VDMS* HELP message. At a minimum, every HELP message contains the items shown in **bold**.

- **Introduction**
  - information about the local data centre
  - **e-mail address of local contact** (in case of problems)
  - recently added features
  - date that the HELP message was last updated
- **Description of message formats and protocols**
  - basic message format
  - sending and receiving e-mail through *VDMS*
- **Description of commands understood by this *VDMS***
  - **supported environments**
  - **supported data types**
    * **supported subtypes, default subtype**
    * **supported subformats, default subformats**
  - local extensions

- **Local limits**
  - maximum size of e-mail message
  - maximum size of HTTP message
  - maximum size of data requests per day per user
  - types of requests that will be rejected (for example, sent by root or mailer-daemon)
  - repeated identical requests from the same user over a short interval
- **Local data**
  - description of what data types are available from what stations/channel
  - description of local data archives
    - segmented versus continuous
    - delay in data collection (how soon after real time is data available)
    - time period during which data are available

Appendix I

Data message examples

This appendix contains examples of formatted data messages. Some of the examples wrap onto the next line and appear as they would on a computer screen.

I.1 Alerts

I.1.1 ALERT_FLOW

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68552137 CTBT_IDC
REF_ID 222222
DATA_TYPE ALERT_FLOW
TIME_STAMP 2021/12/10 08:47:04
AUP06 ALERT_FLOW   2021/12/01 23:08:53
Low Flow - Alerting Operator.
AUP10 ALERT_FLOW   2021/12/02 02:15:58
Low Flow - Alerting Operator.
NOP49 ALERT_FLOW   2021/12/03 14:44:02.7
Air flow alarm!
Air Sampler average flow rate: 335.2 scm/h
LowLow Limit: 500.0 Low Limit: 530.0 HighHigh Limit: 800.0
AUP10 ALERT_FLOW   2021/12/05 01:41:51
Low Flow - Alerting Operator.
AUP05 ALERT_FLOW   2021/12/05 03:57:46
Low Flow - Alerting Operator.
AUP10 ALERT_FLOW   2021/12/08 01:48:58
Low Flow - Alerting Operator.
TIME_STAMP 2021/12/10 08:47:04
STOP
```

I.1.2 ALERT_SYSTEM

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68552022 CTBT_IDC
```

```
REF_ID 24680
DATA_TYPE ALERT_SYSTEM
TIME_STAMP 2021/12/10 08:39:48
RUP58 ALERT_SYSTEM 2021/12/01 00:00:13.6
 Full shutdown of IMS station software at UTC 2021/12/01 00:00:13.110.
RUP58 ALERT_SYSTEM 2021/12/01 14:13:05.5
 Warning: Mains power lost.
RUP58 ALERT_SYSTEM 2021/12/01 14:13:13.8
 Notifcation: Mains power restored.
TIME_STAMP 2021/12/10 08:39:48
STOP
```

I.1.3 ALERT_TEMP

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68552220 CTBT_IDC
REF_ID 235791113
DATA_TYPE ALERT_TEMP
TIME_STAMP 2021/12/10 08:53:16
GBX66 ALERT_TEMP   2021/11/12 02:51:11
Warning level: Warning
SoH sensor: 1_T03_SOV_A is out of bounds.
Value of sensor: 303.758755 Lower limit: 304.4933 Upper Limit: 394.9568
Process time: 1208 min
Recommended action: Consult Manual
TIME_STAMP 2021/12/10 08:53:16
STOP
```

I.1.4 ALERT_UPS

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68552263 CTBT_IDC
REF_ID 510152025
DATA_TYPE ALERT_UPS
TIME_STAMP 2021/12/10 08:55:51
USP77 ALERT_UPS    2021/12/01 02:53:35
WARNING
UPS Load Power out of range.
Param #21: 14 is not within the range 15 - 75
AUP09 ALERT_UPS    2021/12/01 05:58:14
Switched to battery
USP77 ALERT_UPS    2021/12/01 22:49:28
ERROR
UPS Time Remaining out of range.
Param #16: 234 is not within the range 30 - 150
TIME_STAMP 2021/12/10 08:55:51
STOP
```

I.2 ARR—Noble gas version

I.2.1 β-γ coincidence systems (plain text format)

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 72999919 CTBT_IDC
REF_ID 24163264
DATA_TYPE ARR
TIME_STAMP 2022/06/02 09:33:28
IDC Generated Report
Automatic Radionuclide Report
Noble Gas Version

Creation Date: 2022-06-02 03:54:30
Sample Arrival Time: 2022-06-02 03:54:13
Time difference from receipt of raw data to report creation:    17.0 s

Sample Information
-------------------------------------------------------------------------------

Station ID:     USX75   Detector Code: USX75_007
Authenticated:  YES

Station Location:       NG Charlottesville, VA, USA
Detector Description:   Detector #7 in Charlottesville, VA, USA
System Technology:      SAUNA

Sample Reference ID:    75202205312111X
Sample ID:              6740102
Stable Xe Volume:       2.75 ml         Sample Type:    Gas

Collection Start:       2022-05-31 21:42:11     Sampling Time:           12 h  1 s
Collection Stop:        2022-06-01 09:42:12     Processing Time:         6 h 58 m 59 s
Acquisition Start:      2022-06-01 16:41:11     Acquisition Time:        11 h 10 m
Acquisition Stop:       2022-06-02 03:51:11


Measurement Categorization
-------------------------------------------------------------------------------

Categorization Legend

Level A         Clean spectrum - No Xenon is present in the sample.
Level B         Xenon detection within the typical range for the station.
```

```
Level C         Anomalous Xenon detection.

Isotope category
Isotope  Nuclide detected  Abnormal_limit (mBq/m3)  Category
Xe-131m  NO                1.67E-01                 A
Xe-133m  NO                1.14E-01                 A
Xe-133   NO                5.23E-01                 A
Xe-135   NO                7.89E-01                 A

Spectrum Category: A - Clean spectrum - No Xenon is present in the sample

Activity Summary and Minimum Detectable Concentration for Xenon Isotopes
--------------------------------------------------------------------------------

Radon counts in Xenon sample: 115

Xenon isotopes - Beta gamma matrix (BGM) analysis method

Nuclide  Half-Life  Activity (mBq)  StatErr (%)  SysErr (%)  TotalErr (%)  Conc (mBq/m3)  StatErr (%)  SysErr (%)  TotalErr (%)
    LC (mBq/m3)  MDC (mBq/m3)
XE-131M  11.962 D   -1.35E-01       317.81       22.65       318.62        -4.43E-03      317.81       24.76       318.77
    2.38E-02     5.38E-02
XE-133M  2.198 D    1.09E-01        268.09       15.49       268.54        4.10E-03       268.09       18.44       268.73
    1.74E-02     4.20E-02
XE-133   5.2441 D   7.11E-01        146.98       11.74       147.44        2.42E-02       146.98       15.42       147.78
    5.66E-02     1.22E-01
XE-135   9.143 H    -7.86E-01       125.50       9.43        125.85        -6.45E-02      125.50       13.74       126.25
    1.37E-01     2.88E-01

Processing Specific Parameters and Results
--------------------------------------------------------------------------------

Beta gamma matrix (BGM) analysis method

ROI Net Count Results
ROI  Nuclide  Net Counts  Abs Net Error  LC     Efficiency  Abs Eff Error
1    PB-214   47.70       3.71           19.53  N/A         N/A
2    XE-135   -11.54      3.81           24.47  0.60        0.01
3    XE-133   7.23        3.26           16.91  0.70        0.01
4    XE-133   15.17       3.19           18.15  0.71        0.01
5    XE-131M  -1.96       2.49           10.54  0.67        0.01
6    XE-133M  1.51        2.01           6.41   0.67        0.01

ROI Limits (channels)
ROI  BetaLow (channels)  BetaHigh (channels)  GammaLow (channels)  GammaHigh (channels)
1    1                   198                  114                  135
2    1                   255                  79                   101
```

```
3    1                   124                 26                  36
4    1                   138                 8                   16
5    28                  55                  8                   16
6    64                  93                  8                   16
7    1                   25                  8                   16
8    96                  138                 8                   16
9    64                  138                 8                   16
10   1                   55                  8                   16

Processing Parameters
--------------------------------------------------------------------------------

Risk level k:                   1.6449
Gas background used:            YES
Detector background used:       YES
Interference corrections:       YES
Analysis method:                BGM

Calibration Parameters
--------------------------------------------------------------------------------

Gamma energy calibration updated:       YES
Beta energy calibration updated:        YES

Data Timeliness and Availability Flags
--------------------------------------------------------------------------------

Name                     Pass/Fail  Value     Test
Previous Sample Present  Pass       6739323   -1/2 day sample available
Collection Time          Pass       12.00     12h +- 10%
Acquisition Time         Pass       11.17     12h +- 10%
Response Time            Pass       30.20     sample received within 96h of collect start

Data Quality Flags
--------------------------------------------------------------------------------

Name                 Pass/Fail  Value  Test
Stable Xenon Volume  Pass       2.75   greater than 0.44 ml
SOH                  N/A        N/A    N/A
Xe-133 MDC           PASS       0.12   less than 1 mBq/m3

Event Screening Flags
--------------------------------------------------------------------------------

Name                                                  YES/NO/Value

Xenon Isotopes present in this spectrum               YES
```

```

Only one Xenon Isotope in spectrum                         NO

Number of days since last Xenon detection                  0

2 or more Xenon Isotopes present in this spectrum          YES

Xe-133 present in spectrum                                 NO

Number of times Xe-133 seen in last 365 days               156

Short term flag                                            a - Clean spectrum - No Xenon is present in the sample
Isotopic ratios:
- Xe-133m/131m > 2                                         NO
- Xe-135/133 > 5                                           NO
- Xe-133m/133 > 0.3                                        NO

Calibration Equations
--------------------------------------------------------------------------------

Beta Energy To Channel : C(E)= t0 + t1 E + t2 EB2
t0 : -7.83515
t1 : 0.420477
t2 : -0.000163

Gamma Energy To Channel : C(E)= t0 + t1 E + t2 EB2
t0 : 0.0655633
t1 : 0.382069
t2 : -0.0000565
TIME_STAMP 2022/06/02 09:33:28
STOP
```

I.2.2 β-γ coincidence systems (HTML format)

IDC Generated Report
Automatic Radionuclide Report
Noble Gas Version

Creation Date: 2022-06-01 03:53:55
Sample Arrival Time: 2022-06-01 03:53:40
Time difference from receipt of raw data to report creation: 15.0 s

Sample Information

Station ID:	USX75	Detector Code:	USX75_007
Authenticated:	YES		
Station Location:	NG Charlottesville, VA, USA		
Detector Description:	Detector #7 in Charlottesville, VA, USA		
System Technology:	SAUNA		
Sample Reference ID:	75202205302111X		
Sample ID:	6738612		
Stable Xe Volume:	3.20 ml	Sample Type:	Gas
Collection Start:	2022-05-30 21:42:10	Sampling Time:	12 h
Collection Stop:	2022-05-31 09:42:10	Processing Time:	6 h 59 m 2 s
Acquisition Start:	2022-05-31 16:41:12	Acquisition Time:	11 h 10 m
Acquisition Stop:	2022-06-01 03:51:12		

Measurement Categorization

Categorization Legend

Level A	=	Clean spectrum - No Xenon is present in the sample.
Level B	=	Xenon detection within the typical range for the station.
Level C	=	Anomalous Xenon detection.

Isotope category

Isotope	Nuclide detected	Abnormal_limit *(mBq/m3)*	Category
Xe-131m	YES	1.67E-01	B
Xe-133m	NO	1.14E-01	A
Xe-133	NO	5.24E-01	A
Xe-135	NO	7.94E-01	A

Spectrum Category: B - Xenon detection within the typical range for the station

Activity Summary and Minimum Detectable Concentration for Xenon Isotopes

Radon counts in Xenon sample: 113

Xenon isotopes - Beta gamma matrix (BGM) analysis method

Nuclide	Half-Life	Activity (mBq)	StatErr (%)	SysErr (%)	TotalErr (%)	Conc (mBq/m3)	StatErr (%)	SysErr (%)	TotalErr (%)	LC (mBq/m3)	MDC (mBq/m3)
XE-131M	11.962 D	9.80E-01	45.80	4.71	46.04	2.75E-02	45.80	11.05	47.11	1.69E-02	3.91E-02
XE-133M	2.198 D	2.88E-01	98.04	5.70	98.21	9.30E-03	98.04	11.51	98.72	1.29E-02	3.21E-02
XE-133	5.2441 D	7.42E-01	119.12	10.88	119.61	2.17E-02	119.12	14.78	120.03	4.04E-02	8.86E-02
XE-135	9.143 H	-7.51E-01	120.20	10.50	120.65	-5.29E-02	120.20	14.50	121.07	1.08E-01	2.28E-01

Processing Specific Parameters and Results

Beta gamma matrix (BGM) analysis method

ROI Net Count Results

ROI	Nuclide	Net Counts	Abs Net Error	LC	Efficiency	Abs Eff Error
1	PB-214	53.10	3.33	13.68	N/A	N/A
2	XE-135	-11.02	3.64	22.46	0.60	0.01
3	XE-133	7.54	3.00	14.06	0.70	0.01
4	XE-133	10.17	2.49	8.78	0.71	0.01
5	XE-131M	14.16	2.55	8.70	0.67	0.01
6	XE-133M	4.00	1.98	5.56	0.67	0.01

ROI Limits (channels)

ROI	BetaLow *(channels)*	BetaHigh *(channels)*	GammaLow *(channels)*	GammaHigh *(channels)*
1	1	195	115	136
2	1	251	79	101
3	1	122	26	36
4	1	136	8	16
5	28	54	8	16
6	63	92	8	16
7	1	25	8	16
8	95	136	8	16
9	63	136	8	16
10	1	54	8	16

Processing Parameters

Risk level k:	1.6449
Gas background used:	YES
Detector background used:	YES
Interference corrections:	YES
Analysis method:	BGM

Calibration Parameters

Gamma energy calibration updated:	YES
Beta energy calibration updated:	YES

Data Timeliness and Availability Flags

Name	Pass/Fail	Value	Test
Previous Sample Present	Fail	N/A	-1/2 day sample available
Collection Time	Pass	12.00	12h +- 10%
Acquisition Time	Pass	11.17	12h +- 10%
Response Time	Pass	30.19	sample received within 96h of collect start

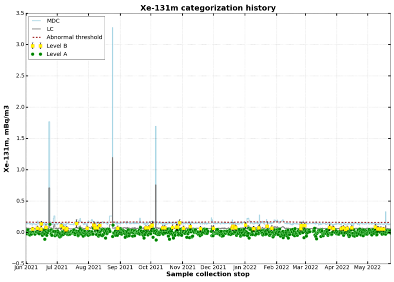
Data Quality Flags

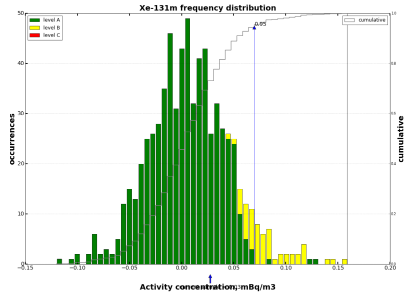
Name	Pass/Fail	Value	Test
Stable Xenon Volume	Pass	3.20	greater than 0.44 ml
SOH	N/A	N/A	N/A
Xe-133 MDC	PASS	0.09	less than 1 mBq/m3

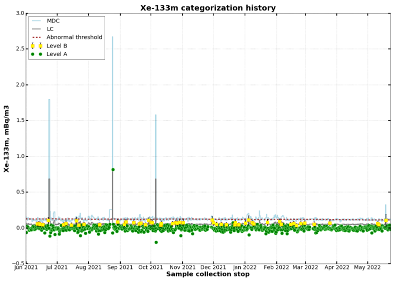
Event Screening Flags

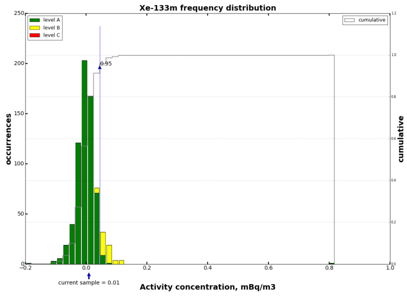
Name	YES/NO/Value
Xenon Isotopes present in this spectrum	YES
Only one Xenon Isotope in spectrum	NO
Number of days since last Xenon detection	0

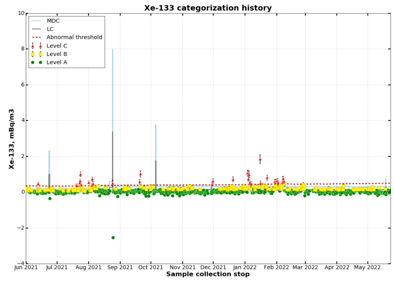
2 or more Xenon Isotopes present in this spectrum	YES
Xe-133 present in spectrum	NO
Number of times Xe-133 seen in last 365 days	156
Short term flag	b - Xenon detection within the typical range for the station
Isotopic ratios:	
- Xe-133m/131m > 2	NO
- Xe-135/133 > 5	NO
- Xe-133m/133 > 0.3	NO

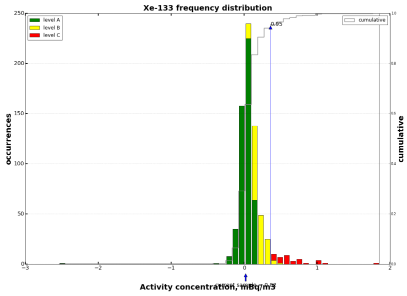


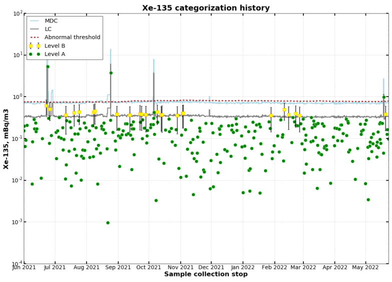


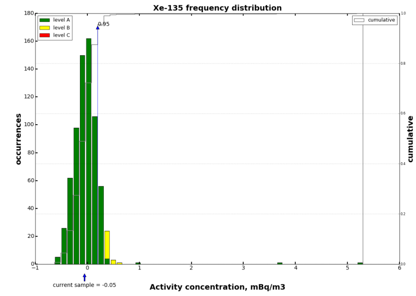


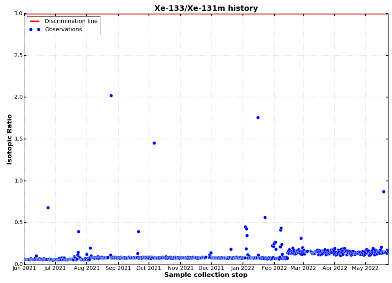


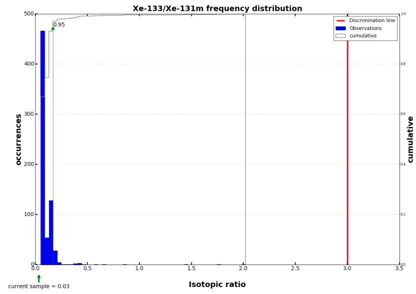


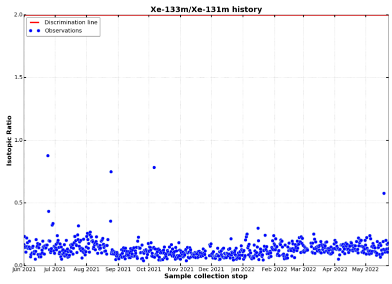


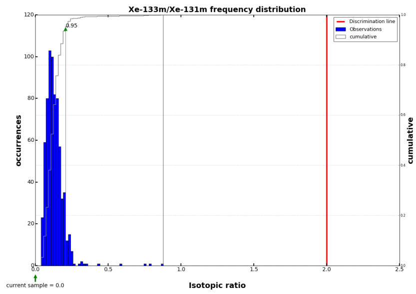

Xe-135 categorization history
Xe-135, mBq/m3
Sample collection stop
MDC
LC
Abnormal threshold
Level B
Level A

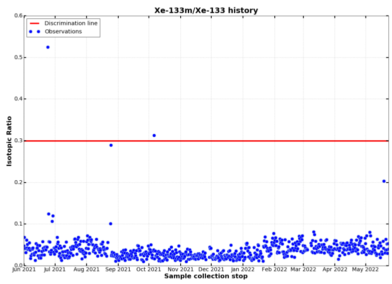

Xe-135 frequency distribution
occurrences
cumulative
Activity concentration, mBq/m3
current sample = -0.05

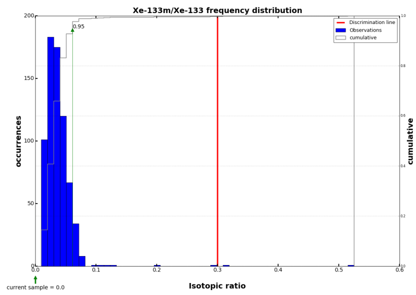

Xe-133/Xe-131m history
Isotopic Ratio
Sample collection stop
Discrimination line
Observations

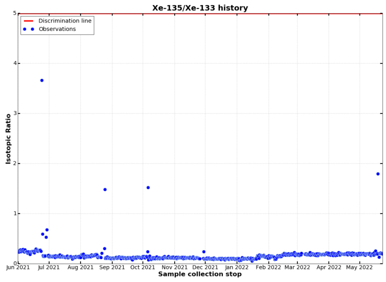

Xe-133/Xe-131m frequency distribution
occurrences
cumulative
Isotopic ratio
current sample = 0.03

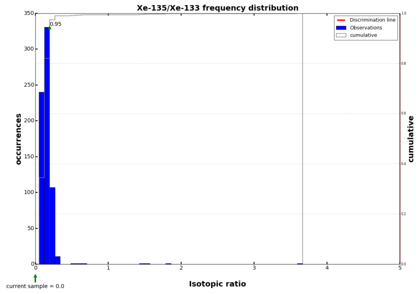

Xe-133m/Xe-131m history
Isotopic Ratio
Sample collection stop
Discrimination line
Observations


Xe-133m/Xe-131m frequency distribution
occurrences
cumulative
Isotopic ratio
current sample = 0.0


Xe-133m/Xe-133 history
Isotopic Ratio
Sample collection stop
Discrimination line
Observations


Xe-133m/Xe-133 frequency distribution
occurrences
cumulative
Isotopic ratio
current sample = 0.0





Calibration Equations

Beta Energy To Channel : C(E)= t0 + t1 E + t2 E^2

t0 : -7.72307
t1 : 0.414462
t2 : -0.0001607

Gamma Energy To Channel : C(E)= t0 + t1 E + t2 E^2

t0 : 0.0703898
t1 : 0.382508
t2 : -0.0000566

I.2.3 HPGe systems (plain text format)

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 73000117 CTBT_IDC
REF_ID 24163264
DATA_TYPE ARR
TIME_STAMP 2022/06/02 09:40:46
IDC Generated Report
Automatic Radionuclide Report
Noble Gas Version

Creation Date: 2022-05-30 21:53:38
Sample Arrival Time: 2022-05-30 21:53:26
Time difference from receipt of raw data to report creation:    12.0 s

Sample Information
--------------------------------------------------------------------------------

Station ID:     MNX45   Detector Code: MNX45_005
Authenticated:  YES

Station Location:       MNX45, Mongolia
Detector Description:   BE3825 detector #5 in Mongolia
System Technology:      SPALAX

Sample Reference ID:    45202205282211G
Sample ID:              6736824
Stable Xe Volume:       4.35 ml Sample Type: Gas

Collection Start:       2022-05-28 22:00:00     Sampling Time:          1 d
Collection Stop:        2022-05-29 22:00:00     Processing Time:         1 h 24 m 6 s
Acquisition Start:      2022-05-29 23:24:06     Acquisition Time:        22 h 21 m 5 s
Acquisition Stop:       2022-05-30 21:45:11

Measurement Categorization
--------------------------------------------------------------------------------

Categorization Legend

Level A =       Clean spectrum - No Xenon is present in the sample.
Level B =       Xenon detection within the typical range for the station.
Level C =       Anomalous Xenon detection.

Isotope category
Isotope Nuclide detected        Abnormal_limit (mBq/m3) Category
```

```
Xe-131m NO      1.20E+00        A
Xe-133m NO      1.58E+00        A
Xe-133  NO      4.94E-01        A
Xe-135  NO      7.50E-01        A

Spectrum Category: A - Clean spectrum - No Xenon is present in the sample

Activity Summary and Minimum Detectable Concentration for Xenon Isotopes
--------------------------------------------------------------------------------

Radon level in Xenon sample
Nuclide Half-Life       Area    RelErr (%)
Rn-222  3.82 D          277.46  8.02

Xenon isotopes

Peak Fit Method

Nuclide  Half-Life  Activity (mBq)  StatErr (%)  SysErr (%)  TotalErr (%)  Conc (mBq/m3)  StatErr (%)  SysErr (%)  TotalErr (%)
    MDI/MDC
XE-131M  11.962 D   2.70E+01        75.05        2.68        75.10         5.58E-01       75.05        4.02        75.16
    2.75E-01
XE-133M  2.198 D    -5.02E+00       420.72       2.72        420.73        -1.19E-01      420.72       4.05        420.74
    2.75E-01
XE-133   5.2441 D   -2.51E-01       979.93       2.50        979.93        -5.39E-03      979.93       3.91        979.93
    2.92E-01
XE-135   9.143 H    4.67E+00        102.21       2.72        102.25        2.25E-01       102.21       4.05        102.29
    1.16E+00

Decay Analysis Method

Nuclide  Half-Life  Activity (mBq)  StatErr (%)  SysErr (%)  TotalErr (%)  Conc (mBq/m3)  StatErr (%)  SysErr (%)  TotalErr (%)
    MDI/MDC
XE-131M  11.962 D   -1.77E+01       117.69       2.68        117.73        -3.66E-01      117.69       4.02        117.76
    2.75E-01
XE-133M  2.198 D    3.40E+01        63.65        2.72        63.71         8.07E-01       63.65        4.05        63.78
    2.75E-01
XE-133   5.2441 D   5.44E+00        45.30        2.50        45.37         1.17E-01       45.30        3.91        45.47
    2.92E-01
XE-135   9.143 H    5.08E+00        86.81        2.72        86.85         2.45E-01       86.81        4.05        86.90
    1.16E+00

Processing Specific Parameters and Results
--------------------------------------------------------------------------------

Xenon Peak Data

```

```
Energy (keV)  Centroid  Width  FWHM (keV)  Eff (%)  Net Area  RelErr (%)
29.66       134.87    3.00   0.60        12.72    101.60    27.88

Processing Parameters
--------------------------------------------------------------------------------

Risk level K:            4.26489
Baseline algorithm:      Smoothing / Lawn Mowers

Calibration Parameters
--------------------------------------------------------------------------------

SAreaThreshold:          100
ConfidenceLevel:         95
ECR updated:             Yes
RER updated:             Yes
Used ECR:                INITIAL
Used RER:                MRPM

Data Timeliness and Availability Flags
--------------------------------------------------------------------------------

Name                      Pass/Fail  Value     Test
Previous Sample Present   Pass       6735347   -1 day sample available
Collection Time           Pass       24.00     24h +- 10%
Acquisition Time          Pass       22.35     24h +- 10%
Response Time             Pass       47.89     sample received within 96h of collect start

Data Quality Flags
--------------------------------------------------------------------------------

Name                 Pass/Fail  Value  Test
Stable Xenon Volume  Pass       4.35   greater than 0.87 ml
SOH                  N/A        N/A    N/A
Xe-133 MDC           PASS       0.29   less than 1 mBq/m3

Event Screening Flags
--------------------------------------------------------------------------------

Name                                                    YES/NO/Value
Xenon Isotopes present in this spectrum                 YES
Only one Xenon Isotope in spectrum                      NO
Number of days since last Xenon detection               0
2 or more Xenon Isotopes present in this spectrum       YES
Xe-133 present in spectrum                              NO
Number of times Xe-133 seen in last 365 days            124
Short term flag                                         a - Clean spectrum - No Xenon is present in the sample
```

```
Isotopic ratios:
- Xe-133m/131m > 2                                          NO
- Xe-135/133 > 5                                            NO
- Xe-133m/133 > 0.3                                         NO

Calibration Equations
--------------------------------------------------------------------------------

Energy : E(C)= t0 + t1 C + t2 CB2 + t3 CB3
t0 : 0.07120749 t1 : 0.2193672  t2 : 2.677922E-7            t3 : 0
Resolution : R(E)= b  (t0 + t1 E + t2 EB2)
t0 : 0.3162     t1 : 0.001381   t2 : 4.614E-7
TIME_STAMP 2022/06/02 09:40:46
STOP
```

I.2.4 HPGe systems (HTML format)

IDC Generated Report
Automatic Radionuclide Report
Noble Gas Version

Creation Date: 2022-05-29 21:52:36
Sample Arrival Time: 2022-05-29 21:52:22
Time difference from receipt of raw data to report creation: 14.0 s

Sample Information

Station ID:	MNX45	Detector Code:	MNX45_005
Authenticated:	YES		
Station Location:	MNX45, Mongolia		
Detector Description:	BE3825 detector #5 in Mongolia		
System Technology:	SPALAX		
Sample Reference ID:	45202205272211G		
Sample ID:	6735347		
Stable Xe Volume:	4.47 ml	Sample Type:	Gas
Collection Start:	2022-05-27 22:00:00	Sampling Time:	1 d
Collection Stop:	2022-05-28 22:00:00	Processing Time:	1 h 24 m 6 s
Acquisition Start:	2022-05-28 23:24:06	Acquisition Time:	22 h 21 m 1 s
Acquisition Stop:	2022-05-29 21:45:07		

Measurement Categorization

Categorization Legend

Level A = Clean spectrum - No Xenon is present in the sample.
Level B = Xenon detection within the typical range for the station.
Level C = Anomalous Xenon detection.

Isotope category

Isotope	Nuclide detected	Abnormal_limit (mBq/m3)	Category
Xe-131m	NO	1.21E+00	A
Xe-133m	NO	1.58E+00	A
Xe-133	YES	4.91E-01	B
Xe-135	NO	7.51E-01	A

Spectrum Category: B - Xenon detection within the typical range for the station

Activity Summary and Minimum Detectable Concentration for Xenon Isotopes

Radon level in Xenon sample

Nuclide	**Half-Life**	**Area**	**RelErr (%)**
Rn-222	3.82 D	315.68	7.39

Xenon isotopes

Peak Fit Method

Nuclide	**Half-Life**	**Activity (mBq)**	**StatErr (%)**	**SysErr (%)**	**TotalErr (%)**	**Conc (mBq/m3)**	**StatErr (%)**	**SysErr (%)**	**TotalErr (%)**	**MDI/MDC**

XE-131M	11.962 D	2.12E+00	925.66	2.68	925.66	4.26E-02	925.66	4.02	925.66	2.62E-01
XE-133M	2.198 D	2.26E+01	90.14	2.72	90.18	5.23E-01	90.14	4.05	90.23	2.62E-01
XE-133	5.2441 D	9.26E+00	28.91	2.50	29.02	1.94E-01	28.91	3.91	29.18	2.88E-01
XE-135	9.143 H	2.53E+00	187.34	2.72	187.36	1.19E-01	187.34	4.05	187.38	1.14E+00

Decay Analysis Method

Nuclide	Half-Life	Activity (mBq)	StatErr (%)	SysErr (%)	TotalErr (%)	Conc (mBq/m3)	StatErr (%)	SysErr (%)	TotalErr (%)	MDI/MDC
XE-131M	11.962 D	-1.35E+01	149.16	2.68	149.18	-2.72E-01	149.16	4.02	149.21	2.62E-01
XE-133M	2.198 D	2.96E+01	70.93	2.72	70.98	6.84E-01	70.93	4.05	71.05	2.62E-01
XE-133	5.2441 D	1.21E+01	22.06	2.50	22.20	2.53E-01	22.06	3.91	22.40	2.88E-01
XE-135	9.143 H	6.42E+00	69.80	2.72	69.85	3.01E-01	69.80	4.05	69.92	1.14E+00

Processing Specific Parameters and Results

Xenon Peak Data

Energy (keV)	Centroid	Width	FWHM (keV)	Eff (%)	Net Area	RelErr (%)
29.74	135.38	3.00	0.60	12.79	99.90	27.85
80.92	368.42	3.00	0.66	26.07	74.66	28.03

Processing Parameters

Risk level K: 4.26489
Baseline algorithm: Smoothing / Lawn Mowers

Calibration Parameters

SAreaThreshold: 100
ConfidenceLevel: 95
ECR updated: Yes
RER updated: Yes
Used ECR: INITIAL
Used RER: MRPM

Data Timeliness and Availability Flags

Name	Pass/Fail	Value	Test
Previous Sample Present	Pass	6733920	-1 day sample available
Collection Time	Pass	24.00	24h +- 10%
Acquisition Time	Pass	22.35	24h +- 10%
Response Time	Pass	47.87	sample received within 96h of collect start

Data Quality Flags

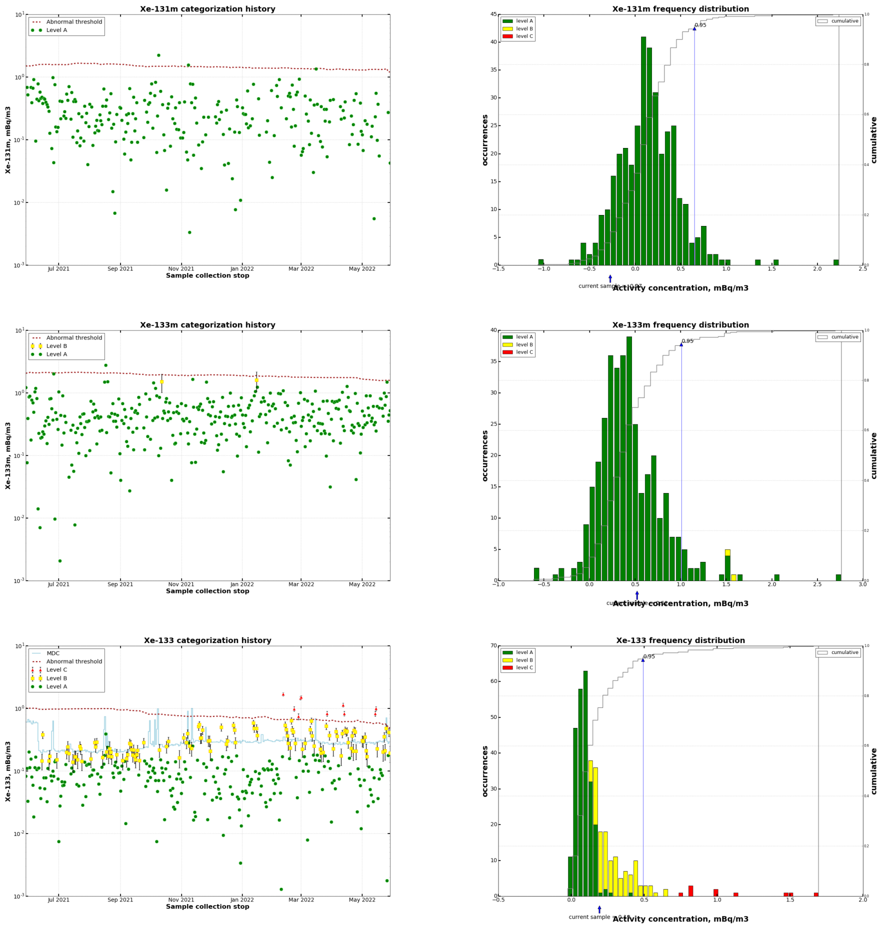
Name	Pass/Fail	Value	Test
Stable Xenon Volume	Pass	4.47	greater than 0.87 ml
SOH	N/A	N/A	N/A
Xe-133 MDC	PASS	0.29	less than 1 mBq/m3

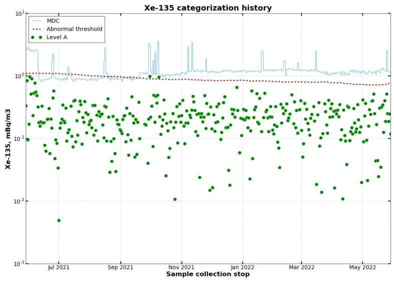
Event Screening Flags

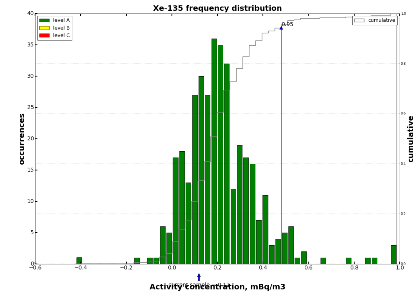
Name	YES/NO/Value
Xenon Isotopes present in this spectrum	YES
Only one Xenon Isotope in spectrum	NO
Number of days since last Xenon detection	0
2 or more Xenon Isotopes present in this spectrum	YES
Xe-133 present in spectrum	YES
Number of times Xe-133 seen in last 365 days	122
Short term flag	b - Xenon detection within the typical range for the

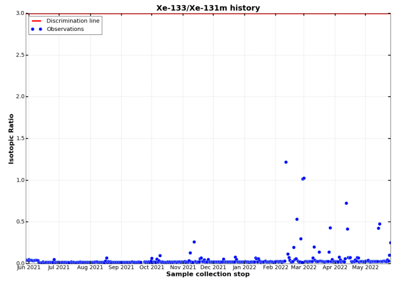
station

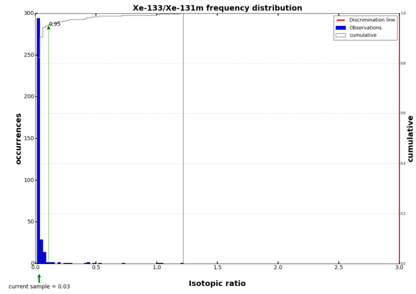
Isotopic ratios:
- Xe-133m/131m > 2 NO
- Xe-135/133 > 5 NO
- Xe-133m/133 > 0.3 NO

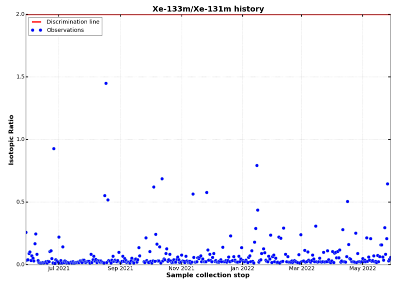


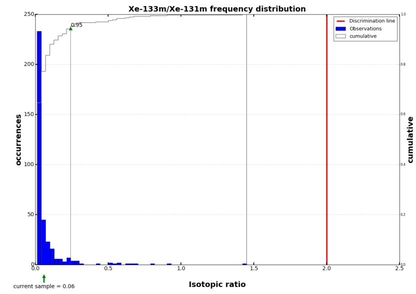

Xe-135 categorization history
MDC
Abnormal threshold
Level A
Xe-135, mBq/m3
Sample collection stop

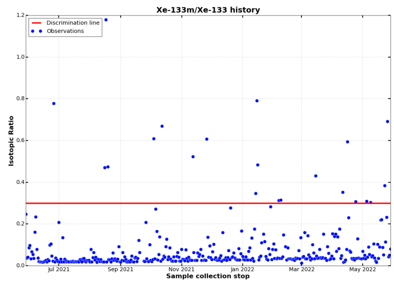

Xe-135 frequency distribution
level A
level B
level C
cumulative
occurrences
Activity concentration, mBq/m3

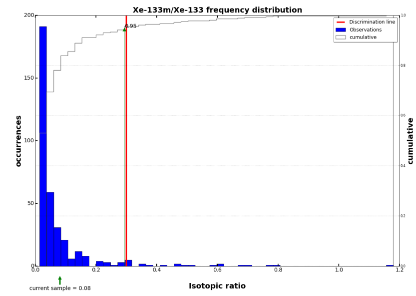

Xe-133/Xe-131m history
Discrimination line
Observations
Isotopic Ratio
Sample collection stop

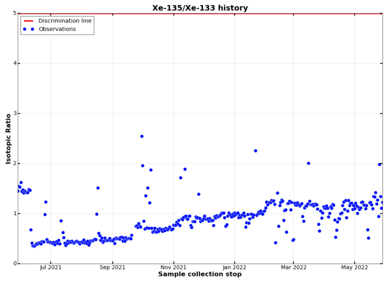

Xe-133/Xe-131m frequency distribution
Discrimination line
Observations
cumulative
occurrences
Isotopic ratio
current sample = 0.03

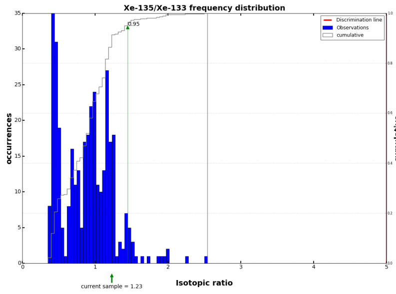

Xe-133m/Xe-131m history
Discrimination line
Observations
Isotopic Ratio
Sample collection stop


Xe-133m/Xe-131m frequency distribution
Discrimination line
Observations
cumulative
occurrences
Isotopic ratio
current sample = 0.06


Xe-133m/Xe-133 history
Discrimination line
Observations
Isotopic Ratio
Sample collection stop


Xe-133m/Xe-133 frequency distribution
Discrimination line
Observations
cumulative
occurrences
Isotopic ratio
current sample = 0.08





Calibration Equations

Energy : E(C)= t0 + t1 C + t2 C^2 + t3 C^3

t0 : 0.03144813
t1 : 0.2194418
t2 : 2.846689E-7
t3 : 0

Resolution : R(E)= $\sqrt{(t0 + t1\ E + t2\ E^2)}$

t0 : 0.3162
t1 : 0.001381
t2 : 4.614E-7

I.3 ARR—Particulate version

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 72650191 CTBT_IDC
REF_ID 235791113
DATA_TYPE ARR
TIME_STAMP 2022/05/19 09:51:20
                              IDC GENERATED REPORT
                          AUTOMATED RADIONUCLIDE REPORT
                               Particulate Version

                         Creation Date: 2022/05/11 22:27:29
                   Sample Arrival Time: 2022/05/11 22:27:22
    Time difference from receipt of raw data to report creation: 0 hours

SAMPLE INFORMATION ======================================================

Station ID:          AUP04               Detector ID:        AUP04_005
Authenticated:       YES

Station Location: Melbourne, VIC, Australia
Detector Description: Detector 05 at AUP04

Sample ID:             6709060          Sample Geometry:    50mmX4.5mm
Sample Quantity:      21750.00 m3       Sample Type:        Particulate


Collection Start:   2022/05/08 23:22    Sampling Time:        23.69 hours
Collection Stop:    2022/05/09 23:04    Decay Time:           24.45 hours
Acquisition Start:  2022/05/10 23:31    Acquisition Time:     22.89 hours
Acquisition Stop:   2022/05/11 22:25    Avg Flow Rate:       918.11 m3/hr

Collection Station Comments:
------ UTC: 2022/05/11 22:06:13 ------
Sys Log: Archiving SOH email
------ UTC: 2022/05/11 22:25:00 ------
Sys Log: Spectrum Acquisition Complete
------ UTC: 2022/05/11 22:25:00 ------
Sys Log: Archiving spectrum.spm


IDC Analysis General Comments:



MEASUREMENT CATEGORIZATION ==============================================

```

```
Categorization Legend
---------------------
Level 1  =  Typical Background Rad. Meas.
Level 2  =  Anomalous Background Rad. Meas.
Level 3  =  Typical Anthropogenic Rad. Meas.
Level 4  =  Anomalous Anthropogenic Rad. Meas.
Level 5  =  Mult. Anomalous Anthropogenic Rad. Meas.

Spectrum Category (2) -- Anomalous Background Rad. Meas.

Categorization Summary:

Name        Category   Categorization Comment
----        --------   ----------------------
AM-241         2        Not Regularly Measured



ACTIVITY SUMMARY ========================================================

NATURAL RADIOACTIVITY:

Nuclides Identified and not Quantified:

BI-214, PB-210, PB-214


Nuclides Quantified:

Nuclide             Half-Life            Conc(uBq/m3)        RelErr(%)       Activ(uBq)          RelErr(%)

BE-7                53.290 D               2.13E+03          2.32             4.54E+07            2.32
PB-212F             10.64 H                2.52E+05          2.01             5.69E+08            2.01

ACTIVATION-PRODUCT RADIOACTIVITY:

Nuclide             Half-Life            Conc(uBq/m3)        RelErr(%)        Activ(uBq)          RelErr(%)       Coincidence

None Found

FISSION-PRODUCT RADIOACTIVITY:

Nuclide             Half-Life            Conc(uBq/m3)        RelErr(%)       Activ(uBq)          RelErr(%)       Coincidence

AM-241              432.2 Y                7.78E+00          21.72             1.69E+05           21.72              NO

MINIMUM DETECTABLE CONCENTRATION FOR KEY NUCLIDES =======================
```

```

Nuclide             Half-Life               MDC(uBq/m3)         MDA(uBq)

BA-140              12.752 D                 2.13E+01             4.27E+05
CE-143              1.377 D                  2.11E+01             2.17E+05
CS-134              2.062 Y                  5.80E+00             1.26E+05
                                                                  ⋮
TE-132              3.204 D                  5.62E+00             8.83E+04
ZR-95               64.020 D                 8.50E+00             1.82E+05
ZR-97               16.900 H                 3.12E+01             1.59E+05


PEAK SEARCH RESULTS ====================================================

      91 peaks found in spectrum by automated peak search.
      73 peaks associated with nuclides by automated processing.
      18 peaks not associated with nuclides by automated processing.
      80 percent of peaks were associated with nuclides.

 Note: "*" indicates that a peak was a component of a multiplet.

 Energy (keV)  Centroid  Width  FWHM (keV)  Eff (%)      Area     Bkgnd (%)  RelErr (%)    Nuclide    Nts

       27.79     80.73      3        0.86    23.16     11315.41       0.00        1.35
       28.83     83.76      3        0.86    23.23      9367.54       0.00        1.73
       29.86     86.78      3        0.87    23.29      8552.00       0.00        1.98     PB-212F
                                                                  ⋮
     2614.30   7660.33      9        3.16     1.98    131219.69       0.14        0.28     PB-212F
     2687.38   7874.64      9        3.21     1.93      3023.30       0.00        2.31     PB-212F
     2699.31   7909.63      9        3.22     1.92       405.72       0.00       12.83     PB-212F

PROCESSING PARAMETERS ==================================================

Risk level K:                      4.26489
Baseline algorithm:                Smoothing / Lawn Mowers
Nucl Id Detectability Threshold: 0.2
Energy Id Tolerance:               0.8 + 0 * FWHM
Background subtraction:            YES
Background spectrum ID:            6577190
Background data type:              blank
Background acquisition start:      2022/02/07 22:38
Background acquisition time:       72 hours
IRF for Pb-212F:                   YES

CALIBRATION PARAMETERS =================================================

```

```
SAreaThreshold:            100
Confidence level:          95
ECR updated:               NO
RER updated:               YES
Used ECR:                  MRP A
Used RER:                  MRP M

DATA TIMELINESS AND AVAILABILITY FLAGS =================================

Previous Sample Present?                               YES
Collection time within 24 hours +/- 10%?               YES
Acquisition time >= 20 hours?                          YES
Decay time <= 24 hours?                                YES
Sample received within 72 hours of collect start?      YES

DATA QUALITY FLAGS =====================================================

Name                           Pass/Fail  Value          Test

Ba140_MDC                      PASS       21.3136        <30
K40_LocationDifference         PASS       0.19873        <3*std deviation
Be7_FWHM                       PASS       1.39926        <1.7
FlowRate                       PASS       918.109        >500


CALIBRATION EQUATIONS ==================================================

Energy vs. Channel

        E(c) = 0.2271 + 0.3415*c - 3.222E-08*c^2

                E = energy (keV)
                c = channel number


Resolution vs. Energy

        FWHM(E) = SQRT(0.67+0.002494*E+4.089e-07*E^2)

                FWHM = Full Width Half Max (keV)
                E = energy (keV)


Efficiency vs. Energy

        VGSL pairs
                 Energy     Efficiency    Uncertainty
```

```
                    40          0.238        0.00297
                    50          0.242         0.0043
                    60          0.243        0.00528
```

⋮

```
                  2300         0.0221       0.000384
                  2380         0.0217       0.000379
                  2450         0.0211       0.000373

 FIELD OF REGARD ======================================================

https://swp.ctbto.org/FOR/AUP04/2022/05/10
TIME_STAMP 2022/05/19 09:51:20
STOP
```

I.4 Arrival data messages

I.4.1 ARRIVAL:ASSOCIATED

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68527602 CTBT_IDC
REF_ID 1234
DATA_TYPE ARRIVAL:associated IMS2.0
Net       Sta      Dist  EvAz     Phase  Date         Time        TRes  Azim AzRes  Slow  SRes Def   SNR        Amp   Per Qual
    Magnitude   OrigID Author        ArrID
          MJAR    6.62 327.2 Pn       2021/12/01 02:09:46.763   0.2 155.9  11.2  10.7 -3.10 TAS  5.70        0.1  0.33 a__  ML
              2.7 21425704 IDC_SEL3  165853767
          WRA    51.30 190.1 P        2021/12/01 02:17:12.900  -0.3   8.0  -0.2   7.7  0.10 TAS  8.60        1.1  0.59 a__  mb
              4.0 21425704 IDC_SEL3  165853968
          WRA    51.30 190.1 tx       2021/12/01 02:17:23.650         8.6   0.3   8.0  -999 ___  5.70        1.0  0.50 a__
                         21425704 IDC_SEL3  165853969
          ILAR   54.08  29.9 P        2021/12/01 02:17:32.850  -0.5 257.3  -9.0   5.6 -0.90 TAS  6.30        0.5  0.69 a__  mb
              3.6 21425704 IDC_SEL3  165853924
          ILAR   54.08  29.9 tx       2021/12/01 02:17:37.050       284.9  14.4   7.7  -999 ___  4.10        0.4  0.87 a__
                         21425704 IDC_SEL3  165853925
          ASAR   55.03 189.9 P        2021/12/01 02:17:41.200   0.5   5.5  -2.1   5.5 -1.20 TAS  4.80        0.2  0.40 a__  mb
              3.5 21425704 IDC_SEL3  165853864
          NVAR   77.76  52.5 P        2021/12/01 02:20:07.025   0.3 298.9  11.4   7.1  2.00 TAS  4.40        0.4  0.55 a__  mb
              3.7 21425704 IDC_SEL3  165853930
```

⋮

```
          NRIK   84.31 342.2 tx       2021/12/01 02:47:57.650         2.4         2.6  -999 ___  4.10        2.0  0.54 a__
                         21426384 IDC_SEL3  165854505
          QSPA   84.77 180.0 P        2021/12/01 02:47:19.719   0.4 339.7 -21.7   2.2 -2.80 TAS 14.20        3.4  0.65 a__  mb
              4.2 21426384 IDC_SEL3  165857907
```

```
            ILAR   84.99   23.3 P         2021/12/01 02:47:19.400  -0.8 255.7   9.8   5.0  0.90 TAS 36.30        5.5  0.84 a__  mb
     4.3 21426384 IDC_SEL3  165854507
            ILAR   84.99   23.3 tx        2021/12/01 02:48:00.800       244.4   2.3   5.4  -999 ___  5.60        2.7  0.99 a__
                  21426384 IDC_SEL3  165854509
            BVAR   85.74 324.0 P          2021/12/01 02:47:23.475  -0.7 114.9  10.5   6.7  1.80 TAS  7.10        2.0  0.86 a__  mb
     3.8 21426384 IDC_SEL3  165855284
            I01AR  19.91 283.2 I          2021/12/01 02:30:00.000  76.3 118.6  -3.2 310.2 24.70 TA_  1.50        0.0  1.92 a__
                  21426476 IDC_SEL3  165854414
            I19DJ  25.51 157.3 I          2021/12/01 02:15:00.000  45.4 333.7  -7.6 324.0 -42.9 TA_  0.70        0.0  0.39 a__
                  21426741 IDC_SEL3  165854416
STOP
```

I.4.2 ARRIVAL:AUTOMATIC

This subtype is not supported by the IDC. See Appendix IV "Unsupported commands at the IDC" for a list of unsupported command.

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 14548
DATA TYPE ARRIVAL:AUTOMATIC IMS2.0
Net         Sta    BeamID           Date        Time        Phase      Azim  Slow    SNR          Amp   Per    STA    Dur  Author          DetID
            I32KE                   2016/06/01 00:00:00.000 N         285.6 322.7    1.0          0.0 -1.00   -1.0        DFX         114378843
            CPUP                    2016/06/01 00:00:02.475 tx        316.8   1.4    3.8          2.4  0.44    3.2        DFX         114378315
            JKA                     2016/06/01 00:00:07.575 Sx        271.0  29.5    4.1         25.2  0.67   21.8        DFX         114379062
            I10CA                   2016/06/01 00:00:10.000 N         176.3 332.4    0.8          0.0 -1.00   -1.0        DFX         114378769
            CMAR                    2016/06/01 00:00:17.850 P         301.2   6.4    5.3          2.1  0.44    2.7        DFX         114378326
STOP
```

I.4.3 ARRIVAL:GROUPED

This subtype is not supported by the IDC. See Appendix IV "Unsupported commands at the IDC" for a list of unsupported command.

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 14548
DATA_TYPE ARRIVAL:GROUPED IMS2.0
Net         Sta   Chan Aux      Date        Time         Phase      Azim Slow    SNR         Amp   Per Qual   Group C Author        ArrID
            CPUP  Z15         2016/06/01 00:00:02.475 tx        316.8   1.4    3.8         2.4  0.44 a__  7801174 0 STAPRO    114378315
            MKAR  MK_         2016/06/01 00:04:03.500 P          83.5  11.8   21.9         0.6  0.33 a__  7801177 0 STAPRO    114378545
            MKAR  MK_         2016/06/01 00:04:14.175 tx         88.4   6.1    4.8         0.3  0.33 a__  7801177 0 STAPRO    114378546
            FINES FI_         2016/06/01 00:07:10.300 P          67.5   5.8   40.5         1.5  0.33 a__  7801178 0 STAPRO    114378532
            FINES FI_         2016/06/01 00:07:20.550 tx         64.6   5.0    6.4         0.7  0.33 a__  7801178 0 STAPRO    114378533
```

```
             FINES FI_        2016/06/01 00:07:35.675 tx         66.9  4.2   5.6         0.6  0.33 a__  7801178 0 STAPRO    114378534
             ZALV  ZA_        2016/06/01 00:12:00.825 P         265.8  7.8   4.2         0.6  0.33 a__  7801186 0 STAPRO    114378743
             ZALV  ZA_        2016/06/01 00:12:22.875 tx        296.4  6.3   6.2         1.0  0.33 a__  7801186 0 STAPRO    114378744
             ASAR  AS_        2016/06/01 00:28:21.300 P         106.4  7.2  45.9         2.0  0.44 a__  7801187 0 STAPRO    114378774
             ASAR  AS_        2016/06/01 00:28:34.800 tx        113.3  7.5   7.2         4.2  0.89 a__  7801187 0 STAPRO    114378775
             ASAR  AS_        2016/06/01 00:28:43.050 tx        112.7  7.9   4.3         2.5  0.89 a__  7801187 0 STAPRO    114378776
             KMBO  H40        2016/06/01 00:28:30.925 Pn         59.8 20.9   6.3         2.7  0.17 a__  7801188 0 STAPRO    114378801
             KMBO  H15        2016/06/01 00:29:06.275 Lg         51.1 22.5   5.7         5.8  0.44 a__  7801188 0 STAPRO    114378803
STOP
```

I.4.4 ARRIVAL:REVIEWED

This subtype is not supported by the IDC. See Appendix IV “Unsupported commands at the IDC” for a list of unsupported command.

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 14548
DATA_TYPE ARRIVAL:REVIEWED IMS2.0
Net          Sta  Chan  Aux      Date        Time        Phase       Azim  Slow   SNR         Amp   Per  Qual  Author      ArrID
IDC_SEIS     BBB  bhz    _    1996/08/16  03:41:40.523 P          256.3  16.2  13.4       228.6  0.33 a__  IDC_REB    116183910
IDC_SEIS     BBB  bhz         1996/08/16  03:42:04.531 S          334.7  18.6   8.2       338.6  0.33 a__  IDC_REB    116183930
IDC_SEIS     DLBC bhz         1996/08/16  03:42:58.584 P          166.7  16.5  16.5       1.5    0.33 a__  IDC_REB    116183960
IDC_SEIS     DLBC bhz         1996/08/16  03:44:59.808 S                                                m__  IDC_REB    116210220
IDC_SEIS     NEW  bhz         1996/08/16  03:43:23.394 P          308.2   6.6   4.2       0.3    0.33 a__  IDC_REB    116147830
IDC_SEIS     NEW  bhz         1996/08/16  03:46:03.321 S          337.6  12.2   4.1       0.2    0.33 a__  IDC_REB    116147870
STOP
```

I.4.5 ARRIVAL:UNASSOCIATED

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68527766 CTBT_IDC
REF_ID 1234
DATA_TYPE ARRIVAL:unassociated IMS2.0
Net          Sta    BeamID            Date         Time        Phase       Azim  Slow   SNR         Amp   Per   STA    Dur  Author        DetID
             CMIG                  2021/12/01  02:05:35.294 N          191.0   2.6   8.7         1.6  0.17   2.0       IDC_SEL3   165854646
             CMIG                  2021/12/01  02:05:47.569 N            3.2  23.1  18.4         2.0  0.17   5.6       IDC_SEL3   165854647
             CMAR                  2021/12/01  02:06:15.450 N           48.8  29.3   4.6         2.6  0.33   4.6       IDC_SEL3   165853716
             I32KE                 2021/12/01  02:07:40.000 N            7.6 116.6   3.5         0.0 -1.00  -1.0       IDC_SEL3   165854021
             CMAR                  2021/12/01  02:12:15.700 N          295.6  16.2   4.3         2.6  0.33   4.4       IDC_SEL3   165853885
```

```
            CMAR                   2021/12/01 02:13:51.450 N         331.6  32.5    4.2        3.0  0.33    5.7        IDC_SEL3  165853886
            I32KE                  2021/12/01 02:20:25.000 N         103.3 314.1    3.0        0.0 -1.00   -1.0        IDC_SEL3  165854605
                                                                       :
            CTA                    2021/12/01 02:46:41.200 N         339.4   5.2    3.3        8.6  1.00    5.7        IDC_SEL3  165855297
            CMAR                   2021/12/01 02:47:57.850 N          32.6  29.7    4.6        1.4  0.44    2.9        IDC_SEL3  165854475
            I32KE                  2021/12/01 02:50:00.000 N         119.6 325.0    2.5        0.0 -1.00   -1.0        IDC_SEL3  165855135
            I32KE                  2021/12/01 02:50:25.000 N          99.8 311.2    4.5        0.0 -1.00   -1.0        IDC_SEL3  165855138
            I32KE                  2021/12/01 02:52:50.000 N         248.8 266.1    0.7        0.0 -1.00   -1.0        IDC_SEL3  165855134
            I32KE                  2021/12/01 02:54:50.000 N         119.8 335.3    0.8        0.0 -1.00   -1.0        IDC_SEL3  165855136
            CMAR                   2021/12/01 02:59:23.450 Pn        185.5  14.4    4.4        1.6  0.44    2.1        IDC_SEL3  165854704
STOP
```

I.5 AUTH_STATUS

AUTH_STATUS is not supported by the IDC. See Appendix IV "Unsupported commands at the IDC" for a list of unsupported command.

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 10000998
DATA_TYPE AUTH_STATUS IMS2.0
Report period from 1994/12/03 00:00:00.0 to 1994/12/04 00:00:00.0

Net        Sta  Chan Aux   Packets_Tested Packets_Failed
IDC_SEIS   ABC   shz                 8640              3
IDC_SEIS   DEF   bhz                 8640              0

Failed Packet Intervals
Net        Sta  Chan Aux        Start_Time              End_Time         Comment
IDC_SEIS   ABC  shz        1994/12/03 14:28:40    1994/12/03 14:29:10    Unknown cause
STOP
```

I.6 BLANKPHD

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68533772 CTBT_IDC
REF_ID 444444
DATA_TYPE LOG
 Info - 68533772 - IMSLANGUAGE request successfully parsed
 Info - 68533772 - Job 89156110: job status has changed to: QUEUED
 Info - 68533772 - Request submitted successfully, request id 68533772
 Info - 68533772 - Job 89156110: job status has changed to: RUNNING
 Info - 68533772 - The product BLANKPHD has been generated in 0 minutes, 0 seconds
     and 187 milliseconds
 Info - 68533772 - You have 4174157.81KB left out of your daily 4194304.00KB quota
DATA_TYPE BLANKPHD
TIME_STAMP 2021/12/09 15:40:11
#Header 3
BRP11 BRP11_002 P RASA              FULL
11000000000131
BRP11_002-2021/11/25-19:53:40   0                               0
2021/11/29 14:30:02
#Comment
Barcode ID: 0000054508
This data generated by RASA Linux Control Software Version 5.50
RASA LINUX CONTROL SOFTWARE VERSION 5.5 - Nov 2017
Ortec 50-TP42122A 3800V
#Acquisition
2021/11/25 19:53:40   300619.52      300197.32
#Calibration
2021/11/24 21:04:04
#g_Energy
59.54            173.37           0.0000
88.03            256.60           0.0000
122.06           355.96           0.0000
136.47           398.05           0.0000
165.86           484.02           0.0000
255.13           745.61           0.0000
391.70           1144.97          0.0000
661.66           1934.99          0.0000
834.84           2441.76          0.0000
898.04           2626.77          0.0000
1115.54          3263.12          0.0000
1173.23          3431.95          0.0000
1332.49          3898.00          0.0000
1836.05          5371.66          0.0000
#g_Resolution
59.54            1.0350           0.000000
88.03            1.0350           0.000000
122.06           1.0630           0.000000
```

```
136.47            1.0840            0.000000
165.86            1.0960            0.000000
255.13            1.0750            0.000000
391.70            1.2420            0.000000
661.66            1.4850            0.000000
834.84            1.5500            0.000000
898.04            1.6400            0.000000
1115.54           1.7540            0.000000
1173.23           1.7470            0.000000
1332.49           1.8600            0.000000
1836.05           2.1040            0.000000
#g_Efficiency
59.54             0.0057000000      0.000150000000
88.03             0.0310000000      0.000660000000
122.06            0.0479000000      0.000950000000
165.86            0.0559000000      0.001110000000
391.70            0.0406000000      0.000770000000
661.66            0.0299000000      0.000580000000
834.84            0.0267000000      0.000510000000
898.04            0.0224000000      0.000400000000
1115.54           0.0215000000      0.000440000000
1173.23           0.0187000000      0.000340000000
1332.49           0.0170000000      0.000310000000
1836.05           0.0144000000      0.000260000000
#g_Spectrum
8192  2900
1     0           0           0           0           0
6     0           0           0           0           0
11    0           0           0           0           0
16    0           0           0           0           0
21    0           0           0           0           0
```

⋮

```
8181  10          18          13          9           9
8186  8           5           13          7           6
8191  16          0
TIME_STAMP 2021/12/09 15:40:11
STOP
```

I.7 BULLETIN (IMS2.0:short format)

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68533072 CTBT_IDC
REF_ID 12345
DATA_TYPE BULLETIN IMS2.0:SHORT
TIME_STAMP 2021/12/09 15:11:20
Reviewed Event Bulletin of the CTBT_IDC from 2021/12/01 12:00:00 to 2021/12/01 13:00:00,  generated 2021/12/09 15:11:20
EVENT  21429064 SOUTH OF HONSHU, JAPAN
   Date       Time        Err   RMS Latitude Longitude  Smaj  Smin  Az Depth   Err Ndef Nsta Gap  mdist  Mdist Qual   Author      OrigID
2021/12/01 12:07:08.52   0.76  1.06  31.1076  142.4125  23.5  16.2  64   0.0f        14   14 136   2.98  93.04 m i uk IDC_REB    21436469

Magnitude  Err Nsta Author      OrigID
ML      3.2 0.2    2 IDC_REB   21436469
mb      3.9 0.1   12 IDC_REB   21436469
mbtmp   3.8 0.1   14 IDC_REB   21436469

Sta      Dist  EvAz Phase        Time      TRes  Azim AzRes   Slow   SRes Def   SNR       Amp   Per Qual Magnitude    ArrID
JHJ      2.98 312.9 Pn       12:07:55.681   1.9 197.5  66.0   20.1    6.4 T__   1.8      11.8  0.33 ___ ML     3.4 165912469
                                                                                         82.8  0.42     mbtmp  4.2
JHJ      2.98 312.9 Sn       12:08:31.358   6.3  90.0 -41.5   20.2   -4.5 ___   5.2      38.6  0.33 a__              165867479
JCJ      4.00 183.0 Pn       12:07:59.550  -7.6   3.5   0.6   18.8    5.0 ___                       ___              165912306
                                                          ⋮
NOA     79.97 338.2 P        12:19:19.470   0.1  56.2  14.1    6.3    1.0 T__   3.3       0.7  0.71 a__ mbtmp  3.8 165866316
                                                                                          0.7  0.71     mb     3.8
PDAR    81.24  45.1 P        12:19:27.965   1.2 346.0   2.0    0.4   -2.2 T__   4.6       0.3  0.64 a__ mbtmp  3.6 165866216
                                                                                          0.3  0.64     mb     3.6
TXAR    93.04  53.1 P        12:20:25.721   1.3 316.5  17.8    2.5   -0.4 T__   3.6       0.6  0.94 a__ mbtmp  3.9 165866238
                                                                                          0.6  0.94     mb     4.0



EVENT  21428539 FIJI ISLANDS REGION
   Date       Time        Err   RMS Latitude Longitude  Smaj  Smin  Az Depth   Err Ndef Nsta Gap  mdist  Mdist Qual   Author      OrigID
2021/12/01 12:11:02.02  12.04  0.05 -18.7411  -177.863 272.0  41.2 142 502.8  95.6    4    4 242  15.08  86.58 m i uk IDC_REB    21451355

Magnitude  Err Nsta Author      OrigID
mb      3.1 0.1    3 IDC_REB   21451355
mbtmp   4.1 0.1    4 IDC_REB   21451355

Sta      Dist  EvAz Phase        Time      TRes  Azim AzRes   Slow   SRes Def   SNR       Amp   Per Qual Magnitude    ArrID
DZM     15.08 254.7 P        12:14:13.107  -0.0  74.7  -5.5   17.1    6.7 TA_   2.2       6.0  0.89 ___ mbtmp  4.3 165917346
```

```
WRA     45.00  260.3 P         12:18:32.247    0.1   95.1   -0.2     8.5     0.5 TAS   29.2         0.6   0.27 a__  mbtmp    4.0  165866253
                                                                                                     0.6   0.27      mb       3.1
ASAR    45.07  255.0 P         12:18:32.691   -0.0   89.9    1.5     8.8     0.5 TAS   44.6         2.8   0.64 a__  mbtmp    4.3  165866197
                                                                                                     2.8   0.64      mb       3.4
ILAR    86.58   12.8 P         12:22:50.905   -0.0  215.1   -5.8     5.0    -0.2 TAS   10.1         0.3   0.41 a__  mbtmp    3.8  165866438
                                                                                                     0.3   0.41      mb       3.0



EVENT  21429217 SOUTH OF HONSHU, JAPAN
   Date         Time         Err    RMS Latitude Longitude   Smaj   Smin   Az Depth    Err Ndef Nsta Gap   mdist   Mdist  Qual    Author
    OrigID
2021/12/01  12:45:04.62    5.61   0.88   31.0229   142.0538 225.4   21.7   72    0.0f          6     6 218    6.34   54.94 m i uk IDC_REB
    21436786

Magnitude  Err Nsta Author       OrigID
mb      3.4 0.1     5 IDC_REB    21436786
mbtmp   3.3 0.1     6 IDC_REB    21436786

Sta      Dist  EvAz  Phase         Time       TRes   Azim  AzRes    Slow    SRes  Def    SNR        Amp    Per  Qual  Magnitude     ArrID
MJAR     6.34  331.0 Pn        12:46:39.462   -0.9  154.3    5.4    11.1    -2.6 TA_    1.3         1.6   0.95 ___  mbtmp    3.0  165913223
ZALV    46.51  316.8 P         12:53:35.157    1.8  101.6    5.9     6.5    -1.4 TAS    1.4         0.2   0.31 ___  mbtmp    3.5  165913581
                                                                                                     0.2   0.31      mb       3.5
MKAR    47.96  306.9 P         12:53:44.151   -0.7   89.8    2.7     7.8     0.1 TAS    1.5         0.2   0.52 ___  mbtmp    3.3  165913220
                                                                                                     0.2   0.52      mb       3.3
KURK    50.27  312.2 P         12:54:02.466   -0.0   90.9    3.2     9.3     1.8 TAS    1.2         0.1   0.40 ___  mbtmp    3.1  165913219
                                                                                                     0.1   0.40      mb       3.1
WRA     51.21  189.3 P         12:54:09.747   -0.1    8.8    1.3     7.6    -0.0 TAS    4.9         0.5   0.77 a__  mbtmp    3.5  165867167
                                                                                                     0.5   0.77      mb       3.5
ASAR    54.94  189.1 P         12:54:37.164   -0.2   16.3    6.0     6.9    -0.2 TAS    1.6         0.2   0.38 ___  mbtmp    3.4  165913183
                                                                                                     0.2   0.38      mb       3.4



TIME_STAMP 2021/12/09 15:11:20
STOP
```

I.8 BULLETIN (IMS2.0:long Format)

BULLETIN IMS2.0:LONG is not supported by the IDC. See Appendix IV "Unsupported commands at the IDC" for a list of unsupported command.

I.9 CALIBPHD

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68552597 CTBT_IDC
REF_ID 3912151821
DATA_TYPE CALIBPHD
TIME_STAMP 2021/12/10 09:14:00
#Header 3
BRP11 BRP11_002 P RASA              FULL
11999999990002
BRP11_002-2021/11/24-17:24:27   0                               0
2021/11/24 23:45:27
#Comment
This data generated by RASA Linux Control Software Version 5.50
RASA LINUX CONTROL SOFTWARE VERSION 5.5 - Nov 2017
Ortec 50-TP42122A 3800V
#Acquisition
2021/11/24 17:24:27.0 15848.0        15749.1
#g_Energy
59.541          173.37          0
88.034          256.60          0
122.061         355.96          0
                                 ⋮
1173.228        3431.95         0
1332.492        3898.00         0
1836.052        5371.66         0
#g_Resolution
59.541          1.035           0
88.034          1.035           0
122.061         1.063           0
                                 ⋮
1173.228        1.747           0
1332.492        1.860           0
1836.052        2.104           0
#g_Efficiency
59.541          0.0057          0.00015
88.034          0.0310          0.00066
122.061         0.0479          0.00095
                                 ⋮
1173.228        0.0187          0.00034
1332.492        0.0170          0.00031
1836.052        0.0144          0.00026
#Calibration
2021/11/24 17:24:27.0
#Certificate
10558      2020/10/01 17:00:00.0 B
Am-241   432.904     Y 308.00   1.850   59.540   35.920  0 0        0
Cd-109   1.264       Y 3070.00  1.950   88.030   3.626   0 0        0
Co-57    271.800     D 154.60   1.850   122.060  85.510  0 0        0
Ce-139   137.640     D 1032.00  1.950   165.860  79.900  0 0        0
Sn-113   115.090     D 2077.00  1.850   391.700  64.970  0 0        0
Cs-137   30.071      Y 102.20   1.850   661.660  84.990  0 0        0
Mn-54    312.130     D 154.70   1.750   834.840  99.795  0 0        0
Y-88     106.630     D 3075.00  1.750   898.040  93.900  0 0        0
Zn-65    244.010     D 370.00   1.850   1115.540 50.220  0 0        0
Co-60    5.275       Y 214.90   1.750   1173.230 99.850  0 0        0
Co-60    5.275       Y 214.90   1.750   1332.490 99.983  0 0        0
Y-88     106.630     D 3076.00  1.750   1836.050 99.320  0 0        0
#g_Spectrum
8192  2800
1     0          0          0          0          0
6     0          0          0          0          0
11    0          0          0          0          0
                                 ⋮
8181  1          0          0          0          1
8186  0          2          0          0          1
8191  0          0
#Header 3
GBL15 GBL15_143 P RASA_7028mm_D_Top FULL
```

```
15999999990147
GBL15_143-2021/11/03-16:21:38.0 0                               0
2021/11/04 13:11:16.9
#Acquisition
2021/11/03 16:21:38.0 20060.68       20000.00
#g_Energy
46.539           134.328          0.02102
59.541           171.537          0.00685
88.034           252.968          0.00753
                                     ⋮
1332.490         3805.658         0.02477
1836.060         5243.537         0.17242
2505.700         7154.078         0.08329
#g_Resolution
46.539           0.941            0.01600
59.541           0.975            0.00478
88.034           1.003            0.00550
                                     ⋮
1332.490         2.263            0.01578
1836.060         2.781            0.12990
2505.700         3.039            0.05098
#g_Efficiency
46.493           0.160500         0.0083860
59.538           0.163200         0.0062880
88.058           0.160600         0.0056470
                                     ⋮
1173.236         0.021920         0.0006716
1332.559         0.019680         0.0005727
1836.162         0.014940         0.0004016
2505.446         0.011220         0.0003088
#g_Spectrum
8192  2800
1     0          0          0          0          0
6     0          0          0          0          0
11    0          0          0          0          0
                                     ⋮
8181  1          0          0          0          0
8186  0          0          0          0          0
8191  0          0          0          0          0
#Calibration
2021/08/12 10:39:13
#Certificate
5358       2019/09/01 12:00:00   B
PB-210    8108.55    D  1375.    2.76    46.54    4.25    0 0        0
AM-241    158007.15  D  241.3    2.58    59.54    35.9    0 0        0
CD-109    461.4      D  1169.    2.63    88.03    3.7     0 0        0
CO-57     271.74     D  40.15    2.64    122.06   85.6    0 0        0
CE-139    137.64     D  37.44    2.69    165.86   80.     0 0        0
CR-51     27.7       D  710.     2.64    320.08   9.91    0 0        0
SN-113    115.09     D  158.6    2.63    391.7    64.97   0 0        0
SR-85     64.85      D  156.5    2.64    514.     96.     0 0        0
CS-137    10986.72   D  228.4    2.7     661.66   85.1    0 0        0
MN-54     312.2      D  197.1    2.58    834.85   99.98   0 0        0
Y-88      106.63     D  370.9    2.58    898.04   93.7    0 0        0
ZN-65     243.93     D  435.8    2.64    1115.54  50.04   0 0        0
CO-60     1925.28    D  237.7    2.57    1173.23  99.85   0 0        0
CO-60     1925.28    D  237.7    2.57    1332.49  99.98   0 0        0
Y-88      106.63     D  370.9    2.58    1836.06  99.2    0 0        0
TIME_STAMP 2021/12/10 09:14:00
STOP
```

I.10 CALIBPHD_Calibration blocks by VGSL simulations

```
#g_Energy
40                122.111          0
50                152.44           0
60                182.769          0
```

⋮

```
2220              6733.833         0
2320              7037.123         0
2420              7340.413         0
#g_Resolution
40                0.936008547      0
50                0.945079362      0
60                0.954071276      0
```

⋮

```
2220              2.219681959      0
2320              2.264678344      0
2420              2.309101124      0
#g_Efficiency
40.000000         0.000223         0.000406
50.000000         0.002218         0.002929
60.000000         0.008153         0.010446
```

⋮

```
2220.000000       0.013835         0.070331
2320.000000       0.013453         0.070332
2420.000000       0.013143         0.070186
```

I.11 CHANNEL

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68531923 CTBT_IDC
REF_ID 999999
DATA_TYPE CHANNEL IMS2.0
Net       Sta  Chan Aux   Latitude  Longitude Coord Sys     Elev Depth   Hang  Vang Sample_Rate Inst      On Date    Off Date
          BDFB  sz      -15.64400  -48.01410               1.095 0.032          0.0   20.000000 GS-21  1993/07/08  2003/05/17
          CPUP  SHZ     -26.33070  -57.33100               0.135 0.032          0.0   40.000000 GS-21  2002/08/28
          CPUP  sz      -26.33060  -57.32920               0.005 0.032          0.0   20.000000 GS-21  1994/01/01  2002/04/23
          LPAZ  SHZ     -16.28790  -68.13070               4.774 0.100          0.0   40.000000 GS-21  2003/05/07  2003/05/08
          LPAZ  SHZ     -16.28793  -68.13071               4.792 0.100          0.0   40.000000 GS-21  2003/05/08  2018/08/08
          LPAZ  SHZ     -16.28793  -68.13071               4.792 0.030          0.0   40.000000 GS-21  2018/08/09
          LPAZ  sz      -16.28790  -68.13070               4.774 0.032          0.0   20.000000 GS-21  1993/08/20  2003/05/07
          PLCA  SHZ     -40.73273  -70.55083               1.073 0.031          0.0   40.000000 GS-21  2002/09/04
          PLCA  sz      -40.73060  -70.55000               0.950 0.033          0.0   20.000000 GS-21  1992/10/26  1994/11/04
          PLCA  sz      -40.73273  -70.55083               1.073 0.033          0.0   20.000000 GS-21  1994/11/04  2002/05/21
          SIV   SH1     -15.99100  -61.07200               0.450 0.000    4.0  90.0   50.000000 HM500  2008/10/09
          SIV   SH2     -15.99100  -61.07200               0.450 0.000   94.0  90.0   50.000000 HM500  2008/10/09
          SIV   SHE     -15.99100  -61.07200               0.450 0.000   90.0  90.0   50.000000 HM500  2000/05/18  2008/10/08
          SIV   SHN     -15.99100  -61.07200               0.450 0.000    0.0  90.0   50.000000 HM500  2000/05/18  2008/10/08
          SIV   SHZ     -15.99100  -61.07200               0.450 0.000          0.0   50.000000 ZM500  2000/05/18
STOP
```

I.12 CHAN_STATUS

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68530395 CTBT_IDC
REF_ID 9876543210
DATA_TYPE CHAN_STATUS IMS2.0
Report period from 2021/12/01 00:00:00.0 to 2021/12/02 00:00:00.0
Channel Status
Net       Sta  Chan %_Recvd %_AvaUA %_Avail  Gaps  Samples  Constant       Mean        RMS
ASAR      AS01  SHZ 100.000 100.000 100.000     0  1728000         0      201.5      198.7
ASAR      AS02  SHZ 100.000 100.000  99.572     0  1728000         0      236.0      197.7
ASAR      AS03  SHZ 100.000 100.000 100.000     0  1728000         0      537.8      219.2
```

⋮

```
ASAR      AS19  SHZ 100.000 100.000 100.000     0  1728000         0      112.5      202.9
ASAR      AS31  BHZ 100.000 100.000 100.000     0  3456000         0      149.6      842.6
          CPUP  SHZ   0.000   0.000   0.000     1        0         0        0.0        0.0
          CPUP  BHZ   0.000   0.000   0.000     1        0         0        0.0        0.0


STOP
```

I.13 COMMENT

COMMENT is not supported by the IDC. See Appendix IV "Unsupported commands at the IDC" for a list of unsupported command.

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 10000998
DATA_TYPE COMMENT IMS2.0

  Almost anything may be typed into the space between the
  DATA_TYPE line and the STOP line. No association was
  desired for this comment, so the association line was
  left blank. Note that this comment is indented so that
  the DATA_TYPE in the second line of this paragraph is
  not interpreted as a command line.
DATA_TYPE COMMENT IMS2.0
Event      7687234
  The referenced event was felt over a wide area (300 square
  kilometers) near the epicenter.
STOP
```

I.14 COMM_STATUS

COMM_STATUS is not supported by the IDC. See Appendix IV "Unsupported commands at the IDC" for a list of unsupported command.

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 10000998
DATA_TYPE COMM_STATUS IMS2.0
Report period from 1994/12/03 00:00:00.0 to 1994/12/04 00:00:00.0
Link                 Nom_kbps  Mode  %_Up   From     Util  From     Util
AUS_NDC  - CTBO_IDC     56.0  full  88.4  AUS_NDC  0.50  CTBO_IDC  0.08
NOR_NDC  - CTBO_IDC    128.0  full  99.2  NOR_NDC  0.77  CTBO_IDC  0.10
USA_NDC  - CTBO_IDC   1000.0  full 100.0  USA_NDC  0.25  CTBO_IDC  0.25

AUS_NDC  - CTBO_IDC link outages
         From                Through               Duration
1994/12/02 20:23:14.0 1994/12/03 00:48:28.0 000  00:25:14.0
1994/12/03 02:34:31.0 1994/12/03 02:49:39.0 000  00:15:08.0
1994/12/03 19:02:27.0 1994/12/03 19:12:29.0 000  00:10:02.0

NOR_NDC  - CTBO_IDC link outages
         From                Through               Duration
1994/12/03 04:34:31.0 1994/12/03 06:35:39.0 000  00:45:13.0
STOP
```

I.15 DETBKPHD

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68557217 CTBT_IDC
REF_ID 123454321
DATA_TYPE DETBKPHD
#Header 3
USL16 USL16_001 P RL16_01_EmptyCave FULL
16111111110040
USL16_001-2021/01/15-13:50:47   0                               0
2021/02/01 23:09:46.0
#Comment
Empty cave background for 7 day count on detector USL16_001.
The report was resent to change to efficiency file to a 3M 50x4.5mm
geometry.  Submitted by L. Greenwood
#Acquisition
2021/01/15 13:50:47.0 605323.83       604800.00
#g_Energy
46.500           122.496          0.01691
59.600           156.558          0.01337
                                        ⋮
1332.460         3491.567         0.01510
1836.010         4811.205         0.01325
#g_Resolution
46.500           1.039            0.00602
59.600           1.062            0.00449
                                        ⋮
1332.460         1.951            0.00430
1836.010         2.237            0.00381
#g_Efficiency
46.500           0.009518         0.0002600
59.540           0.044000         0.0006600
                                        ⋮
1332.460         0.065110         0.0016280
1836.010         0.051510         0.0012880
#g_Spectrum
8192  2800
1     0          0          0          0          0
6     0          0          0          0          0
                                        ⋮
8181  12         9          11         9          6
8186  5          9          12         10         7
8191  9          0          0          0          0
STOP
```

I.16 ERROR_LOG

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID err_888888 CTBT_IDC
REF_ID 888888
DATA_TYPE LOG
 Submitted request :
 begin ims2.0
 msg_type request
 msg_id 888888
 time 2021/12/001 12:00 to 2021/12/001 16:00  bull_type REB  group_bull_list SEL2
     sta_list WRA,MJAR  mag_type mb  mag 3.7 to  depth 0 to 10  event_sta_dist 0.0
     to 20.0  event ims2.0  stop DATA_TYPE ERROR_LOG
 Error[line=4,pos=5]: 2021/12/001 is not a valid DATETIME.
STOP
```

I.17 EVENT

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68531540 CTBT_IDC
REF_ID 888888
DATA_TYPE EVENT IMS2.0
Reviewed Event Bulletin of the CTBT_IDC from 2021/12/01 12:00:00 to 2021/12/01 16:00:00,  generated 2021/12/09 13:57:37
EVENT  21429064 SOUTH OF HONSHU, JAPAN
   Date       Time        Err   RMS Latitude Longitude  Smaj  Smin  Az Depth   Err Ndef Nsta Gap  mdist  Mdist Qual   Author      OrigID
2021/12/01 12:07:08.52   0.76  1.06  31.1076  142.4125  23.5  16.2  64   0.0f        14   14 136   2.98  93.04 m i uk IDC_REB    21436469

Magnitude  Err Nsta Author      OrigID
ML      3.2 0.2    2 IDC_REB   21436469
mb      3.9 0.1   12 IDC_REB   21436469
mbtmp   3.8 0.1   14 IDC_REB   21436469


EVENT  21428380 NEAR EAST COAST OF HONSHU, JAPAN
   Date       Time        Err   RMS Latitude Longitude  Smaj  Smin  Az Depth   Err Ndef Nsta Gap  mdist  Mdist Qual   Author      OrigID
2021/12/01 14:31:34.03   0.71  0.81  40.0857   141.084  17.8  10.6 120   0.0f        19   15 134   4.18  75.72 m i uk IDC_REB    21452111

Magnitude  Err Nsta Author      OrigID
ML      3.7 0.1    3 IDC_REB   21452111
mb      3.8 0.1   11 IDC_REB   21452111
mbtmp   3.9 0.1   15 IDC_REB   21452111
Ms      3.2 0.1    6 IDC_REB   21452111


EVENT  21428379 NEAR EAST COAST OF HONSHU, JAPAN
   Date       Time        Err   RMS Latitude Longitude  Smaj  Smin  Az Depth   Err Ndef Nsta Gap  mdist  Mdist Qual   Author      OrigID
2021/12/01 14:38:25.65   1.01  0.72  36.3695  141.2515  20.2  15.6  92   0.0f        11    9 156   2.43  64.57 m i uk IDC_REB    21448744

Magnitude  Err Nsta Author      OrigID
ML      3.0 0.5    2 IDC_REB   21448744
mb      3.7 0.2    7 IDC_REB   21448744
mbtmp   3.7 0.2    9 IDC_REB   21448744


STOP
```

I.18 EXECSUM

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 10000998
DATA_TYPE EXECSUM IMS2.0
 Executive Summary for 2001-03-01 00:00:00 to 2001-03-06 00:00:00
 generated at 2001-06-13 18:31:01

LATEST PROCESSING TIME (for requested interval)
Seismic-Acoustic              Radionuclide
2001/03/13 18:39:05    2001/03/02 13:56:15

SEISMIC-ACOUSTIC SUMMARY
TotalEvents Considered InsufftData NotScreened ScreenedOut
         59         49           15           6           28

RADIONUCLIDE SUMMARY
Detections  Level4  Level5
        18       1       0

FUSION SUMMARY
FusedEvents


SYSTEM STATUS SUMMARY
 IMS  GCI  IDC RNLab
  47

IMS STATUS BY TECHNOLOGY
   PS   AS    H    I   RN
   66   39   36
STOP
```

I.19 GASBKPHD

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68553509 CTBT_IDC
REF_ID 714212835
DATA_TYPE GASBKPHD
TIME_STAMP 2021/12/10 09:55:32
#Header 3
USX74 USX74_006 B GEOMETRY          FULL
74202111301900X
USX74_006-2021/11/30-19:02      USX74_006-2015/08/22-16:12      0
2021/12/01 06:12:43.2
#Comment
Using Pixie electronics v. 2.43.
Produced by SAUNA_PHDAQ with program version 1.0.12.3.
GC:LL333:2958
Coincidence spectrum set to zero counts where gamma or beta channel is zero.

 IMS data from the upgraded SAUNA II station in Ashland, KS, USA
 Dead volume factor 0.893.

#Acquisition
2021/11/30 19:02:46.2 40195.653000   40179.839000
#Calibration
2014/06/03 16:46:00.0
#g_Energy
32.000000        12.520000        0.006000
59.540000        22.680000        0.006000
121.780000       45.480000        0.005000
244.700000       87.490000        0.041000
344.280000       121.890000       0.013000
661.660000       229.400000       0.013000
#b_Energy
73.340000        C 22.740000        0.500000
88.260000        C 27.820000        0.500000
103.160000       C 32.600000        0.500000
```

⋮

```
410.680000       C 134.970000       0.500000
425.080000       C 138.940000       0.500000
439.450000       C 142.800000       0.500000
#g_Resolution
32.000000        8.490000         0.039300
59.540000        11.870000        0.033800
121.780000       12.720000        0.034100
244.700000       21.650000        0.362700
344.280000       30.990000        0.084400
```

```
661.660000        64.710000         0.075200
#b_Resolution
73.340000         25.570000         0.500000
88.260000         27.140000         0.500000
103.160000        34.650000         0.500000
```

⋮

```
410.680000        70.160000         0.500000
425.080000        72.280000         0.500000
439.450000        71.540000         0.500000
#g_Efficiency
31.630000         0.672000          0.006500
80.980000         0.897000          0.005000
123.000000        0.772000          0.002000
165.000000        0.732000          0.000700
208.000000        0.692000          0.000900
249.800000        0.598000          0.000700
#ROI_Limits
1   18.66820   622.63200  323.65200  393.57200
2   18.66820   976.44500  219.74700  285.99700
3   18.66820   360.30300  63.18320   102.79200
```

⋮

```
8   274.27200  407.62500  18.11650   43.44040
9   173.97100  407.62500  18.11650   43.44040
10  18.66820   145.90400  18.11650   43.44040
#b-gEfficiency
XE-135     2        0.538600   0.076300
XE-133     3        0.684200   0.009300
XE-133     4        0.683800   0.012900
```

⋮

```
XE-133     8        0.033500   0.000900
XE-133     9        0.181500   0.003800
XE-133     10       0.438100   0.008800
#Ratios
PB214_352:242   1  2  0.676000   0.0065
PB214_352:80    1  3  0.461000   0.0050
PB214_352:30_4  1  4  0.095000   0.0020
```

⋮

```
XE133-8_81:30   3  8  0.000780   0.0005
XE133-9_81:30   3  9  0.009900   0.0016
XE133-10_81:30  3  10 0.032100   0.0029
#g_Spectrum
256   742
0     2          3544       8864       5263       3881
5     3612       3279       2519       2294       2161
10    2202       2314       2562       2322       2033
```

⋮

```
245    555          552          574          554          586
250    550          589          586          559          568
255    570
#b_Spectrum
256    984
0      3            4            31           83           77
5      83           62           57           65           65
10     56           58           50           54           55
```

⋮

```
245    31           22           24           20           24
250    13           17           20           24           13
255    16
#Histogram
256    256    742   984
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
    0 0
0 0 0 0 1 1 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
    0 0
```

⋮

```
0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
    0 0
0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
    0 0
TIME_STAMP 2021/12/10 09:55:32
STOP
```

I.20 HELP

Any email with

- any subject and the word help as the body of the message or
- subject help and empty message body

will return the latest Tutorial for Requests and Subscriptions

I.21 LOG

The following example is a section of a message that is sent to a data requestor or subscriber after a subscription or request message has been processed. The log section precedes the message data section and is used to state that the request command was processed.

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68531540 CTBT_IDC
REF_ID 888888
DATA_TYPE LOG
 Info - 68531540 - IMSLANGUAGE request successfully parsed
 Info - 68531540 - Job 89153483: job status has changed to: QUEUED
 Info - 68531540 - Request submitted successfully, request id 68531540
 Info - 68531540 - Job 89153483: job status has changed to: RUNNING
 Info - 68531540 - The product EVENT has been generated in 0 minutes, 0 seconds and 48 milliseconds
 Info - 68531540 - You have 4188554.24KB left out of your daily 4194304.00KB quota
DATA_TYPE EVENT IMS2.0
⋮
STOP
```

I.22 MET

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68553922 CTBT_IDC
REF_ID 714212835
DATA_TYPE MET
CAP14
2021/12/01 11:10:00.0 2021/12/01 11:20:00.0 11.0  112 3.4   1017.80 85  0
2021/12/01 11:20:00.0 2021/12/01 11:30:00.0 11.0  124 3.5   1018.00 84  0
2021/12/01 11:30:00.0 2021/12/01 11:40:00.0 11.1  134 2.1   1018.10 85  0
2021/12/01 11:40:00.0 2021/12/01 11:50:00.0 11.9  122 1.9   1018.30 80  0
2021/12/01 11:50:00.0 2021/12/01 12:00:00.0 12.8  145 1.9   1018.20 77  0.1
2021/12/01 12:00:00.0 2021/12/01 12:10:00.0 12.2  114 1.7   1018.30 78  0
2021/12/01 12:10:00.0 2021/12/01 12:20:00.0 12.0  130 1.7   1018.30 79  0
2021/12/01 12:20:00.0 2021/12/01 12:30:00.0 12.4  137 1.9   1018.30 77  0
2021/12/01 12:30:00.0 2021/12/01 12:40:00.0 12.7  147 1.7   1018.50 75  0
2021/12/01 12:40:00.0 2021/12/01 12:50:00.0 12.0  114 2.1   1018.30 79  0
2021/12/01 12:50:00.0 2021/12/01 13:00:00.0 12.1  121 1.6   1018.20 78  0
2021/12/01 13:00:00.0 2021/12/01 13:10:00.0 12.1  125 1.7   1018.10 79  0
CAP14
2021/12/01 13:10:00.0 2021/12/01 13:20:00.0 11.9  134 2.4   1017.40 80  0
2021/12/01 13:20:00.0 2021/12/01 13:30:00.0 12.9  213 1.9   1018.30 75  0
2021/12/01 13:30:00.0 2021/12/01 13:40:00.0 13.2  217 2.4   1018.30 73  0
2021/12/01 13:40:00.0 2021/12/01 13:50:00.0 13.2  160 1.7   1018.10 73  0
2021/12/01 13:50:00.0 2021/12/01 14:00:00.0 12.5  121 3.1   1017.50 77  0
2021/12/01 14:00:00.0 2021/12/01 14:10:00.0 11.4  96  2.7   1018.20 82  0
2021/12/01 14:10:00.0 2021/12/01 14:20:00.0 11.4  115 2.6   1018.00 82  0
2021/12/01 14:20:00.0 2021/12/01 14:30:00.0 11.8  104 1.7   1018.10 82  0
2021/12/01 14:30:00.0 2021/12/01 14:40:00.0 11.8  106 3.1   1017.90 81  0
2021/12/01 14:40:00.0 2021/12/01 14:50:00.0 11.6  102 2.9   1017.80 82  0
2021/12/01 14:50:00.0 2021/12/01 15:00:00.0 11.6  98  3.6   1017.50 83  0
2021/12/01 15:00:00.0 2021/12/01 15:10:00.0 11.8  107 2.3   1017.80 81  0
STOP
```

I.23 NETWORK

NETWORK is not supported by the IDC. See Appendix IV "Unsupported commands at the IDC" for a list of unsupported command.

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 10000998
DATA_TYPE network IMS2.0
Net       Description
IDC_SEIS  International Data Center Seismic Network
IDC_HYDR  International Data Center Hydroacoustic Network
STOP
```

I.24 ORIGIN

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68530852 CTBT_IDC
REF_ID 666666
DATA_TYPE ORIGIN IMS2.0
Reviewed Event Bulletin of the CTBT_IDC from 2021/12/01 00:00:00 to 2021/12/02 00:00:00,  generated 2021/12/09 13:14:31
   Date        Time          Err    RMS Latitude Longitude  Smaj   Smin   Az Depth    Err Ndef Nsta Gap  mdist   Mdist Qual    Author      OrigID
2021/12/01 04:39:22.34   0.33  0.90  -37.954  -73.4738  12.6    8.5  79   0.0f         66   48  47   3.58 176.98 m i uk IDC_REB    21451982

Magnitude  Err Nsta Author      OrigID
ML      4.7 0.1    3 IDC_REB   21451982
mb      5.2 0.1   16 IDC_REB   21451982
mbtmp   5.1 0.1   19 IDC_REB   21451982
Ms      4.8 0.1   30 IDC_REB   21451982




   Date        Time          Err    RMS Latitude Longitude  Smaj   Smin   Az Depth    Err Ndef Nsta Gap  mdist   Mdist Qual    Author      OrigID
2021/12/01 06:04:52.33   0.47  0.83   35.248  141.3103  11.0    9.9 101   0.0f         41   38 118   0.82 147.64 m i uk IDC_REB    21451882

Magnitude  Err Nsta Author      OrigID
ML      4.1 0.2    7 IDC_REB   21451882
mb      4.6 0.1   28 IDC_REB   21451882
```

```
mbtmp  4.6 0.1   35 IDC_REB   21451882
Ms     4.3 0.0   71 IDC_REB   21451882




   Date       Time        Err   RMS Latitude Longitude  Smaj  Smin  Az Depth   Err Ndef Nsta Gap  mdist  Mdist Qual   Author      OrigID
2021/12/01 08:40:45.80   0.51  0.74  31.0532  142.5334  15.1  10.7  51   0.0f        35   33  73   3.09 151.65 m i uk IDC_REB   21451545

Magnitude  Err Nsta Author      OrigID
ML     3.8 0.1    7 IDC_REB   21451545
mb     4.6 0.1   23 IDC_REB   21451545
mbtmp  4.5 0.0   30 IDC_REB   21451545
Ms     3.7 0.0   48 IDC_REB   21451545




STOP
```

I.25 OUTAGE

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68555677 CTBT_IDC
REF_ID 714212835
DATA_TYPE OUTAGE IMS2.0
Report period from 2021/11/30 00:00:00.0 to 2021/12/01 00:00:00.0
Outage
Net       Sta   Chan     Start Date Time          End Date Time        Duration Comment
MJAR      MJB7  HHZ  2021/11/30 22:50:10.000 2021/12/01 00:00:00.000   4190.000
MJAR      MJB8  HHZ  2021/11/30 00:00:00.000 2021/12/01 00:00:00.000  86400.000
          APG   BHZ  2021/11/30 02:21:15.000 2021/11/30 02:39:05.000   1070.000
          APG   BHZ  2021/11/30 11:12:54.000 2021/11/30 11:29:24.000    990.000
          APG   BHZ  2021/11/30 11:29:24.000 2021/11/30 11:31:41.000    137.000
          APG   BHZ  2021/11/30 13:10:57.000 2021/11/30 13:22:06.000    669.000
          APG   BHZ  2021/11/30 14:12:20.000 2021/11/30 14:29:51.000   1051.000
          SDV   BHZ  2021/11/30 10:56:10.000 2021/11/30 11:14:19.000   1089.000
          SDV   BHZ  2021/11/30 11:14:19.000 2021/11/30 11:23:22.000    543.000
          SDV   BHZ  2021/11/30 11:23:22.000 2021/11/30 11:41:49.000   1107.000
          SDV   BHZ  2021/11/30 14:09:25.000 2021/11/30 14:21:37.000    732.000
          SIJI  BHZ  2021/11/30 00:53:08.000 2021/11/30 01:08:21.000    913.000
          SIJI  BHZ  2021/11/30 01:28:01.000 2021/11/30 01:46:46.000   1125.000

STOP
```

I.26 QCPHD

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68555690 CTBT_IDC
REF_ID 714212835
DATA_TYPE QCPHD
#Header 3
KWP40 KWP40_004 P RASA-QC           FULL
40888888880109
KWP40_004-2021/11/26-06:30:33   0                               0
2021/11/26 07:15:01
#Comment
Barcode ID: QC202111260630
This data generated by RASA Linux Control Software Version 5.50
RASA LINUX CONTROL SOFTWARE VERSION 5.0
#Acquisition
2021/11/26 06:30:33   1200.44        1189.98
#Calibration
2018/09/11 10:24:54
#g_Energy
59.54            173.43           0.0000
88.03            256.68           0.0000
122.06           356.21           0.0000
```

⋮

```
1173.23          3433.05          0.0000
1332.49          3899.35          0.0000
1836.05          5373.58          0.0000
#g_Resolution
59.54            0.8580           0.000000
88.03            0.8440           0.000000
122.06           0.8600           0.000000
```

⋮

```
1173.23          1.7430           0.000000
1332.49          1.8440           0.000000
1836.05          2.0570           0.000000
#g_Efficiency
88.00            0.0161690000     0.000100000000
122.00           0.0242920000     0.000200000000
392.00           0.0163160000     0.000100000000
662.00           0.0119040000     0.000100000000
898.00           0.0099618000     0.000100000000
1173.00          0.0081298000     0.000070000000
1333.00          0.0074916000     0.000070000000
#g_Spectrum
8192  2900
1     0          0          0          0          0
6     0          0          0          0          0
11    0          0          0          0          0
```

⋮

```
8181  0          0          0          0          0
8186  0          0          0          0          1
8191  0          0
#Certificate
5300       2008/01/01 12:00:00
EU-152   13.52      Y 2000.000 5.000   121.800  28.580  0 0        0
EU-152   13.52      Y 2000.000 5.000   244.700  7.580   0 0        0
EU-152   13.52      Y 2000.000 5.000   344.300  26.500  0 0        0
CS-137   30.05      Y 1600.000 5.000   661.700  85.100  0 0        0
EU-152   13.52      Y 2000.000 5.000   778.900  12.940  0 0        0
EU-152   13.52      Y 2000.000 5.000   964.100  14.610  0 0        0
EU-152   13.52      Y 2000.000 5.000   1085.900 10.210  0 0        0
CO-60    5.271      Y 1700.000 5.000   1173.200 99.970  0 0        0
EU-152   13.52      Y 2000.000 5.000   1112.100 13.640  0 0        0
CO-60    5.271      Y 1700.000 5.000   1332.500 99.990  0 0        0
EU-152   13.52      Y 2000.000 5.000   1408.000 21.010  0 0        0
STOP
```

I.27 RESPONSE

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68555644 CTBT_IDC
REF_ID 714212835
DATA_TYPE RESPONSE:OPERATIONAL IMS2.0
CAL2 STKA  BHZ      CMG3TB  6.28000000E-03   1.000    40.00000 2020/05/15 00:00
 (Note: the group delay is unknown and set to zero)
PAZ2  1 C  1.44854388E+10    0    0.000   5   3 instrument:theoretical
 -5.02654800E+02  0.00000000E+00
 -1.00530960E+03  0.00000000E+00
 -1.13097340E+03  0.00000000E+00
 -3.70080000E-02 -3.70080000E-02
 -3.70080000E-02  3.70080000E-02
  0.00000000E+00  0.00000000E+00
  0.00000000E+00  0.00000000E+00
  0.00000000E+00  0.00000000E+00
 (The scale factor is computed such that resp(NCALPER) = 1/NCALIB)
 (Note: the group delay is unknown and set to zero)
PAZ2  2 C  1.33388815E+04    0    0.000   1   0 instrument:theoretical
 -1.33388800E+04  0.00000000E+00
 (The scale factor is computed such that resp(NCALPER) = 1/NCALIB)
DIG2  3  1.00000000E+00 30000.00000 digitizer:theoretical
 (Note: the group delay is unknown and set to zero)
FIR2  4   1.00E+00   15    0.000 A  177 digitizer:theoretical
 -1.50596300E-10 -1.49886400E-10 -1.00311400E-10  1.25946400E-10  7.96045200E-10
  2.42982600E-09  5.98254500E-09  1.31275800E-08  2.66780500E-08  5.11949000E-08
  9.38367800E-08  1.65513100E-07  2.82403400E-07  4.67903700E-07  7.55046400E-07
                                        ⋮
  1.65513100E-07  9.38367800E-08  5.11949000E-08  2.66780500E-08  1.31275800E-08
  5.98254500E-09  2.42982600E-09  7.96045200E-10  1.25946400E-10 -1.00311400E-10
 -1.49886400E-10 -1.50596300E-10
 (The scale factor is set to 1.0)
 (Note: the group delay is unknown and set to zero)
FIR2  5   1.00E+00    5    0.000 A   71 digitizer:theoretical
 -1.40022900E-08 -1.25505900E-07 -6.07492100E-07 -2.04686600E-06 -5.23635200E-06
 -1.04276600E-05 -1.56651400E-05 -1.46713800E-05  3.86690300E-06  5.25491700E-05
  1.34544700E-04  2.27328500E-04  2.69408800E-04  1.65388700E-04 -1.75420500E-04
                                        ⋮
  1.34544700E-04  5.25491700E-05  3.86690300E-06 -1.46713800E-05 -1.56651400E-05
 -1.04276600E-05 -5.23635200E-06 -2.04686600E-06 -6.07492100E-07 -1.25505900E-07
 -1.40022900E-08
 (The scale factor is set to 1.0)
 (Note: the group delay is unknown and set to zero)
FIR2  6   1.00E+00    5    0.000 A  113 digitizer:theoretical
  3.62415300E-09  1.47021700E-08  2.92464800E-08  1.67581600E-08 -9.45969300E-08
 -4.00529200E-07 -9.37365200E-07 -1.53043500E-06 -1.64599100E-06 -4.07870400E-07
  3.03009400E-06  8.68599200E-06  1.47660300E-05  1.71367500E-05  1.01281400E-05
                                        ⋮
  1.47660300E-05  8.68599200E-06  3.03009400E-06 -4.07870400E-07 -1.64599100E-06
 -1.53043500E-06 -9.37365200E-07 -4.00529200E-07 -9.45969300E-08  1.67581600E-08
  2.92464800E-08  1.47021700E-08  3.62415300E-09
 (The scale factor is set to 1.0)
 (Note: the group delay is unknown and set to zero)
FIR2  7   1.00E+00    2    0.000 A  223 digitizer:theoretical
 -2.48770400E-10  4.73744000E-09  1.24031900E-08  2.18423000E-09 -2.97350400E-08
 -2.77409800E-08  4.82350100E-08  9.04852000E-08 -4.37720200E-08 -2.02925100E-07
 -2.93251000E-08  3.57677100E-07  2.38075600E-07 -5.05054100E-07 -6.56660600E-07
                                        ⋮
  2.38075600E-07  3.57677100E-07 -2.93251000E-08 -2.02925100E-07 -4.37720200E-08
  9.04852000E-08  4.82350100E-08 -2.77409800E-08 -2.97350400E-08  2.18423000E-09
  1.24031900E-08  4.73744000E-09 -2.48770400E-10
 (The scale factor is set to 1.0)
 (Note: the group delay is unknown and set to zero)
PAZ2  8 C  1.00005000E+00    0    0.000   1   1 digitizer:theoretical
 -6.28318500E-02  0.00000000E+00
  0.00000000E+00  0.00000000E+00
 (The scale factor is computed such that resp(NCALPER) = 1/NCALIB)
STOP
```

I.28 REVSAMP/SAMPML—Noble gas systems

I.28.1 β-γ coincidence systems


```xml
<?xml version="1.0" encoding="ISO-8859-1"?>
<SampML xmlns="http://www.ctbto.org/SAMPML/0.7">
  <SampleInformation REFID="44202112071111X" SID="6482923"
      MID="MXX44_004-2021/12/08-06:39">
    <StationInformation>
      <StationLocation>Guerrero Negro, Baja California, Mexico.</StationLocation>
      <StationCode>MXX44</StationCode>
      <CountryCode>MX</CountryCode>
      <Coordinates>28 -114 9.4</Coordinates>
    </StationInformation>
    <DetectorInformation>
      <DetectorCode>MXX44_004</DetectorCode>
      <DetectorDescription>Detector #4 in Guerrero Negro,
          Mexico.</DetectorDescription>
    </DetectorInformation>
    <SampleType>SAUNA</SampleType>
    <SystemTechnology>SAUNA</SystemTechnology>
    <MeasuredInformation>
      <SpectrumGroup id="MXX44-6482923-SPHD" calibrationIDs="EN-B-1195981
          EN-G-1169389">
        <Geometry>GEOMETRY</Geometry>
        <ProcessedAirVolume unit="m3">14.7095146179199</ProcessedAirVolume>
        <FlowRate unit="m3/h">1.2257928848266583333333333333333333333</FlowRate>
        <SampleQuantity unit="ml">12.7280457266</SampleQuantity>
        <XeVolume unit="ml">1.10733997821808</XeVolume>
        <SohFlag>${SOH_FLAG}</SohFlag>
        <Authenticated>1</Authenticated>
        <CollectionStart>2021-12-07T11:36:35</CollectionStart>
        <CollectionStop>2021-12-07T23:36:35</CollectionStop>
        <AcquisitionStart>2021-12-08T06:39:36</AcquisitionStart>
        <AcquisitionStop>2021-12-08T17:49:34</AcquisitionStop>
        <ArrivalDate>2021-12-08T17:50:04</ArrivalDate>
        <RealAcquisitionTime>PT40198S</RealAcquisitionTime>
        <LiveAcquisitionTime>PT40184S</LiveAcquisitionTime>
        <SamplingTime>PT43200S</SamplingTime>
        <DecayTime>PT25381S</DecayTime>
        <Comments>
                Using Pixie electronics v. 2.43.
                Produced by SAUNA_PHDAQ with program version 1.0.12.3.
                GC:LL333:3424
                Coincidence spectrum set to zero counts where gamma or beta channel
                    is zero.
                MXX44 SAUNA II station (upgraded) in Guerrero Negro, Mexico
                Deadvolume factor 0.905
</Comments>
        <GeneralComments>
None
None

</GeneralComments>
        <IsotopeComments>
N/A
</IsotopeComments>
        <MeasurementType>S</MeasurementType>
        <SampleID>6482923</SampleID>
        <SpectrumType>FULL</SpectrumType>
        <Data>
          <Spectrum id="MXX44-6482923-SPHD-G" channelSpan="256" energySpan="748"
              type="SPHD-G" format="IMS2.0">
                1          1854       7170       5169       3615
                3088       2657       2332       1746       1652
                                      ⋮
                430        417        409        408        402
                395

</Spectrum>
```

```
            <Histogram id="MXX44-6482923-SPHD-H" gammaChannelSpan="256"
                gammaEnergySpan="748" betaChannelSpan="256" betaEnergySpan="868"
                type="SPHD-H" format="IMS2.0">
                  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
                      0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
                      0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
                      0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
                      0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
                      0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
                      0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
                      0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
                                        ⋮
                  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
                      0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
                      0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
                      0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
                      0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
                      0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
                      0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
                      0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

</Histogram>
          </Data>
        </SpectrumGroup>
        <SpectrumGroup id="MXX44-4569366-DETBK" calibrationIDs="EN-B-18889123
            EN-G-9682116">
                                        ⋮
        </SpectrumGroup>
      </MeasuredInformation>
      <Analyses>
        <Analysis id="AN-MXX44-6482923-SPHD" spectrumIDs="MXX44-6482923-SPHD"
            calibrationIDs="EN-B-1195981 EN-G-1169389">
          <Software>
            <Name>BG_ANALYSE</Name>
            <Version>1.0</Version>
          </Software>
          <Categorization>
1
</Categorization>
          <IdedNuclides>
            <Corrected>
              <Nuclide quantifiable="true">
                <Name>XE-131M</Name>
                <Type>FISSION (G)</Type>
                <HalfLife>11.962 D</HalfLife>
                <Concentration unit="mBq/m3">-0.0344312348882</Concentration>
                <Activity unit="mBq">-0.438242332082</Activity>
                <ActivityAtAcquisition
                    unit="mBq">-0.424628223813</ActivityAtAcquisition>
                <UndecayCorrectedActivity
                    unit="mBq">-0.418892838039</UndecayCorrectedActivity>
                <AbsoluteConcentrationError
                    unit="mBq/m3">0.0278760820791</AbsoluteConcentrationError>
                <RelativeConcentrationError
                    unit="percentage">80.9616099151</RelativeConcentrationError>
                <RelativeActivityAtAcquisitionError
                    unit="percentage">-80.168072302200610614927845964343219234 96
                    </RelativeActivityAtAcquisitionError>
                <AbsoluteActivityError
                    unit="mBq">0.354808047383</AbsoluteActivityError>
                <RelativeActivityError
                    unit="percentage">80.9616099151</RelativeActivityError>
                <MDC unit="mBq/m3">0.116764127988</MDC>
                <LC unit="mBq/m3">0.0508909505258</LC>
                <LD unit="mBq/m3">0.0</LD>
                <LCActivity unit="mBq">0.647742345365</LCActivity>
                <LDActivity unit="mBq">0.0</LDActivity>
                <NuclideIdentificationIndicator numericVal="0">nuclide not identified
                    by automated analysis</NuclideIdentificationIndicator>
              </Nuclide>
              <Nuclide quantifiable="true">
```

⋮


```
          </Nuclide>
        </Corrected>
        <Uncorrected>
          <Nuclide quantifiable="true">
            <Name>XE-131M</Name>
            <Type>FISSION (G)</Type>
            <HalfLife>11.962 D</HalfLife>
            <Concentration unit="mBq/m3">-0.0344312348882</Concentration>
            <Activity unit="mBq">-0.438242332082</Activity>
            <ActivityAtAcquisition
                unit="mBq">${ACTIVITY_AT_ACQUISITION}</ActivityAtAcquisition>
            <UndecayCorrectedActivity
                unit="mBq">-0.418892838039</UndecayCorrectedActivity>
            <AbsoluteConcentrationError
                unit="mBq/m3">0.0278760820791</AbsoluteConcentrationError>
            <RelativeConcentrationError
                unit="percentage">80.9616099151</RelativeConcentrationError>
            <RelativeActivityAtAcquisitionError
                unit="percentage">${ACTIVITY_AT_ACQUISITION_ERROR_PERC}
                </RelativeActivityAtAcquisitionError>
            <AbsoluteActivityError
                unit="mBq">0.354808047383</AbsoluteActivityError>
            <RelativeActivityError
                unit="percentage">80.9616099151</RelativeActivityError>
            <MDC unit="mBq/m3">0.116764127988</MDC>
            <LC unit="mBq/m3">0.0508909505258</LC>
            <LD unit="mBq/m3">0.0</LD>
            <LCActivity unit="mBq">0.647742345365</LCActivity>
            <LDActivity unit="mBq">0.0</LDActivity>
            <NuclideIdentificationIndicator numericVal="0">nuclide not identified
                by automated analysis</NuclideIdentificationIndicator>
          </Nuclide>
          <Nuclide quantifiable="true">
```


⋮


```
          </Nuclide>
        </Uncorrected>
      </IdedNuclides>
      <ABGAM2DFIdedNuclides>
        <Corrected/>
        <Uncorrected/>
      </ABGAM2DFIdedNuclides>
      <RoiInfo>
        <RoiNetCount>
          <RoiNumber>1</RoiNumber>
          <Name>PB-214</Name>
          <NetCounts>-7.14836044950061 10.0763030443496</NetCounts>
          <GrossCounts>44</GrossCounts>
          <GrossCountsError>0</GrossCountsError>
          <LC unit="counts">17.14805240197</LC>
          <LD unit="counts">0.0</LD>
          <DetBackgroundCounts>340 340</DetBackgroundCounts>
          <GasBackgroundCounts>-1.69800003857206
              7.69206604390014</GasBackgroundCounts>
          <Efficiency>N/A</Efficiency>
          <AbsoluteEfficiencyError>N/A</AbsoluteEfficiencyError>
          <RelativeEfficiencyError unit="percentage">N/A</RelativeEfficiencyError>
        </RoiNetCount>
        <RoiNetCount>
```


⋮


```
        </RoiNetCount>
        <RoiBoundaries>
          <RoiNumber>1</RoiNumber>
          <GammaLow unit="keV">116</GammaLow>
          <GammaHigh unit="keV">139</GammaHigh>
          <BetaLow unit="keV">1</BetaLow>
          <BetaHigh unit="keV">193</BetaHigh>
        </RoiBoundaries>
        <RoiBoundaries>
```


⋮

```
          </RoiBoundaries>
        </RoiInfo>
        <ABGAM2DRoiInfo/>
        <ABGAM2DPeakInfo>
${ABGAM2D_PEAKINFO}
</ABGAM2DPeakInfo>
        <CatDataLong>
          <PrevValidSamples>604</PrevValidSamples>
          <AbnXe131M>0.144905895893432 2</AbnXe131M>
          <AbnXe133M>0.11975423953871216</AbnXe133M>
```
⋮
```
          <Conc135133>2.1412978324260714</Conc135133>
          <Conc133131M>2.2676833289680367</Conc133131M>
          <Conc133131MMdc>2.2676833289680367</Conc133131MMdc>
        </CatDataLong>
        <CatDataShort>
          <PrevValidSamples>58</PrevValidSamples>
          <AbnXe131M>0.1418519492169052</AbnXe131M>
          <AbnXe133M>0.09944645851075329</AbnXe133M>
```
⋮
```
          <Conc135133>2.1412978324260714</Conc135133>
          <Conc133131M>${Conc133131M}</Conc133131M>
          <Conc133131MMdc>2.2676833289680367</Conc133131MMdc>
        </CatDataShort>
        <CatParams>
          <MovingAvgDays>365</MovingAvgDays>
          <AbnormalConcFactor>3</AbnormalConcFactor>
          <Xe133MXe131MLimit>2</Xe133MXe131MLimit>
          <Xe133MXe133Limit>0.3</Xe133MXe133Limit>
          <Xe135Xe133Limit>5</Xe135Xe133Limit>
          <BayesPlus>0.025</BayesPlus>
          <BayesMinus>0.975</BayesMinus>
        </CatParams>
        <Parameters>
          <ProcessingParameters>
            <BetaEcrOrder>2</BetaEcrOrder>
            <BinBetaStart>1</BinBetaStart>
            <BinGammaStart>1</BinGammaStart>
            <BinMaxVectorSize>100000</BinMaxVectorSize>
            <BinMinCount>10</BinMinCount>
            <BinRows>3</BinRows>
            <DetBkgndId>4569366</DetBkgndId>
            <DetBkgndUsed>1</DetBkgndUsed>
            <GammaEcrOrder>2</GammaEcrOrder>
            <GasBkgndId>6482210</GasBkgndId>
            <GasBkgndUsed>1</GasBkgndUsed>
            <InterferenceUsed>1</InterferenceUsed>
            <LcAbscissa>1.6449</LcAbscissa>
            <MaxQcDev>1</MaxQcDev>
            <Method>21</Method>
            <QcBThreshold>40</QcBThreshold>
            <QcId>6482254</QcId>
            <XeInAir>0.087</XeInAir>
          </ProcessingParameters>
        </Parameters>
        <ABGAM2D_Parameters>
${ABGAM2D_PARAMETERS}
</ABGAM2D_Parameters>
        <Flags>
          <DataQualityFlags>
            <XeVolume>
              <Value unit="ml">1.10733997821808</Value>
              <Pass>Pass</Pass>
              <Test>greater than 0.44 ml</Test>
            </XeVolume>
            <SOH>
              <Value>N/A</Value>
              <Pass>N/A</Pass>
              <Test>N/A</Test>
            </SOH>
          </DataQualityFlags>
```

```xml
          <TimelinessAndAvailabilityFlags>
            <PreviousSamplePresent>
              <Value unit="sample ID">6482207</Value>
              <Pass>Pass</Pass>
              <Test>-1/2 day sample available</Test>
            </PreviousSamplePresent>
            <CollectionTime>
              <Value unit="h">12.0</Value>
              <Pass>Pass</Pass>
              <Test>12h +- 10%</Test>
            </CollectionTime>
            <AcquisitionTime>
              <Value unit="h">11.1661111111</Value>
              <Pass>Pass</Pass>
              <Test>12h +- 10%</Test>
            </AcquisitionTime>
            <ResponseTime>
              <Value unit="h">30.2247222222</Value>
              <Pass>Pass</Pass>
              <Test>sample received within 96h of collect start</Test>
            </ResponseTime>
          </TimelinessAndAvailabilityFlags>
          <EventScreeningFlags>
            <LastDetectionDays>0</LastDetectionDays>
            <XeIsotopesSeenTimes>99</XeIsotopesSeenTimes>
            <Abgam2DLastDetectionDays>N/A</Abgam2DLastDetectionDays>
            <Abgam2DXeIsotopesSeenTimes>N/A</Abgam2DXeIsotopesSeenTimes>
          </EventScreeningFlags>
          <EventScreeningImages>
```

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```xml
          </EventScreeningImages>
        </Flags>
      </Analysis>
    </Analyses>
    <CalibrationInformation>
      <Calibration Type="Beta Energy To Channel" EnergyUnits="keV" ID="EN-B-599037">
        <Remark>Beta Energy to Channel Calibration equation</Remark>
        <CalibrationUpdated>YES</CalibrationUpdated>
        <CalibrationCreationDate>2007-11-24T12:09:53.89</CalibrationCreationDate>
        <Equation Model="Polynomial" Form="C(E)= t0 + t1 E + t2 E^2">
          <Coefficients>-3.39709 0.386269 -0.000094</Coefficients>
        </Equation>
      </Calibration>
      <Calibration Type="Gamma Energy To Channel" EnergyUnits="keV"
          ID="EN-G-1182157">
        <Remark>Gamma Energy to Channel Calibration equation</Remark>
        <CalibrationUpdated>YES</CalibrationUpdated>
        <CalibrationCreationDate>2007-11-24T12:09:53.89</CalibrationCreationDate>
        <Equation Model="Polynomial" Form="C(E)= t0 + t1 E + t2 E^2">
          <Coefficients>-0.437781 0.379658 -0.0000521</Coefficients>
        </Equation>
      </Calibration>
      <Calibration Type="Beta Energy To Channel" EnergyUnits="keV"
          ID="EN-B-18889123">
```

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```xml
      </Calibration>
    </CalibrationInformation>
  </SampleInformation>
</SampML>
```

I.28.2 HPGe systems


```
<?xml version="1.0" encoding="ISO-8859-1"?>
<SampML xmlns="http://www.ctbto.org/SAMPML/0.7">
  <SampleInformation REFID="29202112062311X" SID="6483215"
      MID="FRX29_004-2021/12/08">
    <StationInformation>
      <StationLocation>Noble Gas Experim. Stn. Reunion, France.</StationLocation>
      <StationCode>FRX29</StationCode>
      <CountryCode>FR</CountryCode>
      <Coordinates>-20.909 55.586917 89.8</Coordinates>
    </StationInformation>
    <DetectorInformation>
      <DetectorCode>FRX29_004</DetectorCode>
      <DetectorDescription>Detector #4 in FRX29, France</DetectorDescription>
    </DetectorInformation>
    <SampleType>SPALAX</SampleType>
    <MeasuredInformation>
      <SpectrumGroup id="FRX29-6483215-SPHD" calibrationIDs="EN-18817220 RE-4839200
          EF-76260964">
        <Geometry>CELLULE_GAZ</Geometry>
        <AirVolume unit="m3">42.1189994812012</AirVolume>
        <FlowRate unit="m3/h">1.75495831171671666666666666666666666667</FlowRate>
        <XeVolume unit="ml">3.6643500328064</XeVolume>
        <SohFlag>N/A</SohFlag>
        <Authenticated>1</Authenticated>
        <CollectionStart>2021-12-06T23:00:00</CollectionStart>
        <CollectionStop>2021-12-07T23:00:00</CollectionStop>
        <AcquisitionStart>2021-12-08T00:24:15</AcquisitionStart>
        <AcquisitionStop>2021-12-08T22:45:10</AcquisitionStop>
        <ArrivalDate>2021-12-08T22:53:07</ArrivalDate>
        <RealAcquisitionTime>PT80455S</RealAcquisitionTime>
        <LiveAcquisitionTime>PT80294S</LiveAcquisitionTime>
        <SamplingTime>PT86400S</SamplingTime>
        <DecayTime>PT5055S</DecayTime>
        <Comments>
                Phase 3 - Station Gaz
                Spalax2M - EnvSA
                be2825 8467 source X13
                Calibration 2015/06/16
</Comments>
        <GeneralComments>
None
None

</GeneralComments>
        <MeasurementType>S</MeasurementType>
        <SampleID>6483215</SampleID>
        <SpectrumType>FULL</SpectrumType>
        <Data>
          <Spectrum id="FRX29-6483215-SPHD" channelSpan="4096" energySpan="6162"
              type="SPHD-G" format="IMS2.0">
                0          0          0          0          0
                0          0          0          0          0
                0          0          0          0          0
                0          0          0          0          0
                0          0          0          0          0
                0          0          0          0          0
                0          0          0          0          0
                0          0          0          0          0
                148        137        148        137        148
                150        187        263        182        109
                131        117        111        90         103
```

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```
        </Data>
      </SpectrumGroup>
      <SpectrumGroup id="FRX29-3263599-DETBK" calibrationIDs="EN-37997392
          RE-19378556 EF-267289886">
```

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```
      </SpectrumGroup>
```

```
    </MeasuredInformation>
    <Analyses>
      <Analysis id="AN-FRX29-6483215-SPHD" spectrumIDs="FRX29-6483215-SPHD"
          calibrationIDs="EN-18817220 RE-4839200 EF-76260964">
        <Software>
          <Name>AutoSaint</Name>
          <Version>1.0</Version>
        </Software>
        <Categorization>
1
</Categorization>
        <IdedNuclides>
          <Corrected>
            <Nuclide quantifiable="true" method="Peak Fit Method">
              <Name>XE-131M</Name>
              <Halflife>11.962 D</Halflife>
              <Concentration unit="mBq/m3">-0.1986376</Concentration>
              <Activity unit="mBq">-8.36641029973</Activity>
              <ActivityAtAcquisition unit="mBq">-8.101116</ActivityAtAcquisition>
              <UndecayCorrectedActivity
                  unit="mBq">-7.88401466946</UndecayCorrectedActivity>
              <AbsoluteActivityError unit="mBq">17.3780705213</AbsoluteActivityError>
              <RelativeActivityError
                  unit="percentage">-207.712386779</RelativeActivityError>
              <AbsoluteConcentrationError
                  unit="mBq/m3">0.4125949</AbsoluteConcentrationError>
              <RelativeConcentrationError
                  unit="percentage">-207.712386779</RelativeConcentrationError>
              <RelativeActivityAtAcquisitionError
                  unit="percentage">-207.690644103849395564759225765931508696
                  </RelativeActivityAtAcquisitionError>
              <MDC unit="mBq/m3">0.2414189</MDC>
              <MDI unit="mBq">${MDI}</MDI>
              <LC unit="mBq/m3">23.26725</LC>
              <LD unit="mBq/m3">46.53449</LD>
              <LCActivity unit="mBq">979.992509205</LCActivity>
              <LDActivity unit="mBq">1959.98459722</LDActivity>
              <NuclideIdentificationIndicator numericVal="0">nuclide not identified
                  by automated analysis</NuclideIdentificationIndicator>
            </Nuclide>
            <Nuclide quantifiable="true" method="Peak Fit Method">
⋮
            </Nuclide>
            <Nuclide quantifiable="true" method="Decay Analysis Method">
              <Name>XE-131M</Name>
              <Halflife>11.962 D</Halflife>
              <Concentration unit="mBq/m3">-0.08665206</Concentration>
              <Activity unit="mBq">-3.64969515981</Activity>
              <ActivityAtAcquisition unit="mBq">-3.533965</ActivityAtAcquisition>
              <UndecayCorrectedActivity
                  unit="mBq">-3.43925879178</UndecayCorrectedActivity>
              <AbsoluteActivityError unit="mBq">18.5438771664</AbsoluteActivityError>
              <RelativeActivityError
                  unit="percentage">-508.093864127</RelativeActivityError>
              <AbsoluteConcentrationError
                  unit="mBq/m3">0.4402738</AbsoluteConcentrationError>
              <RelativeConcentrationError
                  unit="percentage">-508.093864127</RelativeConcentrationError>
              <RelativeActivityAtAcquisitionError
                  unit="percentage">-508.084828231179425942249003597941688726
                  </RelativeActivityAtAcquisitionError>
              <MDC unit="mBq/m3">0.2414189</MDC>
              <MDI unit="mBq">${MDI}</MDI>
              <LC unit="mBq/m3">23.26725</LC>
              <LD unit="mBq/m3">46.53449</LD>
              <LCActivity unit="mBq">979.992509205</LCActivity>
              <LDActivity unit="mBq">1959.98459722</LDActivity>
              <NuclideIdentificationIndicator numericVal="0">nuclide not identified
                  by automated analysis</NuclideIdentificationIndicator>
            </Nuclide>
            <Nuclide quantifiable="true" method="Decay Analysis Method">
```

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```
        </Nuclide>
      </Corrected>
      <Uncorrected>
        <Nuclide quantifiable="true" method="Peak Fit Method">
          <Name>XE-131M</Name>
          <Halflife>11.962 D</Halflife>
          <Concentration unit="mBq/m3">-0.1872418</Concentration>
          <Activity unit="mBq">N/A</Activity>
          <ActivityAtAcquisition
              unit="mBq">${ACTIVITY_AT_ACQUISITION}</ActivityAtAcquisition>
          <UndecayCorrectedActivity unit="mBq">N/A</UndecayCorrectedActivity>
          <AbsoluteActivityError unit="mBq">N/A</AbsoluteActivityError>
          <RelativeActivityError unit="percentage">N/A</RelativeActivityError>
          <AbsoluteConcentrationError
              unit="mBq/m3">0.3889244</AbsoluteConcentrationError>
          <RelativeConcentrationError
              unit="percentage">-207.712380462</RelativeConcentrationError>
          <RelativeActivityAtAcquisitionError
              unit="percentage">${ACTIVITY_AT_ACQUISITION_ERROR_PERC}
              </RelativeActivityAtAcquisitionError>
          <MDC unit="mBq/m3">0.2414189</MDC>
          <MDI unit="mBq">${MDI}</MDI>
          <LC unit="mBq/m3">267.4396</LC>
          <LD unit="mBq/m3">None</LD>
          <LCActivity unit="mBq">N/A</LCActivity>
          <LDActivity unit="mBq">N/A</LDActivity>
          <NuclideIdentificationIndicator numericVal="0">nuclide not identified
              by automated analysis</NuclideIdentificationIndicator>
        </Nuclide>
```


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```
        </Nuclide>
        <Nuclide quantifiable="true" method="Decay Analysis Method">
          <Name>XE-131M</Name>
          <Halflife>11.962 D</Halflife>
          <Concentration unit="mBq/m3">-0.08168085</Concentration>
          <Activity unit="mBq">N/A</Activity>
          <ActivityAtAcquisition
              unit="mBq">${ACTIVITY_AT_ACQUISITION}</ActivityAtAcquisition>
          <UndecayCorrectedActivity unit="mBq">N/A</UndecayCorrectedActivity>
          <AbsoluteActivityError unit="mBq">N/A</AbsoluteActivityError>
          <RelativeActivityError unit="percentage">N/A</RelativeActivityError>
          <AbsoluteConcentrationError
              unit="mBq/m3">0.4150153</AbsoluteConcentrationError>
          <RelativeConcentrationError
              unit="percentage">-508.093757594</RelativeConcentrationError>
          <RelativeActivityAtAcquisitionError
              unit="percentage">${ACTIVITY_AT_ACQUISITION_ERROR_PERC}
              </RelativeActivityAtAcquisitionError>
          <MDC unit="mBq/m3">0.2414189</MDC>
          <MDI unit="mBq">${MDI}</MDI>
          <LC unit="mBq/m3">267.4396</LC>
          <LD unit="mBq/m3">None</LD>
          <LCActivity unit="mBq">N/A</LCActivity>
          <LDActivity unit="mBq">N/A</LDActivity>
          <NuclideIdentificationIndicator numericVal="0">nuclide not identified
              by automated analysis</NuclideIdentificationIndicator>
        </Nuclide>
```


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```
      </Uncorrected>
    </IdedNuclides>
    <XeCovarianceMatrixes>
      <XeCovarianceMatrix method="Peak Fit Method">
        <Cell row="XE-131M" col="XE-131M" unit="(mBq)^2">268.1678</Cell>
        <Cell row="XE-131M" col="XE-133M" unit="(mBq)^2">-831.6442</Cell>
        <Cell row="XE-131M" col="XE-133" unit="(mBq)^2">-3.56204</Cell>
```


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```
        <Cell row="XE-135" col="XE-133M" unit="(mBq)^2">-8.716597e-05</Cell>
        <Cell row="XE-135" col="XE-133" unit="(mBq)^2">-0.04836546</Cell>
        <Cell row="XE-135" col="XE-135" unit="(mBq)^2">3.471289</Cell>
```

```
      &lt;/XeCovarianceMatrix&gt;
      &lt;XeCovarianceMatrix method="Decay Analysis Method"&gt;
        &lt;Cell row="XE-131M" col="XE-131M" unit="(mBq)^2"&gt;305.5182&lt;/Cell&gt;
        &lt;Cell row="XE-131M" col="XE-133M" unit="(mBq)^2"&gt;-967.2635&lt;/Cell&gt;
        &lt;Cell row="XE-131M" col="XE-133" unit="(mBq)^2"&gt;-3.850661&lt;/Cell&gt;
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        &lt;Cell row="XE-135" col="XE-133M" unit="(mBq)^2"&gt;-0.0005981146&lt;/Cell&gt;
        &lt;Cell row="XE-135" col="XE-133" unit="(mBq)^2"&gt;-0.06291585&lt;/Cell&gt;
        &lt;Cell row="XE-135" col="XE-135" unit="(mBq)^2"&gt;3.690312&lt;/Cell&gt;
      &lt;/XeCovarianceMatrix&gt;
    &lt;/XeCovarianceMatrixes&gt;
    &lt;PeakResults&gt;
      &lt;PeakResult peakID="1"&gt;
        &lt;Energy&gt;20.875074&lt;/Energy&gt;
        &lt;Centroid&gt;95.650819&lt;/Centroid&gt;
        &lt;Area&gt;81.319453&lt;/Area&gt;
        &lt;AreaErr&gt;18.810603&lt;/AreaErr&gt;
        &lt;Width&gt;2&lt;/Width&gt;
        &lt;FWHM&gt;0.450049&lt;/FWHM&gt;
        &lt;Efficiency&gt;0.037033&lt;/Efficiency&gt;
      &lt;/PeakResult&gt;
⋮
      &lt;PeakResult peakID="20"&gt;
        &lt;Energy&gt;803.182751&lt;/Energy&gt;
        &lt;Centroid&gt;3656.556646&lt;/Centroid&gt;
        &lt;Area&gt;26.515659&lt;/Area&gt;
        &lt;AreaErr&gt;9.097795&lt;/AreaErr&gt;
        &lt;Width&gt;7&lt;/Width&gt;
        &lt;FWHM&gt;1.504568&lt;/FWHM&gt;
        &lt;Efficiency&gt;0.023728&lt;/Efficiency&gt;
      &lt;/PeakResult&gt;
    &lt;/PeakResults&gt;
    &lt;CatDataLong&gt;
      &lt;PrevValidSamples&gt;346&lt;/PrevValidSamples&gt;
      &lt;AbnXe131M&gt;1.145135628&lt;/AbnXe131M&gt;
      &lt;AbnXe133M&gt;1.3801566250000001&lt;/AbnXe133M&gt;
⋮
      &lt;Conc133131M&gt;1.2095540158620557&lt;/Conc133131M&gt;
      &lt;Conc133131MMdc&gt;1.2095540158620557&lt;/Conc133131MMdc&gt;
    &lt;/CatDataLong&gt;
    &lt;CatDataShort&gt;
      &lt;PrevValidSamples&gt;28&lt;/PrevValidSamples&gt;
      &lt;AbnXe131M&gt;1.1221391600000001&lt;/AbnXe131M&gt;
      &lt;AbnXe133M&gt;1.3599651500000003&lt;/AbnXe133M&gt;
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      &lt;Conc135133&gt;3.505793653076684&lt;/Conc135133&gt;
      &lt;Conc133131M&gt;${Conc133131M}&lt;/Conc133131M&gt;
      &lt;Conc133131MMdc&gt;1.2095540158620557&lt;/Conc133131MMdc&gt;
    &lt;/CatDataShort&gt;
    &lt;CatParams&gt;
      &lt;MovingAvgDays&gt;365&lt;/MovingAvgDays&gt;
      &lt;AbnormalConcFactor&gt;3&lt;/AbnormalConcFactor&gt;
      &lt;Xe133MXe131MLimit&gt;2&lt;/Xe133MXe131MLimit&gt;
      &lt;Xe133MXe133Limit&gt;0.3&lt;/Xe133MXe133Limit&gt;
      &lt;Xe135Xe133Limit&gt;5&lt;/Xe135Xe133Limit&gt;
      &lt;BayesPlus&gt;0.025&lt;/BayesPlus&gt;
      &lt;BayesMinus&gt;0.975&lt;/BayesMinus&gt;
    &lt;/CatParams&gt;
    &lt;Parameters&gt;
      &lt;ProcessingParameters&gt;
        &lt;AverageEnergyCalibration&gt;NO&lt;/AverageEnergyCalibration&gt;
        &lt;BackDataType&gt;BorD&lt;/BackDataType&gt;
        &lt;BackSampleId&gt;0&lt;/BackSampleId&gt;
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        &lt;XeGammaFactor&gt;15.5188682&lt;/XeGammaFactor&gt;
        &lt;XeSigmaFactor&gt;3.0&lt;/XeSigmaFactor&gt;
        &lt;bkgndAcqLimit&gt;23.5&lt;/bkgndAcqLimit&gt;
      &lt;/ProcessingParameters&gt;
    &lt;/Parameters&gt;
```

```
        <Flags>
          <DataQualityFlags>
            <XeVolume>
              <Value unit="ml">3.6643500328064</Value>
              <Pass>Pass</Pass>
              <Test>greater than 0.87 ml</Test>
            </XeVolume>
            <SOH>
              <Value>N/A</Value>
              <Pass>N/A</Pass>
              <Test>N/A</Test>
            </SOH>
          </DataQualityFlags>
          <TimelinessAndAvailabilityFlags>
            <PreviousSamplePresent>
              <Value unit="sample ID">6481775</Value>
              <Pass>Pass</Pass>
              <Test>-1 day sample available</Test>
            </PreviousSamplePresent>
            <CollectionTime>
              <Value unit="h">24.0</Value>
              <Pass>Pass</Pass>
              <Test>24h +- 10%</Test>
            </CollectionTime>
            <AcquisitionTime>
              <Value unit="h">22.3486111111</Value>
              <Pass>Pass</Pass>
              <Test>24h +- 10%</Test>
            </AcquisitionTime>
            <ResponseTime>
              <Value unit="h">47.8852777778</Value>
              <Pass>Pass</Pass>
              <Test>sample received within 96h of collect start</Test>
            </ResponseTime>
          </TimelinessAndAvailabilityFlags>
          <EventScreeningFlags>
            <LastDetectionDays>0</LastDetectionDays>
            <XeIsotopesSeenTimes>35</XeIsotopesSeenTimes>
          </EventScreeningFlags>
          <EventScreeningImages>
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          </EventScreeningImages>
        </Flags>
      </Analysis>
    </Analyses>
    <CalibrationInformation>
      <Calibration Type="Energy" EnergyUnits="keV" ID="EN-18817220">
        <Remark>Energy to Channel Calibration equation</Remark>
        <Winner>INITIAL </Winner>
        <CalibrationCreationDate>2008-02-02T08:05:53.89</CalibrationCreationDate>
        <Equation Model="Polynomial" Form="E(C)= t0 + t1 C + t2 C^2 + t3 C^3">
          <Coefficients>-0.1354979 0.2196582 9.396198E-9 0</Coefficients>
        </Equation>
      </Calibration>
      <Calibration Type="Resolution" EnergyUnits="keV" FWHMUnits="Energy"
          ID="RE-4839200">
        <Remark>Resolution to Energy Calibration equation</Remark>
        <Winner>MRPM    </Winner>
        <CalibrationCreationDate>2007-11-24T12:09:53.89</CalibrationCreationDate>
        <Equation Model="Polynomial" Form="R(E)=SQRT( t0 + t1 E + t2 E^2 )">
          <Coefficients>0.17813 0.00114 0.000001813</Coefficients>
        </Equation>
      </Calibration>
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    </CalibrationInformation>
  </SampleInformation>
</SampML>
```

I.29 RLR—Noble gas systems

I.29.1 β-γ coincidence systems

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 00002990 GBL15
REF_ID 00012620 IMSRM
DATA_TYPE RLR
#Header
Routine
AUX09 09201912030811X
GBL15 GBL15_00X
FIN 1
Category XA
2020/01/15 14:17:42.5
#LabDataVersion
IMS2.0_IDCR8
IMS Laboratory Communication Software Version 1.3.1
#Objective
~AnalysisPurpose
verifying AUX09 results as part of the revalidation process
~TestsAuthorized
-
~SpecialInstructions
-
#Collection
2019/12/03 07:55:39.9 2019/12/03 19:55:38.6 14.251403
#X_Processing
2.0      5.0
2
1.8      5.0      80.0     5.0
2.2      5.0      80.0     5.0
#X_StationSample
spikesample
-9999 -9999
SAUNA bottle    stainless steel
#SampleReceipt
09201912030811X
99999
2019/12/16 13:30:00.0
~PackageCondition
OK
~SealCondition
N/A
~SampleCondition
OK
#X_LabSample
-9999999999
-9999
example comment
#Test
Beta-gamma coincidence spectroscopy
2020/01/15
Spike measurement
#AnalysisMethods
Xecon OSI
~NuclidesMethod
0
~BaselineMethod
0
~LCMethod
0
~CalibrationMethod
0
#References
~SAMPLEPHD
0
~CALIBPHD
0
```

```
~PhysicalConstants
0
#InteractiveAnalysisLog
beta-gamma coincidence spectroscopy, using NaI gamma detector with BC404 Al2O3 c
d plastic scintillator
#X_Results
2019/12/16 16:46:00.0 2019/12/03 19:55:39.0
XE-131M  5.8980E-01  2.54  1.00  68.00 1.3528E-01  7.60  1.00  68.00
XE-133   2.6434E+01  1.32  1.00  68.00 1.3085E+01  6.53  1.00  68.00
XE-133M  2.1601E-01  9.82  1.00  68.00 1.2448E+00  11.75 1.00  68.00
#NuclideRatios
XE-133   XE-131M  0.022    2.86  2019/12/16 16:46:00.0 1970/01/01 00:00:00.0 0.00
XE-133   XE-133M  0.008    9.91  2019/12/16 16:46:00.0 1970/01/01 00:00:00.0 0.00
XE-131M  XE-133M  0.366    10.15 2019/12/16 16:46:00.0 1970/01/01 00:00:00.0 0.00
#CoincidenceCorrection
0        0.00     0.00     0.00
#UncertaintyBudget
~Uncertainties
0        0.00  0
~UncertaintyCalculationMethods
0
#X_MDA/MDC
XE-131M  8.3810E-03  8.2458E-06
XE-133M  7.4826E-03  3.9500E-04
XE-133   5.3822E-03  1.4789E-04
XE-135   2.6334E-03  5.4098E+03
#Conclusions
~IDCSummary
IDC FINDINGS
~LabSummary
GBL15 FINDINGS
~ResultComparison
IDC-GBL15 COMPARISON
#Comment
Re-measured January 2020.
--- Archive Bottle Information ---
Archive Bottle Volume:             0.89  cm3
Archive Bottle Volume uncertainty: 2.58  %
Sample splitting and data aggregation has taken place.
Below are the individual results of each analysis and the metric used to weight
results
Nuclide  Conc (mBq/m3)     MDC     METRIC
XE-131M  109.047(8.20  %)  17.421  8.498
XE-131M  142.152(7.79  %)  15.425  20.398
XE-131M  136.440(7.49  %)  8.246   71.104
Nuclide  Conc (mBq/m3)     MDC     METRIC
XE-133M  1244.778(11.75 %)  395.002 100.000
XE-133M  0.000  (0.00  %)  174875.8540.000
XE-133M  0.000  (0.00  %)  127898.3030.000
Nuclide  Conc (mBq/m3)     MDC     METRIC
XE-133   13085.472(6.53  %)  147.888 100.000
XE-133   0.000  (0.00  %)  68386.1000.000
XE-133   0.000  (0.00  %)  50490.7230.000

STOP
```

I.29.2 HPGe systems

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 00002125 ATL03
DATA_TYPE RLR
#Header
Routine
AUX09 0920191205201 1X
ATL03 ATL03_004
FIN 1
Category XE
2019/12/20 08:11:58.7
#LabDataVersion
IMS2.0_IDCR8
IMS Laboratory Communication Software Version 1.3.1
#Objective
~AnalysisPurpose
network QC
~TestsAuthorized
high resolution gamma spectrometry is authorized for this sample
~SpecialInstructions
-
#Collection
2019/12/05 19:55:45.0 2019/12/06 07:55:43.0 8.30
#X_Processing
2.0      5.0
2
1.8      5.0      80.0     5.0
2.2      5.0      80.0     5.0
#X_StationSample
Environmental Sample
-9999 -999
SAUNA           Archive bottle 1
#SampleReceipt
09201912052011X
-
2019/12/16 07:30:00.0
~PackageCondition
package ok
~SealCondition
no seal
~SampleCondition
sample ok
#X_LabSample
-9999999999
-9999
xenon measurement cell XMC
#Test
high resolution gamma spectrometry
2019/12/20
Spike measurement
#EnergyCalibrationEquation
1
2  3  22.0    2700.0
0.0000E+00  1.7001E-01  -8.0000E-10  -9999999999
#ShapeCalibrationEquation
1
4  2  22.0    2700.0
2.2980E-03  3.6000E-01  -9999999999  -9999999999
#EfficiencyCalibrationEquation
1
6  7  25.0    2700.0
-1.3063E+02 1.7133E+02  -9.0658E+01 2.5273E+01
-3.8958E+00 3.1373E-01  -1.0306E-02  -9999999999
#TotalEfficiencyCalibrationEquation
0
0  0  0.0     0.0
-9999999999 -9999999999 -9999999999 -9999999999
#PeaksMethod
Interwinner
```

```
Method used: INTERPOLATION
Around every channel the algorithms uses a zone of four FWHMs width. The first
and the last quarter of this is used, to calculate a linear regression. The
```
⋮
```
more channels are found. Finally all zones smaller than one FHWM or smaller
than four channels are erased.
#PeakSearch
1      175.15    -9999 29.778    -9999       2.000   M
2      182.13    -9999 30.964    -9999       2.000   M
3      198.40    -9999 33.730    -9999       2.000   M
4      205.75    -9999 34.980    -9999       2.000   M
5      211.10    -9999 35.889    -9999       2.000   M
6      419.26    -9999 71.279    -9999       2.000   0
7      454.38    -9999 77.249    -9999       2.000   0
8      476.97    -9999 81.090    -9999       2.000   0
9      946.36    -9999 160.890   -9999       2.000   0
10     964.87    -9999 164.038   -9999       2.000   0
#PeakFitPart1
1      0.90  161.00    190.00    1.2379E+02  1.64  BLANK        -9999999999  -9999
2      -9999 161.00    190.00    1.2379E+02  1.64  BLANK        -9999999999  -9999
3      0.81  193.00    215.00    7.4892E+01  2.41  BLANK        -9999999999  -9999
4      1.02  193.00    215.00    7.4892E+01  2.41  BLANK        -9999999999  -9999
5      -9999 193.00    215.00    7.4892E+01  2.41  BLANK        -9999999999  -9999
6      0.73  414.00    424.00    5.2509E+01  4.16  BLANK        -9999999999  -9999
7      0.43  452.00    457.00    5.2952E+01  5.61  BLANK        2.2711E-04   25.73
8      0.78  466.00    484.00    4.1759E+01  3.55  BLANK        -9999999999  -9999
9      0.49  942.00    950.00    1.9053E+01  7.64  BLANK        -9999999999  -9999
10     0.92  956.00    974.00    1.7842E+01  5.43  BLANK        -9999999999  -9999
#PeakFitPart2
1      6.4940E+04  0.42  2.1506E-01  0.38  1.6389E+02  501.35 2.4376E+01  8.51
2      5.1194E+04  0.47  1.8073E-01  0.41  1.6024E+02  430.92 2.4712E+01  8.28
3      1.3085E+04  0.96  4.3308E-02  0.88  1.4760E+02  112.10 2.5362E+01  7.81
4      1.1499E+04  1.07  4.2816E-02  0.88  1.1658E+02  140.32 2.5607E+01  7.63
5      2.7854E+03  2.51  2.3300E-02  0.92  9.5766E+01  92.95  2.5769E+01  7.51
6      2.3940E+02  15.60 7.3769E-04  15.43 1.1080E+02  2.54   2.7743E+01  5.41
7      6.0287E+01  54.09 1.5980E-05  100.0 1.3274E+02  0.05   2.7634E+01  5.27
8      5.4560E+04  0.43  1.6471E-01  0.44  9.3378E+01  673.93 2.7522E+01  5.20
9      6.2520E+01  32.21 1.7978E-04  34.13 7.2459E+01  0.95   2.1767E+01  4.64
10     2.3710E+03  2.33  7.1090E-03  2.37  7.0397E+01  38.58  2.1508E+01  4.64
#AnalysisMethods
Interwinner
~NuclidesMethod
First step:
For each peak in the spectrum it is determined which lines in the nuclide
library are in the range of the peak identification window around the measured
```
⋮
```
sample after transfer into the cell. The xenon transfer efficiency is the
calculated ratio from these two measurements.
#PeakAssociation
1      100.000 XE-131M
2      100.000 XE-133
3      100.000 XE-131M
4      100.000 XE-133
5      100.000 XE-133
6      100.000 XE-133
7      -999999 below LC
8      100.000 XE-133
9      -999999 below LC
10     100.000 XE-131M
#References
~SAMPLEPHD
ATL03_004-2019/12/16-10:22:55.0
~CALIBPHD
ATL03_004-2014/10/20-14:26:35.0
~PhysicalConstants
The decay data is taken from two sources, depending on the availability.
- Decay Data Evaluation Project (http://www.nucleide.org/DDEP_WG/DDEPdata.htm)
- NNDC Brookhaven (https://www.nndc.bnl.gov)
Above sequence reflects the priority.
DDEP is preferred, if the required data is not available NNDC Brookhaven is used
#InteractiveAnalysisLog
```

```
- peak search performed with sensitivity factors 2.00 and 2.00
- LC criterion according to Currie applied -
(only peaks above LC are categorized as detected)
- manual inspection of the quality of the fit of all peaks
- lines for activity calculation checked and selected
#X_Results
2019/12/16 10:22:55.0 2019/12/05 19:55:45.0
XE-131M  1.9265E+03  5.40  1.0   68.27 4.2292E+02  6.72  -9999 -9999
XE-133   2.0609E+03  5.29  1.0   68.27 9.7471E+02  6.64  -9999 -9999
#NuclideRatios
XE-131M  XE-133   1.0697   7.57  2019/12/16 10:22:55.0 1970/01/01 00:00:00.0 0.00
0        0        -9999999 -9999 1970/01/01 00:00:00.0 1970/01/01 00:00:00.0 0.00
#CoincidenceCorrection
00000000 99999999 99999999 99999
#UncertaintyBudget
~Uncertainties
VOL      4.00  % unc. of sample volume
XE-131M  0.42  % unc. of net count rate at 29.8 keV
XE-131M  8.51  % unc. of efficiency at 29.8 keV
XE-131M  2.50  % unc. of e.prob. and c.cor. at 29.8 keV
```

⋮

```
XE-133   32.21 % unc. of net count rate at 160.9 keV
XE-133   4.64  % unc. of efficiency at 160.9 keV
XE-133   12.00 % unc. of e.prob. and c.cor. at 160.9 ke
~UncertaintyCalculationMethods
By assuming Poisson statistics the absolute uncertainty of the peak area is
calculated by taking the square root of the peak area.
```

⋮

```
uncertainty from the volume of the transfer syringe and the uncertainty of
the temperature measurement.
#X_MDA/MDC
XE-131M  1.2446E+02  2.7321E+01
XE-133   7.7256E+00  3.6539E+00
XE-133M  4.1715E+01  1.3141E+02
XE-135   1.9349E+01  3.4329E+08
#Conclusions
~IDCSummary
0
~LabSummary
archive bottle properties:
pressure at STP corrected = (76900 +:- 400) Pa
stable xenon in bottle = (0.960 +:- 0.04) cm3
transfer to measurement cell:
stable xenon in measurement cell = (0.722 +:- 0.029) cm3
~ResultComparison
0
#Comment
Archive bottle pressure was close to ambient pressure.
Also unusual amount of air was found in the bottle.

sample category XE
RLR produced: 2019/12/20 06:19:29.0
Spe-file: C:/InterWinner/GE/*NG-SAMPLE/2019/E09201912052011X/D4_09201912052011X.

EFF-file: C:/InterWinner/GE/(DET4)/D4_XMC.eff
NUL-file: C:/InterWinner/GE/(DET4)/D4_XMC_36.nul
ISO-file: C:/InterWinner/GE/(DET4)/ISO/E09201912052011X.iso

for particulate samples, activities and MDAs are reported in Bq
for noble gas samples, activities and MDAs are reported in mBq
for particulate samples, activity concentrations and MDCs are reported in Bq/m3
for noble gas samples, activity concentrations and MDCs are reported in mBq/m3

reference date for activity calculation:16.12.2019, 10:22:55

STOP
```

I.30 RLR—Particulate version

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68556088 CTBT_IDC
REF_ID 111211221
DATA_TYPE RLR
#Header
Routine
AUP09 09202111060511
NZL12 NZL12_004
FIN 1
Category A
2021/12/02 20:58:53.2
#LabDataVersion
IMS2.0_IDCR8
IMS Laboratory Communication Software Version 1.4.4
#Objective
~AnalysisPurpose
The purpose of this test is network QC
~TestsAuthorized
High resolution Gamma Ray Spectroscopy is authorized for this sample
~SpecialInstructions
0
#P_IDCActivitySummary
~NuclidesNotQuantified
GE-71M, GE-75M, K-40, PB-206
~NaturalNuclides
BE-7      53.290 D      3.3858e-3   2.23
PB-212F   10.64 H       3.3192e-2   2.05
~ActivationProducts
NA-24     14.959 H      1.1826e-5   26.17
~FissionProducts
0         0             -9999999999 -9999
#P_IDCEventScreeningFlags
Y 168
N 0
N 0
N 0
#Collection
2021/11/06 06:00:57.0 2021/11/07 06:04:18.0 20872.0
#P_StationSample
Environmental sample
5.0   0.45  -9999
8.8
-9999999 -9999 PVC
Compressed cylinder
#SampleReceipt
09202111060511
IMS-2017-2029
2021/11/22 03:30:00.0
~PackageCondition
Good
~SealCondition
Good
~SampleCondition
Good
#g_LabSample
-9999999999
5.00  0.65  -9999
8.81
-9999999 -9999 0
3M filter
#Test
High resolution gamma spectrometry
2021/11/30
Example text
#EnergyCalibrationEquation
1
2  2  16.41   2714.86
-2.4421E-01 1.6657E-01  -9999999999 -9999999999
#ShapeCalibrationEquation
```

```
1
3  2  16.41   2714.86
9.4214E-01  2.8986E-02  -9999999999 -9999999999
#EfficiencyCalibrationEquation
2
2  6  16.41   122.1
-2.1581E+03 2.2943E+03  -9.8503E+02 2.1298E+02
-2.3151E+00 1.0105E+00  -9999999999 -9999999999
2  6  122.1   2714.86
-2.2985E+02 1.7358E+02  -5.1988E+01 7.6917E+00
-5.6446E-01 1.6434E-02  -9999999999 -9999999999
#TotalEfficiencyCalibrationEquation
0
0  0  0.0     0.0
-9999999999 -9999999999 -9999999999 -9999999999
#PeaksMethod
Genie2000 V3.4
Peak Locate Unidentified Second Difference
Peak search sensitivity 2.2
Sum/Non linear least squares fit Peak area
Continuum Step 2 channels
Residual Search Threshold 4.0
----------------------
PEAK ASSOCIATION CODES
----------------------
S = Sum     X = X-ray
SE = Single escape     DE = Double escape
UNKNOWN = not yet identified
#PeakSearch
1     281.484  0.04  46.643   0.49        2.200   IF
2     322.382  0.22  53.455   0.24        2.200   IF
3     841.349  0.02  139.900  0.15        2.200   IF
```

⋮

```
16    8772.010 0.01  1460.920 0.01        2.200   IF
17    0596.200 0.01  1764.770 0.00        2.200   IF
18    5703.900 0.01  2615.570 0.00        2.200   IF
#PeakFitPart1
1     1.13  258.000  298.000  1.8625E+02  1.73  BLANK        -9999999999  -9999
2     1.02  312.000  333.000  1.7858E+02  1.77  BLANK        -9999999999  -9999
3     1.01  832.000  853.000  1.6097E+02  1.77  BLANK        -9999999999  -9999
```

⋮

```
16    2.46  8759.000 8788.000 6.7254E+00  7.08  BLANK        -9999999999  -9999
17    1.19  0586.000 0607.000 4.1135E+00  8.75  BLANK        -9999999999  -9999
18    2.60  5692.000 5715.000 3.1961E+00  9.34  BLANK        -9999999999  -9999
#PeakFitPart2
1     2.1962E+03  3.23  8.0315E-03  3.23  2.6039E+02  8.43   3.1890E-02  5.20
2     2.3193E+02  22.71 8.4817E-04  22.71 1.5391E+02  1.51   6.1950E-02  4.96
3     5.6874E+02  9.41  2.0799E-03  9.41  1.4199E+02  4.01   2.0317E-01  4.00
```

⋮

```
16    1.6042E+02  10.96 5.8666E-04  10.96 3.3132E+01  4.84   4.0314E-02  3.40
17    2.7266E+01  36.52 9.9714E-05  36.52 2.0357E+01  1.34   3.4803E-02  3.50
18    8.3540E+01  15.45 3.0551E-04  15.45 1.8613E+01  4.49   2.5086E-02  3.67
#AnalysisMethods
Genie2000 V3.4
~NuclidesMethod
NID plus Interference Correction Tolerence=1.00 keV NID Threshold = 0.1
~BaselineMethod
Sum Non-linear LSQ Fit Step 2 channels
~LCMethod
L.A. Currie Method Canberra Genie Algorithms 5% risk at type 1 errors
~CalibrationMethod
LabSOCS
#PeakAssociation
1     100.00  Pb-210
2     100.00  Ge-73
3     100.00  Ge-75m
```

⋮

```
16    100.00  K-40
17    100.00  Bi-214
18    100.00  Tl-208
```

```
#References
~SAMPLEPHD
NZL12_004-2021/11/22-21:21:31.0
~CALIBPHD
NZL12_004-2018/06/12-16:03:57.0
~PhysicalConstants
DDEP and Brookhaven Nuclear Data, last reviewed April 2018
#InteractiveAnalysisLog
Genie 2K Peak Search Alterations
Energy (keV) Alteration Type  Remark(s)
596.114        2              G
2577.484       2              D, E
2582.010       2              D, E
Notes
1 = Peak Added
2 = Peak Deleted
3 = Peak ROI adjusted
```

⋮

```
L = ROI Channels Reduced Due To Overlapping Adjacent Peak
M = ROI Channels Reduced To Better Represent the Background
N = Use Fixed FWHM
#P_Results
2021/11/22 21:21:31.0 2021/11/06 06:00:57.0
Be-7     5.9822e+01  5.58  1.00  68.00 3.5379e-03  5.58  1.00  68.00
#NuclideRatios
0        0        0.00     0.00  1970/01/01 00:00:00.0 1970/01/01 00:00:00.0 0.00
#CoincidenceCorrection
-9999    -9999999 -9999999 -9999
#UncertaintyBudget
~Uncertainties
Be-7     5.58  concentration combined
Be-7     0.25  Peak rate
Be-7     0.57  Gamma ray emission probability
```

⋮

```
Be-7     0.00  Sample volume
Be-7     5.58  Activity combined
Be-7     2.00  Systematic Uncertainty
~UncertaintyCalculationMethods
The peak area uncertainty is calculated using Genie-2000 equations.
The detector efficiency is derived using LabSOCS and its uncertainty
has been quantified experimentally.
The gamma ray emission probability has been taken from DDEP and Brookhaven Nucle
ata, reviewed April 2018.
Bias errors on Genie coincidence summing factors have been applied on a
linear scale ranging from 0% error for 0% coincidence factor, through
5% error for a 20% coincidence factor.Combined uncertainties have
been obtained by quadratically summing the statistical components and adding
linearly 2% systematic uncertainty.
 
#P_MDA/MDC
Ag-106m  2.3642E-02  4.3723E-06
Ag-108m  1.1004E-02  5.2723E-07
Ag-110m  1.0293E-02  5.1572E-07
```

⋮

```
Zr-95    1.0483E-02  5.9813E-07
Zr-97    2.0277E-02  7.3269E+00
#Conclusions
~IDCSummary
Be-7     IDC Result:   3.3858E-03 Bq/m3
Pb-212F  IDC Result:   3.3192E-02 Bq/m3
Na-24    IDC Result:   1.1826E-05 Bq/m3
~LabSummary
Be-7     NZL12 Result: 3.5379E-03 Bq/m3
~ResultComparison
Be-7     Difference:   4.5 %
#Comment
Pb-212F and Na-24 were not detected.
---
---
STOP
```

I.31 RMSSOH

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68555686 CTBT_IDC
REF_ID 714212835
DATA_TYPE RMSSOH
#Header 3
GBP68 GBP68_002
2021/12/01 17:58:51.7 2021/12/01 20:00:00.0 2021/12/01 20:04:46.3
#AirSamplerEnv
17.00 1010.00 2021/12/01 18:00:00.0 600
17.00 1010.00 2021/12/01 18:10:00.0 600
16.00 1010.00 2021/12/01 18:20:00.0 600
⋮
16.00 1010.00 2021/12/01 19:30:00.0 600
16.00 1010.00 2021/12/01 19:40:00.0 600
16.00 1010.00 2021/12/01 19:50:00.0 600
#AirSamplerFlow
908.0000    -9999999999 2021/12/01 18:00:00.0 600
897.0000    -9999999999 2021/12/01 18:10:00.0 600
898.0000    -9999999999 2021/12/01 18:20:00.0 600
⋮
904.0000    -9999999999 2021/12/01 19:30:00.0 600
900.0000    -9999999999 2021/12/01 19:40:00.0 600
900.0000    -9999999999 2021/12/01 19:50:00.0 600
#Comment
 HealthMonitor.exe Version 4.2.9.0 at 2021/12/01 20:04:45.535
#DetEnv
22.5  CLOSED 29  2500  -173 0   -999 -99999 2021/12/01 17:58:51.7 600
22.4  CLOSED 29  2500  -173 0   -999 -99999 2021/12/01 18:08:51.7 600
22.4  CLOSED 29  2500  -173 0   -999 -99999 2021/12/01 18:18:51.7 600
⋮
22.4  CLOSED 26  2500  -173 0   -999 -99999 2021/12/01 19:28:51.7 600
22.3  CLOSED 26  2500  -173 0   -999 -99999 2021/12/01 19:38:51.7 600
22.1  CLOSED 26  2500  -173 0   -999 -99999 2021/12/01 19:48:51.7 600
#EquipStatus
C: 68202112011711   P: 68202111301711   A: 68202111291711   2021/12/01 17:58:51.7 600
C: 68202112011711   P: 68202111301711   A: 68202111291711   2021/12/01 18:08:51.7 600
C: 68202112011711   P: 68202111301711   A: 68202111291711   2021/12/01 18:18:51.7 600
⋮
C: 68202112011711   P: 68202111301711   A: 68202111291711   2021/12/01 19:28:51.7 600
C: 68202112011711   P: 68202111301711   A: 68202111291711   2021/12/01 19:38:51.7 600
C: 68202112011711   P: 68202111301711   A: 68202111291711   2021/12/01 19:48:51.7 600
#PowerSupply
MAIN ON  AUX OFF UPS OFF 2021/12/01 17:58:51.7 600
MAIN ON  AUX OFF UPS OFF 2021/12/01 18:08:51.7 600
MAIN ON  AUX OFF UPS OFF 2021/12/01 18:18:51.7 600
⋮
MAIN ON  AUX OFF UPS OFF 2021/12/01 19:28:51.7 600
MAIN ON  AUX OFF UPS OFF 2021/12/01 19:38:51.7 600
MAIN ON  AUX OFF UPS OFF 2021/12/01 19:48:51.7 600
#TamperEnv
aslid                CLOSED 2021/12/01 17:58:51.7 600
aspanel              OPEN   2021/12/01 17:58:51.7 600
decaycab             CLOSED 2021/12/01 17:58:51.7 600
door1                OPEN   2021/12/01 17:58:51.7 600
aslid                CLOSED 2021/12/01 18:08:51.7 600
aspanel              OPEN   2021/12/01 18:08:51.7 600
decaycab             CLOSED 2021/12/01 18:08:51.7 600
door1                OPEN   2021/12/01 18:08:51.7 600
⋮
aslid                CLOSED 2021/12/01 19:48:51.7 600
aspanel              OPEN   2021/12/01 19:48:51.7 600
decaycab             CLOSED 2021/12/01 19:48:51.7 600
door1                OPEN   2021/12/01 19:48:51.7 600
STOP
```

I.32 RNPS

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68556594 CTBT_IDC
REF_ID 714212835
DATA_TYPE RNPS
                      Radionuclide Network Product Summary
                  Product created on 2021/12/10 12:44:11

   This product shows the radionuclide products received at the IDC between
                    2021/11/25 00:00:00 and 2021/11/30 00:00:00


Station Detector  SID      P/G/B Cstart(GMT)      Cstop(GMT)       Category Status  Products    CTBT Relevant
--------------------------------------------------------------------------------------------------------------
SEX63   SEX63_008 6470591  B     2021/11/29 12:01 2021/11/29 18:01 Level 2  R       A,R,XA,XR   XE-133
SEX63   SEX63_007 6470224  B     2021/11/29 06:01 2021/11/29 12:01 Level 2  R       A,R,XA,XR   XE-133
SEX63   SEX63_008 6469853  B     2021/11/29 00:01 2021/11/29 06:01 Level 2  R       A,R,XA,XR   XE-133
SEX63   SEX63_007 6469497  B     2021/11/28 18:01 2021/11/29 00:01 Level 2  R       A,R,XA,XR   XE-131M XE-133M
SEX63   SEX63_008 6469132  B     2021/11/28 12:01 2021/11/28 18:01 Level 2  R       A,R,XA,XR   XE-133
SEX63   SEX63_007 6468767  B     2021/11/28 06:01 2021/11/28 12:01 Level 2  R       A,R,XA,XR   XE-131M
SEX63   SEX63_008 6468398  B     2021/11/28 00:01 2021/11/28 06:01 Level 2  R       A,R,XA,XR   XE-133
SEX63   SEX63_007 6468039  B     2021/11/27 18:01 2021/11/28 00:01 Level 2  R       A,R,XA,XR   XE-133
SEX63   SEX63_008 6467684  B     2021/11/27 12:01 2021/11/27 18:01 Level 1  R       A,R,XA,XR
SEX63   SEX63_007 6467336  B     2021/11/27 06:01 2021/11/27 12:01 Level 2  R       A,R,XA,XR   XE-135
SEX63   SEX63_008 6466978  B     2021/11/27 00:01 2021/11/27 06:01 Level 1  R       A,R,XA,XR
SEX63   SEX63_007 6466627  B     2021/11/26 18:01 2021/11/27 00:01 Level 2  R       A,R,XA,XR   XE-133
SEX63   SEX63_008 6466273  B     2021/11/26 12:01 2021/11/26 18:01 Level 2  R       A,R,XA,XR   XE-133
SEX63   SEX63_007 6465922  B     2021/11/26 06:01 2021/11/26 12:01 Level 2  R       A,R,XA,XR   XE-133
SEX63   SEX63_008 6465566  B     2021/11/26 00:01 2021/11/26 06:01 Level 2  R       A,R,XA,XR   XE-133
SEX63   SEX63_007 6465221  B     2021/11/25 18:01 2021/11/26 00:01 Level 2  R       A,R,XA,XR   XE-133 XE-135
SEX63   SEX63_008 6464863  B     2021/11/25 12:01 2021/11/25 18:01 Level 1  R       A,R,XA,XR
SEX63   SEX63_007 6464510  B     2021/11/25 06:01 2021/11/25 12:01 Level 1  R       A,R,XA,XR
SEX63   SEX63_008 6464146  B     2021/11/25 00:01 2021/11/25 06:01 Level 1  R       A,R,XA,XR
SEX63   SEX63_007 6463796  B     2021/11/24 18:01 2021/11/25 00:01 Level 2  R       A,R,XA,XR   XE-131M

Products Legend:
     A: ARR
     R: RRR
     S: SSREB
     XA: SAMPML XML A
     XR: SAMPML XML R
STOP
```

I.33 RRR—Noble gas version

I.33.1 β-γ coincidence systems (plain text format)

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 73000890 CTBT_IDC
REF_ID 24163264
DATA_TYPE RRR
TIME_STAMP 2022/06/02 10:33:05
IDC Generated Report
Reviewed Radionuclide Report
Noble Gas Version

Creation Date: 2022-05-30 07:12:50
Sample Arrival Time: 2022-05-28 00:54:17
Time difference from receipt of raw data to report creation: 2 d 6 h 18 m 33.0 s

Sample Information
--------------------------------------------------------------------------------

Station ID:     AUX04   Detector Code: AUX04_005
Authenticated:  YES

Station Location:       Melbourne, VIC
Detector Description:   Detector #5 in Victoria, Australia.
System Technology:      SAUNA

Sample Reference ID:    04202205261811X
Sample ID:              6732658
Stable Xe Volume:       0.99 ml          Sample Type:    Gas

Collection Start:       2022-05-26 18:31:48     Sampling Time:           12 h  4 s
Collection Stop:        2022-05-27 06:31:52     Processing Time:         7 h 10 m 58 s
Acquisition Start:      2022-05-27 13:42:50     Acquisition Time:        11 h 9 m 58 s
Acquisition Stop:       2022-05-28 00:52:48

IDC Analysis General Comments:2022-05-30 07:12:33
The sample is categorized at Level B due to the detection of Xe133 with activity concentration(s) within the normal range for the
    station

Measurement Categorization
--------------------------------------------------------------------------------

Categorization Legend
```

```
Level A          Clean spectrum - No Xenon is present in the sample.
Level B          Xenon detection within the typical range for the station.
Level C          Anomalous Xenon detection.

Isotope category
Isotope  Nuclide detected  Abnormal_limit (mBq/m3)  Category
Xe-131m  NO                1.57E-01                 A
Xe-133m  NO                1.37E-01                 A
Xe-133   YES               5.17E-01                 B
Xe-135   NO                8.85E-01                 A

Spectrum Category: B - Xenon detection within the typical range for the station

Activity Summary and Minimum Detectable Concentration for Xenon Isotopes
--------------------------------------------------------------------------------

Radon counts in Xenon sample: 102

Xenon isotopes - Beta gamma matrix (BGM) analysis method

Nuclide  Half-Life  Activity (mBq)  StatErr (%)  SysErr (%)  TotalErr (%)  Conc (mBq/m3)  StatErr (%)  SysErr (%)  TotalErr (%)
    LC (mBq/m3)  MDC (mBq/m3)
XE-131M  11.962 D   -8.25E-01       58.55        40.61       71.25         -7.52E-02      58.55        41.83       71.95
    8.17E-02     1.83E-01
XE-133M  2.198 D    -1.23E-01       289.67       167.59      334.66        -1.29E-02      289.67       167.89      334.81
    6.37E-02     1.50E-01
XE-133   5.2441 D   2.03E+00        51.18        33.37       61.10         1.93E-01       51.18        34.84       61.91
    1.48E-01     3.19E-01
XE-135   9.143 H    -1.76E+00       49.84        28.25       57.29         -4.07E-01      49.84        29.97       58.16
    3.58E-01     7.58E-01

Processing Specific Parameters and Results
--------------------------------------------------------------------------------

Beta gamma matrix (BGM) analysis method

ROI Net Count Results
ROI  Nuclide  Net Counts  Abs Net Error  LC     Efficiency  Abs Eff Error
1    PB-214   21.81       3.70           21.19  N/A         N/A
2    XE-135   -26.53      3.64           23.35  0.62        0.11
3    XE-133   22.14       3.37           16.95  0.75        0.15
4    XE-133   8.40        3.38           20.48  0.70        0.10
5    XE-131M  -10.59      2.49           11.52  0.60        0.07
6    XE-133M  -1.54       2.11           7.64   0.60        0.07

ROI Limits (channels)
```

```
ROI  BetaLow (channels)  BetaHigh (channels)  GammaLow (channels)  GammaHigh (channels)
1    1                   217                  117                  140
2    1                   277                  82                   104
3    1                   136                  25                   36
4    1                   152                  6                    15
5    29                  55                   6                    15
6    68                  102                  6                    15
7    1                   28                   6                    15
8    103                 152                  6                    15
9    68                  152                  6                    15
10   1                   55                   6                    15

Processing Parameters
-------------------------------------------------------------------------------

Risk level k:                     1.6449
Gas background used:              YES
Detector background used:         YES
Interference corrections:         YES
Analysis method:                  BGM

Calibration Parameters
-------------------------------------------------------------------------------

Gamma energy calibration updated:        YES
Beta energy calibration updated:         YES

Data Timeliness and Availability Flags
-------------------------------------------------------------------------------

Name                     Pass/Fail  Value     Test
Previous Sample Present  Pass       6731925   -1/2 day sample available
Collection Time          Pass       12.00     12h +- 10%
Acquisition Time         Pass       11.17     12h +- 10%
Response Time            Pass       30.37     sample received within 96h of collect start

Data Quality Flags
-------------------------------------------------------------------------------

Name                 Pass/Fail  Value  Test
Stable Xenon Volume  Pass       0.99   greater than 0.44 ml
SOH                  Pass       Fair   SOH substantially meets operational requirements
Xe-133 MDC           PASS       0.32   less than 1 mBq/m3

Event Screening Flags
-------------------------------------------------------------------------------

```

```
Name                                                   YES/NO/Value

Xenon Isotopes present in this spectrum                YES

Only one Xenon Isotope in spectrum                     NO

Number of days since last Xenon detection              0

2 or more Xenon Isotopes present in this spectrum      YES

Xe-133 present in spectrum                             YES

Number of times Xe-133 seen in last 365 days           110

Short term flag                                        b - Xenon detection within the typical range for the station
Isotopic ratios:
- Xe-133m/131m > 2                                     NO
- Xe-135/133 > 5                                       NO
- Xe-133m/133 > 0.3                                    NO

Calibration Equations
--------------------------------------------------------------------------------

Beta Energy To Channel : C(E)= t0 + t1 E + t2 EB2
t0 : -3.62
t1 : 0.432138
t2 : -0.0001346

Gamma Energy To Channel : C(E)= t0 + t1 E + t2 EB2
t0 : -0.3268965
t1 : 0.3819843
t2 : -0.0000436
TIME_STAMP 2022/06/02 10:33:05
STOP
```

I.33.2 β-γ coincidence systems (HTML format)

IDC Generated Report
Reviewed Radionuclide Report
Noble Gas Version

Creation Date: 2022-05-30 07:12:50
Sample Arrival Time: 2022-05-28 00:54:17
Time difference from receipt of raw data to report creation: 2 d 6 h 18 m 33.0 s

Sample Information

Station ID:	AUX04	Detector Code:	AUX04_005
Authenticated:	YES		
Station Location:	Melbourne, VIC		
Detector Description:	Detector #5 in Victoria, Australia.		
System Technology:	SAUNA		
Sample Reference ID:	04202205261811X		
Sample ID:	6732658		
Stable Xe Volume:	0.99 ml	Sample Type:	Gas
Collection Start:	2022-05-26 18:31:48	Sampling Time:	12 h 4 s
Collection Stop:	2022-05-27 06:31:52	Processing Time:	7 h 10 m 58 s
Acquisition Start:	2022-05-27 13:42:50	Acquisition Time:	11 h 9 m 58 s
Acquisition Stop:	2022-05-28 00:52:48		

IDC Analysis General Comments:

```
2022-05-30 07:12:33
The sample is categorized at Level B due to the detection of Xe133 with activity concentration(s) within the normal
range for the station
```

Measurement Categorization

Categorization Legend

Level A = Clean spectrum - No Xenon is present in the sample.
Level B = Xenon detection within the typical range for the station.
Level C = Anomalous Xenon detection.

Isotope category

Isotope	Nuclide detected	Abnormal_limit *(mBq/m3)*	Category
Xe-131m	NO	1.57E-01	A
Xe-133m	NO	1.37E-01	A
Xe-133	YES	5.17E-01	B
Xe-135	NO	8.85E-01	A

Spectrum Category: B - Xenon detection within the typical range for the station

Activity Summary and Minimum Detectable Concentration for Xenon Isotopes

Radon counts in Xenon sample: 102

Xenon isotopes - Beta gamma matrix (BGM) analysis method

Nuclide	Half-Life	Activity (mBq)	StatErr (%)	SysErr (%)	TotalErr (%)	Conc (mBq/m3)	StatErr (%)	SysErr (%)	TotalErr (%)	LC (mBq/m3)	MDC (mBq/m3)

XE-131M	11.962 D	-8.25E-01	58.55	40.61	71.25	-7.52E-02	58.55	41.83	71.95	8.17E-02	1.83E-01
XE-133M	2.198 D	-1.23E-01	289.67	167.59	334.66	-1.29E-02	289.67	167.89	334.81	6.37E-02	1.50E-01
XE-133	5.2441 D	2.03E+00	51.18	33.37	61.10	1.93E-01	51.18	34.84	61.91	1.48E-01	3.19E-01
XE-135	9.143 H	-1.76E+00	49.84	28.25	57.29	-4.07E-01	49.84	29.97	58.16	3.58E-01	7.58E-01

Processing Specific Parameters and Results

Beta gamma matrix (BGM) analysis method

ROI Net Count Results

ROI	Nuclide	Net Counts	Abs Net Error	LC	Efficiency	Abs Eff Error
1	PB-214	21.81	3.70	21.19	N/A	N/A
2	XE-135	-26.53	3.64	23.35	0.62	0.11
3	XE-133	22.14	3.37	16.95	0.75	0.15
4	XE-133	8.40	3.38	20.48	0.70	0.10
5	XE-131M	-10.59	2.49	11.52	0.60	0.07
6	XE-133M	-1.54	2.11	7.64	0.60	0.07

ROI Limits (channels)

ROI	BetaLow *(channels)*	BetaHigh *(channels)*	GammaLow *(channels)*	GammaHigh *(channels)*
1	1	217	117	140
2	1	277	82	104
3	1	136	25	36
4	1	152	6	15
5	29	55	6	15
6	68	102	6	15
7	1	28	6	15
8	103	152	6	15
9	68	152	6	15
10	1	55	6	15

Processing Parameters

Risk level k:	1.6449
Gas background used:	YES
Detector background used:	YES
Interference corrections:	YES
Analysis method:	BGM

Calibration Parameters

Gamma energy calibration updated:	YES
Beta energy calibration updated:	YES

Data Timeliness and Availability Flags

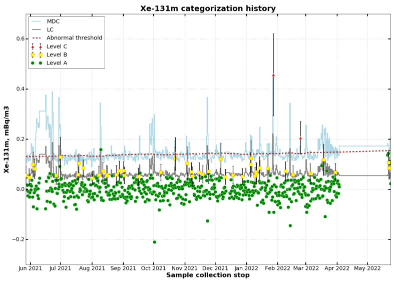
Name	Pass/Fail	Value	Test
Previous Sample Present	Pass	6731925	-1/2 day sample available
Collection Time	Pass	12.00	12h +- 10%
Acquisition Time	Pass	11.17	12h +- 10%
Response Time	Pass	30.37	sample received within 96h of collect start

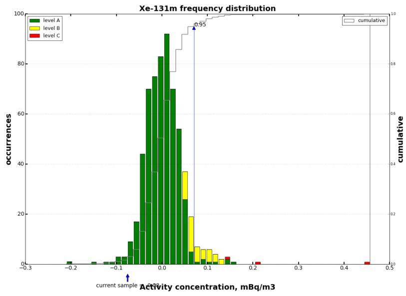
Data Quality Flags

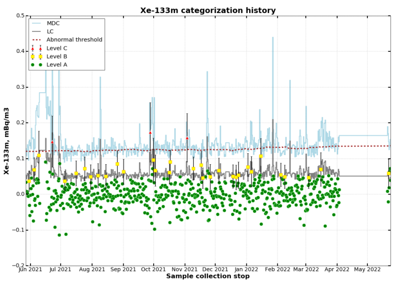
Name	Pass/Fail	Value	Test
Stable Xenon Volume	Pass	0.99	greater than 0.44 ml
SOH	Pass	Fair	SOH substantially meets operational requirements
Xe-133 MDC	PASS	0.32	less than 1 mBq/m3

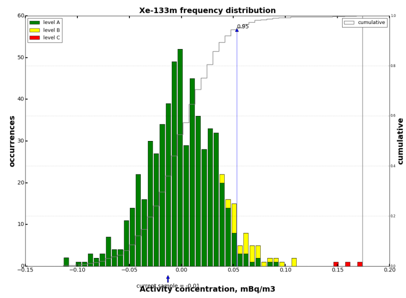
Event Screening Flags

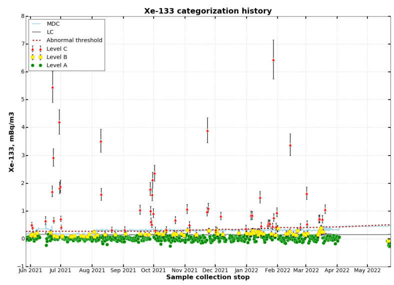
Name	**YES/NO/Value**
Xenon Isotopes present in this spectrum	YES
Only one Xenon Isotope in spectrum	NO
Number of days since last Xenon detection	0
2 or more Xenon Isotopes present in this spectrum	YES
Xe-133 present in spectrum	YES
Number of times Xe-133 seen in last 365 days	110
Short term flag	b - Xenon detection within the typical range for the station
Isotopic ratios:	
- Xe-133m/131m > 2	NO
- Xe-135/133 > 5	NO
- Xe-133m/133 > 0.3	NO

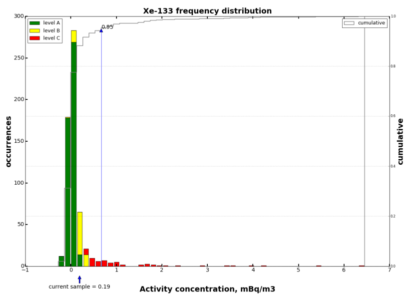


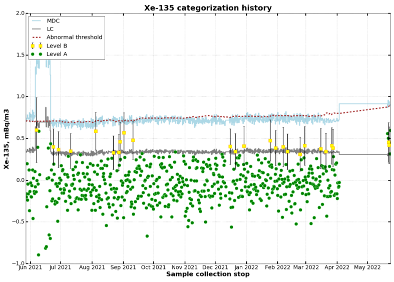


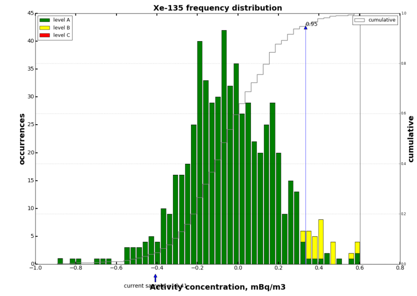


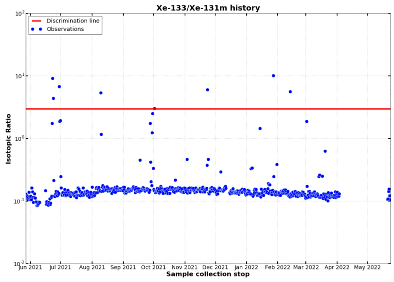


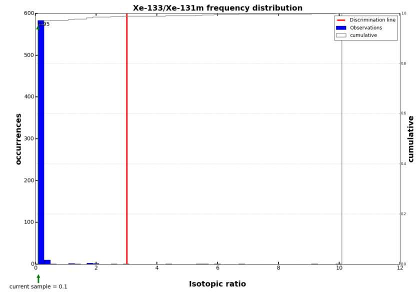


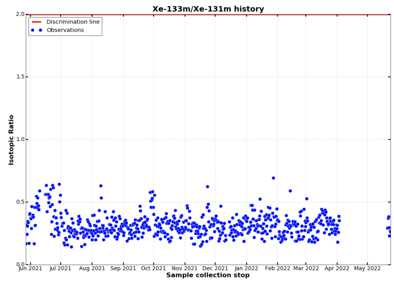


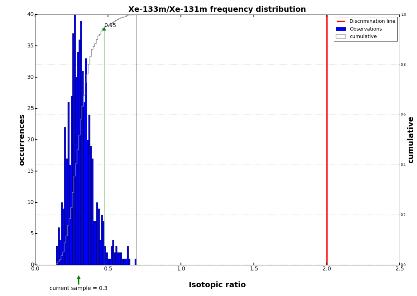

Xe-135 categorization history
MDC
LC
Abnormal threshold
Level B
Level A
Xe-135, mBq/m3
Sample collection stop

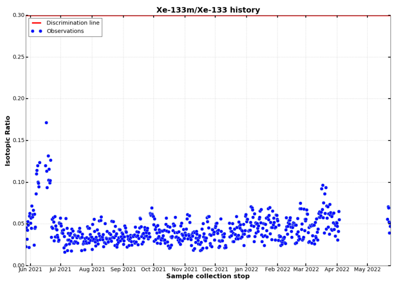

Xe-135 frequency distribution
level A
level B
level C
cumulative
occurrences
Activity concentration, mBq/m3

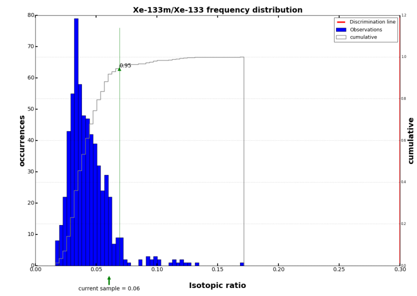

Xe-133/Xe-131m history
Discrimination line
Observations
Isotopic Ratio
Sample collection stop

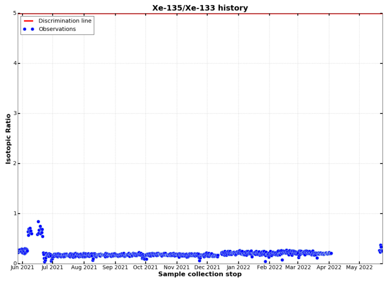

Xe-133/Xe-131m frequency distribution
Discrimination line
Observations
cumulative
occurrences
current sample = 0.1
Isotopic ratio

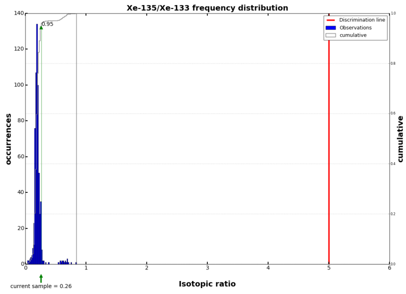

Xe-133m/Xe-131m history
Discrimination line
Observations
Isotopic Ratio
Sample collection stop


Xe-133m/Xe-131m frequency distribution
Discrimination line
Observations
cumulative
occurrences
current sample = 0.3
Isotopic ratio


Xe-133m/Xe-133 history
Discrimination line
Observations
Isotopic Ratio
Sample collection stop


Xe-133m/Xe-133 frequency distribution
Discrimination line
Observations
cumulative
occurrences
current sample = 0.06
Isotopic ratio





Calibration Equations

Beta Energy To Channel : C(E)= t0 + t1 E + t2 E^2

t0 : -3.62
t1 : 0.432138
t2 : -0.0001346

Gamma Energy To Channel : C(E)= t0 + t1 E + t2 E^2

t0 : -0.3268965
t1 : 0.3819843
t2 : -0.0000436

I.33.3 HPGe systems reports (plain text format)

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 73001207 CTBT_IDC
REF_ID 24163264
DATA_TYPE RRR
TIME_STAMP 2022/06/02 10:51:54
IDC Generated Report
Reviewed Radionuclide Report
Noble Gas Version

Creation Date: 2022-05-31 08:10:32
Sample Arrival Time: 2022-05-30 21:53:26
Time difference from receipt of raw data to report creation:  10 h 17 m 6.0 s

Sample Information
-------------------------------------------------------------------------------

Station ID:      MNX45    Detector Code: MNX45_005
Authenticated:   YES

Station Location:        MNX45, Mongolia
Detector Description:    BE3825 detector #5 in Mongolia
System Technology:       SPALAX

Sample Reference ID:     45202205282211G
Sample ID:               6736824
Stable Xe Volume:        4.35 ml Sample Type: Gas

Collection Start:        2022-05-28 22:00:00     Sampling Time:          1 d
Collection Stop:         2022-05-29 22:00:00     Processing Time:         1 h 24 m 6 s
Acquisition Start:       2022-05-29 23:24:06     Acquisition Time:        22 h 21 m 5 s
Acquisition Stop:        2022-05-30 21:45:11

IDC Analysis General Comments:None
None

Measurement Categorization
-------------------------------------------------------------------------------

Categorization Legend

Level A =        Clean spectrum - No Xenon is present in the sample.
Level B =        Xenon detection within the typical range for the station.
Level C =        Anomalous Xenon detection.
```

```

Isotope category
Isotope Nuclide detected        Abnormal_limit (mBq/m3) Category
Xe-131m NO      1.34E+00        A
Xe-133m NO      1.58E+00        A
Xe-133  NO      5.67E-01        A
Xe-135  NO      7.17E-01        A

Spectrum Category: A - Clean spectrum - No Xenon is present in the sample

Activity Summary and Minimum Detectable Concentration for Xenon Isotopes
--------------------------------------------------------------------------------

Radon level in Xenon sample
Nuclide Half-Life       Area    RelErr (%)
Rn-222  3.82 D          277.46  8.02

Xenon isotopes

Peak Fit Method

Nuclide  Half-Life  Activity (mBq)  StatErr (%)  SysErr (%)  TotalErr (%)  Conc (mBq/m3)  StatErr (%)  SysErr (%)  TotalErr (%)
    MDI/MDC
XE-131M  11.962 D   2.83E+01        71.57        2.68        71.62         5.85E-01       71.57        4.02        71.68
    2.74E-01
XE-133M  2.198 D    -4.92E+00       429.22       2.72        429.22        -1.17E-01      429.22       4.05        429.23
    2.74E-01
XE-133   5.2441 D   -3.08E-01       797.48       2.50        797.48        -6.62E-03      797.48       3.91        797.49
    2.92E-01
XE-135   9.143 H    4.66E+00        102.43       2.72        102.47        2.25E-01       102.43       4.05        102.51
    1.16E+00

Decay Analysis Method

Nuclide  Half-Life  Activity (mBq)  StatErr (%)  SysErr (%)  TotalErr (%)  Conc (mBq/m3)  StatErr (%)  SysErr (%)  TotalErr (%)
    MDI/MDC
XE-131M  11.962 D   -1.77E+01       117.69       2.68        117.73        -3.66E-01      117.69       4.02        117.76
    2.74E-01
XE-133M  2.198 D    3.40E+01        63.65        2.72        63.71         8.07E-01       63.65        4.05        63.78
    2.74E-01
XE-133   5.2441 D   5.44E+00        45.30        2.50        45.37         1.17E-01       45.30        3.91        45.47
    2.92E-01
XE-135   9.143 H    5.08E+00        86.81        2.72        86.85         2.45E-01       86.81        4.05        86.90
    1.16E+00

Processing Specific Parameters and Results
--------------------------------------------------------------------------------
```

```

Xenon Peak Data

Energy (keV)  Centroid  Width  FWHM (keV)  Eff (%)  Net Area  RelErr (%)
29.60       134.57    3.00   0.60        12.66    106.10    26.64

Processing Parameters
--------------------------------------------------------------------------------

Risk level K:           4.26489
Baseline algorithm:     Smoothing / Lawn Mowers

Calibration Parameters
--------------------------------------------------------------------------------

SAreaThreshold:         100
ConfidenceLevel:        95
ECR updated:            Yes
RER updated:            No
Used ECR:               INITIAL
Used RER:               MRPA

Data Timeliness and Availability Flags
--------------------------------------------------------------------------------

Name                     Pass/Fail  Value     Test
Previous Sample Present  Pass       6735347   -1 day sample available
Collection Time          Pass       24.00     24h +- 10%
Acquisition Time         Pass       22.35     24h +- 10%
Response Time            Pass       47.89     sample received within 96h of collect start

Data Quality Flags
--------------------------------------------------------------------------------

Name                 Pass/Fail  Value  Test
Stable Xenon Volume  Pass       4.35   greater than 0.87 ml
SOH                  Pass       Good   SOH meets operational requirements
Xe-133 MDC           PASS       0.29   less than 1 mBq/m3

Event Screening Flags
--------------------------------------------------------------------------------

Name                                                    YES/NO/Value
Xenon Isotopes present in this spectrum                 YES
Only one Xenon Isotope in spectrum                      NO
Number of days since last Xenon detection               1
2 or more Xenon Isotopes present in this spectrum       YES
```

```
Xe-133 present in spectrum                                      NO
Number of times Xe-133 seen in last 365 days                    124
Short term flag                                                 a - Clean spectrum - No Xenon is present in the sample
Isotopic ratios:
- Xe-133m/131m > 2                                              NO
- Xe-135/133 > 5                                                NO
- Xe-133m/133 > 0.3                                             NO

Calibration Equations
--------------------------------------------------------------------------------

Energy : E(C)= t0 + t1 C + t2 CB2 + t3 CB3
t0 : 0.07120926 t1 : 0.2193672  t2 : 2.677893E-7          t3 : 0
Resolution : R(E)= b  (t0 + t1 E + t2 EB2)
t0 : 0.3162     t1 : 0.001381   t2 : 4.614E-7
TIME_STAMP 2022/06/02 10:51:54
STOP
```

I.33.4 HPGe systems reports (HTML format)

IDC Generated Report
Reviewed Radionuclide Report
Noble Gas Version

Creation Date: 2022-05-31 08:10:31
Sample Arrival Time: 2022-05-30 21:53:26
Time difference from receipt of raw data to report creation: 10 h 17 m 5.0 s

Sample Information

Station ID:	MNX45	Detector Code:	MNX45_005
Authenticated:	YES		
Station Location:	MNX45, Mongolia		
Detector Description:	BE3825 detector #5 in Mongolia		
System Technology:	SPALAX		
Sample Reference ID:	45202205282211G		
Sample ID:	6736824		
Stable Xe Volume:	4.35 ml	Sample Type:	Gas
Collection Start:	2022-05-28 22:00:00	Sampling Time:	1 d
Collection Stop:	2022-05-29 22:00:00	Processing Time:	1 h 24 m 6 s
Acquisition Start:	2022-05-29 23:24:06	Acquisition Time:	22 h 21 m 5 s
Acquisition Stop:	2022-05-30 21:45:11		

IDC Analysis General Comments:

None
None

Measurement Categorization

Categorization Legend

Level A = Clean spectrum - No Xenon is present in the sample.
Level B = Xenon detection within the typical range for the station.
Level C = Anomalous Xenon detection.

Isotope category

Isotope	Nuclide detected	Abnormal_limit *(mBq/m3)*	Category
Xe-131m	NO	1.34E+00	A
Xe-133m	NO	1.58E+00	A
Xe-133	NO	5.67E-01	A
Xe-135	NO	7.17E-01	A

Spectrum Category: A - Clean spectrum - No Xenon is present in the sample

Activity Summary and Minimum Detectable Concentration for Xenon Isotopes

Radon level in Xenon sample

Nuclide	**Half-Life**	**Area**	**RelErr (%)**
Rn-222	3.82 D	277.46	8.02

Xenon isotopes

Peak Fit Method

Nuclide	**Half-Life**	**Activity (mBq)**	**StatErr (%)**	**SysErr (%)**	**TotalErr (%)**	**Conc (mBq/m3)**	**StatErr (%)**	**SysErr (%)**	**TotalErr (%)**	**MDI/MDC**
XE-131M	11.962 D	2.83E+01	71.57	2.68	71.62	5.85E-01	71.57	4.02	71.68	2.74E-01

XE-133M	2.198 D	-4.92E+00	429.22	2.72	429.22	-1.17E-01	429.22	4.05	429.23	2.74E-01
XE-133	5.2441 D	-3.08E-01	797.48	2.50	797.48	-6.62E-03	797.48	3.91	797.49	2.92E-01
XE-135	9.143 H	4.66E+00	102.43	2.72	102.47	2.25E-01	102.43	4.05	102.51	1.16E+00

Decay Analysis Method

Nuclide	**Half-Life**	**Activity (mBq)**	**StatErr (%)**	**SysErr (%)**	**TotalErr (%)**	**Conc (mBq/m3)**	**StatErr (%)**	**SysErr (%)**	**TotalErr (%)**	**MDI/MDC**
XE-131M	11.962 D	-1.77E+01	117.69	2.68	117.73	-3.66E-01	117.69	4.02	117.76	2.74E-01
XE-133M	2.198 D	3.40E+01	63.65	2.72	63.71	8.07E-01	63.65	4.05	63.78	2.74E-01
XE-133	5.2441 D	5.44E+00	45.30	2.50	45.37	1.17E-01	45.30	3.91	45.47	2.92E-01
XE-135	9.143 H	5.08E+00	86.81	2.72	86.85	2.45E-01	86.81	4.05	86.90	1.16E+00

Processing Specific Parameters and Results

Xenon Peak Data

Energy (keV)	**Centroid**	**Width**	**FWHM (keV)**	**Eff (%)**	**Net Area**	**RelErr (%)**
29.60	134.57	3.00	0.60	12.66	106.10	26.64

Processing Parameters

Risk level K: 4.26489
Baseline algorithm: Smoothing / Lawn Mowers

Calibration Parameters

SAreaThreshold: 100
ConfidenceLevel: 95
ECR updated: Yes
RER updated: No
Used ECR: INITIAL
Used RER: MRPA

Data Timeliness and Availability Flags

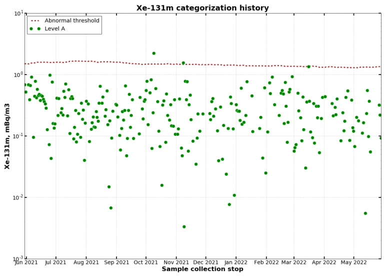
Name	**Pass/Fail**	**Value**	**Test**
Previous Sample Present	Pass	6735347	-1 day sample available
Collection Time	Pass	24.00	24h +- 10%
Acquisition Time	Pass	22.35	24h +- 10%
Response Time	Pass	47.89	sample received within 96h of collect start

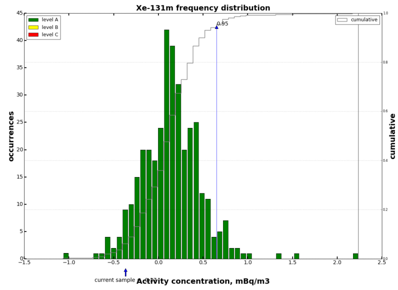
Data Quality Flags

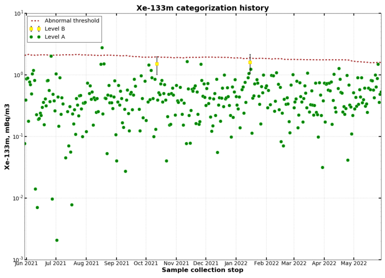
Name	**Pass/Fail**	**Value**	**Test**
Stable Xenon Volume	Pass	4.35	greater than 0.87 ml
SOH	Pass	Good	SOH meets operational requirements
Xe-133 MDC	PASS	0.29	less than 1 mBq/m3

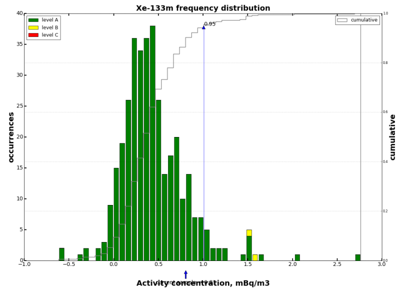
Event Screening Flags

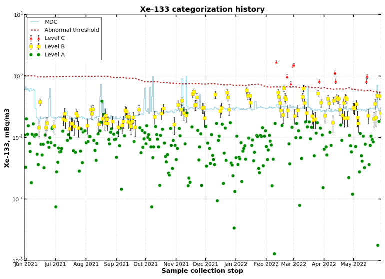
Name	**YES/NO/Value**
Xenon Isotopes present in this spectrum	YES
Only one Xenon Isotope in spectrum	NO
Number of days since last Xenon detection	1
2 or more Xenon Isotopes present in this spectrum	YES
Xe-133 present in spectrum	NO
Number of times Xe-133 seen in last 365 days	124
Short term flag	a - Clean spectrum - No Xenon is present in the sample
Isotopic ratios:	
- Xe-133m/131m > 2	NO
- Xe-135/133 > 5	NO
- Xe-133m/133 > 0.3	NO

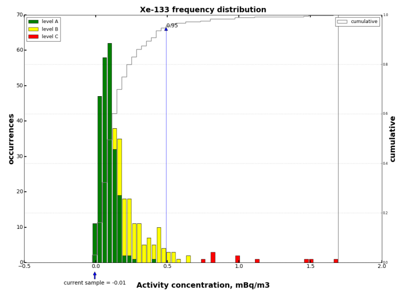

Xe-131m categorization history
Abnormal threshold
Level A
Xe-131m, mBq/m3
Sample collection stop

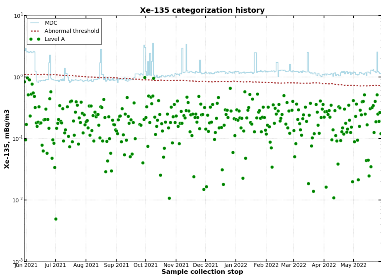

Xe-131m frequency distribution
level A
level B
level C
cumulative
occurrences
0.95
Activity concentration, mBq/m3

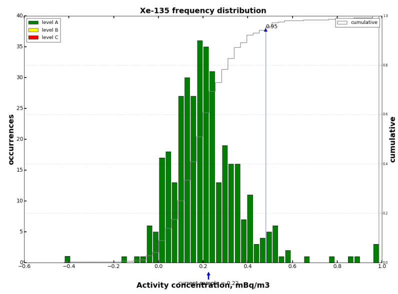

Xe-133m categorization history
Abnormal threshold
Level B
Level A
Xe-133m, mBq/m3
Sample collection stop

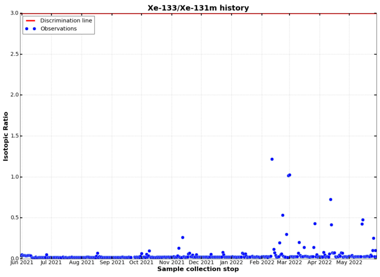

Xe-133m frequency distribution
level A
level B
level C
cumulative
occurrences
0.95
Activity concentration, mBq/m3

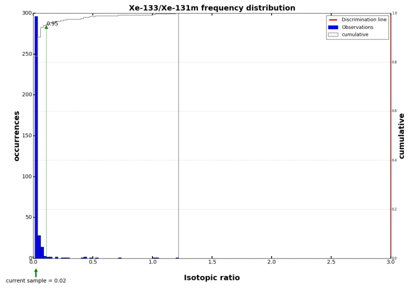

Xe-133 categorization history
MDC
Abnormal threshold
Level C
Level B
Level A
Xe-133, mBq/m3
Sample collection stop

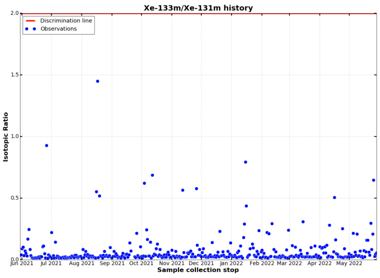

Xe-133 frequency distribution
level A
level B
level C
cumulative
occurrences
0.95
current sample = -0.01
Activity concentration, mBq/m3

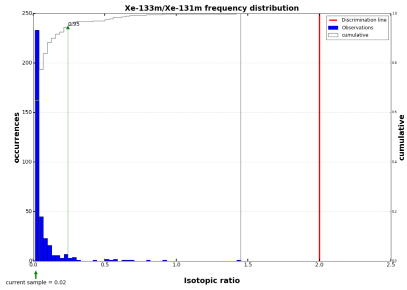

Xe-135 categorization history
MDC
Abnormal threshold
Level A
Xe-135, mBq/m3
Sample collection stop

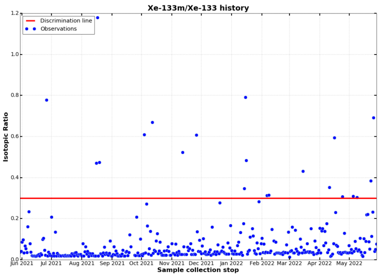

Xe-135 frequency distribution
level A
level B
level C
cumulative
occurrences
0.95
Activity concentration, mBq/m3

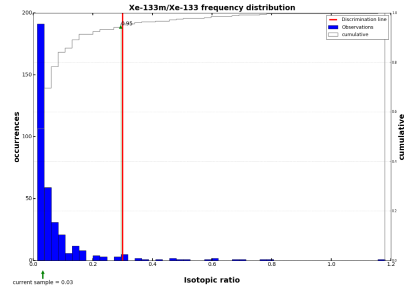


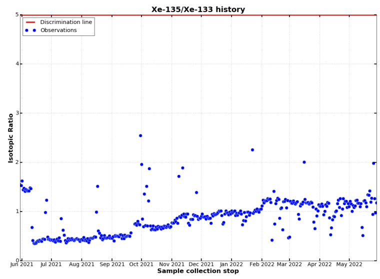


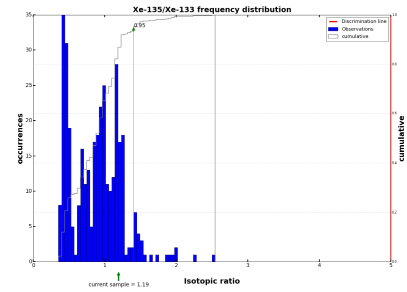












Calibration Equations

Energy : $E(C) = t0 + t1\ C + t2\ C^2 + t3\ C^3$

t0 : 0.07120926
t1 : 0.2193672
t2 : 2.677893E-7
t3 : 0

Resolution : $R(E) = \sqrt{(t0 + t1\ E + t2\ E^2)}$

t0 : 0.3162
t1 : 0.001381
t2 : 4.614E-7

I.34 RRR—Particulate version

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 72650797 CTBT_IDC
REF_ID 714212835
DATA_TYPE RRR
                              IDC GENERATED REPORT
                           REVIEWED RADIONUCLIDE REPORT
                               Particulate Version

                        Creation Date: 2022/05/13 10:04:11
                  Sample Arrival Time: 2022/05/12 22:03:35
    Time difference from receipt of raw data to report creation: 12 hours

SAMPLE INFORMATION ======================================================

Station ID:          AUP04                Detector ID:        AUP04_005
Authenticated:       YES

Station Location: Melbourne, VIC, Australia
Detector Description: Detector 05 at AUP04

Sample ID:              6710514           Sample Geometry:    50mmX4.5mm
Sample Quantity:       22045.00 m3        Sample Type:        Particulate


Collection Start:    2022/05/09 23:04    Sampling Time:        24.29 hours
Collection Stop:     2022/05/10 23:22    Decay Time:           23.98 hours
Acquisition Start:   2022/05/11 23:21    Acquisition Time:     22.69 hours
Acquisition Stop:    2022/05/12 22:02    Avg Flow Rate:       907.58 m3/hr

Collection Station Comments:
------ UTC: 2022/05/12 21:21:02 ------
Sys Log: Archiving Spc email
------ UTC: 2022/05/12 22:03:00 ------
Sys Log: Spectrum Acquisition Complete
------ UTC: 2022/05/12 22:03:00 ------
Sys Log: Archiving spectrum.spm


IDC Analysis General Comments:
IDC 2022/05/13 10:04:11





MEASUREMENT CATEGORIZATION ==============================================

Categorization Legend
---------------------
Level 1  =  Typical Background Rad. Meas.
Level 2  =  Anomalous Background Rad. Meas.
Level 3  =  Typical Anthropogenic Rad. Meas.
Level 4  =  Anomalous Anthropogenic Rad. Meas.
Level 5  =  Mult. Anomalous Anthropogenic Rad. Meas.

Spectrum Category (1) -- Typical Background Rad. Meas.



ACTIVITY SUMMARY ========================================================

NATURAL RADIOACTIVITY:

Nuclides Identified and not Quantified:

K-40, PB-206, PB-210, TH-234


Nuclides Quantified:
```

```

Nuclide             Half-Life            Conc(uBq/m3)        RelErr(%)
    Activ(uBq)          RelErr(%)

BE-7                53.290 D               1.94E+03          2.34
    4.20E+07            2.34
PB-212F             10.64 H                3.12E+05          2.01
    7.24E+08            2.01

ACTIVATION-PRODUCT RADIOACTIVITY:

Nuclide             Half-Life            Conc(uBq/m3)        RelErr(%)
    Activ(uBq)          RelErr(%)        Coincidence

None Found

FISSION-PRODUCT RADIOACTIVITY:

Nuclide             Half-Life            Conc(uBq/m3)        RelErr(%)
    Activ(uBq)          RelErr(%)        Coincidence

None Found

MINIMUM DETECTABLE CONCENTRATION FOR KEY NUCLIDES =======================

Nuclide             Half-Life               MDC(uBq/m3)         MDA(uBq)

BA-140              12.752 D                 2.36E+01             4.79E+05
CE-143              1.377 D                  2.30E+01             2.40E+05
CS-134              2.062 Y                  6.32E+00             1.39E+05
CS-136              13.160 D                 8.49E+00             1.73E+05
CS-137              30.100 Y                 5.96E+00             1.31E+05
I-131               8.040 D                  6.67E+00             1.29E+05
I-133               20.87 H                  2.63E+01             1.79E+05
MO-99               2.748 D                  6.59E+01             9.96E+05
NB-95               34.970 D                 5.22E+00             1.12E+05
RU-103              39.260 D                 5.32E+00             1.14E+05
TE-132              3.204 D                  6.17E+00             9.84E+04
ZR-95               64.020 D                 9.31E+00             2.02E+05
ZR-97               16.900 H                 3.35E+01             1.75E+05


PEAK SEARCH RESULTS =====================================================

      80 peaks found in spectrum by automated peak search.
      72 peaks associated with nuclides by automated processing.
       8 peaks not associated with nuclides by automated processing.
      90 percent of peaks were associated with nuclides.

 Note: "*" indicates that a peak was a component of a multiplet.

 Energy (keV)  Centroid  Width  FWHM (keV)  Eff (%)      Area     Bkgnd (%)  RelErr
    (%)    Nuclide    Nts

       29.80     86.60      3        0.87    23.28      1103.95       0.00
           19.65     PB-212F
       35.00    101.84      3        0.87    23.56       664.11       0.00
           32.53                 1
       39.76    115.76      3        0.88    23.79     80145.27       0.00
           0.44     PB-212F
                                                    ⋮
     2687.38   7874.52      9        3.21     1.93      3779.35       0.00
         2.06     PB-212F
     2699.35   7909.64      9        3.22     1.92       427.95       0.00
         13.58     PB-212F
      670.00   1961.64      4        1.59     5.92       584.86       0.00
          4.13     PB-212F    10

SPECTRAL-REGION-OF-INTEREST (SROI) EDITING =============================

Nuclide ID Changes:
```

```
   Average Concentration Differences: none
   Nuclides Entering:
        Name      Average Conc (uBq/m3)  RelErr (%)
        BE-7      1944.93                2.34
        K-40      17.28                  69.90
        PB-206    6.00                   57.97
        PB-210    647.88                 2.65
        PB-212F   311905.10              2.01
        TH-234    7362.83                1.17

   Nuclides Leaving: none



PEAK SEARCH NOTES =====================================================

NOTE 1:
Date Entered: 2022/05/13 10:02:35
Analyst: IDC
False peak detection; Type I error in peak processing.

====================================================================

NOTE 2:
Date Entered: 2022/05/13 10:02:20
Analyst: IDC
False peak detection; Type I error in peak processing.

====================================================================

```

⋮

```

====================================================================

NOTE 9:
Date Entered: 2022/05/13 10:03:26
Analyst: IDC
PB-212F nuclide identity provided during review

====================================================================

NOTE 10:
Date Entered: 2022/05/13 10:03:31
Analyst: IDC
This peak was inserted to correct a perceived missed-peak error in automatic
processing (based on a nominal risk level of 0.001 per cent)

Date Entered: 2022/05/13 10:03:38
Analyst: IDC
PB-212F nuclide identity provided during review

====================================================================


PROCESSING PARAMETERS ==================================================

Risk level K:                    4.26489
Baseline algorithm:              Smoothing / Lawn Mowers
Nucl Id Detectability Threshold: 0.2
Energy Id Tolerance:             0.8 + 0 * FWHM
Background subtraction:          YES
Background spectrum ID:          6577190
Background data type:            blank
Background acquisition start:    2022/02/07 22:38
Background acquisition time:     72 hours
IRF for Pb-212F:                 YES

CALIBRATION PARAMETERS =================================================

SAreaThreshold:             100
Confidence level:           95
```

```
ECR updated:                YES
RER updated:                YES
Used ECR:                   CMD
Used RER:                   CMD

DATA TIMELINESS AND AVAILABILITY FLAGS =================================

Previous Sample Present?                               YES
Collection time within 24 hours +/- 10%?               YES
Acquisition time >= 20 hours?                          YES
Decay time <= 24 hours?                                YES
Sample received within 72 hours of collect start?      YES

DATA QUALITY FLAGS =====================================================

Name                           Pass/Fail  Value           Test

Ba140_MDC                      PASS       23.5646         <30
K40_LocationDifference         PASS       0.194824        <3*std deviation
Be7_FWHM                       PASS       1.39927         <1.7
FlowRate                       PASS       907.575         >500

EVENT SCREENING FLAGS ==================================================

     Activation Products present in this spectrum                 No

     Only one fission product in spectrum                         No

     2 or more fission products in spectrum                       No

     Cs-137 present in spectrum                                   No



CALIBRATION EQUATIONS ==================================================

Energy vs. Channel

        E(c) = 0.2271 + 0.3415*c - 3.222E-08*c^2

                E = energy (keV)
                c = channel number


Resolution vs. Energy

        FWHM(E) = SQRT(0.67+0.002494*E+4.089e-07*E^2)

                FWHM = Full Width Half Max (keV)
                E = energy (keV)


Efficiency vs. Energy

        VGSL pairs
                 Energy     Efficiency    Uncertainty
                     40          0.238        0.00297
                     50          0.242         0.0043
                     60          0.243        0.00528
```

⋮

```
                   2300         0.0221       0.000384
                   2380         0.0217       0.000379
                   2450         0.0211       0.000373

 FIELD OF REGARD ======================================================

https://swp.ctbto.org/FOR/AUP04/2022/05/11
STOP
```

I.35 SAMPLEPHD—Noble gas version

I.35.1 SAMPLEPHD—β-γ coincidence data version

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68558648 CTBT_IDC
REF_ID 714212835
DATA_TYPE SPHDF
#Header 3
AUX04 AUX04_003 B GEOMETRY          FULL
04202111302311X
AUX04_003-2021/12/01-18:43      AUX04_003-2015/09/17-01:24
    AUX04_003-2021/12/01-06:43
2021/12/02 05:53:20.1
#Comment
Using Pixie electronics v. 2.43.
Produced by SAUNA_PHDAQ with program version 1.0.12.3.
GC:LL333:2960
Coincidence spectrum set to zero counts where gamma or beta channel is zero.

 The upgraded SAUNA II System AUX04 in Melbourne, Australia


#Collection
2021/11/30 23:32:21.6 2021/12/01 11:32:18.2 14.920163
#Acquisition
2021/12/01 18:43:18.0 40201.886000   40190.260000
#Processing
0.99102  0.09910
0.85303  0.12064
01
#Calibration
2014/09/17 16:46:00.0
#g_Energy
32.860000        12.717500        0.050000
661.657000       228.899000       0.050000
121.782000       45.593100        0.050000
344.279000       124.528000       0.050000
59.541000        22.661500        0.050000
#b_Energy
81.606000        C 27.775600        0.050000
97.124000        C 33.752700        0.050000
```

⋮

```
379.449000       C 131.962000       0.050000
393.705000       C 136.392000       0.050000
#g_Resolution
32.860000        7.043420         0.314187
661.657000       53.292500        0.374654
121.782000       12.913400        0.321525
344.279000       28.483000        0.341482
59.541000        8.785120         0.316353
#b_Resolution
81.606000        27.905200        0.303536
97.124000        30.495000        0.306615
```

⋮

```
379.449000       60.111900        0.375997
393.705000       60.504800        0.380343
#g_Efficiency
31.630000        0.638800         0.004400
80.980000        0.743100         0.009100
123.000000       0.767000         0.050000
165.000000       0.723000         0.050000
208.000000       0.679000         0.050000
249.800000       0.649000         0.004400
#ROI_Limits
1  13.91920   581.53500  319.58000  386.58800
2  13.91920   869.35100  211.51700  279.39500
3  13.91920   357.36600  65.84220   98.33980
```

```
4  13.91920   395.67500  20.26630   41.64720
5  87.36280   150.90400  20.26630   41.64720
6  178.20200  266.30200  20.26630   41.64720
7  13.91920   79.60350   20.26630   41.64720
8  275.13200  395.67500  20.26630   41.64720
9  178.20200  395.67500  20.26630   41.64720
10 13.91920   150.90400  20.26630   41.64720
#b-gEfficiency
XE-135     2        0.609100   0.006600
XE-133     3        0.737800   0.012900
XE-133     4        0.706900   0.007800
XE-131m    5        0.638600   0.006700
XE-133m    6        0.645800   0.006800
XE-1337    7        0.211000   0.003300
XE-1338    8        0.037500   0.001000
XE-1339    9        0.191100   0.003000
XE-13310   10       0.451900   0.006300
#Ratios
PB214_352:242   1  2  0.568960   0.0051
PB214_352:80    1  3  0.392630   0.0039
PB214_352:30_4  1  4  0.072210   0.0015
PB214_352:30_5  1  5  0.009510   0.0005
PB214_352:30_6  1  6  0.017700   0.0007
PB214_352:30_7  1  7  0.009180   0.0005
PB214_352:30_8  1  8  0.027260   0.0009
PB214_352:30_9  1  9  0.047230   0.0012
PB214_352:30_10 1  10 0.020030   0.0008
XE133-1_81:30   3  4  0.045100   0.0451
XE133-2_81:30   3  5  0.379610   0.0001
XE133-3_81:30   3  6  0.269800   0.0001
XE133-7_81:30   3  7  0.033030   0.0330
XE133-8_81:30   3  8  0.000640   0.0006
XE133-9_81:30   3  9  0.004450   0.0045
XE133-10_81:30  3  10 0.039220   0.0392
#g_Spectrum
256   749
0     3          1024       7515       5938       4291
5     3694       3399       2547       2092       2037
⋮
250   523        522        498        525        510
255   468
#b_Spectrum
256   875
0     1          3          32         64         55
5     62         63         50         54         54
⋮
250   22         20         33         25         27
255   25
#Histogram
256   256   749  875
⋮
STOP
```

I.35.2 SAMPLEPHD—HPGe data version

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 73027467 CTBT_IDC
REF_ID 714212835
DATA_TYPE SPHDF
#Header 3
CAX16 CAX16_002 G CELLULE_GAZ        FULL
16202205231311G
CAX16_002-2022/05/24-15:05:18.0 0
2022/05/25 13:30:26.0
#Comment
Yellowknife
#Collection
2022/05/23 13:42:13.0 2022/05/24 13:42:13.0 65.541
#Acquisition
2022/05/24 15:05:18.0 80463.30       80387.67
#Processing
5.70207  0.17106
0        0
2
#g_Spectrum
16384 2000
0     0         0         0         0         0
5     0         0         0         0         0
10    0         0         0         0         0
⋮
605   19        27        15        18        30
610   39        51        64        64        66
615   66        66        46        33        20
620   14        18        17        14        15
625   15        26        36        32        42
⋮
16370 0         0         1         1         1
16375 1         0         1         0         1
16380 0         0         0         0         0
#g_Energy
22.076          182.880         0.00747
33.236          274.746         0.05289
46.539          382.780         0.01231
⋮
391.688         3209.502        0.01722
513.990         4211.776        0.03680
661.657         5421.527        0.03184
#g_Resolution
22.076          0.627           0.00181
33.236          0.735           0.01348
46.539          0.631           0.00294
⋮
391.688         1.046           0.00396
513.990         1.135           0.00860
661.657         1.317           0.00752
#g_Efficiency
22.076          0.18396         0.00868
33.236          0.19422         0.01040
46.539          0.23701         0.00973
⋮
391.688         0.06302         0.00248
513.990         0.04451         0.00157
661.657         0.03553         0.00145
STOP
```

I.36 SAMPLEPHD—Particulate systems

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68558763 CTBT_IDC
REF_ID 714212835
DATA_TYPE SPHDF
#Header 3
AUP09 AUP09_007 P 50mmX4.5mmDisk    FULL
09202111300611
AUP09_007-2021/12/02-06:37:11.0 AUP09_007-2021/06/28-01:06:00.0 0
2021/12/03 05:07:00
#Comment
------ UTC: 2021/12/03 04:37:02 ------
Sys Log: Archiving Spc email
------ UTC: 2021/12/03 05:07:00 ------
Sys Log: Spectrum Acquisition Complete
------ UTC: 2021/12/03 05:07:00 ------
Sys Log: Archiving spectrum.spm
#Collection
2021/11/30 06:05:34   2021/12/01 06:13:26   20707
#Sample
5.00  0.50
#Acquisition
2021/12/02 06:37:11   80954          80676
#Calibration
2019/10/04 05:38:09
#g_Energy
59.541000        173.420000       0
88.034000        256.770000       0
122.061000       356.290000       0
⋮
1332.492000      3899.160000      0
1836.052000      5373.300000      0
2505.740000      7333.660000      0
#g_Resolution
59.541000        0.897000         0
88.034000        0.895000         0
122.061000       0.945000         0
⋮
1332.492000      2.186000         0
1836.052000      2.576000         0
2505.740000      3.000000         0
#g_Efficiency
59.541000        0.005500         0.000140
88.034000        0.059700         0.001220
122.061000       0.115200         0.002030
⋮
1173.228000      0.039900         0.000730
1332.492000      0.035500         0.000650
1836.052000      0.029400         0.000530
#g_Spectrum
8192  2800
1     0          0          0          0          0
6     0          0          0          0          0
11    0          0          0          0          0
⋮
8181  43         43         25         29         45
8186  29         32         39         38         37
8191  15         0
STOP
```

I.37 SSREB—Noble gas systems

The SSREB for noble gas have the same format for β-γ coincidence and HPGe systems

I.37.1 Plain text format

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 73003633 CTBT_IDC
REF_ID 24163264
TIME_STAMP 2022/06/02 13:14:52
IDC Generated Report
STANDARD SCREENED RADIONUCLIDE EVENT BULLETIN

Creation Date: 2022-05-27 09:08:24
Time Difference Between Receipt of Raw Data and Creation Date:  8 h 14 m 17.0 s

Fission Product ID: 12539       Authenticated: YES

EVENT DETECTION SUMMARY
--------------------------------------------------------------------------------

Sample Information
--------------------------------------------------------------------------------

Station ID:              AUX04
Detector Code:           AUX04_005
Sample ID:               6731183
Sample Reference ID:     04202205251811X
Collection Stop:         2022-05-26 06:31:48

Measurement Categorization
--------------------------------------------------------------------------------

Isotope category

Isotope Nuclide detected        Abnormal threshold (mBq/m3)     Categorization comment
Xe-131m NO      1.58E-01        Below detection threshold
Xe-133m NO      1.36E-01        Below detection threshold
Xe-133  YES     5.12E-01        Abnormal xenon concentration
Xe-135  NO      8.84E-01        Below detection threshold

Sample Category: C - Abnormal xenon concentration
```

```

Event Screening Flags
--------------------------------------------------------------------------------

Name                                              YES/NO/Value
Number of days since last xenon detection         0
2 or more xenon isotopes present in this sample   NO
Xe-133 present in this sample                     YES
Number of times Xe-133 seen in last 365 days      108
Short term flag                                   c - Abnormal xenon concentration

Isotopic Ratio  Value   YES/NO  Test
Xe-133m/131m    0.84    NO      Xe-133m/131m > 2
Xe-135/133      1.16    NO      Xe-135/133 > 5
Xe-133m/133     0.31    NO      Xe-133m/133 > 0.3
Xe-133/131m     2.67    NO      Xe-133/131m > 1000

ENHANCED FIELD OF REGARD
--------------------------------------------------------------------------------

CERTIFIED LABORATORY RESULTS
--------------------------------------------------------------------------------

ADDITIONAL INFORMATION
--------------------------------------------------------------------------------
TIME_STAMP 2022/06/02 13:14:52
STOP
```

I.37.2 HTML format

IDC Generated Report
STANDARD SCREENED RADIONUCLIDE EVENT BULLETIN

Creation Date: 2022-05-27 09:08:23
Time Difference Between Receipt of Raw Data and Creation Date: 8 h 14 m 16.0 s

Fission Product ID: 12538 Authenticated: YES

EVENT DETECTION SUMMARY

Sample Information

Station ID:	AUX04
Detector Code:	AUX04_005
Sample ID:	6731183
Sample Reference ID:	04202205251811X
Collection Stop:	2022-05-26 06:31:48

Measurement Categorization

Isotope category

Isotope	**Nuclide detected**	**Abnormal threshold** *(mBq/m3)*	**Categorization comment**
Xe-131m	NO	1.58E-01	Below detection threshold
Xe-133m	NO	1.36E-01	Below detection threshold
Xe-133	YES	5.12E-01	Abnormal xenon concentration
Xe-135	NO	8.84E-01	Below detection threshold

Sample Category: C - Abnormal xenon concentration

Event Screening Flags

Name	**YES/NO/Value**
Number of days since last xenon detection	0
2 or more xenon isotopes present in this sample	NO
Xe-133 present in this sample	YES
Number of times Xe-133 seen in last 365 days	108
Short term flag	c - Abnormal xenon concentration

Isotopic Ratio	**Value**	**YES/NO**	**Test**
Xe-133m/131m	0.84	NO	Xe-133m/131m > 2
Xe-135/133	1.16	NO	Xe-135/133 > 5
Xe-133m/133	0.31	NO	Xe-133m/133 > 0.3
Xe-133/131m	2.67	NO	Xe-133/131m > 1000

ENHANCED FIELD OF REGARD

CERTIFIED LABORATORY RESULTS

ADDITIONAL INFORMATION

I.38 SSREB—Particulate version

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 72650394 CTBT_IDC
REF_ID 714212835
DATA_TYPE SSREB
                              IDC GENERATED REPORT
                 STANDARD SCREENED RADIONUCLIDE EVENT BULLETIN

                      Creation Date: 2022/03/01 14:19:36

     Time Difference Between Receipt of Raw Data and Creation Date: 9 hours


               Fission Product ID: 12340     Authenticated: YES



EVENT DETECTION SUMMARY =========================================================

     Station    Collect Stop         Sample ID  Name       Categorization Comment
     -------    ------------         ---------  ----       ----------------------
     AUP09      2022/02/27 06:11:23  6604185    CO-60      Not Regularly Measured


     Activation Products present in this spectrum                 Yes
          Number of days since last activation product            18

     Only one fission product in spectrum                         No

     2 or more fission products in spectrum                       No

     Cs-137 present in spectrum                                   No


ENHANCED FIELD OF REGARD ========================================================

    https://swp.ctbto.org/FOR/AUP09/2022/02/27

CERTIFIED LABORATORY RESULTS ====================================================

ADDITIONAL INFORMATION ==========================================================

STOP
```

I.39 STATION

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68531352 CTBT_IDC
REF_ID 111111
DATA_TYPE STATION IMS2.0
Net       Sta   Type  Latitude  Longitude Coord Sys     Elev   On Date   Off Date
          AAK          42.63910   74.49420              1.645 2007/03/06
          ABKT         37.93040   58.11890              0.678 1993/04/25
          AFI         -13.90930 -171.77730              0.706 2004/11/29
          BR101        39.72540   33.63910              1.438 2000/01/07 2004/03/22
```

⋮

```
          BR131        39.72500   33.63900              1.440 2003/02/10 2017/02/13
          BR131        39.72500   33.63900              1.440 2017/02/14
          BRTR         39.72500   33.63900              1.440 2003/02/10
STOP
```

I.40 STA_STATUS

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68531118 CTBT_IDC
REF_ID 666666
DATA_TYPE STA_STATUS IMS2.0
Report period from 2021/12/01 00:00:00.0 to 2021/12/02 00:00:00.0
Station Status
Sta   Max_Exp_Time   ______________ Minimum Channels _______________ ____________ Geophysical Channels _____________
                          Data         Timely Data        Mission          Data             Data             Data
                      Availability    Availability    Capability (%)   Received (%)     Availability     Availability
                          (%)             (%)                                          Unauthenticated        (%)
                                                                                             (%)
MJAR  0001 00:00:00      95.988          95.899          38.576           84.707           84.707           84.695
MKAR  0001 00:00:00     100.000         100.000         100.000          100.000          100.000           91.667
ZALV  0001 00:00:00      99.273          99.273          92.211           99.995           99.995           91.000
MAW   0001 00:00:00       0.000           0.000           0.000          100.000           99.999            0.000
H01W  0001 00:00:00     100.000         100.000         100.000          100.000          100.000          100.000
```

⋮

```
MDT   0000 00:16:21       0.000           0.000           0.000          100.000          100.000            0.000
MLR   0000 01:18:49      99.741          99.741          99.233          100.000           99.741           99.741
MMAI  0000 20:43:02      99.998          99.998          99.972           99.996           99.996           99.991
MSKU  0000 00:00:00       0.000           0.000           0.000            0.000            0.000            0.000
MSVF  0000 08:58:20     100.000         100.000         100.000          100.000          100.000          100.000

STOP
```

I.41 WAVEFORM (IMS2.0:cm6 format)

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68607321 CTBT_IDC
REF_ID 123454321
DATA_TYPE WAVEFORM IMS2.0:CM6
WID2 2021/12/01 12:00:00.000 FIA0  SHZ      CM6    48000   40.000000   2.58e-03
    0.333 S-13    -1.0  0.0
STA2 FINES      61.44363   26.07713 WGS-84       0.150 0.000
DAT2
YYNob+m-Z2UE2WNlGWArBQXToLePl0uJkGYTXRu1n5aCbCpRpNZKrQaHY7r0UEW+V2VCaDw-0XDmJcBq
BYAYJlIkMqJZ3lKoScIoPlGYHo6aGt2XEf0uKWNu-W+UlSq2m0lQkTaRkEl2VMn0lHWHUFLaBpRp3V1o
AaLoMnIbTURuCVHg3p0qNlMb0l-VGV7o5V-l1a3pQV1lAWAb9xEWKW3SW5m1kFkFb9l0t-VNWNrJUMbP
o9l+IUGeHy8qSjRlEICn0X8W3pIW9Y4m0V7m4WGlNmSYBm8mNW1W0p74XCn1WNp+XFXQvPUl0V5y5dPq
Ia3YEw4c-q9lHZ0rReQWJy8bJWKs1bSo1ZMYBz2bLb7oBlDX9q40VCoId1lMr-kMWSMVIm3VEZQu-LlG
⋮
p6ULVQW1l5oEXAIV5VLlFX7n-m3VSo+kSZ9W6p+YKVGoAZ9oDoDkLnCY3YPnPV3bDlGs9AZSUEVCq8a+
lLq+i1u+VCZ6pQZMlFl0kSVSVGmFm7V9V1l+V0DmNm6WImDW8l8UPZRy+Sd0W+WHmIlQV4lQm+b4m+V0
lDr7Z0mJZ5mFl6XCrCaHr5kSUFo0dPnTXMkSpLY7UJV5o11X9XKG4l8kHW3rPX2Z0W6m0oBW8TV10Y-p
TKd3nPnIm4V6m-b0nHv+c5WMV1r5VMYD0V0pFb3rEVFe-tPX2lA1lFlNZ3qSbEkHkKX-oNbSr9nSX1d7
nQuKh1r8W7VCvTXQUNl4l-X3kJVRnElKbLq9lI3XJZLuClNg7n4oAW9FW1m9VSmE-MnLW9
CHK2 45455954
STOP
```

I.42 WAVEFORM (IMS2.0:int format)

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 68607455 CTBT_IDC
REF_ID 123454321
DATA_TYPE WAVEFORM IMS2.0:INT
WID2 2021/12/01 12:00:00.000 FIA0  SHZ      INT    48000   40.000000   2.58e-03
    0.333 S-13    -1.0  0.0
STA2 FINES      61.44363   26.07713 WGS-84       0.150 0.000
DAT2
4249 4178 4042 4070 4114 4162 4299 4386 4549 4475 4389 4430 4320 4557 4760
4622 4466 4469 4597 4402 4104 4012 4158 4115 3887 3841 3543 3456 3506 3306
3122 3002 2918 2880 3049 2833 2607 2492 2292 2361 2225 2229 2382 2483 2560
2424 2453 2428 2245 2338 2276 2164 2199 2098 2207 2024 1953 2260 2225 2279
2012 1809 2180 2355 2440 2465 2459 2674 2873 3036 3255 3376 3446 3599 3769
⋮
-873 -871 -781 -656 -762 -812 -719 -636 -519 -579 -410 -481 -503 -204 -220
-136 -96 -53 -59 -122 -20 -140 -20 81 160 336 359 636 678 594 609 921 1109
955 1220 1251 1355 1505 1272 1163 1079 957 802 748 673 659 533 353 420 284
96 -87 -153 -36 -253 -527 -408 -391 -514 -562 -611 -593 -650 -645 -720 -794
-876 -1077 -1203
CHK2 45455954
STOP
```

Appendix II

Codes

This appendix contains codes used in *VDMS* messages and includes the following topics:

II.1 Country codes 361

II.2 Radionuclide station codes 367

II.3 S/H/I station codes 373

II.4 Seismometer instrument codes 382

II.1 Country codes

Table 173. Country codes according to ISO 3166 (1997)

Country	2-letter code	3-letter code
Afghanistan	AF	AFG
Albania	AL	ALB
Algeria	DZ	DZA
Andorra	AD	AND
Angola	AO	AGO
Antigua and Barbuda	AG	ATG
Argentina	AR	ARG
Armenia	AM	ARM
Australia	AU	AUS
Austria	AT	AUT
Azerbaijan	AZ	AZE

Continues on next page

Table 173 (cont.)

Country	**2-letter code**	**3-letter code**
Bahamas	BS	BHS
Bahrain	BH	BHR
Bangladesh	BD	BGD
Barbados	BB	BRB
Belarus	BY	BLR
Belgium	BE	BEL
Belize	BZ	BLZ
Benin	BJ	BEN
Bhutan	BT	BTN
Bolivia, Plurinational State of	BO	BOL
Bosnia and Herzegovina	BA	BIH
Botswana	BW	BWA
Brazil	BR	BRA
Brunei Darussalam	BN	BRN
Bulgaria	BG	BGR
Burkina Faso	BF	BFA
Burundi	BI	BDI
Cabo Verde	CV	CVP
Cambodia	KH	KHM
Cameroon	CM	CMR
Canada	CA	CAN
Central African Republic	CF	CAF
Chad	TD	TCD
Chile	CL	CHL
China	CN	CHN
Colombia	CO	COL
Comoros	KM	COM
Congo	CG	COG
Cook Islands	CK	COK
Costa Rica	CR	CRI
Côte d’Ivoire	CI	CIV
Croatia	HR	HRV
Cuba	CU	CUB
Cyprus	CY	CYP
Czechia	CZ	CZE
Democratic People’s Republic of Korea	KP	PRK
Democratic Republic of the Congo	CD	COD
Denmark	DK	DNK

Continues on next page

Table 173 (*cont.*)

Country	**2-letter code**	**3-letter code**
Djibouti	DJ	DJI
Dominica	DM	DMA
Dominican Republic	DO	DOM
Ecuador	EC	ECU
Egypt	EG	EGY
El Salvador	SV	SLV
Equatorial Guinea	GQ	GNQ
Eritrea	ER	ERI
Estonia	EE	EST
Eswatini	SZ	SWZ
Ethiopia	ET	ETH
Fiji	FJ	FJI
Finland	FI	FIN
France	FR	FRA
Gabon	GA	GAB
Gambia	GM	GMB
Georgia	GE	GEO
Germany	DE	DEU
Ghana	GH	GHA
Greece	GR	GRC
Grenada	GD	GRD
Guatemala	GT	GTM
Guinea	GN	GIN
Guinea-Bissau	GW	GNB
Guyana	GY	GUY
Haiti	HT	HTI
Holy See	VA	VAT
Honduras	HN	HND
Hungary	HU	HUN
Iceland	IS	ISL
India	IN	IND
Indonesia	ID	IDN
Iran, Islamic Republic of	IR	IRN
Iraq	IQ	IRQ
Ireland	IE	IRL
Israel	IL	ISR
Italy	IT	ITA
Jamaica	JM	JAM

Continues on next page

Table 173 (*cont.*)

Country	2-letter code	3-letter code
Japan	JP	JPN
Jordan	JO	JOR
Kazakhstan	KZ	KAZ
Kenya	KE	KEN
Kiribati	KI	KIR
Kuwait	KW	KWT
Kyrgyzstan	KG	KGZ
Lao People’s Democratic Republic	LA	LAO
Latvia	LV	LVA
Lebanon	LB	LBN
Lesotho	LS	LSO
Liberia	LR	LBR
Libya	LY	LBY
Liechtenstein	LI	LIE
Lithuania	LT	LTU
Luxembourg	LU	LUX
Madagascar	MG	MDG
Malawi	MW	MWI
Malaysia	MY	MYS
Maldives	MV	MDV
Mali	ML	MLI
Malta	MT	MLT
Marshall Islands	MH	MHL
Mauritania	MR	MRT
Mauritius	MU	MUS
Mexico	MX	MEX
Micronesia, Federated States of	FM	FSM
Monaco	MC	MCO
Mongolia	MN	MNG
Montenegro	ME	MNE
Morocco	MA	MAR
Mozambique	MZ	MOZ
Myanmar	MM	MMR
Namibia	NA	NAM
Nauru	NR	NRU
Nepal	NP	NPL
Netherlands, Kingdom of the	NL	NLD
New Zealand	NZ	NZL

Continues on next page

Table 173 (cont.)

Country	2-letter code	3-letter code
Nicaragua	NI	NIC
Niger	NE	NER
Nigeria	NG	NGA
Niue	NU	NIU
North Macedonia	MK	MKD
Norway	NO	NOR
Oman	OM	OMN
Pakistan	PK	PAK
Palau	PW	PLW
Panama	PA	PAN
Papua New Guinea	PG	PNG
Paraguay	PY	PRY
Peru	PE	PER
Philippines	PH	PHL
Poland	PL	POL
Portugal	PT	PRT
Qatar	QA	QAT
Republic of Korea	KR	KOR
Republic of Moldova	MD	MDA
Romania	RO	ROU
Russian Federation	RU	RUS
Rwanda	RW	RWA
Saint Kitts and Nevis	KN	KNA
Saint Lucia	LC	LCA
Saint Vincent and the Grenadines	VC	VCT
Samoa	WS	WSM
San Marino	SM	SMR
Sao Tome and Principe	ST	STP
Saudi Arabia	SA	SAU
Senegal	SN	SEN
Serbia	RS	SRB
Seychelles	SC	SYC
Sierra Leone	SL	SLE
Singapore	SG	SGP
Slovakia	SK	SVK
Slovenia	SI	SVN
Solomon Islands	SB	SLB
Somalia	SO	SOM

Continues on next page

Table 173 (cont.)

Country	**2-letter code**	**3-letter code**
South Africa	ZA	ZAF
Spain	ES	ESP
Sri Lanka	LK	LKA
Sudan	SD	SDN
Suriname	SR	SUR
Sweden	SE	SWE
Switzerland	CH	CHE
Syrian Arab Republic	SY	SYR
Tajikistan	TJ	TJK
Thailand	TH	THA
Timor-Leste	TL	TLS
Togo	TG	TGO
Tonga	TO	TON
Trinidad and Tobago	TT	TTO
Tunisia	TN	TUN
Türkiye	TR	TUR
Turkmenistan	TM	TKM
Tuvalu	TV	TUV
Uganda	UG	UGA
Ukraine	UA	UKR
United Arab Emirates	AE	ARE
United Kingdom of Great Britain and Northern Ireland	GB	GBR
United Republic of Tanzania	TZ	TZA
United States of America	US	USA
Uruguay	UY	URY
Uzbekistan	UZ	UZB
Vanuatu	VU	VUT
Venezuela, Bolivarian Republic of	VE	VEN
Viet Nam	VN	VNM
Yemen	YE	YEM
Zambia	ZM	ZMB
Zimbabwe	ZW	ZWE

II.2 Radionuclide station codes

Table 174, Table 175 and Table 176 provide the station codes for all particulate stations, certified labs and tentative noble gas stations, respectively.

Table 174. Radionuclide particulate station codes

Station code	Treaty number	Country	Location
ARP01	RN01	Argentina	Buenos Aires
ARP02	RN02	Argentina	Salta
ARP03	RN03	Argentina	Bariloche
AUP04	RN04	Australia	Melbourne, VIC
AUP05	RN05	Australia	Mawson, Antarctica
AUP06	RN06	Australia	Townsville, QLD
AUP07	RN07	Australia	Macquarie Island
AUP08	RN08	Australia	Cocos Islands
AUP09	RN09	Australia	Darwin, NT
AUP10	RN10	Australia	Perth, WA
BRP11	RN11	Brazil	Rio de Janeiro
BRP12	RN12	Brazil	Recife
CMP13	RN13	Cameroon	Douala
CAP14	RN14	Canada	Vancouver, BC
CAP15	RN15	Canada	Resolute, NWT
CAP16	RN16	Canada	Yellowknife, NT
CAP17	RN17	Canada	St. John’s, NL
CLP18	RN18	Chile	Punta Arenas
CLP19	RN19	Chile	Hanga Roa, Easter Island
CNP20	RN20	China	Beijing
CNP21	RN21	China	Lanzhou
CNP22	RN22	China	Guangzhou
CKP23	RN23	Cook Islands	Rarotonga
ECP24	RN24	Ecuador	Isla San Cristóbal, Galápagos Islands
ETP25	RN25	Ethiopia	Filtu
FJP26	RN26	Fiji	Nadi
FRP27	RN27	France	Papeete, Tahiti
FRP28	RN28	France	Pointe-á-Pitre, Guadeloupe
FRP29	RN29	France	Reunion
FRP30	RN30	France	Port-aux-Français, Kerguelen
FRP31	RN31	France	Cayanne, French Guiana
FRP32	RN32	France	Dumont d’Urville, Antarctica

Continues on next page

Table 174 (cont.)

Station code	Treaty number	Country	Location
DEP33	RN33	Germany	Schauinsland/Freiburg
ISP34	RN34	Iceland	Reykjavik
IRP36	RN36	Iran, Islamic Republic of	Tehran
JPP37	RN37	Japan	Okinawa
JPP38	RN38	Japan	Takasaki, Gunma
KIP39	RN39	Kiribati	Kiritimati
KWP40	RN40	Kuwait	Kuwait City
LYP41	RN41	Libya	Misratah
MYP42	RN42	Malaysia	Kuala Lumpur
MRP43	RN43	Mauritania	Nouakchott
MXP44	RN44	Mexico	Baja California
MNP45	RN45	Mongolia	Ulaanbaatar
NZP46	RN46	New Zealand	Chatham Island
NZP47	RN47	New Zealand	Kaitaia
NEP48	RN48	Niger	Bilma
NOP49	RN49	Norway	Spitsbergen
PAP50	RN40	Panama	Panama City
PGP51	RN51	Papua New Guinea	New Hanover
PHP52	RN52	Philippines	Quezon City
PTP53	RN53	Portugal	Ponta Delgada, São Miguel, Azores
RUP54	RN54	Russian Federation	Kirov
RUP55	RN55	Russian Federation	Norilsk
RUP56	RN56	Russian Federation	Peleduy
RUP57	RN57	Russian Federation	Bilibino
RUP58	RN58	Russian Federation	Ussuriysk
RUP59	RN59	Russian Federation	Zalesovo
RUP60	RN60	Russian Federation	Petropavlovsk-Kamchatskiy
RUP61	RN61	Russian Federation	Dubna
ZAP62	RN62	South Africa	Marion Island
SEP63	RN63	Sweden	Stockholm
TZP64	RN64	Tanzania, United Republic of	Dar es Salaam
THP65	RN65	Thailand	Bangkok
GBP66	RN66	United Kingdom of Great Britain and Northern Ireland	BIOT/Chagos Archipelago
GBP67	RN67	United Kingdom of Great Britain and Northern Ireland	St. Helena
GBP68	RN68	United Kingdom of Great Britain and Northern Ireland	Tristan de Cunha

Continues on next page

Table 174 (cont.)

Station code	**Treaty number**	**Country**	**Location**
GBP69	RN69	United Kingdom of Great Britain and Northern Ireland	Halley, Antarctica
USP70	RN70	United States of America	Sacramento, California
USP71	RN71	United States of America	Sand Point, Alaska
USP72	RN72	United States of America	Melbourne, Florida
USP73	RN73	United States of America	Palmer Station, Antarctica
USP74	RN74	United States of America	Ashland, Kansas
USP75	RN75	United States of America	Charlottesville, Virginia
USP76	RN76	United States of America	Salchacket, Alaska
USP77	RN77	United States of America	Wake Island
USP78	RN78	United States of America	Midway Islands
USP79	RN79	United States of America	Oahu, Hawaii
USP80	RN80	United States of America	Upi, Guam

Table 175. Radionuclide certified laboratory codes

Laboratory code	Treaty number	Country or state responsible for laboratory	Name and location of laboratory
ARL01	RL01	Argentina	National Board of Nuclear Regulation, Buenos Aires
AUL02	RL02	Australia	Australian Radiation Laboratory, Melbourne, VIC
ATL03	RL03	Austria	Austrian Research Centre, Seibersdorf
BRL04	RL04	Brazil	Institute of Radiation Protection and Dosimetry, Rio de Janeiro
CAL05	RL05	Canada	Health Canada, Ottawa, Ontario
CNL06	RL06	China	Beijing
FIL07	RL07	Finland	Centre for Radiation and Nuclear Safety, Helsinki
FRL08	RL08	France	Atomic Energy Commission, Montlhéry
ILL09	RL09	Israel	Soreq Nuclear Research Centre, Yavne
ITL10	RL10	Italy	Laboratory of the National Agency for the Protection of the Environment, Rome
JPP11	RL11	Japan	Japan Atomic Energy Research Institute, Tokai, Ibaraki
NZL12	RL12	New Zealand	National Radiation Laboratory, Christchurch
RUL13	RL13	Russian Federation	Central Radiation Control Laboratory, Ministry of Defence Special Verification Service, Moscow
ZAL14	RL14	South Africa	Atomic Energy Corporation, Pelindaba
GBL15	RL15	United Kingdom of Great Britain and Northern Ireland	AWE Blacknest, Chilton
USL16	RL16	United States of America	McClellan Central Laboratories, Sacramento, California

Table 176. Radionuclide noble gas station codes

Station code	Treaty number	Country	Location
ARX01	RN01	Argentina	Buenos Aires
AUX04	RN04	Australia	Melbourne, VIC
AUX09	RN09	Australia	Darwin, NT
BRX11	RN11	Brazil	Rio de Janeiro
CMX13	RN13	Cameroon	Douala
CAX16	RN16	Canada	Yellowknife, NT
CAX17	RN17	Canada	St. John's, NL
CLX19	RN19	Chile	Hanga Roa, Easter Island
CNX20	RN20	China	Beijing
CNX22	RN22	China	Guangzhou
ETX25	RN25	Ethiopia	Filtu
FRX27	RN27	France	Papeete, Tahiti
FRX29	RN29	France	Réunion
FRX30	RN30	France	Port-aux-Français, Kerguelen
FRX31	RN31	France	Kourou, French Guiana
DEX33	RN33	Germany	Freiburg
IRX36	RN36	Iran, Islamic Republic of	Tehran
JPX38	RN38	Japan	Takasaki, Gunma
MRX43	RN43	Mauritania	Nouakchott
MXX44	RN44	Mexico	Guerrero Negro, Baja California
MNX45	RN45	Mongolia	Ulaanbaatar
NZX46	RN46	New Zealand	Chatham Island
NEX48	RN48	Niger	Bilma
NOX49	RN49	Norway	Spitsbergen
PAX50	RN50	Panama	Panama City
RUX55	RN55	Russian Federation	Norilsk
RUX58	RN58	Russian Federation	Ussuriysk
RUX60	RN60	Russian Federation	Petropavlovsk-Kamchatskiy
RUX61	RN61	Russian Federation	Dubna
ZAX62	RN62	South Africa	Marion Island
SEX63	RN63	Sweden	Stockholm
THX65	RN65	Thailand	Bangkok
GBX66	RN66	United Kingdom of Great Britain and Northern Ireland	BIOT/Chagos Archipelago
GBX68	RN68	United Kingdom of Great Britain and Northern Ireland	Tristan de Cuhna

Continues on next page

Table 176 (cont.)

Station code	**Treaty number**	**Country**	**Location**
GBX69	RN69	United Kingdom of Great Britain and Northern Ireland	Halley, Antarctica
USX74	RN74	United States of America	Ashland, Kansas
USX75	RN75	United States of America	Charlottesville, Virginia
USX77	RN77	United States of America	Wake Island
USX79	RN79	United States of America	Oahu, Hawaii

II.3 S/H/I station codes

Table 177, Table 178, Table 179 and Table 180 provide the station codes for all primary seismic, auxiliary seismic, hydroacoustic and infrasonic stations, respectively.

Table 177. Primary seismic station codes

Station code	Treaty number	Country	Location
PLCA	PS01	Argentina	Paso Flores
WRA	PS02	Australia	Warramunga, NT
ASAR	PS03	Australia	Alice Springs, NT
STKA	PS04	Australia	Stephens Creek, NSW
MAW	PS05	Australia	Mawson, Antarctica
LPAZ	PS06	Bolivia, Plurinational State of	La Paz
BDFB	PS07	Brazil	Brasilia
ULM	PS08	Canada	Lac du Bonnet, MB
YKA	PS09	Canada	Yellowknife, NWT
SCHQ	PS10	Canada	Schefferville, Quebec
BGCA	PS11	Central African Republic	Bangui
HILR	PS12	China	Hailar
HIA	PS12	China	Hailar
LZDM	PS13	China	Lanzhou
ROSC	PS14	Colombia	El Rosal
DBIC	PS15	Côte d'Ivoire	Dimbokro
LUXOR	PS16	Egypt	Luxor
FINES	PS17	Finland	Lahti
PPT	PS18	France	Tahiti
GERES	PS19	Germany	Freyung
THR	PS21	Iran, Islamic Republic of	Tehran
MJAR	PS22	Japan	Matsushiro
MKAR	PS23	Kazakhstan	Makanchi
KMBO	PS24	Kenya	Kilimambogo
SONM	PS25	Mongolia	Songino
TORD	PS26	Niger	Torodi
NOA	PS27	Norway	Hamar
ARCES	PS28	Norway	Karasjok
PRPK	PS29	Pakistan	Pari
CPUP	PS30	Paraguay	Villa Florida
KSRS	PS31	Republic of Korea	Wonju
KBZ	PS32	Russian Federation	Khabaz

Continues on next page

Table 177 (cont.)

Station code	Treaty number	Country	Location
ZALV	PS33	Russian Federation	Zalesovo
NRIK	PS34	Russian Federation	Norilsk
PDYAR	PS35	Russian Federation	Peleduy
PETK	PS36	Russian Federation	Petropavlovsk-Kamchatskiy
USRK	PS37	Russian Federation	Ussuriysk
HLBN	PS38	Saudi Arabia	Haleban
BOSA	PS39	South Africa	Boshof
ESDC	PS40	Spain	Sonseca
CMAR	PS41	Thailand	Chiang Mai
KEST	PS42	Tunisia	Kesra
BRMAR	PS43	Türkiye	Keskin
BRTR	PS43	Türkiye	Keskin
GEYT	PS44	Turkmenistan	Alibeck
AKASG	PS45	Ukraine	Malin
TXAR	PS46	United States of America	Lajitas, TX
NVAR	PS47	United States of America	Mina, NV
PDAR	PS48	United States of America	Pinedale, WY
ILAR	PS49	United States of America	Eielson, AK
VNDA	PS50	United States of America	Vanda, Antarctica

Table 178. Auxiliary seismic station codes

Station code	**Treaty number**	**Country**	**Location**
CFA	AS001	Argentina	Coronel Fontana
USHA	AS002	Argentina	Ushuaia
GNI	AS003	Armenia	Garni
CTA	AS004	Australia	Charters Towers, QLD
FITZ	AS005	Australia	Fitzroy Crossing, WA
NWAO	AS006	Australia	Narrogin, WA
BRDH	AS007	Bangladesh	Bariadhala, Chittagong
SIV	AS008	Bolivia, Plurinational State of	San Ignacio
LBTB	AS009	Botswana	Lobatse
PTGA	AS010	Brazil	Pitinga
RCBR	AS011	Brazil	Riachuelo
FRB	AS012	Canada	Iqaluit, NU
DLBC	AS013	Canada	Dease Lake, BC
SADO	AS014	Canada	Sadowa, ON
BBB	AS015	Canada	Bella Bella, BC
RES	AS016	Canada	Resolute, NU
INK	AS017	Canada	Inuvik, NT
RPN	AS018	Chile	Easter Island
LVC	AS019	Chile	Limon Verde
BJT	AS020	China	Baijiatuan
KMI	AS021	China	Kunming
SSE	AS022	China	Sheshan
XAN	AS023	China	Xian
RAR	AS024	Cook Islands	Rarotonga
JTS	AS025	Costa Rica	Las Juntas de Abangares
VRAC	AS026	Czech Republic	Vranov
SFJD	AS027	Denmark	Sondre Stromfjord, Greenland
ATD	AS028	Djibouti	Arta Tunnel
KEG	AS029	Egypt	Kottamya
FURI	AS030	Ethiopia	Furi
MSVF	AS031	Fiji	Monasavu, Viti Levu
DZM	AS032	Indonesia	Mont Dzumac
MDP	AS033	Indonesia	Montagne des Pères, French Guiana
MSKU	AS034	Gabon	Masuku
SNAA	AS035	Germany/South Africa	SANAE Station, Antarctica
IDI	AS036	Greece	Anogia, Crete
APG	AS037	Guatemala	El Apazote

Continues on next page

Table 178 (cont.)

Station code	Treaty number	Country	Location
BORG	AS038	Iceland	Borgarnes
LEM	AS040	Indonesia	Lembang, Jawa Barat
JAY	AS041	Indonesia	Jayapura, Irian Jaya
SIJI	AS042	Indonesia	Sorong, Irian Jaya
PSI	AS043	Indonesia	Parapat, Sumatera
KAPI	AS044	Indonesia	Kappang, Sulawesi Selatan
BATI	AS045	Indonesia	Baumata, Timur
KRBA	AS046	Iran, Islamic Republic of	Kerman
SHGO	AS047	Iran, Islamic Republic of	Shushtar
EIL	AS048	Israel	Eilath
MMAI	AS049	Israel	Mount Meron
VAE	AS050	Italy	Valguarnera, Sicily
JNU	AS051	Japan	Ohita, Kyushu
JOW	AS052	Japan	Kunigami, Okinawa
JHJ	AS053	Japan	Hachijojima, Izu Islands
JKA	AS054	Japan	Kamikawa-asahi, Hokkaido
JCJ	AS055	Japan	Chichijima, Ogasawara
ASF	AS056	Jordan	Tel-Alasfar
BVAR	AS057	Kazakhstan	Borovoye
KURK	AS058	Kazakhstan	Kurchatov
AKTO	AS059	Kazakhstan	Aktyubinsk
AAK	AS060	Kyrgyzstan	Ala-Archa
OPO	AS061	Madagascar	Ambohidratompo
KOWA	AS062	Mali	Kowa
TEIG	AS063	Mexico	Tepich, Quintana Roo
CMIG	AS064	Mexico	Colonia Cuauhtémoc Matias Romero, Oaxaca
LPIG	AS065	Mexico	La Paz, Baja California Sur
MDT	AS066	Morocco	Midelt
TSUM	AS067	Namibia	Tsumeb
EVN	AS068	Nepal	Everest
RPZ	AS069	New Zealand	Rata Peaks, South Island
RAO	AS070	New Zealand	Raoul Island
URZ	AS071	New Zealand	Urewera, North Island
SPITS	AS072	Norway	Spitsbergen
JMIC	AS073	Norway	Jan Mayen
WSAR	AS074	Oman	Wadi Sarin

Continues on next page

Table 178 (cont.)

Station code	Treaty number	Country	Location
PMG	AS075	Papua New Guinea	Port Moresby
KRVT	AS076	Papua New Guinea	Keravat
ATAH	AS077	Peru	Atahualpa
NNA	AS078	Peru	Nana
DAV	AS079	Philippines	Davao, Mindanao
TGY	AS080	Philippines	Tagaytay, Luzon
MLR	AS081	Romania	Muntele Rosu
KIRV	AS082	Russian Federation	Kirov
KVAR	AS083	Russian Federation	Kislovodsk
OBN	AS084	Russian Federation	Obninsk
ARTI	AS085	Russian Federation	Arti
SEY	AS086	Russian Federation	Seymchan
TLY	AS087	Russian Federation	Talaya
YAK	AS088	Russian Federation	Yakutsk
KLR	AS089	Russian Federation	Kuldur
BIL	AS090	Russian Federation	Bilibino
TIXI	AS091	Russian Federation	Tiksi
YSAH	AS092	Russian Federation	Yuzhno-Sakhalinsk
MA2	AS093	Russian Federation	Magadan
BELG	AS094	Russian Federation	Belogornoe
AFI	AS095	Samoa	Afiamalu
DJNS	AS096	Saudi Arabia	Dhaban Al-Janub
BBTS	AS097	Senegal	Babate
HNR	AS098	Solomon Islands	Honiara, Guadalcanal
SUR	AS099	South Africa	Sutherland
PALK	AS100	Sri Lanka	Pallekele
HFS	AS101	Sweden	Hagfors
DAVOX	AS102	Switzerland	Davos
MBAR	AS103	Uganda	Mbarara
EKA	AS104	United Kingdom of Great Britain and Northern Ireland	Eskdalemuir
GUMO	AS105	United States of America	Guam, Marianas Islands
PMSA	AS106	United States of America	Palmer Station, Antarctica
TKL	AS107	United States of America	Tuckaleechee Caverns TN
PFO	AS108	United States of America	Piñon Flat, CA
YBH	AS109	United States of America	Yreka, CA
KDAK	AS110	United States of America	Kodiak Island, AK

Continues on next page

Table 178 (cont.)

Station code	**Treaty number**	**Country**	**Location**
ANMO	AS111	United States of America	Albuquerque, NM
SHEM	AS112	United States of America	Shemya Island, AK
ELK	AS113	United States of America	Elko, NV
QSPA	AS114	United States of America	South Pole, Antarctica
NEW	AS115	United States of America	Newport, WA
SJG	AS116	United States of America	San Juan, PR
SDV	AS117	Venezuela, Bolivarian Republic of	Santo Domingo
PCRV	AS118	Venezuela, Bolivarian Republic of	Puerto la Cruz
LSZ	AS119	Zambia	Lusaka
MATP	AS120	Zimbabwe	Matopos

Table 179. Hydroacoustic station codes

Station code	Treaty number	Country	Location
H01W	HA01	Australia	Cape Leeuwin, WA
H02N	HA02	Canada	Haida Gwaii, BC
H02S	HA02	Canada	Haida Gwaii, BC
H03N	HA03	Chile	Juan Fernández Island
H03S	HA03	Chile	Juan Fernández Island
H04N	HA04	France	Crozet Islands
H04S	HA04	France	Crozet Islands
H05N	HA05	France	Guadeloupe
H05S	HA05	France	Guadeloupe
H06E	HA06	Mexico	Socorro Island
H06N	HA06	Mexico	Socorro Island
H06S	HA06	Mexico	Socorro Island
H07N	HA07	Portugal	Flores
H07S	HA07	Portugal	Flores
H08N	HA08	United Kingdom of Great Britain and Northern Ireland	BIOT/Chagos Archipelago
H08S	HA08	United Kingdom of Great Britain and Northern Ireland	BIOT/Chagos Archipelago
H09N	HA09	United Kingdom of Great Britain and Northern Ireland	Tristan da Cunha
H09W	HA09	United Kingdom of Great Britain and Northern Ireland	Tristan da Cunha
H10N	HA10	United Kingdom of Great Britain and Northern Ireland	Ascension
H10S	HA10	United Kingdom of Great Britain and Northern Ireland	Ascension
H11N	HA11	United States of America	Wake Island
H11S	HA11	United States of America	Wake Island

Table 180. Infrasonic station codes

Station code	Treaty number	Country	Location
I01AR	IS01	Argentina	Pilcaniyeu
I02AR	IS02	Argentina	Ushuaia
I03AU	IS03	Australia	Davis Base, Antarctica
I04AU	IS04	Australia	Shannon
I05AU	IS05	Australia	Hobart, TAS
I06AU	IS06	Australia	Cocos Islands
I07AU	IS07	Australia	Warramunga, NT
I08BO	IS08	Bolivia, Plurinational State of	La Paz
I09BR	IS09	Brazil	Brasilia
I11CV	IS11	Cabo Verde	Cape Verde Islands
I10CA	IS10	Canada	Lac du Bonnet, Man.
I12CF	IS12	Central African Republic	Bangui
I13CL	IS13	Chile	Easter Island
I14CL	IS14	Chile	Robinson Crusoe Island
I15CN	IS15	China	Beijing
I16CN	IS16	China	Kunming
I17CI	IS17	Côte d'Ivoire	Dimbokro
I18DK	IS18	Denmark	Qaanaaq, Greenland
I19DJ	IS19	Djibouti	Djibouti
I20EC	IS20	Ecuador	Isla Santa Cruz, Galápagos Islands
I21FR	IS21	France	Marquesas Islands
I22FR	IS22	France	Port Laguerre, New Caledonia
I23FR	IS23	France	Kerguelen
I24FR	IS24	France	Tahiti
I25FR	IS25	France	Guadeloupe
I26DE	IS26	Germany	Freyung
I27DE	IS27	Germany	Georg von Neumayer, Antarctica
I29IR	IS29	Iran (Islamic Republic of)	Tehran
I30JP	IS30	Japan	Isumi
I31KZ	IS31	Kazakhstan	Aktyubinsk
I32KE	IS32	Kenya	Nairobi
I33MG	IS33	Madagascar	Antananarivo
I34MN	IS34	Mongolia	Songino
I35NA	IS35	Namibia	Tsumeb
I36NZ	IS36	New Zealand	Chatham Island
I37NO	IS37	Norway	Bardufoss
I38PK	IS38	Pakistan	Rahimyar Khan

Continues on next page

Table 180 (cont.)

Station code	**Treaty number**	**Country**	**Location**
I39PW	IS39	Palau	Palau
I40PG	IS40	Papua New Guinea	Keravat
I41PY	IS41	Paraguay	Villa Florida
I42PT	IS42	Portugal	Graciosa, Azores
I43RU	IS43	Russian Federation	Dubna
I44RU	IS44	Russian Federation	Petropavlovsk-Kamchatskiy
I45RU	IS45	Russian Federation	Ussuriysk
I46RU	IS46	Russian Federation	Zalesovo
I47ZA	IS47	South Africa	Boshof
I48TN	IS48	Tunisia	Kesra
I49GB	IS49	United Kingdom of Great Britain and Northern Ireland	Tristan da Cunha
I50GB	IS50	United Kingdom of Great Britain and Northern Ireland	Ascension
I51GB	IS51	United Kingdom of Great Britain and Northern Ireland	Bermuda
I52GB	IS52	United Kingdom of Great Britain and Northern Ireland	BIOT/Chagos Archipelago
I53US	IS53	United States of America	Fairbanks, AK
I54US	IS54	United States of America	Palmer Station, Antarctica
I55US	IS55	United States of America	Windless Bight, Antarctica
I56US	IS56	United States of America	Newport, WA
I57US	IS57	United States of America	Piñon Flat, CA
I58US	IS58	United States of America	Midway Islands
I59US	IS59	United States of America	Hawaii, HI
I60US	IS60	United States of America	Wake Island

II.4 Seismometer instrument codes

Table 181 lists the instrument codes used for seismometers.

Table 181. IMS S/H/I instrument codes

Instrument code	Description
20171A	Geotech 20171A
23900	Geotech 23900
7505A	Geotech 7505A
8700C	Geotech 8700C
Akashi	Akashi
BB-13V	Geotech BB-13V
CM3TB	Guralp CMG-3TB
CMG	Guralp CMG-3
CMG-3	Guralp CMG-3
CMG-3E	Guralp CMG3-ESP
CMG-3N	Guralp CMG-3NSN
CMG-3T	Guralp CMG-3T
CMG-3V	Guralp CMG-3V
CMG3T	Guralp CMG-3T
CMG3TB	Guralp CMG-3TB
CMG3VB	Guralp CMG-3VB
CMG40T	Guralp CMG-40T
FBA-23	Kinemetrics FBA-23
GS-13	Geotech GS-13
GS-13H	Geotech GS-13H
GS-13V	Geotech GS-13V
GS-21	Geotech GS-21
HM-500	HM-500
KS3600	Geotech KS-36000
KS360i	Geotech KS-36000-I
KS5400	Geotech KS-54000
LE-3D	LE-3D
LPHA	DASE LPHA-12
LPHA12	DASE LPHA-12
LPZA	DASE LPZA-12
LPZA12	DASE LPZA-12
Mk-3A	Willmore Mk 3A
Mk II	Willmore Mk II
MP-L4C	Mark Products L4C

Continues on next page

Table 181 (cont.)

Instrument code	Description
Oki	Oki
Parus2	Parus-2
Podrst	Podrost
S-13	Geotech S-13
S-500	Geotech S-500
S-750	Geotech S-750
SDSE-1	SDSE-1
SOSUS	SOSUS
STS-1	Streckeisen STS-1
STS-1H	Streckeisen STS-1H
STS-1V	Streckeisen STS-1V
STS-2	Streckeisen STS-2
STS-2H	Streckeisen STS-2H
STS-2V	Streckeisen STS-2V
STS-5A	Streckeisen STS-5A
STS-6A	Streckeisen STS-6A
STS2.5	Streckeisen STS-2.5
TSJ-1e	TSJ-1e
T-120	Trillium 120
T-360	Trillium 360
T120QA	Trillium 120QA
T240	Trillium 240
ZM500	DASE ZM500

Appendix III

Computer code for CHK2 checksum

III.1 C code

Listing III.1. C code for the CHK2 checksum.

```c
#include <stdlib.h>
#include <math.h>

/* This function computes the ims2.0 checksum used in the CHK2 line
   */
void compute_checksum(signal_int, number_of_samples, _checksum)
    int  *signal_int;
    int  number_of_samples;
    int  *_checksum;
{
    int  i_sample;
    int  sample_value;
    int  modulo;
    int  checksum;

    int  MODULO_VALUE = 100000000;

    checksum = 0;

    modulo = MODULO_VALUE;

    for (i_sample=0; i_sample < number_of_samples; i_sample++)
    {
        /* check on sample value overflow */
        sample_value = signal_int[i_sample];

        if (abs(sample_value) >= modulo)
        {
                sample_value = sample_value -
                        (sample_value/modulo)*modulo;
        }
    }
}
```

III.2 FORTRAN code

Listing III.2. FORTRAN code for the CHK2 checksum.

```
subroutine compute_checksum(signal_int,number_of_samples,checksum)
c***********************************************************
c  This subroutine computes ims2.0 checksum used in the CHK2 line
c***********************************************************
c  declarations
c
      implicit none
c
      integer*4 signal_int(*)        ! (input)  seismic signal
                                     ! (counts, integer values)
      integer*4 number_of_samples    ! (input)  number of used samples
      integer*4 checksum             ! (output) computed checksum
      integer*4 i_sample             ! index
      integer*4 sample_value         ! value of one sample after
                                     ! sample overflow check
      integer*4 modulo               ! overflow protection value
      integer*4 MODULO_VALUE         ! overflow protection value
      parameter (MODULO_VALUE = 100 000 000)
c
c  initialize the checksum
      checksum = 0
c
c  use modulo variable besides MODULO_VALUE parameter to suppress
c  optimizing compilers to bypass local modulo division computation
      modulo = MODULO_VALUE
c
c  loop over all samples (counts, integer values)
c
      do i_sample = 1, number_of_samples
c
c  check on sample value overflow
c
          sample_value = signal_int(i_sample)
          if(abs(sample_value) .ge. modulo)then
              sample_value = sample_value-
     *        (sample_value/modulo)*modulo
          endif
```

Appendix IV

Unsupported commands at the IDC

This appendix contains a list of commands for the IMS 2.0 format that are unsupported at the IDC.

Introduction

The IMS2.0 Formats and Protocols Specification was developed to provide an extensive set of formats for exchanging seismic data and derived parameters using e-mail messages.

However, IMS2.0 includes formats considered essential by some organizations outside the CTBT monitoring community, such as the European Mediterranean Seismological Centre (e.g. ARRIVAL:GROUPED). Thus, some of the request lines, environments, and subformats documented in subsequent chapters are not supported by the IDC's *VDMS*. Below are commands and environments documented in this manual but not supported at the IDC.

Request lines in request and subscription messages

- AUTH_STATUS
- ARRIVAL:GROUPED
- ARRIVAL:REVIEWED
- ARRIVAL:UNASSOCIATED
- BULLETIN IMS1.0:LONG
- COMMENT
- COMM_STATUS (with subscriptions)
- NETWORK
- WAVEFORM, subtype CM8

Environment lines in request and subscription messages

- AUX_LIST
- GROUP_BULL_LIST (with subscriptions)
- FREQ Custom (with subscriptions)

Request/environment combinations in request and subscription messages

- STATION/LAT; STATION/LON
- CHANNEL/LAT; CHANNEL/LON
- CHAN_STATUS: Minimum TIME precision of days
- STA_STATUS: Minimum TIME precision of days

Appendix V

History of “Formats and Protocols for Messages”

This appendix contains an outline of the history of the formats and protocols used to exchange messages to monitor data under the Comprehensive Nuclear-Test-Ban Treaty (CTBT).

The first version of Automatic Data Request Manager (AutoDRM) was developed during July 1991. The set of command that could be sent to *AutoDRM* was small at that time, but sufficient for basic requests for waveforms and other seismological data. This set of commands did not have a special name and was at that time just known as “*AutoDRM* request commands”. Later, when the GSE2.0 formats and protocols were defined, this first set of commands was referred to as the “GSE1-format” and was published in 1993 Kradolfer (1993). During 1994, the Group of Scientific Experts (GSE), a group of scientists established by the *Conference of Disarmament* in Geneva in 1976, decided to use this method of automated data exchange for its third technical test (GSETT-3). While the basic functions of *AutoDRM* were useful, it was also noted that some extensions were needed in order to use this method for international data centres. A dedicated working group created a new set of commands, allowing for data to be requested from individual channels and for requests and responses to be tracked by means of request-ID’s for requests and reference-IDs for the corresponding responses. The new formats and protocols were written down in the document of the “Conference of Disarmament, Formats and Protocols for Data Exchange, Conference Room Paper 243, Volume 2 Operations, Annex 3” in 1995.

In 1996, when the CTBT was brought into and accepted by the UN General Assembly in New York and when the establishment of a CTBT organisation (CTBTO) in Vienna was foreseeable, the formats for *AutoDRM* were extended once more and the new format was changed to GSE2.1. It was published in May 1997 as “Operations Annex 3” to the “Conference Room Paper 243” of the Conference of Disarmament.

During the establishment of the CTBTO (actually the Provisional Technical Secreteriat (PTS)) in Vienna, the concept of *AutoDRM* was regarded as useful for other monitoring techniques as well. Therefore additional features were added to the formats and protocols, in order to include data from hydroacoustic and infrasound networks in addition to seismological data. The version of these new formats was IMS1.0, after the CTBTO division that deals with the stations of the global monitoring system: the International Monitoring System (IMS). In November 2001, after the addition of radionuclide messages, the version of the formats was changed to IMS2.0.

In 2009, the *AutoDRM* was redesigned to use current technologies and was renamed *Verification Data and products Messaging System* (*VDMS*). The current version of *VDMS* is 3.0.

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Glossary

Symbols

β-γ **coincidence** Nuclear decay that produces both a γ-ray and a β particle within a very short time scale. May also refer to other photon-electron coincidence events such as an X-ray with a conversion electron.

β-γ **coincidence event** Nuclear decay that produces both a γ-ray and a β particle within a very short time scale. May also refer to other photon-electron coincidence events such as an X-ray with a conversion electron.

β **particle** Electron that is produced from a nuclear decay. May also refer to other electron radiations, for example, a conversion electron.

γ *See* γ-ray.

γ**-ray** Photon that is produced from a nuclear transition; may also imply other photon radiations, for example, an X-ray.

3-C station *See* 3-C station.

A

acquisition live-time Time multichannel analyser electronics is available for processing pulse amplitude signals; equivalent to acquisition real-time less detector dead time, reported in s.

acquisition real-time Total elapsed clock time a sample is counted, reported in s.

acquisition start When the detection system at a station commences sample acquisition.

acquisition stop Time at which the detection system at a station completes sample acquisition.

activation product A nuclide produced from the absorption of a neutron by a nucleus.

activity Decay rate of a radionuclide; this quantity is expressed in becquerels (disintegrations per second).

activity A set of actions designed to achieve a particular result. An activity is usually defined as part of process and is documented in a procedure.

activity

(1) A set of actions designed to achieve a particular result. An activity is usually defined as part of process and is documented in a procedure

(2, RN) Decay rate of a radionuclide; this quantity is expressed in becquerels (disintegrations per second).

activity concentration Activity per unit volume of air.

ALERT Alert message. Data type that includes ALERT_FLOW, ALERT_SYS, ALERT_TEMP, and ALERT_UPS.

ALERT_FLOW Type of ALERT message used to notify the IDC/IMS that the sample flow rate is above or below a specified threshold.

ALERT_SYSTEM Type of ALERT message used to notify the IDC/IMS that the computer controlling the systems is being rebooted or that the system is shutting down.

ALERT_TEMP Type of ALERT message used to notify the IDC/IMS that a system temperature is above or below a specified threshold.

ALERT_UPS Type of ALERT message used to notify the IDC/IMS that there is a problem with the UPS.

algorithm A finite sequence of steps for solving a logical, mathematical or science problem.

allowable time delay *See* Delay in Transmission.

alphanumeric data Data that are displayed to an analyst as numbers or letters (e.g. the latitude and longitude of an event hypothesis). This is in contrast to waveform data.

alternate subsystem A duplicate of the operational subsystem software and hardware at a geographically separate location. The alternate subsystem is continuously available to assume mission responsibilities.

American Standard Code for Information Interchange (ASCII)

(1) A coding scheme using 7 or 8 bits that assigns numeric values to up to 256 characters, including letters, numerals, punctuation marks, control characters, and other symbols. The American Standard Code for Information Interchange was developed in 1968 to standardize data transmission among disparate hardware and software systems and is built into most minicomputers and all personal computers.

(2) 8-bit code for representing alphanumeric characters.

amplitude Zero-to-peak height of a waveform.

analyst Personnel responsible for reviewing and revising the results of automatic processing.

anthropogenic Man-made, not of natural origin.

application A program designed to assist in the performance of a specific task, such data acquisition, rereading, processing, monitoring.

architecture

(1) Organizational structure of a system or component.

(2) The physical construction or design of a computer system and its components.

(3) The design of application software incorporating protocols and the means for expansion and interfacing with other programs.

archive Single file formed from multiple independent files for storage and backup purposes. Often compressed and encrypted.

archive protocol Protocol used for communications between Archive and MSwriter.

ARR *See* Automatic Radionuclide Report (ARR).

array A spatially distributed set of sensors all transmitting their outputs to a central recording facility to be recorded against a common time base.

array element Single station or substation of a sensor array, referred to by its element name (such as YKR8), as opposed to its array name (YKA in this example).

arrival Detected signal that has been associated to an event. First, the *GA* software associates the detection to an event. Later, during interactive processing, many arrivals are confirmed, improved, or added by visual inspection.

arrival time The time at which the arrival of a particular wave phase is registered at a station.

ASCII *See* American Standard Code for Information Interchange (ASCII).

assay date Date of certificate source assay, format is yyyy/mm/dd.

assay time Time of certificate source assay, format is hh:mm:ss.s.

associate, to To assign an arrival to a S/H/I event.

associated phase Phase that is associated with a S/H/I event.

association of an arrival Assignment of a wave arrival to a specific seismic event.

ATM *See* atmospheric transport modelling (ATM).

atmospheric model Atmospheric model, also called numerical weather prediction model, uses mathematical models of the atmosphere, current weather conditions and high-speed computers to analyse and forecast the global state of the atmosphere. This data is needed to model infrasound signal propagation and run atmospheric transport modelling.

atmospheric transport modelling (ATM) Atmospheric transport modelling (ATM) is performed using mathematical models to simulate dispersion of radionuclide in the atmosphere. ATM provides a link between radionuclide measurements and their source.

attenuation The decrease in amplitude of a signal due to loss of energy as the signal propagates away from its source. Attenuation consists of two components: intrinsic attenuation, which is the phenomenon in which kinetic energy is converted to heat by anelastic processes or internal friction, and scattering attenuation, which is caused by energy reflecting off of small scale material heterogeneities. In addition to attenuation, geometric spreading also acts to modify the amplitude of seismic signals.

attribute

(1) A quantitative measure of a signal; for example, time, azimuth, slowness (or trace velocity), amplitude and period (or frequency).

(2) A database column.

authentication signature A series of bytes that are unique to a set of data and that are used to verify the authenticity of the data.

authenticity The property of being genuine and being able to be verified and trusted.

authorized user An IDC customer, nominated by a State Party, who has access to IMS data and IDC products.

automatic processing Data processing that is performed by the system without analyst interaction. This type of processing is initiated by a configurable trigger such as availability of data or the completion of a previous processing step. Includes station processing, network processing, post-analysis processing, post-evaluation processing, and late data processing.

Automatic Radionuclide Report (ARR) A radionuclide standard IDC product. This report is a product of the automatic processing of sample pulse height data for a single radionuclide sample (gas or particulate). It includes information concerning the physical collection of the sample, calibration equations, processing and update parameters, peak search results, nuclide identification, data quality flags, event screening flags, minimum detectable concentrations for key nuclides and field of regard images.

auxiliary seismic station A station from the auxiliary network, supplement to the primary one. The list of auxiliary seismic stations is provided in Table 1-B of Annex 1 to the Protocol for the Treaty. An auxiliary seismic station shall fulfil the technical and operational requirements specified in the Operational Manual for Seismological Monitoring and the International Exchange of Seismological Data. Data from an auxiliary seismic station may at any time be requested by the IDC and shall be immediately available through online computer connections.

availability

(1) Ensuring timely and reliable access to and use of information.

(2) The accessibility of a system, in terms of usage or of the percentage of the total amount of time the device is needed.

azimuth Direction, in deg clockwise with respect to north.

B

back azimuth

(1) The direction (in degrees, °) from an event epicentre to a station measured clockwise from true north.

(2) The horizontal angle from the station towards an event source, measured in degrees (°) clockwise against north.

background Contributions to the count from all sources other than the radionuclides of interest. Natural radioactivity in the sample contributes to the background, but sources outside the sample also can contribute. These outside sources include environmental radiation, cosmic rays, electromagnetic interference, other instrument noise and the interaction between radiation and the materials near the detector.

background measurement identifier Unique alphanumeric string identifying the relevant background measurement for a specific sample; includes the detector code and the background acquisition initiation date and time.

background noise Contribution to a recorded signal from ambient natural and anthropogenic sources that interferes with the measurement of a particular signal of interest.

Backup The subsystem acting as the backup location for the System. The pipeline and analyst processing do not actively run on the Backup. May be either operational subsystem or alternate subsystem. The Primary always synchronizes data to the Backup. During a pipeline transfer, the Primary and Backup roles switch.

bandwidth The data transfer capacity of a digital communications system.

base of operations A fixed or temporary facility (or facilities) located inside, or in the vicinity of, the inspection area from which the inspection team coordinates and/or conducts its inspection activities.

baseline Contribution to a spectrum from the partial energy deposition of a γ-ray or γ-ray in a detector.

battery Two or more cells in a container that produces an electrical current when two electrodes within the container touch an electrolyte. In the field stations, batteries may be used as the main power source recharged by solar cells.

beam

(1) Waveform created from array station elements that are sequentially summed in the direction of a specified azimuth and slowness.

(2) The product of beamforming; a single derived channel representing the sum of the coherent signals from raw channels for all the elements of an array.

beam steering *See* beamforming.

beam, origin *See* origin beam.

beamforming Beamforming (also known as beaming) is a multichannel signal processing technique taking advantage of the direction-dependent arrival of a signal across the elements of an array. Beamforming sums the waveform data from the elements of an array to produce a single derived channel. The intent is to boost signal-to-noise ratio.

beaming *See* beamforming.

becquerel Unit of activity equal to one disintegration per second; denoted by Bq.

bit The smallest unit of information handled by a computer. One bit expresses a 1 or a 0 in a binary numeral, or a true or false logical condition, and is represented physically by an element such as a high or low voltage at one point in a circuit or a small spot on a disk magnetized one way or the other. A single bit conveys little information a human would consider meaningful. A group of 8 bits, however, makes up a byte, which can be used to represent many types of information, such as a letter of the alphabet, a decimal digit, or other character.

blank pulse height data (BLANKPHD) ASCII data message containing the PHD of an unexposed air filter, as well as other information, in an IDC-approved format.

BLANKPHD *See* blank pulse height data (BLANKPHD).

body wave A seismic wave that propagates through the interior of the Earth.

broadcast Sent to more than one recipient. In communications and on networks, broadcast data are distributed to all tasks or processes.

build (an event) To create an event by detecting its seismic or hydroacoustic signals, associating its arrivals, identifying them as phase, and locating the event.

bulletin Chronological listing of event origins spanning an interval of time. Often, the specification of each origin or event is accompanied by the event's arrivals and sometimes with the event's waveforms.

byte A unit of data, today almost always consisting of 8 bits. A byte can represent a single character, such as a letter, a digit, or a punctuation mark. Because a byte represents only a small amount of information, amounts of computer memory and storage are usually given in kB (1,024 bytes), MB (1,048,576 bytes), or GB (1,073,741,824 bytes).

C

CALIBPHD *See* calibration pulse height data (CALIBPHD).

calibration Determination, by measurement or comparison to a standard, of parameters needed to properly interpret recorded signals. When used for specific systems:

(1) Instrument calibration (for all four IMS technologies): the parameters typically calibrated are those associated with the instrument response or transfer function (e.g. detector or other sensor efficiencies and/or gains, amplifier gains, bandwidths, delays, phase shifts, linearity, etc.). On-site calibration means that the calibration is carried out with the equipment on site.

(2) System calibration: the application of a defined set of parameters to improve the performance of the IDC processing system.

calibration coefficients Numbers that define the energy, resolution, and efficiency equations.

calibration pulse height data (CALIBPHD) American Standard Code for Information Interchange (ASCII) data message transmitted to the IDC containing the PHD of a certified standard source as well as other information in an IDC-approved format. The data in a calibration pulse height data is used to determine the ECR, energy vs efficiency regression (EER) and RER.

capability Ability of an organization, system or process to realize a product that will fulfil the requirements for that product.

category Value (referred to as Level) assigned to a radionuclide sample, from 1 to 5 for particulates or from A to C for noble gas systems, indicating the presence of certain types of nuclide. For particulates, Level 1 indicates a spectrum with normal natural nuclides, while Level 5 indicates spectra with multiple anthropogenic nuclides, at least one of them being a fission product. For noble gases, Level A indicates no radioxenon detected, while Level C indicates that a activity concentration of radioxenon which is atypical for the station has been detected.

CD-1.0 format and protocols A standard used for transmitting continuous waveform data from stations of the IMS to the IDC and for transmitting these data from the IDC to NDCs. CD-1.0 uses a TCP/IP program-to-program socket communication to send binary formatted waveform data (frames). The CD-1.0 standard has been superseded by the CD-1.1 standard, CD-1.1 format and protocols. The format and protocols are described in *Formats and protocols for continuous data — CD-1.0* (IDC/ENG/SPC/100/Rev.1).

CD-1.1 format and protocols A standard used for transmitting continuous waveform and station SoH data from stations of the IMS to the IDC and for transmitting these data from the IDC to NDCs. This protocol is designed to support multicasting of continuous data, which entails more complex data flow topologies. The format and protocols are described in *Formats and protocols for continuous data — CD-1.1* (IDC/OPS/SPC/101/Rev.3).

central processing unit (CPU) The computational and control unit of a computer. The CPU is the device that interprets and executes instructions. Single-chip CPUs, called microprocessors, made possible personal computers and workstations.

central processing unit time In multiprocessing, the amount of time during which a particular process has active control of the CPU. The more CPU time is required by a program, the more powerful the computer shall be to execute this program.

centroid Energy (in keV) or channel number at the centre of a fitted peak.

centroid channel Spectrum channel at the centre of a photopeak.

cepstral domain measurements Measurements made in the cepstral domain for characterizing a signal of interest, in particular, hydroacoustic signals. The cepstral domain highlights periodicities in the spectrum (frequency domain). The cepstrum of a waveform is the Fourier transform of the waveform's power spectrum. The independent variable of the cepstrum is called quefrency, expressed in units of time, but representing the period of harmonic features of the waveform.

cepstrum Fourier transformation of a power spectrum whose magnitudes have been scaled logarithmically.

certificate Certified standard source of known activity used in the acquisition of radionuclide energy, resolution, and efficiency calibration data.

certification The assessment against the IMS specifications and other criteria of the equipment and instrumentation, associated facilities and operational performance pertaining to a seismic, hydroacoustic, infrasound or radionuclide monitoring station. Successful certification leads to the formal acceptance of the station into the IMS.

certified laboratory A radionuclide laboratory listed in Annex 1 to the Protocol to the Treaty and certified by the Technical Secretariat. Additional laboratories may be certified with the approval of the Executive Council to perform the routine analysis of samples from manual monitoring stations, where necessary, in the future.

changed by Name of person or organization that was (physically) responsible for the installation, initiation or change. Short names or abbreviations are acceptable, where the meaning is clear. The name of the person merely providing the information or entering it in the database must not be entered here.

channel A segment with distinct energy range in a gamma spectrum of radionuclides.

channel Component of motion or distinct stream of data from waveform stations.

channel

(RN) A segment with distinct energy range in a gamma spectrum of radionuclides.
(S/H/I) Component of motion or distinct stream of data from waveform stations.

checksum A calculated value that is used to test data for the presence of errors that can occur when data is transmitted from the field stations. The checksum is calculated for a given data frame by sequentially combining all the bytes of data with a series of arithmetic or logical operations. After the data is transmitted or stored, a new checksum is calculated in the same way using the (possibly faulty) transmitted or stored data. If the two checksums do not match, an error has occurred, and the data should be transmitted or stored again. Checksums cannot detect all errors and they cannot be used to correct erroneous data.

classified information Confidential information (including data) that has been classified as OSI Protected or OSI Highly Protected in accordance with the procedures in Chapter 10.

coherent Multiple signals detected on various array elements having a constant phase relation over a given time period.

coherent beam Summation of data from numerous seismic or infrasonic array station elements after shifting the data traces in time to maximize the coherence of plane-wave signals travelling along a particular azimuth and slowness.

coherent beamforming A method for increasing the signal-to-noise ratio of signals arriving at an array from a particular azimuth and slowness. Coherent beamforming (also known as beam steering) time shifts the waveforms from an array's elements before summing, under the assumption that a plane wave is arriving from that direction. The shifting is done for each element by subtracting the time delay relative to the array beampoint (a reference location for the array) that would be expected for a plane wave arriving from that azimuth and slowness. If there is a signal arriving from the specified azimuth and slowness, an signal-to-noise ratio gain occurs when summing the time delayed waveforms, due to the simultaneous constructive interference of coherent directional signals, and destructive interference of incoherent background noise. In theory, a gain of signal-to-noise ratio equal to the square root of the number of elements can be achieved (e.g. a factor of 3 for a 9 element array). In practice, the realized gain is usually less.

collection start Time at which the collection equipment at a station commences sample collection.

collection stop Time at which the collection equipment at a station completes sample collection.

collection time At a particulate monitoring station takes place over a 24-hour period ($\pm 10\%$). Air sampling period for noble gas monitoring station shall not exceed 24 h. Collection period is not dependent on type of equipment or operating mode employed at the station.

command Expression that can be input to a computer system to initiate an action or affect the execution of a computer program.

command request A command request or a command response message..

command request (message) A message that contains a series of command lines that provide information about the return message (E-MAIL), set the environment for the requested command (TIME_STAMP) and specify the type of command that is requested.

command response (message) A message sent by the station in response to a command request. The response may include arguments and command parameters. More than one response may result from a single command request; for example an acknowledgement followed later by some required information or results.

comment Free text field containing comments made by a station operator or IDC analyst.

communication node Intermediate data routing point where data are forwarded to the IDC.

component

(1) One dimension of a 3-dimensional signal

(2) The vertically- or horizontally-oriented (north or east) sensor of a station used to measure the signal in that dimension.

(3) One of the parts of a system; also referred to as a module or unit.

Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) With its Headquarters at the Vienna International Centre, the Organization is charged with monitoring and verifying the Treaty through a network of seismic, hydroacoustic, infrasound and radionuclide stations and radionuclide laboratories that compose the IMS and that relay data to the IDC for processing and analysis. The Organization is also responsible for confidence building measures, on-site inspections and coordinating consultation and clarification.

compress To reduce the size of a set of data, such as a file, so that it can be stored in less space or transmitted with less bandwidth. Data can be compressed by removing repeated patterns of bits and replacing them with some form of summary that takes up less space; restoring the repeated patterns decompresses the data. Lossless compression methods must be used for text, code, and numeric data files; lossy compression may be used for video and sound files.

computer software component (CSC) Functionally or logically distinct part of a computer software configuration item, typically an aggregate of two or more software units.

concentration *See* activity concentration.

confidential information Information (including data) the unauthorized disclosure of which could cause damage to the interests of a State Party, or of the Organization, whether or not it has been classified in accordance with the procedures in Chapter 10 (*see* classified information).

confidentiality Preventing the disclosure of confidential information to unauthorized individuals or systems.

configuration

(1) (hardware) Arrangement of a computer system or components as defined by the number, nature, and interconnection of its parts.

(2) (software) Set of adjustable parameters, usually stored in files, which control the behaviour of applications at run time.

(3) In reference to a single microcomputer, the sum of a system's internal and external components, including memory, disk drives, keyboard, video, and generally less critical add-on hardware, such as a mouse, modem, or printer. The user's choices established through configuration files. Although system configuration can be changed, as by adding more memory or disk capacity, the basic structure of the system remains the same.

(4) In relation to networks, the entire interconnected set of hardware, or the way in which a network is laid out —the manner in which elements are connected.

configuration file A file that contains machine-readable operating specifications for software programs like the monitoring agents or that contains information on another file or on a specific user, such as the user's logon identifier.

configuration item

(1) Aggregation of hardware, software, or both treated as a single entity in the configuration management process.

(2) Any component that needs to be managed in order to deliver a service. Information about each configuration item is recorded in a configuration record within the configuration management system and is maintained throughout its life cycle by configuration management. Configuration items are under the control of change management.

configuration management Directing and surveying the functional and physical characteristics of a configuration item, controlling changes to those characteristics, and recording and reporting changes and implementation, and verifying compliance with requirements.

constant values Constant values are declared in waveform data whenever a sequence of at least X data samples has the same value; the parameter X is defined in the station-specific documentation.

continuous waveform data Waveform data that are transmitted to the IDC on a nominally continuous basis.

conversion electron Electron emitted from an atomic electron shell, usually in coincidence with an X-ray.

Coordinated Universal Time (UTC) International basis of civil and scientific time, implemented in 1964. UTC is widely broadcast by precisely coordinated radio signals; these radio time signals ultimately furnish the basis for the setting of all public and private clocks. Since 1 January 1972, UTC has been obtained from atomic clocks. The unit of UTC is the atomic second.

cosmic ray General term for radiation originating from the cosmos. Includes primarily protons and alpha particles, but may also include electrons and nuclei of atomic number between 4 and 26.

count Number of pulses observed within a spectrum channel.

count Units of digital waveform data.

count

(1) Units of digital waveform data.

(2) Number of pulses observed within a spectrum channel.

CPU *See* central processing unit (CPU).

critical level (Lc) Minimum net counts that must be contained in a ROI for reliable nuclide detection (Currie, 1968).

CSC *See* computer software component (CSC).

CTBTO *See* Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO).

D

DAC *See* digital to analogue converter (DAC).

data Plural of the Latin datum, meaning an item of information.

data acquisition Receiving data from a data provider and storing it for subsequent access by the System. Data can be acquired in a variety of formats including CD-1.0, CD-1.1, IMS 2.0, SEED, and miniSEED.

data authentication Measures taken to ensure that the integrity of the data from the monitoring stations in the IMS network has not been compromised, either accidentally or maliciously, by some action at the station or in transmission to the IDC, or at any time thereafter.

data availability for an IMS S/H/I station The ratio of verified data received by the IDC, relative to the data expected to be received from the minimum number and distribution of channels required to achieve mission capability defined in the station-specific documentation, expressed as a percentage.

data block Units of information that, when combined with other data blocks, comprise a data message.

data buffer A temporary record of station data maintained at the station, a NDC or an appropriate communication node to minimize loss of data during a period of communication outage with the IDC.

data flow Sequence in which data are transferred, used, and transformed during the execution of a computer program.

data format The particular structure of the information contained in a digital file (or collection of files), and the relationships between the data contained within related files.

data frame Data structure that contains some type of data and is transmitted using the CD-1.0, CD-1.1, or archive protocol.

data processing *See* processing.

data provider Sender of continuous data (CD-1.0 or CD-1.1 data frames). This may be a station or a data centre that forwards data.

data quality A measure of how well data from a monitoring station are within tolerances, have correct time, adhere to calibration and certification standards and are free of aberrations such as low or zero air flow rates, or spikes and gaps.

data received percentage for an IMS S/H/I station The ratio of data received by the IDC relative to the data expected to be received from all instrument channels for that station defined in the station-specific documentation, expressed as a percentage. This definition produces a percentage value per station, regardless of data quality, which is considered in calculating data availability.

data source A source of waveform and/or event data for the System. Data sources can be stations or external data centres.

data time stamp A record of absolute Coordinated Universal Time, attached to a unit of data, that provides the time when those data were sampled.

data type Kind of data in a data message; possible data types include ALERT_FLOW, ALERT_-SYSTEM, ALERT_TEMP, ALERT_UPS, ARR, BLANKPHD, CALIBPHD, DETBK-PHD, GASBKPHD, MET, QCPHD, RLR, RMSSOH message, RNPS, RRR, SAMPLE-PHD, and SSREB.

date of last calibration Date of previous detector calibration, format is *yyyy/mm/dd*.

dead time For detection systems that record discrete events, such as particle and nuclear detectors, the dead time is the time after each event during which the system is not able to record another event. The total dead time of a detection system is usually due to the contributions of the intrinsic dead time of the detector, of the analogue front end (for example the shaping time of a spectroscopy amplifier) and of the data acquisition (the conversion time of the analogue-to-digital converters and the readout and storage times).

decade Factor of ten in frequency (Hz).

decay time Time duration between end of sampling and data acquisition.

defining An arrival attribute, such as arrival time, azimuth, or slowness, which is utilized in the calculation of the event's location or magnitude.

defining phase Associated phase of which features are used in the estimation of the location and origin time of an S/H/I event.

defining/non-defining Any observation that contributes to the determination of an event attribute is considered to be "defining" for that attribute. The detection of an event, the location of an event, the magnitude of an event, and the source type assigned to an event are all determined by specific types of defining observations (travel time, azimuth, slowness, amplitude) from one or more phases recorded by one or more stations. If an observation is linked to an event (associated), but does not contribute to the calculation of an event attribute, then it is considered to be non-defining for that attribute.

Delay in Transmission For continuous data, the time difference between the time when the sensor acquires a signal and the time that the signal reaches the IDC. For auxiliary seismological station data, the time difference between the time when the request is sent by the IDC and the time that the requested data segment reaches the IDC. This amount of time includes any delay introduced in the communication system itself as well as by routing the data through a NDC or an appropriate communication node.

derived channel A source for time series data created by processing one or more raw channels. Examples of common types of processing to form derived channels are filtering, beaming, and rotation. Derived channels are generally created to enhance the signal-to-noise ratio of signals.

derived waveform Output from a derived channel during a particular time interval (e.g. a bandpass filtered version of a raw waveform; a beam created by summing multiple raw waveforms from the elements of an array).

DETBKPHD *See* detector background pulse height data (DETBKPHD).

detection

(1) A seismic or acoustic signal or noise that is found in the data stream by automatic processing (*Detection and Feature Extraction* (*DFX*) software) that meets preset criteria for signal identification and measurement.

(2) Discovery of a certain condition that could create a geophysical event.

***Detection and Feature Extraction* (*DFX*)** *DFX* is a programming environment that executes applications written in Scheme (known as detection and feature extraction applications).

detector background pulse height data (DETBKPHD) Data message containing the PHD from a background count.

detector code Includes the radionuclide site code plus four unique characters identifying a specific detector unit.

dev *See* development subsystem (dev).

development subsystem (dev) The portion of the System that supports System development. The development subsystem provides a software development and component test environment.

DFX See *Detection and Feature Extraction* (*DFX*).

digital signal A signal in which information is represented by discrete states —for example, high and low voltages— rather than by fluctuating levels in a continuous stream, as in an analogue signal.

digital to analogue converter (DAC) A digital to analogue converter converts digital values to analogue voltages.

document Any recorded information regardless of its physical form or characteristics, which may be preserved or represented in order to serve as evidence for some purpose. In general, documents can be printed (on paper or other material) or electronic (stored as files on electronic storage media like hard disk drives, CDs, DVDs, USB flash drives).

E

Earth model A representation of one or more physical properties of the Earth, generally used for calculating a predicted value for an observation measured at a station for a particular event (e.g. travel time, azimuth, and slowness). Earth models are used to predict observables for S/H/I signals.

ECR *See* energy vs channel regression (ECR).

ECRU *See* energy vs channel regression update (ECRU).

EER *See* energy vs efficiency regression (EER).

efficiency

(processes) The capability of a process to provide appropriate performance, relative to the amount of used resources and time and under stated conditions.

(RN) The probability of detection of an emitted quantum of radiation (either β or γ) compared with the decay rate. For most spectra, this is equivalent to the ratio of counts detected under a detected peak to the amount of radiation quanta emitted by a sample, and depends on detector configuration and geometry.

efficiency (RN) The probability of detection of an emitted quantum of radiation (either β or γ) compared with the decay rate. For most spectra, this is equivalent to the ratio of counts detected under a detected peak to the amount of radiation quanta emitted by a sample, and depends on detector configuration and geometry.

element

(1) *See* array element.

(2) Data storage location in a data array.

energy (RN) Refers to the measured kinetic energy of radiation quanta deposited in a detector. The unit most appropriate for such measurements is keV.

energy vs channel regression (ECR) An equation providing the detector-specific relationship between channel number and energy.

energy vs channel regression update (ECRU) An equation providing the updated detector-specific relationship between channel number and energy.

energy vs efficiency regression (EER) An equation providing the detector-specific relationship between efficiency and energy.

epicentre The location of an event projected to the Earth's surface defined by origin time, latitude and longitude.

event

(1) A physical occurrence that generates seismoacoustic energy.

(2) A generation of seismoacoustic energy that has been detected and may have been located in space and/or time by a monitoring system.

(3) A detected generation of seismoacoustic energy qualifying to appear in the IDC products on the basis of any established event criteria.

event

(1) A physical occurrence that generates seismoacoustic energy and/or emits radionuclides.

(2) A generation of seismoacoustic energy and/or radionuclides that has been detected and may have been located in space and/or time by a monitoring system.

(3) A detected generation of seismoacoustic energy and/or radionuclides qualifying to appear in the IDC products on the basis of any established event criteria.

event characterization IDC process of characterizing events by features of signals recorded at one or more stations.

event characterization parameter A parameter that characterizes an event (usually a combination of event parameters such as the ratio of M_S to m_b).

event definition criteria A set of criteria that must be met by the associated signal parameters before an event can become part of an event list or bulletin.

event epicentre An event's 2-D geographic location as described by latitude and longitude (i.e. the position on a map). This is in contrast to an event hypocentre, which refers to latitude, longitude, *and* depth.

event hypocentre An event's 3-D spatial location as described by latitude, longitude, *and* depth. This is in contrast to an event epicentre, which refers only to the latitude and longitude (i.e. the position on a map).

event hypothesis A proposed solution for an event. Each event consists of a sequence of event hypotheses that describe an evolution to a final best model of the event. Each event hypothesis is composed of a set of associated signal detections and has one or more event hypothesis location solutions, one of which must be designated as preferred.

event hypothesis location solution An estimate of an event location (latitude, longitude, depth, origin time) that is tied to a particular event hypothesis. Each location solution is based on a set of defining signal detection feature measurements (e.g. time, azimuth, slowness).

event location The combination of an event's spatial location, temporal location, spatial location uncertainty, and temporal location uncertainty.

event parameters Parameters that describe an event (e.g. origin time, location and depth).

event screening

(1) IDC process of assessing whether an event is consistent with natural or man-made, non-nuclear phenomena.

(2) IDC process that produces the SSEB by removing events of clear natural origin from the SEB.

event screening criteria The individual criteria that are applied to event characterization parameters to screen events.

event screening metric A number that results from the application of an event characterization parameter to event screening criteria. The metric indicates numerically, for each event, the degree to which that event does, or does not, meet the event screening criteria.

execute To carry out an instruction, process, or computer program.

Executive Council Executive body of the CTBTO responsible for supervising the activities of the Technical Secretariat.

Executive Summary Product that provides summary statistics regarding the number of S/H/I events formed by automated and reviewed processing, the numbers of those events in the various event screening categories, the number of Level 4 and 5 radionuclide events, the status of IMS stations, the status of communications, and IDC systems status.

F

failure Inability of a system or component to perform its required functions within specified performance requirements.

feature A unique, attractive, or desirable property of a program or of a computer or other hardware.

field

(1) Attribute of a generic object.

(2) Attribute in a database table (the name of the column).

field of regard The geographical area where releases of radionuclides, occurring in a given time interval, are expected to influence the composition of air sampled at a given station during a given time interval. Fields of regard are based on source-receptor sensitivities calculated by atmospheric transport modelling.

file A complete, named collection of information, such as a program, a set of data used by a program, or a user-created document. A file is the basic unit of storage that enables a computer to distinguish one set of information from another. A file is the "glue" that binds a conglomeration of instructions, numbers, words, or images into a coherent unit that a user can retrieve, change, delete, save, or send to an output device.

filter, waveform *See* waveform filter.

fission product A nuclide produced from fission.

flow rate Air volume passing through a sampling system per unit time; reported in standard cubic meters m^3/h.

frequency Measure (in Hz) of the number of cycles per unit time.

FULL Spectral identifier indicating that the sample has been counted for the total acquisition duration.

full sample pulse height data (SPHDF) ASCII data message containing the PHD of a sample acquired for a complete collection interval, as well as other information, in an IDC-approved format.

full width at half-maximum (FWHM) Metric of detector resolution and equivalent to the width of a photopeak (in keV) taken at the peak height equal to half the maximum peak counts.

function

(1) Is defined by the requirement to contribute to, take responsibility for, or take decisions for key tasks.

(2) Named section of a program that performs a particular task.

G

***Global Association* (GA)** Subsystem that associates S/H/I phases to events.

gain Amplification of the measured energy deposition in a radiation detector. This is achieved through the use of electronic amplifiers.

gain The increase in the amplitude of a signal, as of voltage, current, or power, that is produced by a circuit.

gain

(RN) Amplification of the measured energy deposition in a radiation detector. This is achieved through the use of electronic amplifiers

(systems) The increase in the amplitude of a signal, as of voltage, current, or power, that is produced by a circuit.

gap A gap is declared in waveform data whenever an expected data sample is missing.

gas background pulse height data (GASBKPHD) Data type sent by noble gas monitoring systems that observe a memory effect during sample acquisition. This effect is due to atoms from the previous sample adsorbed onto the walls of the gas cell. The counts from the memory effect must be subtracted from the sample counts for accurate activity quantification.

GASBKPHD *See* gas background pulse height data (GASBKPHD).

generic object Construct used to hold and manipulate data. The type of object determines the data that it can contain. Also known as an object.

geographic region An area on the surface of the Earth defined by either a polygon in geographic coordinates or an ellipse. Geographic regions are used to visualize information on a map, for geospatial analysis, and in configuration of processing operations. Examples of geographic regions are Flinn-Engdahl seismic and geographical regions, but may be any arbitrary closed polygon or ellipse useful in the system. An “active geographic region” is a region definition that is valid in the system at a particular time. Regions may be created, changed, or made inactive.

geometric spreading The decrease in signal amplitude as a wavefront expands away from its source that accounts for the increasing wavefront size.

guideline For the purpose of this work instruction, the term “guideline” is understood as a recommendation that, in comparison to a “rule”, is more informative than mandatory. A guideline indicates good practice, recognizing that some modification may be needed in relation to the circumstances encountered.

H

half-life Time required for a radionuclide to decay to half its initial activity.

high purity germanium detector (HPGe) High purity germanium detectors are semiconductor crystal devices employed for detection of X-ray and γ-radiation, where incident photons free valence electrons in the crystal linearly proportional to the energy of the photon adsorbed. A voltage is applied across two electrodes arranged across the crystal, to collect electrons/holes promoted from the valence to the conduction band. Such devices produce less electronic noise from thermal excitation at lower temperatures, and hence are typically cooled to liquid nitrogen temperatures (77 K).

histogram Two-dimensional array containing $\beta\gamma$ coincidence counts. One axis represents γ channels (or energy) while the other represents β channels (or energy).

host

(1) Machine on a network that provides a service or information to other computers. Every networked computer has a hostname by which it is known on the network.

(2) The main computer in a system of computers or terminals connected by communications links.

(3) The computer running a given program "hosted" on its hard drive.

hydroacoustic Pertaining to sound in the ocean.

hydrophone An electroacoustic transducer that responds to waterborne pressure waves and delivers essentially equivalent electrical signals.

I

IDC *See* International Data Centre (IDC).

IDC products A set of specific products and their subsets that have been derived from processing IMS data at the IDC.

identification An assertion of who someone is or what something is.

IMS *See* International Monitoring System (IMS).

IMS 2.0 format The International Monitoring System (IMS) 2.0 version of the formats and protocols used for discrete message exchange, including bulletin and waveform data. The formats and protocols are described in *Formats and protocols for messages* (IDC/ENG/SPC/103/Rev.8).

IMS data The raw data from the IMS networks. Specifically, the digitized outputs of the IMS facilities as transmitted over the communication links between the IMS facilities and the IDC.

incoherent beam The derived channel resulting from incoherent beamforming.

incoherent beamforming The same as coherent beamforming except that the waveforms are rectified (i.e. absolute values) before summing.

infrasonic Pertaining to low-frequency (sub-audible) sound in the atmosphere.

infrasound *See* infrasonic.

infrasound monitoring network The set of IMS stations specified in Table 4 of Annex 1 to the Protocol to the Treaty and comprising 60 stations.

initiated by *See* changed by.

instance Running computer program. An individual program may have multiple instances on one or more host computers.

insufficient data (IS) Category of S/H/I events that lack adequate measurements to apply any of the event screening criteria.

integrity Maintaining and assuring the accuracy and consistency of data over its entire life-cycle.

interactive processing Analyst-directed data processing. Interactive processing can be performed to review and refine existing event hypotheses (automatic or analyst-built) or to build new event hypotheses missed by prior processing.

International Data Centre (IDC) The International Data Centre is an integral part of the Technical Secretariat. Its function is to receive, collect, process, analyse, report on and archive data from IMS facilities, including the results of analysis conducted at certified radionuclide laboratories.

International Monitoring System (IMS) The global network of seismic, hydroacoustic, infrasonic, and radionuclide stations deployed as part of the CTBT verification regime.

IS *See* insufficient data (IS).

K

Kbps Kilobit per second; a measure of data transfer speed.

keV Kilo electron Volt; a unit of kinetic energy.

km Kilometre(s).

L

Level Category of radionuclide spectrum of a sample from an IMS radionuclide station.

logon Process of a computer user identifying themselves by means of a user identifier and password to a computer operating system as a registered user, beginning an interactive session.

long period A passband of interest, often for the study of surface waves. It normally refers to frequencies below 0.1 Hz.

M

magnitude Empirical measure of the size of an event (usually made on a logarithmic scale).

magnitude estimation The process whereby the magnitude (size) of an event is estimated based on the observed waveform characteristics for a specified seismic phase at one or more stations. Magnitude is calculated for each station observing the event (*See* station event magnitude) and these results are combined to come up with a network magnitude. The magnitude calculation requires that the location of the event be known, so location must be estimated before magnitude. A magnitude estimation calculation formula must account for the decreases in signal amplitude between source and receiver due to geometric spreading and anelastic attenuation. These factors are determined empirically based on the observed amplitudes for a set of events of well-known sizes.

magnitude type A particular magnitude estimation method based on a specified phase, frequency band, and instrument.

magtype Descriptor that uniquely identifies a computed magnitude type (for example, mb_ave or mb_mle).

management system System to establish policy and objectives and to achieve those objectives.

manual A manual is a written and officially approved QMS document directed to a set of related issues of particular management concern (e.g. health and safety; confidentiality; training), providing general guidance which may establish requirements for the development of procedures and the implementation of related processes and activities.

m_b Magnitude of a seismic body wave.

MDC *See* minimum detectable concentration (MDC).

measurement identifier (MID) Unique alphanumeric string identifying a specific data acquisition; includes the detector code and the acquisition start date and time.

message Piece of information passed from individual process or tasks to the local hard drive or to the supervisor console (via addrsrv) to suggest an action, indicate a condition, or inform that an event has occurred.

message ID *See* message identifier.

message identifier Unique 20-character alphanumeric identification given to a message by the sender that facilitates message tracking for the sender.

message type Kind of message; possible message types include DATA, REQUEST, and SUBSCRIPTION.

MET *See* meteorological data (MET).

met end When meteorological data collection at a station ends.

met start When meteorological data collection at a station commences.

meteorological data (MET) Data describing the global state of the atmosphere as simulated by numerical atmospheric models from major weather centres. This data is used by infrasound monitoring to build infrasound-specific dynamic atmospheric models for modelling signal propagation and by ATM.

metric

(1) Property describing the attributes of a process, service or activity that is measured to help management.

(2) Unit of measure characterizing performance.

microbarometer A transducer that converts sound waves into an electrical signal.

MID *See* measurement identifier (MID).

minimum detectable concentration (MDC) The smallest activity concentration of a radionuclide that can be reliably detected and quantified in a spectrum.

miniSEED format A format used to identify SEED data records without any control header information, also known as *data-only SEED*. The miniSEED format is described in *SEED reference manual (v.2.4)*, Appendix G (IRIS, 2012), from the Incorporated Research Institutions for Seismology (IRIS).

mission capability It is the percentage of time that a station is mission capable, and is used for setting maintenance priorities. For a station to be mission capable, verified data from the station channels required to compute mission capability must be timely. A station specific definition of mission capability is part of the station-specific documentation required to be at the station.

mission capable station A mission capable station is one that properly acquires the appropriate amount of data from a minimally specified number and required distribution of sensors and transmits these data to the IDC while meeting the data availability, timely data availability and data quality requirements imposed on an IMS station.

modem Short for modulator/demodulator. A communications device that enables a computer to transmit information over a standard telephone line. Because a computer is digital (works with discrete electrical signals representing binary 1 and binary 0) and a telephone line is analogue (carries a signal that can have any of a large number of variations), modems are needed to convert digital to analogue and vice versa. When transmitting, modems impose (modulate) a computer's digital signals onto a continuous carrier frequency on the telephone line. When receiving, modems sift out (demodulate) the information from the carrier and transfer it in digital form to the computer. Sophisticated modems are also capable of such functions as automatic dialing, answering, and redialing in addition to transmitting and receiving. Without appropriate communications software, however, modems cannot perform any useful work.

monitoring agents The monitoring agents are individually defined in a configuration file for each property or object to which a monitoring rule is to be applied. It generally includes the property or object identification, the rule, the thresholds and the actions to be triggered when the thresholds are crossed.

monitoring metric Performance indicator that measures the effectiveness of a radionuclide station at performing its monitoring mission.

monitoring mission performance A measure of how well the System is performing the monitoring mission. This is based on the System's metrics and statistics supporting sensor state-of-health, geophysical network capability, algorithmic performance, and detected event statistics.

M_S Magnitude of a seismic surface wave.

multiplet A spectrum ROI composed of more than one photopeak.

N

National Data Centre (NDC) A data centre, operated and maintained by a State Party, whose functions may include sending IMS data to the IDC and/or receiving data and products from the IDC.

National Event Bulletin (NEB) Bulletin of events that is a national product involving application of national event screening criteria.

National Event Screening If requested by a State Party, the IDC shall apply to any of its standard products, on a regular and automatic basis, event screening criteria established by that State Partys, and provide the results of such analysis to that State Party. This service shall be undertaken at no cost to the requesting State Party. The output of such national event screening processes shall be considered a product of the requesting State Party.

National Executive Summary A version of the Executive Summary that uses National Event Screening criteria.

National Screened Event Bulletin (NSEB) Bulletin of events that is a national product, excluding events that were screened out by national event screening criteria.

NC *See* not considered (NC).

NDC *See* National Data Centre (NDC).

NEB *See* National Event Bulletin (NEB).

net area Equal to the integrated photopeak counts minus the baseline and background counts, interference counts, and memory effects.

network

(1) Spatially distributed collection of S/H/I stations for which the station spacing is much larger than a wavelength.

(2) A group of stations used for monitoring. For example, the IMS network is the group of stations used by the IDC to monitor the CTBT. Spacing between stations in a network is much larger than in an array, and array processing techniques are generally not applied across a network.

network event magnitude An estimate of the size of a seismic event determined by combining the set of available station event magnitudes. Separate network event magnitudes can be calculated for each available station magnitude type (e.g. m_b, M_S).

network processing Integrated processing of data from two or more stations within a network. If the network processing requires processed station data, then station processing must be completed for all required stations before network processing can begin. Types of network processing include: signal association, event location refinement, and magnitude estimation.

noble gas Noble element of the periodic table: He, Ne, Ar, Kr, Xe, and Rn.

noble gas system Radionuclide monitoring system that collects and measures relevant noble gas isotopes by compressing air from the station environment through absorbent beds and purifying the relevant noble gas from other constituents of the air. A purified sample is then transferred to a nuclear counting system and analysed to determine its radioactive content.

noise Incoherent natural or artificial perturbations of the waveform trace caused by ice, animals migrations, cultural activity, equipment malfunctions or interruption of satellite communication, or ambient background movements.

non-defining Arrival attribute, such as arrival time, azimuth, or slowness, which is associated, but not used in calculating the event's location or event magnitude.

not considered (NC) Category of S/H/I events that are not considered for application of the event screening procedure.

not screened out (NS) Category of S/H/I events that have sufficient data to apply at least one event screening criterion but do not satisfy any of the criteria.

NS *See* not screened out (NS).

NSEB *See* National Screened Event Bulletin (NSEB).

nuclide One of many combinations of nucleons that may comprise an atomic nucleus. Because all nuclide of interest with respect to verification of compliance with the CTBT are radioactive, this term is often used to refer specifically to radionuclides.

numerical weather prediction model *See* atmospheric model.

O

onset The first appearance of a seismic or acoustic signal on a waveform.

operating system (OS) The software that controls the allocation and usage of hardware resources such as memory, CPU time, disk space, and peripheral devices. The operating system is the foundation on which applications are built. Popular operating systems include Windows and UNIX.

Operational Manual for the IDC The document that provides the guidelines for operating and maintaining the IDC established under the provisions of the Treaty. It specifies the nature of all IDC products and services and establishes overall procedures, criteria, responsibilities and requirements for all elements of design, development and operation of the IDC.

Operational Manual for the IMS The documents that describe, in broad and general terms, the responsibilities of IMS stations and laboratories and the roles of the States Parties, NDCs, IMS and Technical Secretariat in ensuring that reliable, authenticated data are transmitted within specified time constraints to the IDC. Each Operational Manual refers to operations that apply to all stations within a technology (seismologic, hydroacoustic, infrasound or radionuclide). Procedures that apply to individual stations and laboratories and details of operation are described in the station-specific documentation.

operational subsystem The portion of the System residing at the principal location that supports the operational mission. This subsystem can serve as Primary or Backup. To insure there is no impact on mission capability, development and testing are supported with separate subsystems (development subsystem and sustainment/testing subsystem).

origin Hypothesized time and location of a S/H/I event. Any event may have many origins. Characteristics such as magnitudes and error estimates may be associated with an origin.

origin beam

(1) A coherent beam and incoherent beams steered to the origin of the event.

(2) Coherent beam steered to the estimated event origin.

origin time The date and time an event occurred expressed in Coordinated Universal Time (UTC).

OS *See* operating system (OS).

P

P (phase) Seismic wave that travels from the event to the station as a compressional wave through the solid Earth.

parameter

(1) A quantitative attribute of an arrival, such as azimuth, slowness (or trace velocity), period (or frequency), amplitude and duration.

(2) A numerical or other measurable factor forming one of a set that defines a system or sets the conditions of its operation.

parse Decompose information contained in a set of data.

particulate sample A sample collected for radionuclide monitoring at a particulate station.

particulate system Radionuclide monitoring system that collects air particles in a filter by pumping the air from the station environment through this filter. Following collection, the filter is then analysed for its radioactive content.

passband Bandwidth of an electrical system, delimited by the lower and the higher frequency at which the system attenuates signals by 3 dB in terms of voltage from the maximum value.

peak A statistically significant increase in counts above a spectrum baseline at an energy associated with a photon of a particular radionuclide or other phenomenon.

period Duration of one cycle of a phase.

phase Detected signal that is identified on the basis of its path through the Earth.

phase grouping The process of grouping all of the signal detections from one station that are assumed to come from the same event. Each signal represents a different phase. The system bases grouping on signal detection measurements (e.g. relative timing, azimuth, slowness). Various operations can be made on signal detections after placing them in groups, including phase assignment, and creation of a single-station event hypothesis.

phase name Name assigned to a S/H/I arrival associated with a travel path.

PHD *See* pulse height data (PHD).

photon energy Component of the data pairs comprising a radionuclide detector's energy, resolution, and efficiency calibration data (in keV).

photopeak A peak in the γ spectrum caused by the interaction of photoelectron effect.

pipeline

(1) Flow of data at the IDC from the receipt of communications to the final automatically processed data before analyst review.

(2) Sequence of IDC processes controlled by the digital access and cross-connect system that either produce a specific product (such as a Standard Event List) or perform a general task (such as station processing).

pipeline processing The sequence of real-time automatic data processing by the System, which begins after acquisition of raw waveform data, and results in a set of event hypotheses with associated signal detections.

pipeline processing transfer The process of transferring the execution of System operations from the Primary to the Backup.

PKI *See* public key infrastructure (PKI).

policy

(1) A document describing principles or rules that guides decisions in order to achieve a rational outcome.

(2) A high level document, approved at the appropriate level of the Senior Management of the Organization, deriving from a core mission and/or values often expressed in a founding document, and intended to establish standards and objectives to be achieved by the Organization and its subsidiary bodies. A policy establishes the framework within which resources are allocated and procedures developed in order to achieve the stated standards and objectives of the Organization.

post-analysis processing Automated processing that occurs after analysts have reviewed the automatic event bulletins.

PREL Preliminary; usually referring to a SAMPLEPHD with an acquisition time less than that of the full acquisition duration.

preliminary phase label A seismic phase label determined using only station signal detection feature measurements (i.e. prior to network signal association). The possible preliminary phase labels are: compressional (P), shear (S), teleseismic (T_x), regional (Rx), and noise (N).

Preparatory Commission (PrepCom) Preparatory Commission for the CTBTO; new international body funded by States Parties to prepare for implementation of the Treaty. This body will become the CTBTO after entry-into-force of the Treaty.

PrepCom *See* Preparatory Commission (PrepCom).

primary seismic station A station of the primary network. The list of 50 primary stations is provided in Table 1-A of Annex 1 to the Protocol to the Treaty. A primary station shall fulfil the technical and operational requirements specified in the Operational Manual for Seismological Monitoring and the International Exchange of Seismological Data.

procedure A specified way to carry out an activity or a process. Note: When a procedure is documented, the term *written procedure* or *documented procedure* is frequently used.

process

(1) a structured set of activities designed to accomplish a specific objective. A process takes one or more defined inputs and turns them into defined outputs. A process may include any of the roles, responsibilities, tools and management controls required to reliably deliver the outputs. A process may define policies, standards, guidelines, activities and work instructions, if needed. (The output may be information/data that serves as an input to another process.)

(2) Function or set of functions in an application that perform a task.

(3) A set of interrelated or interacting activities that transforms inputs into outputs.

processing The manipulation of data within a computer system. Processing is the vital step between receiving geophysical data (input) and producing results (output like automatic detection).

processing sequence An ordered grouping of processing steps or other nested processing sequences connected by logic elements that specify sequencing, branching, concurrency, and entry and exit criteria. Processing sequences may specify control parameters such as data buffering and data source, and must adhere to an interface standard for invocation, status return, data access, logging, messaging, etc.

processing stage A named group of data processing and analysis functions, used to track status of increments of work performed on time intervals and events through the System. The flow of data through the System, from data acquisition, through automated processing and multiple reviews, to reporting of an event, is defined as a series of processing stages (e.g. pipeline, traditional analysis roles). A processing stage may define automatic sequences (*See* processing sequence), interactive-only activities, or interactive and automatic sequences. A stage description includes a list of functions that are performed, entry criteria (time, event, or data availability triggers), and exit criteria (completion of processing, recognition of an important event, or declaration by an analyst).

processing step A basic processing action with defined inputs and outputs. Processing steps may specify control parameters such as data buffering and data source, and must adhere to an interface standard for invocation, status return, data access, logging, messaging, etc.

program

(1) A sequence of instructions that can be executed by a computer. The term can refer to the original source code or to the executable (machine language) version. Also called software.

(2) Organized list of instructions that, when executed, causes the computer to behave in a predetermined manner. A program contains a list of variables and a list of statements that tell the computer what to do with the variables.

property A property reflects the status or the operating conditions of system component with a numerical value or with a text.

public key infrastructure (PKI) Infrastructure used for the secure exchange of information.

pulse height data (PHD) A format for spectral data messages transmitted to the IDC. Possible PHD message types include SPHD, GASBKPHD, BLANKPHD, DETBKPHD, CALIBPHD, and QCPHD.

Q

QCPHD *See* quality control pulse height data (QCPHD).

QMS *See* quality management system (QMS).

quality

(1) The ability of a product to provide the intended value.

(2) Degree to which a set of inherent characteristics fulfils requirements.

quality control The part of quality management focused on fulfilling quality requirements.

quality control pulse height data (QCPHD) Data message containing the pulse height data of a known source.

quality management

(1) The set of activities necessary to guide and control the quality matters of an organization.

(2) Coordinated activities to direct and control an organization with regard to quality.

quality management system (QMS)

(1) A generic term indicating a document that is issued under the authority of the Executive Secretary (the Director-General once the Treaty has entered into force), subordinate to the Treaty and its Protocol, and distinct from documents issued under the authority of the Policy Making Organ. They are process-related documents fulfilling QMS requirements in accordance with the Preparatory Commission's Quality Policy and conforming, as appropriate, to ISO 9000 guidance (International Organization for Standardization). QMS documents include, inter alia, manuals (other than those specified

in the Treaty as being approved by the Policy Making Organ), standard operating procedures, work instructions, and records.

(2) The set of processes responsible for ensuring that all work carried out by an organization is of a suitable quality to reliably meet objectives or service levels.

(3) Management system to direct and control an organization with regard to quality.

quality management system (QMS) document A document produced and approved under the authority of the Executive Secretary and necessary for the effective planning, operation or control of a QMS-specific process pursuant to the Provisional Technical Secretariat Quality Policy.

quantity Collected air volume in standard cubic meters; same as sampled air volume.

quefrency Time-delay axis with units of s for a cepstrum.

R

radioactivity *See* activity.

radionuclide A nuclide that has an unstable nucleus, that is, a radioactive nuclide.

radionuclide data Spectra of γ and/or β radiation associated with radioactive particulates and noble gases.

radionuclide laboratory *See* certified laboratory.

Radionuclide Laboratory Report (RLR) Report containing sample analysis results from a certified radionuclide laboratory.

Radionuclide Laboratory Reports, Preliminary and Full (RLRP/RLRF) A radionuclide standard IDC product, created by radionuclide laboratory analysis for selected samples, specifically Level 5 samples.

Radionuclide Monitoring System (RMS) The part of the IMS that monitors the atmosphere for radionuclides.

Radionuclide Monitoring System State-of-Health (RMSSOH) message One of the many radionuclide data types.

Radionuclide Network Product Summary (RNPS) Daily report containing a compilation of the status of collection, processing, and analysis of particulate and noble gas data for a 3-day period.

raw channel A source for unprocessed time series data from a S/H/I sensor (e.g. the output from a short period, vertical component seismometer).

raw waveform Output from a raw channel during a particular time interval.

real time

(1) Actual time during which something takes place.

(2) This term conveys the need for software to execute quickly to meet external timing constraints. For example, the analogue to digital converter in Digitizer Mark II has a constant 4 kHz throughput. The 386 has 250 µs to read and process each sample before the next one appears. Of course, this includes scaling, filtering, compressing, packetizing and transmitting packets, not to mention running PGA calibrations, seismometer calibrations, checking clocks, etc.

REB *See* Reviewed Event Bulletin (REB).

reboot To restart a computer by reloading the operating system.

record

(1) A document stating results achieved or providing evidence indicating that the activities indicated in standard operating procedures and/or work instructions are performed.

(2) A document stating results achieved or providing evidence of activities performed.

(3) A type of document, which is defined as an account of an event or proceedings recorded in writing or otherwise for future reference; it provides evidence that activities have been performed or results have been achieved (it always documents the past).

Note: In the context of the control and coding of PTS QMS documents, this type of documents does not require review and approval as records are not subject to change, but each Division should ensure that procedures are in place for their control.

region of interest (ROI) Region of a radionuclide spectrum or histogram that corresponds to a particular radionuclide.

regional

(distance) Source to seismometer separations between a few deg and 20 deg.

(event) Recorded at distances where the first P and S waves from shallow events have travelled along paths through the uppermost mantle.

relevant radionuclide A radionuclide that is either a fission product or an activation product included in the standard list of relevant radionuclides for IDC event screening.

report A document containing information prepared on an ad hoc, periodic, recurring, regular or as required basis. Reports may refer to specific periods, events, occurrences or subjects.

requirement

(1) Need or expectation that is stated, generally implied or obligatory. Certain terms, related to specific types of QMS documents, require definitions tailored to the requirements of the on-site inspection Division. These are set out in the order addressed in the Provisional Technical Secreteriat (PTS) QMS document, “Procedure for Coding and Control of QMS Related Documents”.

(2) Need or expectation that is stated, generally implied or obligatory.

RER *See* resolution vs energy regression (RER).

residual Difference between the observed value for an attribute (for example, time, azimuth, slowness, or magnitude) and its corresponding theoretical value.

resolution Metric of a detector’s ability to detect photons at discrete energies and is equivalent to the FWHM.

resolution The theoretical minimum change that a digital system can sense.

resolution

(1) The theoretical minimum change that a digital system can sense

(2, RN) Metric of a detector’s ability to detect photons at discrete energies and is equivalent to the FWHM.

resolution vs energy regression (RER) An equation providing the updated detector-specific relationship between resolution and energy.

resolution vs energy regression update Provides the updated detector-specific relationship between resolution and energy.

retrieve To obtain a specific requested item or set of data by locating it and returning it to a program or to the user.

Reviewed Event Bulletin (REB) A standard product based on data from all three seismoacoustic technologies and produced after analyst review of Standard Event List 3. The bulletin contains all standard event parameters and all standard signal parameters for associated signals, for each signal detection associated with each event. The uncertainties of the standard event parameters are also included. The REB is a subset of the Standard Event Bulletin with the same events but without the event characterization parameters and the event screening metrics.

Reviewed Radionuclide Report (RRR) A radionuclide IDC product. This report is the final product of the analyst review on sample pulse height data for a single radionuclide sample (gas or particulate). It includes updated versions of all the sections in an Automatic Radionuclide Report with analyst review comments made on peaks and nuclide association as well as a section on spectral peaks added, deleted or changed during the review process. The characterization level is also included.

risk Likelihood that a threat will use a vulnerability to cause harm; or, more generally, likelihood that something bad will happen that causes harm.

RLR *See* Radionuclide Laboratory Report (RLR).

RLRF *See* Radionuclide Laboratory Reports, Preliminary and Full (RLRP/RLRF).

RLRP *See* Radionuclide Laboratory Reports, Preliminary and Full (RLRP/RLRF).

RMS *See* Radionuclide Monitoring System (RMS).

RNPS *See* Radionuclide Network Product Summary (RNPS).

ROI *See* region of interest (ROI).

rotation A coordinate system transform that rotates raw channel data from a 3-C station to align the data's axes parallel and perpendicular to a specific azimuth and slowness (i.e. ray path). Rotation produces derived channels corresponding to an arriving signal's radial and transverse ground motion. The purpose of rotation is to enhance the signal-to-noise ratio of signals of interest.

RRR *See* Reviewed Radionuclide Report (RRR).

S

S (phase) Shear wave, bottoming below the uppermost mantle; also an upgoing shear wave from a source below the uppermost mantle.

safety Subject to specific guidance in this manual, safety refers to protection against danger, risk or injury caused by known hazards, accidental events or environmental risks.

sample The solid or gaseous entity collected by the radionuclide equipment at a station that is analysed to determine its airborne activity concentration. This term can also refer to any physical entity counted on a detector.

sample collection period At a particulate station takes place over a 24-hour period ($\pm 10\%$). This collection period is not dependent on type of equipment or operating mode employed at the station. Because of the short half-lives of the isotopes of interest, the air-sampling period for noble gas stations does not exceed 24 h. The schedule for sampling is established in consultation with the Technical Secretariat for each specific station in the network.

sample geometry Sample configuration, shape, and physical state in a detector chamber.

sample pulse height data (SAMPLEPHD) Data message containing the PHD of a sample measurement.

sample pulse height data (SPHD) A format for spectral data messages transmitted to the IDC. Possible SPHD message types include sample, blank, background, quality control and calibration.

sample reference ID *See* sample reference identifier (ID).

sample reference identifier (ID) A code which serves to identify a sample and its fractions, should it be split. A label bearing the sample reference identifier (e.g. bar-coded) should accompany all samples and the corresponding documentation. The sample reference identifier contains such information as date of collection, sampling system used and sample type. The sample reference identifier is also used to identify various auxiliary measurements, which though not strictly based on samples are nevertheless intimately connected to the processing and analysis of samples (such as GASBKPHD, CALIBPHD etc.).

sample splitting Level 5 samples are required to be split and sent to the radionuclide laboratories for analyses. These activities are performed following the procedure described in the station-specific document.

SAMPLEPHD *See* sample pulse height data (SAMPLEPHD).

sampling The conversion of analogue signals to a digital format; samples are taken at periodic intervals to measure and record some parameter, such as a signal from a seismic sensors. Analogue-to-digital converters are used in computers to sample analogue signals as voltages and convert them to the binary form a computer can process. The two primary characteristics of this type of sampling are the sampling rate (usually expressed in sample/s) and the sampling precision (expressed in bits; 8-bit samples, for instance, can measure an input voltage accurate to $\frac{1}{256}$ of the measured range).

sampling rate The number of samples per unit of time that are converted from analogue to digital signals at uniform time intervals.

SC3XML format An eXtensible Markup Language (XML) schema that contains station metadata. SC3XML is based on the schema used in SeisComP, a seismic software used for data acquisition, processing, distribution, and interactive analysis.

schema Database structure description.

Scheme Dialect of the Lisp programming language that is used to configure some IDC software.

score Numerical indication of the degree to which an event does, or does not, meet the event screening criteria.

screened out (SO) Category of S/H/I events that are considered to be consistent with natural or man-made, non-nuclear phenomena.

SEB *See* Standard Event Bulletin (SEB).

security Subject to specific guidance in the OSI Operational Manual, security refers to protection against danger, risk or injury caused by intentional actions.

SEED format An international standard format for the exchange of digital seismic data. It was designed for use by the earthquake research community, primarily for the exchange of unprocessed waveform data between institutions. The SEED format is described in *SEED reference manual (v.2.4)* (IRIS, 2012) from the Incorporated Research Institutions for Seismology (IRIS).

seismic Pertaining to elastic waves travelling through the Earth.

seismoacoustic Pertaining to seismic, hydroacoustic and infrasound.

seismometer A sensor that converts ground motion into an electrical signal.

SEL1 *See* Standard Event List 1 (SEL1).

SEL2 *See* Standard Event List 2 (SEL2).

SEL3 *See* Standard Event List 3 (SEL3).

sensor Device that detects a variable physical quantity and converts it to an electrical signal that can be digitally sampled.

sensor type The type of sensor used in a particular technology; a seismometer for seismic, a hydrophone or seismometer for hydroacoustic and a microbarometer for infrasonic).

short period A passband of interest, often for the study of body waves. It normally refers to frequencies above 1 Hz.

signal A coherent perturbation of the waveform trace reflecting seismic or acoustic waves generated by events.

signal association The process of linking (associating) a set of signal detections from a network of stations to an event hypothesis, either existing or new. Association is based on consistency of observed and predicted signal detection feature measurements (e.g. arrival time, azimuth, slowness). Signal association can be done automatically by the system (*See* pipeline processing), or manually by an analyst.

signal characterization The process of measuring signal detection features for the purpose of determining the phase of a signal detection, and for determining whether or not a signal detection is consistent with an event hypothesis. *See also* signal association.

signal detection A specific interval on a waveform marking the arrival of a signal of interest. Other portions of the waveform are noise.

signal detection feature A feature associated with a signal detection (e.g. arrival time, back azimuth, horizontal slowness, amplitude, frequency content).

signal detection feature measurement A measurement of a signal detection feature, including measurement uncertainty.

signal parameter Parameters that describe detected signals (e.g. arrival time, azimuth and slowness) and that may be combined to hypothesize an event.

single-station event hypothesis An event hypothesis with associated signal detections coming from only a single station.

site Location of a sensor within a station.

site code Five character alphanumeric field identifying a particular radionuclide monitoring system site: the first two characters are the country code, the next character identifies the site type (`P` for particulate radionuclide station, `X` for noble gas radionuclide station, and `L` for certified lab), and the last two characters are the numbers assigned to the station or lab in the text of the CTBT.

slowness The reciprocal of apparent wave speed, in s/deg or s/km.

SLSD *See* Standard List of Signal Detections (SLSD).

SO *See*screened out.

socket Type of file used for network communication between processes.

socket connection Method allowing a program on one machine to talk to a program on another machine over a TCP/IP connection.

software unit Discrete set of software statements that implements a function; usually a subcomponent of a computer software component (CSC).

source type An assessment of the cause of an event (e.g. deep earthquake, shallow earthquake, explosion, mine collapse). Source type can be determined automatically or by an analyst.

source-receptor sensitivity (SRS) The core results of routine ATM at the IDC. Source-receptor sensitivity fields specify the location of the air masses prior to their arrival at any radionuclide station of the IMS network. The source-receptor sensitivity resolutionin space and time is respectively one degree or smaller and three hours or shorter.

specification A document stating requirements.

spectral qualifier Code in a SAMPLEPHD that indicates whether the spectrum acquisition time is truncated (PREL) or FULL.

spectrum

(RN) A plot of the number of pulses (counts) per pulse height (as counts vs energy)

(S/H/I) Plot of the energy contained in waveforms as a function of frequency.

spectrum (RN) A plot of the number of pulses (counts) per pulse height (as counts vs energy).

spectrum (S/H/I) Plot of the energy contained in waveforms as a function of frequency.

SPHD *See* sample pulse height data (SPHD).

SPHDF *See* full sample pulse height data (SPHDF).
SRS *See* source-receptor sensitivity (SRS).
SSEB *See* Standard Screened Event Bulletin (SSEB).
SSREB *See* Standard Screened Radionuclide Event Bulletin (SSREB).
standard cubic meter Volume occupied by 1 m^3 of gas at 0 °C and 1013 hPa.
Standard Event Bulletin (SEB) A seismoacoustic standard IDC product. Currently produced by automatically adding event characterization parameters and event screening metrics to the Reviewed Event Bulletin. The bulletin contains all standard event parameters and all standard signal parameters for associated signals, for each signal detection associated with each event. The uncertainties of the standard event parameters are also included. The bulletin contains all event characterization parameters and the event screening metrics.
Standard Event List 1 (SEL1) The S/H/I bulletin created by completely automatic processing and analysis of continuous time series data. Typically, SEL1 is produced 1 h behind real time.
Standard Event List 2 (SEL2) The S/H/I bulletin created by completely automatic processing and analysis of both continuous data and segments of data specifically downloaded from stations of the auxiliary seismic network. Typically, SEL2 is produced 4 h behind real time.
Standard Event List 3 (SEL3) The S/H/I bulletin created by completely automatic processing and analysis of both continuous data and segments of data specifically downloaded from stations of the auxiliary seismic network. Typically, the list runs 6 h behind real time.
Standard Event Lists 1, 2 and 3 (SEL1, SEL2 and SEL3) The lists are produced completely automatically through automatic signal detection, association and location, without any analyst review or other interactive steps. SEL1 is based on primary seismic and hydroacoustic data. Requests for auxiliary seismic data are made for the events in SEL1. SEL2 is based on data from all three seismoacoustic technologies, including auxiliary seismic data obtained as answers to the requests. A second round of requests for auxiliary seismic data is made for the events in SEL2. SEL3 includes, in addition, auxiliary data obtained as answers to the requests and late-arriving data. The event lists contain all standard event parameters, except some of the magnitudes, and the standard signal parameters for associated signals, for each signal detection associated with each event. No surface waves are associated with the events. The uncertainties of the standard event parameters are also included.
standard event parameters The parameters to be computed for a seismoacoustic event: origin time, latitude, longitude, depth, numbers of defining phases and stations, gap in azimuth coverage, distances to closest and furthest stations, and magnitudes.
standard IDC product Any defined product of the IDC. Included are the SLSD, the SEB, the SSEB, the ARR, the RRR, the SSREB, Executive Summaries and subsets of these.
Standard List of Signal Detections (SLSD) A seismoacoustic standard IDC product, comprising the integrated, time ordered list of all detected or analyst added signals. The standard signal parameters and the estimated uncertainties are given for each signal.
standard operating procedure A written and officially approved QMS document that clearly defines how a process is structured and to be performed to produce a defined output.
Standard Screened Event Bulletin (SSEB) A seismoacoustic standard IDC product, comprising the result of applying event screening to the Standard Event Bulletin, which is the final step in the seismoacoustic processing. It is a subset of the SEB. Events in the SEB that

are screened out on the basis of the event screening metrics are not included in the SSEB, but all other events are included and the same information as in the SEB is given for these events.

Standard Screened Radionuclide Event Bulletin (SSREB) A radionuclide standard IDC product. This report is produced only for those samples that contain one or more fission or activation products from the standard list of relevant radionuclides at abnormal activity concentrations (Level 4 or 5). The SSREB is a dynamic report that incorporates information on all correlated events from any radionuclide station. It contains the Reviewed Radionuclide Report (RRR) of all contributing events, information identifying the relevant nuclide and estimates of the field of regard that are enhanced relative to those normally computed in the RRRs. When results of laboratory analysis (Radionuclide Laboratory Reports) are received by the IDC, they are appended to the SSREB.

standard signal parameters The parameters to be computed for each seismoacoustic signal detected: arrival time, preliminary phase code, amplitude, period, signal-to-noise ratio, azimuth and slowness (for seismic arrays and 3-C stations). Azimuth is also given for spatially separated hydrophone facilities.

standard signal parameters for associated signals The parameters computed for signals associated with an event station to event distance, event to station azimuth, arrival time, time residual, phase code, amplitude, period, signal-to-noise ratio, azimuth, azimuth residual, slowness, slowness residual, magnitude and flags for defining phases. Azimuth and slowness are given for arrays and 3-C stations. Azimuth is also given for spatially separated hydrophone facilities.

state of health data Supplementary data provided by sensors connected to, or associated with, equipment and instrumentation at the station, to provide information on the operational status of the station and the quality of the raw monitoring data being transmitted from the station.

State Party A Treaty signatory that has deposited its instrument of ratification.

station The equipment, facilities, infrastructure and staff required to carry out monitoring at a designated location within the IMS network. This includes all operational systems necessary for this function. In addition, the station may include the equipment necessary to provide ancillary data, such as meteorological information and state of health.

station code

(1) Code used to identify distinct stations.

(2) Site code.

(3) Five character alphanumeric field identifying a particular station: the first two characters being the country code and the last three the station number.

station data Data sent to the System by contributing stations. This includes both the ground-motion data (waveform) as well as state-of-health station data.

station event magnitude An estimate of the size of a seismic event determined by processing the waveform data recorded by one station. Separate station event magnitudes can be calculated for different magnitude types (e.g. m_b, M_S).

station identifier *See* station code.

station operator The station operator is responsible for station operation and maintenance and is the point of contact for the Technical Secretariat. Is identified as such by the State hosting, or otherwise taking responsibility for the IMS station. For stations that are not staffed or are located in remote areas with limited resources, some tasks and responsibilities of the station operator may be carried out by the Technical Secretariats, if requested by the State Party hosting the station.

station processing Processing of data from a station that is independent of processing of data from any other stations. Types of station processing include: waveform quality control, waveform filtering, beamforming, signal detection, signal characterization, and phase grouping.

station state-of-health (SoH) An assessment of how well a station is functioning for a specified time interval. Station state-of-health is based on station state-of-health data, which may include any type of data that can be time indexed, and that can be used to determine the capability of a station to meet mission requirements (e.g. status of sensor channels, site temperature, power status, security status).

station-specific documentation Documentation that comprises a description of and technical details pertaining to an individual station, including monitoring equipment and instrumentation, communication systems, operational procedures, maintenance protocols and identification of authorized station personnel.

storage media The various types of physical material on which data bits are written and stored, such as floppy disks, hard disks, tapes, zips and optical disks.

strike Azimuth of the major axis of an error ellipse.

structure Software construct that collects one or more variables, possibly of different types, together under a single name for convenient handling.

subscription A standing request for data or products.

subsystem Secondary or subordinate system within the larger system.

surface wave Wave that travels along or near the Earth's surface.

sustainment/testing subsystem The portion of the System that supports System validation testing. The sustainment/testing subsystem is a functionally redundant copy of the operational subsystem.

system configuration The complete set of parameters that define the operation of the System software for one subsystem (operational subsystem, alternate subsystem, development subsystem, sustainment/testing subsystem). Examples include sensor thresholds, filters, the particular version of an Earth model in use, and processing sequences. Each instance of a system configuration is saved so the state of all parameters at any time can be recalled.

system type Phase of the RMS sample being collected; `P` indicates particulate and `G` gaseous.

T

task *See* process.

TCP/IP *See* Transmission Control Protocol/Internet Protocol (TCP/IP).

Technical Secretariat The body established by the Executive Council to implement the technical provisions of the Treaty, including oversight of the IMS and the IDC.

teleseismic

(1) (distance) Source to seismometer separations of 20 deg or more.

(2) (event) Recorded at distances where the first P and S waves from shallow events have travelled paths through the mantle/core.

threat Anything (manmade or act of nature) that has the potential to cause harm.

three-component (3-C) station A station that measures seismic signals in three orthogonal directions. It consists of a single three-axial or separate 3-C seismometers, broadband or separate LP and short-period seismometers.

time of last calibration Time of previous detector calibration, format is $hh:mm:ss.s$.

time series Time ordered sequence of data samples. Typically a waveform or derived from waveforms, such as a beam.

time, arrival *See* arrival time.

time, origin *See* origin time.

timely data availability for an IMS S/H/I station The ratio of verified data received by the IDC within the allowable time delay of five minutes, relative to the data expected to be received from the minimum number and distribution of channels required to achieve mission capability defined in the station-specific documentation, expressed as a percentage.

total efficiency

(1) Ratio of γ-rays interacting with the detector crystal to the total number emitted by a sample.

(2) Ratio of the total number of pulses in the entire energy spectrum due to a photon of a given energy, E, to the number of photons emitted by a source for a specified source-to-detector distance. "The total efficiency can be affected by the shield design due to photon scattering" [ANSI Standard 42.14]. This parameter is required for cascade summing corrections.

trace velocity The apparent horizontal velocity of a wave moving across a set of sensors (e.g. a seismic or infrasonic array).

transmission For the purpose of this work instruction, the term "transmission" is taken to mean electronic transmission.

Transmission Control Protocol/Internet Protocol (TCP/IP) A protocol developed by the Department of Defense for communications between computers. It is built into the UNIX system and has become the de facto standard for data transmission over networks, including the Internet.

transmit date Date a message was sent from a transmitter, format is yyyy/mm/dd.

transmit time Time a message is sent from a transmitter, format is hh:mm:ss.s.

Treaty The Comprehensive Nuclear-Test-Ban Treaty (CTBT).

U

uncertainty Estimate of the deviation from the true mean for a parameter or variable of interest.

UNIX A portable, multi-user, time-shared operating system that supports process scheduling, job control, and a programmable user interface.

uptime The amount or percentage of time a system or its associated hardware is functioning and available for use.

user interface The portion of a program or an application with which a user interacts.

UTC *See* Coordinated Universal Time (UTC).

V

verbose Displaying messages as English text rather than as concise (but cryptic) codes. A verbose mode is accessible in a system for a precise monitoring of the tasks.

verified data Data that are authenticated, that do not have constant values, for which there is input from the sensors and for which there is no indication of tampering from tamper switches.

version Initial release or re-release of a CSC.

vulnerability Weakness that could be used to endanger or cause harm.

W

waveform

(1) Time-domain signal data from a sensor (the voltage output) where the voltage has been converted to a digital count (which is monotonic with the amplitude of the stimulus to which the sensor responds).

(2) A generic term for either a raw or a derived waveform.

waveform filter An algorithm that operates on a waveform to produce a derived waveform with enhanced signal content relative to the background. The most common type of filtering limits frequency content (e.g. low-pass, high-pass, or band-pass). More complex types of waveform filters compare incoming data against a model, either of the background noise (autoregressive filter), or of the expected signal (phase match filter, pseudo-correlation filter).

waveform quality control The processing of waveform data to identify problems related to data acquisition and/or transfer (e.g. dropouts, spikes). In particular, waveform quality control is focused on identifying problems that can lead to false signal detections and/or to missed true signal detections.

waveform storage format The persistent waveform storage format used by the System, as described in the Database Design Document (DBDD).

wavelength The distance between successive peaks or maxima of a wave.

work instruction A document, usually related to a standard operating procedure, which describes in detail a specific process or sub-process and its constituent activities, in accordance with stated quality parameters if possible, designed to produce an output (which may be information) which may then serve as an input to another process.

workstation High-end, powerful desktop computer preferred for graphics and usually networked.

X

xenon sample A full xenon sample is typically 2–4 standard cubic meters and is acquired in the field and after compression from the sample bag into a scuba bottle at 200 bar, it is transported to the base of operations. The final xenon sample is the concentrated and purified gas after the processing system. The final xenon sample also contains carrier gas (system specific).

IDC/AUTOSAINT/SDD
V.2.3, 12 April 2012

English only

CTBTO PREPARATORY COMMISSION | preparatory commission for the comprehensive nuclear-test-ban treaty organization

AWST science software technology

AWST-TR-08/10

autoSaint Software Design Description

This document defines the *autoSaint* software design description. The software design includes the architectural design, detailed design and interface descriptions.

Summary

autoSaint is a software system that automatically processes particulate and Xenon noble gas radionuclide data, in order to detect any radionuclide isotopes present in the sample. The software runs automatically without human intervention. It reads processing parameters from the database. It processes the sample data according to the specified parameters and writes the results back to the database. The results can then be analysed further using separate interactive analysis software.

Document History

Version	Date	Author	Description
0.1	1 February 2007	Marian Harustak	Initial draft of the document
1.0	27 March 2007	Marian Harustak	Delivered initial SDD
1.1	3 April 2007	Marian Harustak	Revised version addressing IDC comments
2.0	31 October 2007	Marian Harustak Thierry Ferey	Added descriptions in Scientific Calculations library, updated configuration parameters; modified language to the "as built" situation
2.1	21 May 2008	Marian Harustak	Added description of Xenon parts
2.2	8 June 2011	Marian Harustak	Updated to *autoSaint* version 2.1.3
2.3	12 April 2012	Marian Harustak	Added description of new autoSaint features

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1. SCOPE

1.1. Identification

This document applies to the *autoSaint* version 2.1.3.

1.2. System overview

The IMS (International Monitoring System) includes among others also radionuclide stations, where particulate and noble gas monitoring systems are installed. These systems send spectrum data to the IDC (International Data Centre) in Vienna on a daily basis. The IDC processes and reviews the spectrum data. Analysis is performed in two separate pipelines: The automatic pipeline where each incoming spectrum is processed automatically and the manual pipeline where the same spectrum and its automatic analysis are reviewed by a radionuclide analyst. Both processes produce analysis reports, which conform to a specified IDC format.

The *autoSaint* software automatically processes gamma spectral data from particulate stations equipped with HPGe detectors and noble gas stations equipped with SPALAX detectors. This processing will occur after the data have been parsed and before the Automatic Radionuclide Report (ARR) is produced.

For each received spectrum, the software calibrates the spectral data using the latest calibration pairs (resolution, energy and efficiency) and finds the reference peaks defined in the database. The calibration routine consists in calculating the spectrum baseline, the SCAC and LC calculation, and then fine tuning the peak characteristics for each peak found.

After calibrating the spectrum and updating the calibration pairs, the processing diverges for particulate and xenon noble gas samples.

- For a particulate sample, the peak finding process is being repeated to recalculate the three described quantities (energy, resolution, efficiency). In this phase the new Spectrum Baseline, the SCAC and the peaks found are stored. As the next step, the Nuclide Identification Routine runs using the last efficiency calibration.
- For noble gas sample, a xenon analysis routine is executed. In this phase the new Spectrum Baseline, the SCAC and the characteristics of four xenon isotopes are calculated.

Afterwards, for both particulates and xenon, the software calculates the activity concentration and the MDC for the energy of interest. The results of the processing are stored in the database and file store.

The software also runs the Quality Control program with the results being stored in the database.

1.3. Document overview

This document defines the *autoSaint* version 2.1.3 software design. The software design includes the architectural design, detailed design and interface descriptions.

This document is mainly intended for developers, maintainers and documentation writers. It is also of interest to project management, requirements analysts, quality assurance staff and user representatives.

The design is described in terms of a set of connected entities. An entity is an element (component) that is structurally and functionally distinct from other elements and that is separately named and referenced. Entities may be sub-systems, data stores, modules, programs, processes, or object classes. Entities may be nested or form hierarchies.

Each entity is described in terms of requirements and design decisions.

Each mandatory, testable requirement is stated using the word **shall**. Therefore, each **shall** in this document should be traceable to a documented test. Each mandatory, non-testable requirement is stated using the word **will**. Each recommended requirement is stated using the word **should**. A permissible course of action is stated using the word **may**. This convention is used in ISO/IEC 12207.

Each mandatory, design decision is stated using the word **will**. Each design recommendation is stated using the word **should**. A permissible course of action is stated using the word **may**. This convention is used in ISO/IEC 12207.

This document is compliant with the IDC Software Documentation Framework (2002) and the CTBTO Editorial Manual (2002).

2. SOFTWARE ARCHITECTURE

The architectural decomposition of the *autoSaint* software is shown in Figure 1.

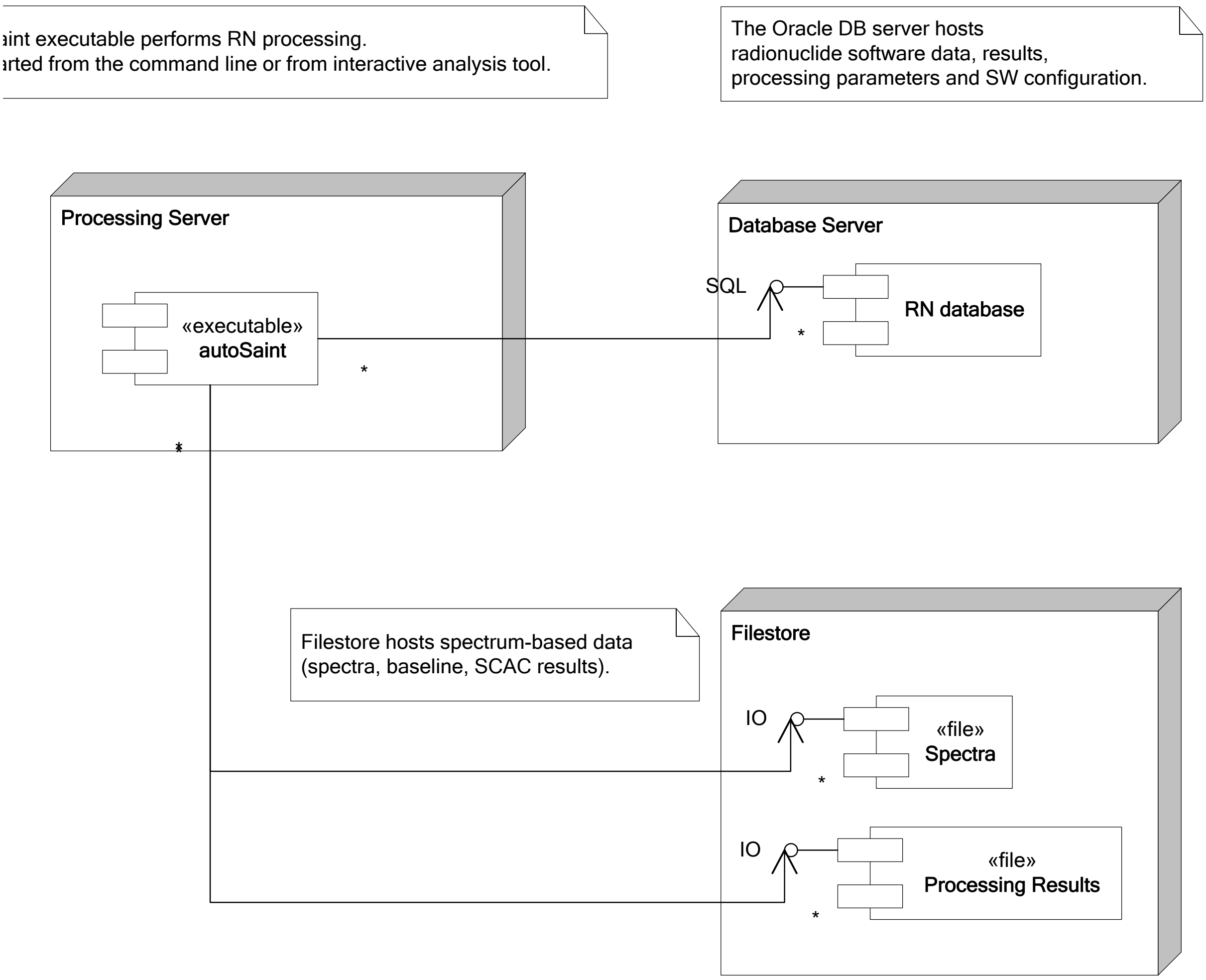

Figure 1 - *autoSaint* components

The main component is the *autoSaint* executable. This executable contains all of the functionality described in this SDD. It accesses the data stored on the relational database server (Oracle SQL) and on the file based data store (e.g. spectra files). The relational data store holds the software configuration, processing parameters, part of the input data and processing results. The file based data store holds the spectra based data (input spectra, baselines, SCACs).

2.1. Software decomposition

The architectural software decomposition of the *autoSaint* software is shown in Figure 2.

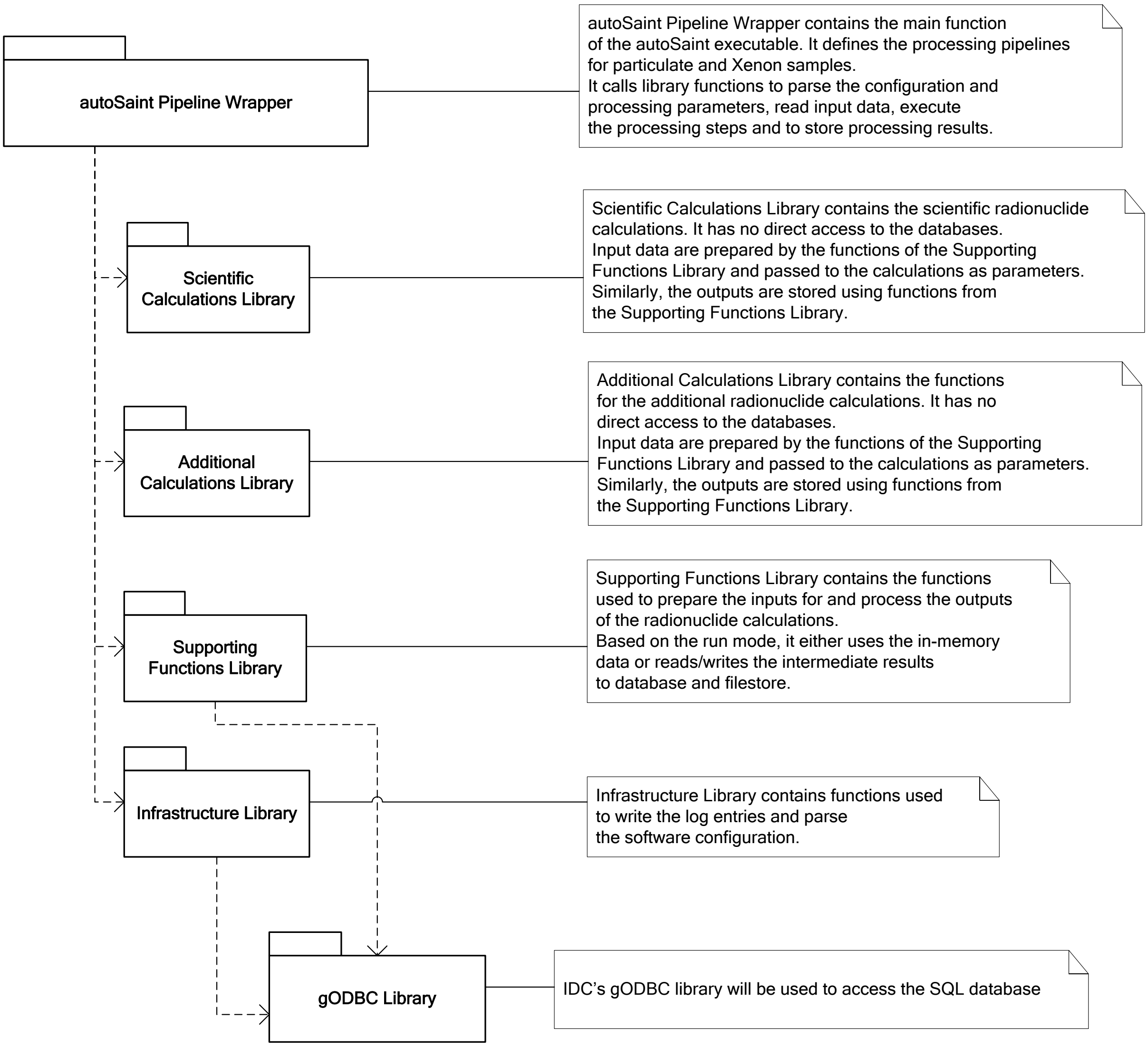

Figure 2 – Software decomposition

The *autoSaint* software can be decomposed into the Pipeline Wrapper and various libraries. The Pipeline Wrapper contains the top-level logic and calls other library functions to perform various activities. The rationale behind the decomposition is to make the software modular on the source code level and to facilitate later modifications of the processing pipeline.

2.1.1. autoSaint Pipeline Wrapper

The Pipeline Wrapper is the top-level executable component of the software. It executes the complete automatic pipeline.

The Pipeline Wrapper executes the default processing sequence for particulate or SPALAX sample as defined in the Terms of Reference (TOR) and in subsequent meetings with the

CTBTO representatives. The description of the processing sequence is included in Appendix III.

The integrity of the database and log files is ensured by using the sample ID in all database and log file entries. The sample ID thus serves as a cross-data store logical key.

2.1.2. Scientific Calculations Library

The Scientific Calculations Library contains all scientific functionality of the software, such as baseline, SCAC and LC calculations, peak search, nuclide identification and Xenon analysis. The details of the scientific calculations are described in section 3.2.

2.1.3. Additional Calculations Library

The Additional Calculation Library contains the additional calculation functions needed to perform the processing pipeline, like activity and MDC calculation and application of the QC algorithm. The details of the additional calculations are described in section 3.2.4.6.

2.1.4. Supporting Functions Library

The Supporting Functions Library is responsible for preparing the data for the calculation routines and for parsing the results. The details of the supporting functions are described in section 3.3.4.8.

2.1.5. Infrastructure Library

The Infrastructure Library contains the infrastructure functions like reading the software configuration and writing log entries. The details of the infrastructure functions are described in section 3.4.4.8.

2.1.6. gODBC

The IDC's gODBC library is used to access the SQL database. The gODBC library is not a part of the *autoSaint* software. Details of the data access are described in section 4.1.

2.2. Rationale

The rationale behind the software decomposition as described in section 2.1 is to provide the software with a high degree of configurability on the run-time level (for example allowing the users to reprocess a sample using different parameters) and a high degree of modularity on the source code level. The individual steps performed in the Pipeline Wrapper are largely independent from a source code point of view. This approach allows for an easier integration of additional processing steps.

The decomposition of the software into multiple components based on their functions also improves the maintainability of the software by making the source code easier to read and navigate.

2.3. General Implementation

The general requirements affecting the design of the *autoSaint* software, which are not specified by the detailed design description, are listed in the section 2.3.1 and are addressed in the section 2.3.2.

2.3.1. Requirements

General implementation requirements affecting the architecture, as specified in [AUTO_SAINT_SRS] and [AUTO_XE_SAINT_SRS]:

1. The software shall be implemented in ANSI C.
2. It shall be possible to regenerate all executables using GNU auto-tools.
3. The software shall compile correctly (without warnings) with both the Sun workshop compiler (version 6.2 or higher) and the GNU C compiler (version 3.4.0 or higher). *Note: Sun workshop compiler compatibility is no longer required.*
4. The software shall compile correctly with the GNU C compiler on both Solaris and Linux platforms. *Note: Solaris compatibility is no longer required.*
5. The source code shall meet the requirements specified in the [IDC_CS_2002].
6. The software shall be written in a modular fashion, so as to be extendable and to allow alternative calculation methods to be added.
7. The software shall be able to execute and completely meet all requirements on a Sun Blade 1500 sparc or better, 1Gb RAM, running Solaris (version 9 or later). *Note: Sun Solaris compatibility is no longer required.*
8. The software shall be able to execute, completely meeting all requirements, on a 1.7 GHz Pentium-4 processor with 256 MB of RAM, running Linux (Red Hat 4.2 or later).
9. The system should interface with the existing tables in the database wherever possible. This is because changing the database may impact other systems.

Note: Additional requirements were identified and corresponding software changes designed and implemented in the test use of autoSaint. These requirements were recorded in AWST Jira issue tracking tool.

2.3.2. Design decisions

Design decisions addressing the general implementation requirements:

1. The software was implemented in ANSI C. The design described in this document reflects this design decision.
2. The GNU auto-tools were used during the development of the software.
3. The software is built so that it compiles correctly (without warnings) with both the Sun workshop compiler (version 6.2 or higher) and the GNU C compiler (version 3.4.0 or higher). *Note: Sun workshop compiler compatibility is no longer required.*
4. The software is built so that it compiles correctly with the GNU C compiler on both Solaris and Linux platforms. *Note: Solaris compatibility is no longer required.*

5. The software was coded in compliance with the coding standard [IDC_CS_2002].The modularity of the software is described in the section 2.
6. The software was written for and tested on a Sun Blade 1500 sparc or better, 1Gb RAM, running Solaris (version 9 or later). *Note: Sun Solaris compatibility is no longer required.*
7. The software was written for and tested on host running a Linux Red Hat 4.2 or later.
8. The software design and implementation minimizes the need for changes of the existing tables in the database. This is because changing the database may impact other systems.

3. PROCESSING ENTITIES

3.1. *autoSaint* Pipeline Wrapper

3.1.1. Overview

The Pipeline Wrapper is the core of the *autoSaint* executable, the top-level executable component of the software. It is used to execute a complete automatic pipeline.

In terms of functionality, the Pipeline Wrapper contains only the pipeline logic. All scientific calculations, supporting and infrastructure functions are implemented in the libraries.

3.1.2. Dependencies

The Pipeline Wrapper depends on all other libraries of the *autoSaint* software, namely the Scientific Calculations Library, Additional Calculations Library, Supporting Function Library and Infrastructure Library.

It also depends on both data stores: the file based data store and the relation database.

It uses the library interfaces defined in the corresponding library header files.

3.1.3. Requirements

Table 1- Requirements allocated to Pipeline Wrapper

Requirement	Addressed by
The software shall be able to run completely automatically without any operator intervention.	The design of the Pipeline Wrapper and the handling of configuration.
The user shall have full access to the software's functionality without needing a GUI or any other interface software.	The design of Pipeline Wrapper.
The software shall be able to process 20 samples simultaneously, with each sample being processed with different parameters. It shall be possible to automatically process 20 sets of sample data simultaneously	Each sample can be processed by a different instance of the *autoSaint*. There is no limitation on the number of *autoSaint* instances running in parallel apart from those imposed by the operating system and/or database.
The software shall require a user ID and password before starting the automated processing.	User access control is performed using the database login credentials defined in the software configuration or on a command line. See section 3.1.4.2.1
The software shall have the capability to read the password from a file.	User access control is performed using the database login credentials. It is possible to read them from a file. See section 3.1.4.2.1.

Requirement	**Addressed by**
The software shall allow the user to specify: (a) Whether the default login or a specific login should be used; (b) The sample IDs to process	(a) Only the DB login is used (covered by set of requirements defining the database login credentials). (b) See section 3.1.4.2.1
If during initialization the current user is the super user then the software shall generate an error and terminate.	See section 3.1.4.2.2
The software shall provide a database login identifier and password when connecting to the database.	See section 3.1.4.2.1
The system shall have the capability to read the database login and password from a file.	See section 3.1.4.2.1
The system shall allow processing parameters to be adapted without recompiling the software.	See section 3.5.4.1
The automatic processing capability shall be able to execute completely and independently of the interactive analysis.	The design of the Pipeline Wrapper.
The software shall be able to run in parallel with the other IDC operational radionuclide software systems without affecting those systems.	The design of the Pipeline Wrapper. The only effect on other systems will be the sharing of hardware and operating system resources, if run on the same host, and sharing of database server resources.
It shall be possible for multiple instances of the software to run on a single platform.	The *autoSaint* software allows for multiple instances to run on a single platform, each processing a different sample (identified by a sample ID).
The software shall be able to log at start-up the values of all configurable values.	See section 3.1.4.2.1
If the software is unable to connect to the database then the software shall generate an error and terminate.	See section 3.1.4.2
If the software is unable to read from the database, any of the parameters required for automatic processing then the software shall generate an error message and terminate.	See section 3.1.4.2

Requirement	Addressed by
The software shall never overwrite the input data or the output data for a particular sample from the automatic processing tables, in the Auto database.	This requirement was changed upon agreement with the customer. The new requirement: The software shall never overwrite the input data from the automatic processing tables. By default, the software shall not overwrite the output data of automatic processing. It shall be possible to override this restriction by the configuration parameter. The new requirement is addressed in section 3.1.4.2.4.

Note: Additional requirements weere identified and corresponding software changes designed and implemented in the test use of autoSaint.

3.1.4. Design decisions

3.1.4.1. Pipeline Architecture

The Pipeline Wrapper processing is described in the flow diagram in Figure 3.

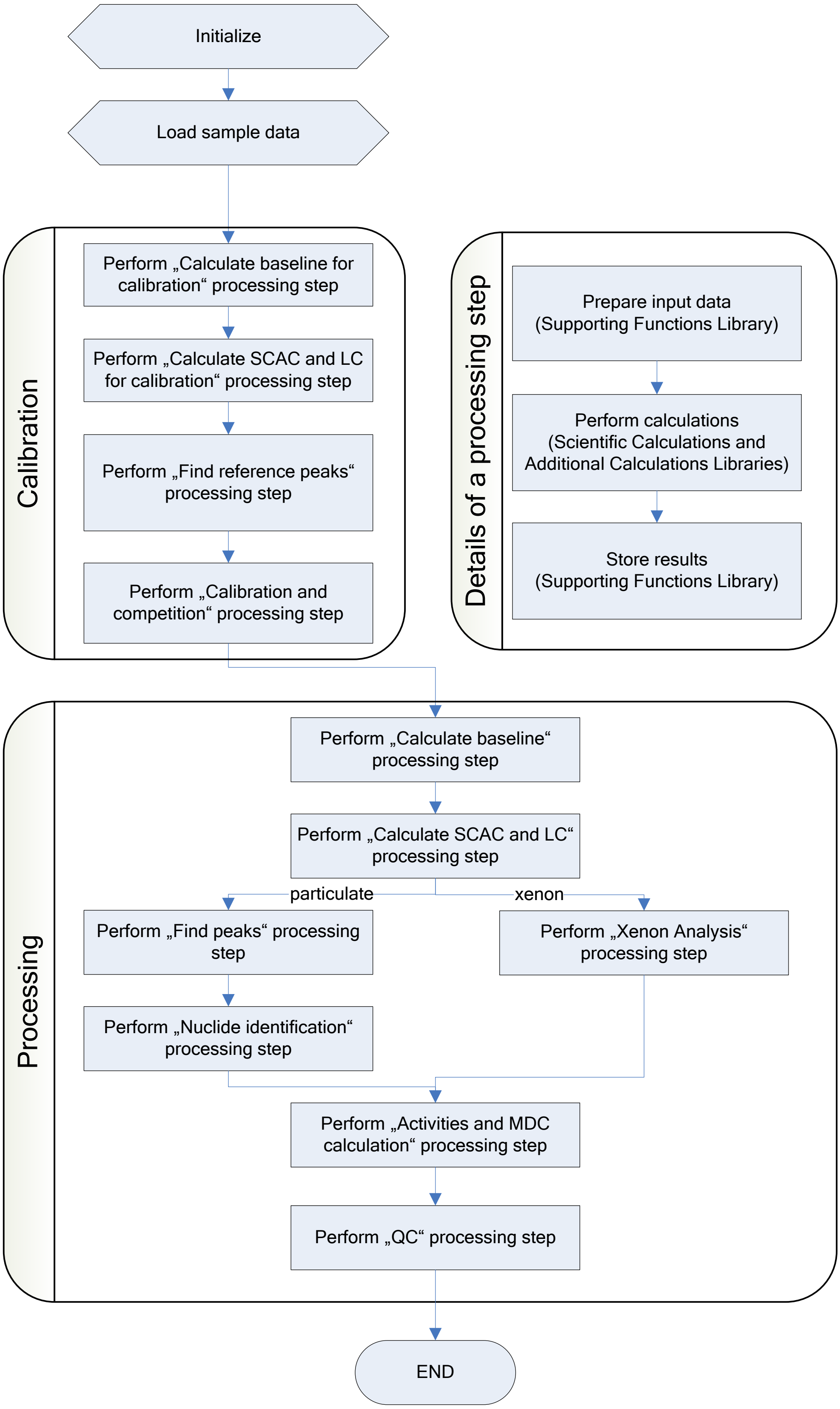

Figure 3 - Pipeline Wrapper processing sequence

Initial steps include the reading of the radionuclide measurement sample from the SQL and file-based data stores, identified by the sample ID which is provided as a command line parameter.

The Pipeline Wrapper performs a sequence of processing steps. This forms the full pipeline process. Intermediate data are passed between individual steps using in-memory data structures.

Each processing step consists of three sub-steps. Firstly, input data for the calculations are prepared by the Support Functions Library. This procedure is based on the operating mode, either the in-memory data are used or the data are read from the file(s). Secondly, the actual calculations are performed. Finally, the outputs of the calculations are processed based on the run mode. In case of the single-step mode, they are stored to files, while in pipeline-processing they are passed to the next step and optionally saved to files.

This architecture defines a clear interface between calculation functions and data preparation / handling. It uses clearly defined data structures, and makes the future additions to the pipeline easier to implement.

The individual steps of the processing pipeline are described in detail in subsequent sections of this SDD. There is a section for each library; each section describes the purpose, requirements and design considerations that have been considered for that particular library.

3.1.4.2. Initialization

The following steps are performed during the initialization of the *autoSaint* software.

3.1.4.2.1. Logging

The software logs a start-up message.

3.1.4.2.2. Verifying the User

The software verifies the operating system user name. If the current user name is “root” (super user), the software generates an error and terminates.

3.1.4.2.3. Configuration

The software parses the parameters provided in the command line. The following command line parameters are mandatory:

- Sample ID
- Database connect string, the file containing the connect string or a parameter specifying that the default file containing the connect string shall be used. If the connection fails, the software generates an error and terminates.

Afterwards, the software connects to the database and reads the parameters provided in the **GARDS_SAINT_DEFAULT_PARAMS** database table. For a list of parameters, see the Appendix II, Configuration Parameters.

For any unspecified parameters, the default values will be used, if defined.

SQL query used when reading processing parameters:

```
SELECT NAME, VALUE, MODDATE FROM GARDS_SAINT_DEFAULT_PARAMS
```

After parsing the configuration, the software verifies correctness of configuration and exits if there is a problem in the configuration (e.g. missing mandatory parameters). The parameter rules are defined in the Appendix II.

The software then stores the actual configuration parameters to the **GARDS_SAINT_PROCESS_PARAMS** database table, using SAMPLE_ID as a primary key.

SQL queries used when storing used processing parameters:

```
DELETE GARDS_SAINT_PROCESS_PARAMS WHERE SAMPLE_ID=%d

INSERT INTO GARDS_SAINT_PROCESS_PARAMS (SAMPLE_ID, NAME, VALUE) VALUES (%sampleId,
'%parameterName', '%parameterValue')

INSERT INTO GARDS_SAINT_PROCESS_PARAMS (SAMPLE_ID, NAME, VALUE) VALUES (%sampleId,
'%parameterName', NULL)
```

If the help function was requested in the input parameters, the software displays the description of available parameters and exits.

If the version string was requested in the input parameters, the software displays the version string and exits.

3.1.4.2.4. Check whether the Sample was Already Processed

The software checks whether the sample was already processed to avoid reprocessing of an already processed sample. This check is based on the STATUS attribute in **GARDS_SAMPLE_STATUS** table.

- If the STATUS is 'U' (unprocessed) or 'A' (currently under processing / failed processing), the sample is processed.
- If the STATUS is 'P' (processed), and the overwrite flag is not set, the sample is not reprocessed
- If the STATUS is 'P' and the overwrite flag is set, the sample is reprocessed and a warning message is written to the log file. The previous output in the database and the file system is overwritten.
- If the STATUS has any other value than 'U','A' or 'P', an error message is written to the log file and the sample is not processed.

At the beginning of the processing, the STATUS is set to 'A'. If the processing is successful, the STATUS is set to 'P', if the processing fails the STATUS remains set to 'A'.

SQL queries used when reading and writing processing status:

```
SELECT STATUS FROM GARDS_SAMPLE_STATUS WHERE SAMPLE_ID = %sampleId

UPDATE GARDS_SAMPLE_STATUS SET STATUS = '%newSampleStatus' WHERE SAMPLE_ID = %sampleId

DELETE FROM GARDS_COMMENTS WHERE (SAMPLE_ID = %sampleId) AND (UPPER(ANALYST) NOT LIKE
'%%INPUT%%' OR  (ANALYST IS NULL))
```

3.1.4.2.5. Preparing the Data for Processing

The software prepares the data needed for the processing of the sample. The following steps are performed:

- Read sample data from the SQL database
- Read sample spectrum data
- For Xenon noble gas processing, read preliminary samples data
- Get MRP coefficients
- Prepare energy and resolution arrays for the calibration. See section 3.4.4.1 for details.

SQL queries used to read sample data:

```
SELECT GSD.SITE_DET_CODE, GSD.SAMPLE_ID, GSD.STATION_ID, GSD.DETECTOR_ID,
GSD.INPUT_FILE_NAME, GSD.SAMPLE_TYPE, GSD.DATA_TYPE, GSD.GEOMETRY, GSD.SPECTRAL_QUALIFIER,
GSD.TRANSMIT_DTG, GSD.COLLECT_START, GSD.COLLECT_STOP, GSD.ACQUISITION_START,
GSD.ACQUISITION_STOP, GSD.ACQUISITION_REAL_SEC, GSD.ACQUISITION_LIVE_SEC, GSD.QUANTITY,
GSD.MODDATE , CAST(NVL(GSD.ACQUISITION_REAL_SEC, 0.0) AS NUMBER), GS.STATION_CODE FROM
GARDS_SAMPLE_DATA GSD, GARDS_STATIONS GS WHERE GSD.SAMPLE_ID = %sampleId AND GSD.STATION_ID
= GS.STATION_ID

SELECT XE_VOLUME FROM GARDS_SAMPLE_AUX WHERE SAMPLE_ID=%sampleId

SELECT DIR, DFILE, CAST(FOFF AS NUMBER(11,1)), CAST(DSIZE AS NUMBER(11,1)) FROM FILEPRODUCT
WHERE TYPEID = %fileproductTypeId AND CHAN = '%sampleId'

SELECT CHANNELS, CAST(NVL(START_CHANNEL,-1) AS NUMBER) FROM GARDS_SPECTRUM WHERE
SAMPLE_ID=%sampleId
```

3.1.4.3. Calibration

During the calibration, various processing parameters are recalculated. The calibration consists of the following steps:

- Calculate Baseline of the main sample spectrum (and of preliminary spectra for Xenon samples)
- Calculate LC of the main sample spectrum (and of preliminary spectra for Xenon samples)
- Calculate SCAC of the main sample spectrum (and of preliminary spectra for Xenon samples)
- Perform the initial peak search for energy calibration
- Identify reference peaks for energy calibration
- Perform energy calibration and competition
- Perform the initial peak search for resolution calibration (with variable fwhm)
- Identify reference peaks for resolution calibration
- Perform resolution calibration and competition

The details of the individual steps are described in the section 3.2.

3.1.4.4. Pipeline Processing

The sample is analyzed using the processing parameters that won in the competition performed during energy and resolution calibration.

The following steps are performed:

- Calculate Baseline of the main sample spectrum (and of preliminary spectra for Xenon samples)
- Calculate LC of the main sample spectrum (and of preliminary spectra for Xenon samples)
- Calculate SCAC of the main sample spectrum (and of preliminary spectra for Xenon samples)
- Perform peak search
- For particulate samples:
  - Identify nuclides
- For Xenon samples:
  - Perform Xenon analysis
- Calculate activities and MDCs
- Perform categorization
  Note: This step is optional and it is currently not used in the IDC
- Perform QC checks
- Set processing status

The details of individual steps are described in sections 3.2 and 3.2.4.6.

3.2. Scientific Calculations Library

3.2.1. Overview

The Scientific Calculations Library contains all scientific functionality of the software, such as baseline, SCAC and LC calculations and nuclide identification. These functions are used by the Pipeline Wrapper to execute the processing steps.

3.2.2. Dependencies

The Scientific Calculations Library depends on the Infrastructure Library to perform logging and to access the configuration. The interfaces to the library are defined by their respective header files. There is one interface function for each high-level function defined in section 3.2.4.

The input data are prepared and the outputs parsed by the Supporting Functions Library and the Data Access Library functions.

3.2.3. Requirements

There are no explicit requirements listed in [AUTO_SAINT_SRS] and [AUTO_XE_SAINT_SRS]. The design of the scientific calculations is based on the existing source code, the prototypes and the results of discussions with IDC staff.

Note: Additional requirements were identified and corresponding software changes designed and implemented in the test use of autoSaint.

3.2.4. Design decisions

The following high-level functions are defined in the Scientific Calculations Library:

- Calculate baseline
- Calculate SCAC
- Calculate LC
- Find peaks
- Nuclide identification
- Xenon Analysis

3.2.4.1. Calculate Baseline

The goal of this function is to compute the level of noise across the whole spectrum. It is based on the "lawn mower" algorithm, which cuts out each peak identified in a given energy range with respect to the slope of the selected spectrum area.

Before and after applying the "lawn mower" algorithm, the selected part of the spectrum is smoothed.

The number of times the "lawn mower" algorithm is applied depends on the part of the spectrum that is considered.

The energy boundaries and the number of passes are configurable for each detector ID and data type and it is defined in the **GARDS_BASELINE** database table. The following Table 2 shows the working example number of passes of the "lawn mower" algorithm used for each part of the spectrum. Different configurations can be defined for different types of spectra.

Table 2- Number of passes of "lawn mover"

NR of passes	Energy minimum	Energy maximum	Other condition
4	-	55	spectrum > 1
2	63	65	-
5	62	70	-
15	67	79	-

NR of passes	Energy minimum	Energy maximum	Other condition
15	67	96	-
2	95	120	-
2	117	138	-
4	130	160	-
4	504	516	-
4	2355	2390	-
10		155	-

Description of "Lawn mower" algorithm

For each channel j we define a channel interval j – δ1, j + δ2 where δ1 and δ2 are the equivalent in channels of 2*FWHM(j). If the channel j happens to be the one with maximum counts in this interval, it is a good candidate to be the centroid of a potential peak. In this case the original spectrum in the selected interval is replaced with a straight line from j – δ1 to j + δ2.

3.2.4.2. Calculate SCAC

The Single Channel Analyzer Curve (SCAC) is the spectrum as "seen by a sliding single channel analyzer". It is computed by a smoothing of the spectrum.

$$SCAC(i) = \frac{\delta 2 * Spectrum(i - \delta 1 - 1) + \delta 2 * Spectrum(i + \delta 1 + 1)\sum_{i-\delta 1}^{i+\delta 1} Spectrum(i)}{1.25 * Fwhmc(i)}$$

$$\delta 1 = E((((1.25 * Fwhmc(i)) - 1)/2) + 0.000001)$$

$$\delta 2 = (((1.25 * Fwhmc(i)) - 1)/2) + 0.000001 - \delta 1$$

3.2.4.3. Calculate LC

The goal of this function is to compute the "critical level" named LC.

LC is equal to the Baseline plus the uncertainty of the Baseline considering a given risk level.

So the regions where SCAC is above LC are most likely due to actual peaks and not to random noise.

The formula is:

$$\forall i = 1..m : LC_i = B_i + k.\sqrt{\frac{B_i}{1.25R_i}} \quad ,$$

where

$m = number\ of\ channels\ in\ the\ spectrum$
$LC_i = channel\ i\ of\ LC$
$B_i = channel\ i\ of\ Baseline$
$R_i = resolution\ of\ peaks\ around\ channel\ i$
$k = risk\ level\ in\ this\ region\ of\ the\ spectrum$

3.2.4.4. Find Peaks

The aim of this calculation is to find all the peaks in the spectrum.
The peaks to be identified have to satisfy the simultaneous equations:

$$\forall j = 1..m : S_j - B_j = \sum_{i=0..n} \frac{w_i.A_i}{\sigma_i.\sqrt{2.\pi}} * e^{\frac{(e_j - c_i)^2}{2.\sigma_i^2}} \quad ,$$

where

$m = number\ of\ channels\ in\ the\ spectrum$
$n = number\ of\ peaks\ in\ the\ spectrum$
$S_j = channel\ j\ of\ the\ spectrum$
$B_j = channel\ j\ of\ the\ baseline$
$c_i = centroid\ of\ peak\ i$
$\sigma_i = sigma\ of\ peak\ i$
$wi = channel\ width\ around\ peak\ i\ centroid$
$A_i = area\ of\ peak\ i$
$e_j = energy\ of\ channel\ j$

σ, e and w are calculated with the data of calibration arrays.
Initially, peaks are searched one by one from left to right with a left Gaussian fitting.
Then areas and centroids are tuned simultaneously and iteratively with a least square fitting.
Peaks whose magnitude is less than noise are discarded.

For each found peak, the following additional values are calculated:

<u>Area error</u>

This value is computed based on the energy of the peak centroid i.

$$AreaError = \sqrt{\frac{(SCAC_i + B_i * 1.25 * Résolution_i}{0.85891}}$$

Efficiency

This value is computed based on the energy of the found peak. The coefficients are given as input data.

$$c = \log(Coeff\,0 / ene)$$

$$Efficiency = Exp(\sum_{i=1..n} Coeff_i * c^{i-1})$$

ene : centroid energy of the current peak

Detectability (ene is the centroid value of the considered peak)

$$\forall i = ene - 2 ... ene + 2 : Detectability = Max(\frac{SCAC_i - B_i}{LC_i - B_i})$$

Finally, the filter is applied on the peaks to filter out erroneous unphysical peaks:

- Peaks with negative detectability are discarded.
- If the peak detectability is positive but less than one, the peak area condition is applied. If a peak area is greater than $1.25 \times fwhm[centroid] \times \max_{peakchannels}(LC - baseline) / 0.8591$, the peak is discarded because of unphysical area.

3.2.4.5. Nuclides Identification

The goal of this function is to identify the radionuclide responsible for the peaks found in the previous step. For each peak, a list of radionuclide with the associated contribution (in %) is given.

The routine structure is the following:

1. Find nuclides where the key line energy is close (tolerance to be set as input value) to one of the peaks found.
2. Reject nuclides where a support line (with higher detectability than the key line in the current spectrum) does not justify them.
3. Reject nuclides after interference checking (in other words, reject nuclides whose key-line is actually a line of another nuclide present)
4. Identify the other lines belonging to the selected nuclide (also using interference check).

5. Mark the unidentified peaks as unknown.

This routine uses the IDC Nuclide Library and will correct for true coincidence where an Isotope Response Function (IRF) is available.

Parameters for energy tolerance and error tolerance are given as input.

3.2.4.6. Xenon Analysis

The goal is to compute the area of each gamma peak associated to Xe isotopes.

Two different methods are used (called Method 1 and Method 2) and both method algorithms are explained in the following sections.

There are four Xe isotopes

- Two metastable isotopes Xe131m and Xe133m
- Two non-metastable isotopes Xe133 end Xe135

Each isotope is associated with one gamma peak and four peaks in the X-ray region (also simply referred to as "X" below).

Knowing the energy and the probability of each X peak it is possible to determine the shape of the X spectrum:

$$Gausx(chan) = somme_{pic} (Laurantian(chan, energy_{pic}) * probability_{pic})$$

where

Gausx	: X spectrum shape of the considered isotope
chan	: channel
$energy_{pic}$	: peak energy
$probability_{pic}$	: peak probability

Once obtained this shape is normalized so that the area is equal to one:

Func(chan) = Gausx (chan) sum Gausx

where

Func	: normalized multiplet
chan	: channel
sum Gausx	: summation of all the Gausx channels

Comments:

- The two metastable isotopes share the same normalized multiplet
- The two non metastable isotopes share another normalized multiplet

For each Xe isotope, the ratio between the multiplet area and the gamma peak area can be computed:

Ratio = multiplet area / gamma peak area

$= sum_{k=1..4} (effx_k * branchx_k) / eff_g * branch_g$

where

Ratio : X and Gamma area ratio

$effx_k$: efficiency of the X peak number k

$branchx_k$: branch value the X peak number k

eff_g : gamma efficiency

$branch_g$: gamma branch value

3.2.4.6.1. Method 1 algorithm

The goal of this method is to approximate the full spectrum based on the gamma peak area. There is one equation for each channel in the X ray region:

$sum_{i=1..4} (X_i * Func_i(chan) / Ratio_i)$ = Spectrum(chan) – Baseline(chan) + err(chan) (1)

where

i : Xe isotope index

X_i : unknown value of the area of the gamma peak for the isotope number i

$Func_i$: normalized multiplet of the isotope number i

$Ratio_i$: ratio of the X and Gamma area of the isotope number i

Spectrum : measured spectrum

Baseline : spectrum baseline

Err : spectrum error

For each isotope, the gamma area can be defined as follows:

$X_i = A_i + err(i)$ (2)

where

X_i : unknown value of the area of the gamma peak for the isotope number i

A_i : gamma peak area of the isotope number i measured in the spectrum

err(i) : error on the estimated value of A_i

Knowing that the gamma peaks are very low, the area is estimated based on the SCAC value around the theoretical value of the energy of each peak. Furthermore, the criteria SCAC > LC must not be taken into account.

$$A_i = \text{Max}\,(\text{SCAC(chan)} - \text{Baseline(chan)}) * 1.25*\text{fwhmc(chan)}/0.8591$$

where

A_i	: gamma peak area of the isotope number i measured in the spectrum
SCAC	: computed SCAC
Baseline	: computed baseline
fwhmc	: fwhm in channels

Using equations (1) and (2), an equation system can be created and solved with the least mean square method. The measurement uncertainties are also taken into account.

The results are the gamma area of each Xe isotope, and the associated uncertainties are obtained by the root square value of the terms found in the main diagonal of the covariance matrix.

Before storing the result, the covariance matrix values are adjusted by the decrease factor of the corresponding isotope:

cov_{adj}[i,isotope] = cov[i,isotope] * fAct*fAct

where

```
fAct = CCF / ( abundance[isotope] * detectorEfficiency *
acquisitionLifeTime ) * 1e03
CCF is a Coincidence Correction Factor
```

3.2.4.6.2. Method 2 algorithm

This method is based on the algorithm used in the method 1. In addition, decrease in peak area for each isotope due to its decay is also used in the calculation. The algorithm makes use of preliminary spectra.

The full spectrum is measured between t_0 and t_{tot}.

With a preliminary spectrum given at the time t, the area of a given isotope i can be computed as follow:

$$A_{it} = A_{itot} * fact_{it}$$

where

A_{it}	: gamma peak area of the given isotope measured between t_0 and t
A_{itot}	: gamma peak area of the given isotope measured between t_0 and t_{tot}

$fact_{it}$: decrease factor of the isotope i at t time

The decrease factor is computed as follow:

$fact_{it}$ = [1-exp (- $lambda_i$ * (t - t_0))] / [1-exp (- $lambda_i$ * (t_{tot} - t_0))]

where

$fact_{it}$: decrease factor of the isotope i at t

$lambda_i$: i decrease coefficient value associated to the concidered isotope

For each given preliminary spectrum and for the full spectrum the equations (1) and (2) are reused but X_i is replaced by X_i * $fact_{it.}$

The resolution of the equation system is done in the same way as for method 1.

3.2.4.6.3. Laurantian

A Laurantian is the mean of Gaussians computed around the energy of a given peak.

The Laurantian is parameterized with a parameter named gamma. When gamma is set to 0 the Laurentian is reduced to a pure Gaussian.

In the algorithms used for Xe isotope determination, the gamma parameter value is set to 15.518870.

The Laurentian is computed as follow:

Laurantian (ener) = 1/99 * Sum $_{i=1..99}$ (gaussian(ener, mu(i), sigma))

where

ener : energy of the computed channel

mu(i) : Gassian centroid for the i indices

sigma : Gaussian sigma value

Gaussians are distributed around mu0 according to the i indices by using the following law :

mu(i) = mu0 + (gamma/500)*tan((i/100-0.5)*pi)

3.3. Additional Calculations Library

3.3.1. Overview

The Additional Calculation Library contains additional radionuclide calculation functions needed to perform the processing pipeline, like a categorization and a QC check. These functions are used by a Pipeline Wrapper to execute the processing steps.

3.3.2. Dependencies

The Additional Calculations Library depends on the Infrastructure Library to perform logging and to access the configuration. The interfaces to the library are defined by their respective header files.

The input data are prepared and the outputs parsed by the Supporting Functions Library and the Data Access Library functions.

3.3.3. Requirements

There are no explicit requirements listed in [AUTO_SAINT_SRS] and [AUTO_XE_SAINT_SRS]. The design of the additional calculations is based on the existing source code and prototypes and on the results of discussions with the IDC.

Note: Additional requirements were identified and corresponding software changes designed and implemented in the test use of autoSaint.

3.3.4. Design decisions

The following high-level functions are defined in the Additional Calculations Library:

- Calculation of calibration arrays
- Identification of reference peaks
- Recalculation of processing parameters (calibration)
- Competition
- Activities Calculation
- Categorization
- QC
- IDC Efficiency calibration

3.3.4.1. Calibration Arrays

The energy and resolution calibration arrays are used during the calibration part of sample processing.

In case that the MRP_A calibration coefficients are used to calculate the arrays, the polynomial coefficients are read from the database.

In case of INPUT, the polynomial parameters is calculated using the least square polynomial fitting of the input pairs defined in the input sample.

Individual calibration coefficients sets used in *autoSaint* are described in section 3.4.4.1.

Once the polynomial parameters are available, the energy and resolution arrays are calculated.

There are two options to calculate the energy calibration array. The option used can be specified in the configuration of *autoSaint* software. The formulas associated with these options are based on Saint Matlab prototypes.

The first (default) option uses the formula:

$$\forall i = 1..m : E_i = \sum_{j=0..n} c_j . x_i^j \quad ,$$

where

$$m = number\ of\ channels\ in\ the\ spectrum$$
$$E = energy$$
$$n = energy\ regression\ polynom\ degree$$
$$c_j = energy\ regression\ polynom\ coefficien\ ts$$
$$x = [1, 2, .., m]$$

The second option uses the formula

$$\forall i = 1..m : E_i = \frac{\left(\sum_{j=0..n} c_j . x_i^j + \sum_{j=0..n} c_j . y_i^j \right)}{2} \quad .$$

where

$$m = number\ of\ channels\ in\ the\ spectrum$$
$$E = energy$$
$$n = energy\ regression\ polynom\ degree$$
$$c_j = energy\ regression\ polynom\ coefficien\ ts$$
$$x = [1, 2, .., m]$$
$$y = [0, 1, ..., m - 1]$$

The resolution array can be calculated using the formula

$$\forall i = 1..m : R_i = \sqrt{\sum_{j=0..n} c_j . E_i^j} \quad ,$$

where

$$m = number\ of\ channels\ in\ the\ spectrum$$
$$E = energy$$
$$R = resolution$$
$$n = resolution\ regression\ polynom\ degree$$
$$c_j = resolution\ regression\ polynom\ coefficients$$
$$x = [1, 2, .., m]$$

3.3.4.2.Identification of Reference Peaks

The goal of this function is to find particular, well-known peaks in the spectrum.

The results of the peak search with variable sigma parameter are compared to the list of well known reference peaks defined in the database table **GARDS_REF_LINES** (or **GARDS_XE_REF_LINES** for Xenon samples).

The following steps are performed:

- Filter out the peaks with an area smaller than the area threshold
- Associate found peaks to the reference lines by searching for the closest peak for each reference line. The peak is linked to the reference line only if the distance between reference line and peak energy is smaller than a configurable threshold.

3.3.4.3. Recalculate Processing Parameters

After the reference peak search, the INITIAL energy and resolution regression coefficients are calculated based on the centroid's channel, energy and resolution calculated for each reference peak.

A least-square fit using the Singular Value Decomposition method is used to fit the polynomial function to the pairs defined by reference peaks.

As a first step, the number of reference peaks found in the initial peak search is compared to a configurable threshold. If not enough peaks are found, the INITIAL coefficients are not calculated.

3.3.4.3.1. Energy Calibration

The energy coefficients calibration is performed using a least-square fitting of pairs $(channel_i, energy_i),\ i = 1..no\ of\ reference\ peaks$ by the polynomial function $ecr(channel) = \sum_{i=0}^{M} a_i \cdot channel^i$. The error is defined by vector

$$\Delta energy = \begin{pmatrix} \Delta channel_1 \cdot \dfrac{energy_1}{channel_1} \\ \Delta channel_2 \cdot \dfrac{energy_2}{channel_2} \\ \dots \\ \Delta channel_N \cdot \dfrac{energy_N}{channel_N} \end{pmatrix}.$$

In the calculation, $channel_i$ is the centroid channel as calculated by the initial peak search and $energy_i$ is the reference line energy. M is a degree of the fitted polynomial function and is configurable in the software, and N is the number of reference peaks.

The outputs of the least-square fitting are the vector of coefficients of the fitted polynomial function $A = \begin{pmatrix} a_0 \\ a_1 \\ \dots \\ a_M \end{pmatrix}$ and the covariance matrix $\mathrm{cov}(A)$.

3.3.4.3.2. Resolution Calibration

The resolution and resolution error values provided by the initial peak search are in the form of resolution in channel. They must be first recalculated to resolution in energy. The recalculation is done using the energy coefficients A calculated in the energy calibration:

$$resolution_{keV} = resolution_{channel} \cdot \frac{d(energy)}{d(channel)} =$$
$$= resolution_{channel} \cdot \left(a_1 + 2 \cdot a_2 \cdot channel + \dots + M \cdot a_M \cdot channel^{M-1}\right)$$

where $channel$ is the corresponding centroid channel calculated in the initial peak search.

The same recalculation applies to resolution error.

As the fitting function for resolution is $rer(channel) = \sqrt{\sum_{i=0}^{N} b_i \cdot energy^i}$, to use the same methodology as for the energy calibration, the values for the resolution are squared and therefore the least-square fit of pairs $\left(energy_i, resolution_i^{\,2}\right), i = 1..no\ of\ reference\ peaks$ by the polynomial function $rer(channel)^2 = \sum_{i=0}^{N} b_i \cdot energy^i$ is used. The error is defined as the vector $\Delta\left(resolution^2\right) = 2 * \Delta resolution * resolution = \begin{pmatrix} 2 * \Delta resolution_1 * resolution_1 \\ 2 * \Delta resolution_2 * resolution_2 \\ ... \\ 2 * \Delta resolution_P * resolution_P \end{pmatrix}$.

In the pairs, $energy_i$ is the reference line energy and $resolution_i$ is the resolution as calculated by the initial peak search. N is the degree of the fitted polynomial function and it is configurable in the software. The $\Delta resolution$ is a resolution error calculated by the initial peak search.

The outputs of the least-square fitting are the vector of coefficients of the fitted polynomial function $B = \begin{pmatrix} b_0 \\ b_1 \\ ... \\ b_N \end{pmatrix}$ and the covariance matrix $\mathrm{cov}(B)$.

3.3.4.4. Competition

The purpose of the competition is to select the best one of the available sets of calibration coefficients. The competition among the sets of calibration coefficients is performed at the end of the calibration sequence. The “winning” set of coefficients is then selected for use in processing.

There are three competition modes:

- Competition based on Nuclide identification (the default for particulate spectra)
- Competition based on Reference peaks (the default for Xenon spectra, available for particulate spectra if requested by command line parameter)
- Competition based on Covariance (available if requested by command line parameter).

3.3.4.4.1. Competition based on Nuclide Identification

This competition mode is available for particulate spectra only, and it is the default mode for particulate spectra. Processing is executed up to and including the nuclide identification step for each of the ECR candidates. For RER, the first available of MRP M, MRP A, MRP QC and INPUT is used.

The candidate with the highest number of identified nuclides is used for processing.

3.3.4.4.2. Competition based on Reference Peaks

This competition mode is available for both particulate and SPALAX spectra. For SPALAX spectra it is the default mode. Processing is executed up to and including the identification of reference peaks for each of the ECR candidates. For RER, the first available of MRP M, MRP A, MRP QC and INPUT is used.

A candidate with the highest number of found reference peaks is used for processing.

3.3.4.4.3. Competition based on Covariance Matrix

This competition mode is available for both particulate and SPALAX spectra. Extensive testing has shown that the results of this method are on average inferior to the results of the above approaches. For this reason, automatic processing does not use the competition based on the covariance matrix, but it can be requested by command line parameter, e.g. in manual reprocessing.

In this case the competition is performed in two stages:

- Energy coefficients competition
- Resolution coefficients competition.

There is a single selection algorithm that, for both ECR and RER, decides which calibration to select. This algorithm uses the same numerical procedures (least-square fit and statistical test) for both the ECR and the RER. The algorithm has three steps:

1. Only those ECR and RER candidates come into consideration, that do not show a significant shift relative to the ECR and RER relation from the current spectrum. The shift is evaluated using a shift test based on the $F(\chi^2, n)$ distribution, where χ^2 is calculated from the reference peaks energies, with energies calculated using candidate calibration coefficients and their uncertainties.
2. ECR and RER candidates are scored and the winners (one for ECR and one for RER) are selected for use in processing.

3.3.4.4.3.1. Energy competition

First, the command line parameters are evaluated:

- If the energy coefficients for the processing are specified on the command line, these are used and no other energy competition is performed.
- If the energy competition winner is specified on the command line, it is used and no other energy competition is performed.

If neither the coefficients nor the competition winner is specified as the command line parameter, the following algorithm applies:

INITIAL coefficients (calculated from the reference peaks found in the sample itself) are tested for quality sing the $F(\chi^2, n)$ distribution based on data from the polynomial fitting. The test is performed using the condition $F(\chi^2, n) < q$, where q is a configurable confidence level (default value 95%). If the condition is not met or the INITIAL coefficients are not available at all, the first available coefficients from a prioritised list of (MRP_M, MRP_{QC}, MRP_A and INPUT in descending order of priority) are used and competition ends. Here

- MRP_M stands for the most recent sample spectrum from this detector that has undergone analyst review;
- MRP_{QC} stands for the most recent QC spectrum from this detector;

- MRP_A stands for the most recent sample spectrum from this detector that has undergone automated analysis; and
- INPUT stands for the coefficients in the message file of the current sample spectrum itself.

MRP coefficients are considered to be available if the corresponding MRP sample is found by a search query. INPUT coefficients are always available.

If the INITIAL coefficients pass the quality test, all candidates are tested for a possible shift, which, if present, would disqualify them. The shift is evaluated using the $F(\chi^2, n)$ distribution for each candidate coefficient set. First, the square of error is calculated for each peak:

$\Delta energy_i^2 = \sum_{k=1}^{M}\sum_{l=1}^{M} centroid\ channel_i^{(k-1)+(l-1)} \cdot \mathrm{cov}(k,l)$, where M is a degree of the candidate polynomial, $\mathrm{cov}(k,l)$ is an element from the covariance matrix and $channel_i$ is the centroid channel calculated by the reference peak search.

Then the least square is calculated:

$\chi^2 = \sum_{i=1}^{N} \frac{(energy(channel_i) - centroid\ energy_i)^2}{\Delta energy_i^2 + \Delta centroid\ energy^2}$, where N is the number of reference peaks, $energy()$ is the energy calculated using the polynomial defined by the candidate, $centroid\ channel_i$, $centroid\ energy_i$ and $\Delta centroid\ energy_i$ are the centroid channel, energy and energy error calculated by the reference peak search.

As the next step, the chi-square distribution $F(\chi^2, n)$ is calculated, where n is the degree of freedom and it equals to number of reference peaks.

Finally, the shift is tested using the condition $F(\chi^2, n) < q$, where q is a configurable confidence level (default value 95%). If the condition is satisfied, the candidate is qualified to enter the competition.

For the candidates that passed the shift test a score is calculated as $score = \max_{a \le channel \le b} \Delta energy(channel)$, where a and b are the channels at the energies defining the scoring energy range. These energies are configurable separately for particulate and Xenon samples.

The candidate with minimal score wins.

3.3.4.4.3.2. Resolution competition

The resolution competition is based on the winning energy coefficients from the energy competition and on reference peaks found in the peak search for resolution competition.

First, the command line parameters are evaluated:

- o If the resolution coefficients for the processing are specified on the command line, these are used and no competition is performed.
- o If the resolution competition winner is specified on the command line, no actual competition is performed and the specified winner is used.

If neither the coefficients nor the competition winner is specified on the command line, the following algorithm applies. The algorithm is similar to the one used for energy competition:

INITIAL coefficients are tested for a shift using the $F(\chi^2, n)$ based on data from the polynomial fitting. The test is performed using the condition $F(\chi^2, n) < q$, where q is a configurable confidence level (default value 95%). If the condition fails or the INITIAL coefficients are not available at all, first available coefficients from MRP_M, MRP_{QC}, MRP_A and INPUT are used and competition ends.

If the test of INITIAL coefficients succeeds, all candidates are tested for a shift. Only the candidates passing the test will enter the competition. For each candidate, the following test applies:

The square of error is calculated for each peak:

$\Delta resolution_i^2 = \sqrt{\sum_{k=1}^{M}\sum_{l=1}^{M} centroid\ energy_i^{(k-1)+(l-1)} \cdot \mathrm{cov}(k,l)}$, where M is a degree of the candidate polynomial, $\mathrm{cov}(k,l)$ is an element from the covariance matrix and $centroid\ energy_i$ is the centroid energy calculated by the reference peak search.

Then the least square is calculated:

$\chi^2 = \sum_{i=1}^{N} \frac{(resolution(energy_i) - centroid\ resolution_i)^2}{\Delta resolution_i^2 + \Delta centroid\ resolution^2}$, where N is the number of reference peaks, $resolution()$ is the resolution calculated using the polynomial defined by the candidate, $centroid\ energy_i$, $centroid\ resolution_i$ and $\Delta centroid\ resolution_i$ are the centroid energy, resolution and resolution error calculated by the reference peak search.

As the next step, the chi-square distribution $F(\chi^2, n)$ is calculated, where n is the degree of freedom and it equals to number of reference peaks.

Finally, the shift is tested using the condition $F(\chi^2, n) < q$, where q is a configurable confidence level (default value 95%). If the condition is satisfied, the candidate is qualified to enter the competition.

For the candidates that passed the shift test the score is calculated as $score = \max_{a \le energy \le b} \Delta resolution(energy)$, where a and b are the channels at the energies defining the scoring energy range. These energies are configurable separately for particulate and Xenon samples.

The candidate with minimal score wins.

3.3.4.4.4. Efficiency Competition

First, the command line parameters are evaluated:

- If the efficiency coefficients for the processing are specified on the command line, they overwrite the calculated efficiency coefficients.
- If VGSL pairs are available, these are used.
- Otherwise, if IDC efficiency pairs are enabled (parameter EffIDCPairs) and available (database table **GARDS_EFFICIENCY_IDC_PAIRS**), those are used.
- Otherwise the pairs from the sample itself are used.

3.3.4.5.Calculate Activities and Concentrations

For each peak and nuclide line found in the nuclides identification for particulate samples or for each relevant Xenon isotope line for Xenon samples, the following line characteristics are calculated.

$$Act_i = \frac{A_{ki} \cdot CCF \cdot DCF}{Y_i \cdot eff_{ki} \cdot T_L},$$

where

Act_i is an activity of the nuclide i

A_{ki} is a net key peak area

CCF is a coincidence correction factor

Y_i is a key line yield in the decay of nuclide i

eff_{ki} is detector efficiency at key line

T_L is an acquisition life time

and DCF is a decay correction factor.

$$DCF = \frac{\lambda \cdot T_S}{1 - e^{-\lambda \cdot T_S}} \cdot e^{\lambda \cdot T_D} \cdot \frac{\lambda \cdot T_A}{1 - e^{-\lambda \cdot T_A}},$$

where

T_S is a sampling time

T_A is an acquisition real time

T_D is a decay time

λ is a nuclide decay constant.

This formula assumes that the activity concentration in air stayed constant during sampling.

The relative uncertainty in the activity is calculated as the square root of the sum of the squares of the relative uncertainties in the area and the efficiency.

$$Act_{ierr} = \sqrt{A_{kierr}^2 + eff_{kierr}^2}$$

The nuclide concentration is derived from activity by dividing it with sampling volume:

$$Con_i = \frac{Act_i}{S_{vol}}$$

The data sources for the individual elements of the formula are described in the Table 3 (for particulate samples) and in the Table 4 (for Xenon samples)

Table 3 - Data sources for particulate activity calculation

Symbol	Data source
A_{ki}	Area of the key line peak from the peak search results. TPeak.area*TPeak.comment.->value, where TPeak.comment->keyFlag is set to 1 and TPeak.name == nuclide$_i$ name
A_{kierr}	Key line peak area uncertainty from the peak search results TPeak.areaUncertainty*TPeak.comment.->value where TPeak.comment->keyFlag is set to 1 and TPeak.name == nuclide$_i$ name.
CCF	**GARDS_IRF**.SUM_CORR
Y_i	**GARDS_NUCL_LINES_LIB**.ABUNDANCE
eff_{ki}	Efficiency of the key line peak from the peak search results. TPeak.efficiency.
eff_{kierr}	Efficiency uncertainty of the key line peak from the peak search results. TPeak.efficiencyUncertainty.
T_L	**GARDS_SAMPLE_DATA**.ACQUISITION_LIVE_SEC
T_S	(**GARDS_SAMPLE_DATA**.COLLECT_STOP-**GARDS_SAMPLE_DATA**.COLLECT_START) * 24 * 60 * 60
T_A	**GARDS_SAMPLE_DATA**.ACQUISITION_REAL_SEC
T_D	(**GARDS_SAMPLE_DATA**.ACQUISITION_START-**GARDS_SAMPLE_DATA**.COLLECT_STOP) * 24 * 60 * 60

Symbol	Data source
λ	$\lambda = \frac{\log(2)}{t}$, where t is half-life in seconds (**GARDS_NUCL_LIB**.HALFLIFE_SEC)
S_{vol}	**GARDS_SAMPLE_DATA**.QUANTITY

Table 4 - Data sources for Xenon activity calculation

Symbol	Data Source
A_{ki}	Area of the peak from the Xenon analysis results.
A_{kierr}	Area uncertainty from the Xenon analysis results
CCF	Constant “1”.
Y_i	**GARDS_XE_NUCL_LINES_LIB**.ABUNDANCE
eff_{ki}	Detector efficiency at gamma line. For MDI, detector efficiency at x-ray line.
eff_{kierr}	1% of the detector efficiency.
T_L	**GARDS_SAMPLE_DATA**.ACQUISITION_LIVE_SEC
T_S	(**GARDS_SAMPLE_DATA**.COLLECT_STOP-**GARDS_SAMPLE_DATA**.COLLECT_START) * 24 * 60 * 60
T_A	**GARDS_SAMPLE_DATA**.ACQUISITION_REAL_SEC
T_D	(**GARDS_SAMPLE_DATA**.ACQUISITION_START-**GARDS_SAMPLE_DATA**.COLLECT_STOP) * 24 * 60 * 60
λ	$\lambda = \frac{\log(2)}{t}$, where t is half-life in seconds (**GARDS_XE:NUCL_LIB**.HALFLIFE_SEC)
S_{vol}	**GARDS_SAMPLE_AUX**.XE_VOLUME / 0.087

Minimum Detectable Activities (MDA) and Minimum Detectable Concentrations (MDC) of all nuclides of interest are calculated using the formulas below.

$$MDA_i = \frac{L_{DI} \cdot CCF \cdot DCF}{Y_i \cdot eff_{ki} \cdot T_L}$$

$$MDC_i = \frac{MDA_i}{S_{vol}}$$

$$L_{DI} = \frac{2 \cdot FWHMC_i \cdot (LCC_i - baseline_i)}{0.8591}$$

The data sources are described in the Table 5.

Table 5 - Data sources for minimum activity and concentration calculations

Symbol	Data Source
LCC_i	LCC at line channel
$baseline_i$	Baseline at line channel
$FWHMC_i$	FWHMC (channel resolution) at line channel

For particulate samples, the results are stored in **GARDS_NUCL_LINES_IDED** database table.

For Xenon samples, the results are stored in **GARDS_XE_RESULTS** database table.

In addition, decay uncorrected concentration is calculated for Xenon samples (with no DCF factor applied).

For particulate samples, nuclide characteristics are calculated out of line characteristics. Calculated characteristics include:

- Average activity
- Average activity uncertainty
- Activity at key line
- Activity uncertainty at key line
- Minimal MDA
- CSC ratio at key line
- CSC ratio uncertainty at key line
- CSC ratio flag at key line
- Nuclide found flag
- Decay correction factor

These results are stored in **GARDS_NUCL_IDED** database table.

Note: The activity calculations are not performed for Detector Background spectra.

3.3.4.6.Categorization

Note: The categorization by autoSaint can be performed for particulate samples only and it is currently not in use in the IDC.

The categorization assigns one of the category levels 1 to 5 to each sample.

First, individual nuclides are categorized:

- Nuclide template is loaded of it exists
- The relevance of the nuclide is determined
- The nuclide type is identified to determine whether the nuclide is natural or cosmic
- Natural non-relevant nuclides are assigned the category level 2
- For non-natural and/or relevant nuclides, if the template exists, it is used to determine the category level.
- If the template does not exist, the category level of a nuclide is defined based on relevance, nuclide count in the last month, nuclide count in history and on other attributes.

Then, the category level of the sample is determined based on the nuclide categorization results. The category of the sample will be set equal to the highest category of its nuclides, with special treatment applied to the category level 4 nuclides.

SQL queries used in categorization:

```
SELECT NID_FLAG, NAME, ACTIV_KEY, TYPE FROM GARDS_NUCL_IDED WHERE SAMPLE_ID = %sampleId

SELECT STATION_ID, DETECTOR_ID, NAME, METHOD_TYPE, CAST(NVL(UPPER_BOUND,0.0) AS NUMBER),
CAST(NVL(LOWER_BOUND,0.0) AS NUMBER), CAST(NVL(CENTRAL_VALUE,0.0) AS NUMBER),
TO_CHAR(BEGIN_DATE,'YYYY-MM-DD HH24:MI:SS'), CAST(NVL(ABSCISSA,0.0) AS NUMBER) FROM
GARDS_CAT_TEMPLATE WHERE STATION_ID = %stationId AND NAME = '%nuclideName' AND BEGIN_DATE <
to_date('%acquisitionStart', 'YYYY/MM/DD HH24:MI:SS') AND END_DATE >
to_date('%acquisitionStart', 'YYYY/MM/DD HH24:MI:SS')

SELECT STATION_ID, DETECTOR_ID, NAME, METHOD_TYPE, CAST(NVL(UPPER_BOUND,0.0) AS NUMBER),
CAST(NVL(LOWER_BOUND,0.0) AS NUMBER), CAST(NVL(CENTRAL_VALUE,0.0) AS NUMBER),
TO_CHAR(BEGIN_DATE,'YYYY-MM-DD HH24:MI:SS'), CAST(NVL(ABSCISSA,0.0) AS NUMBER) FROM
GARDS_CAT_TEMPLATE WHERE STATION_ID = %stationId AND NAME = '%nuclideName' AND BEGIN_DATE <
to_date('%acquisitionStart', 'YYYY/MM/DD HH24:MI:SS') AND END_DATE IS NULL

SELECT TYPE FROM GARDS_RELEVANT_NUCLIDES WHERE NAME = '%nuclideName' AND SAMPLE_TYPE =
'%sampleType'

SELECT TYPE FROM GARDS_NUCL_LIB WHERE NAME = '%nuclideName'

SELECT CAST(COUNT(GSC.ACTIVITY) AS NUMBER(11,1)) FROM GARDS_SAMPLE_CAT GSC,
GARDS_SAMPLE_DATA GSD, GARDS_READ_SAMPLE_STATUS GSS WHERE GSC.SAMPLE_ID = GSD.SAMPLE_ID AND
GSC.SAMPLE_ID = GSS.SAMPLE_ID AND GSD.STATION_ID = %stationId AND GSC.NAME = '%nuclideName'
AND GSS.STATUS IN ('R' ,'Q') AND GSS.CATEGORY IS NOT NULL AND GSD.COLLECT_STOP BETWEEN
to_date('%collectStop', 'YYYY/MM/DD HH24:MI:SS')-30 AND to_date('%collectStop', 'YYYY/MM/DD
HH24:MI:SS')

SELECT GSC.ACTIVITY FROM GARDS_SAMPLE_CAT GSC, GARDS_SAMPLE_DATA GSD,
GARDS_READ_SAMPLE_STATUS GSS WHERE GSC.SAMPLE_ID = GSD.SAMPLE_ID AND GSC.SAMPLE_ID =
GSS.SAMPLE_ID AND GSD.STATION_ID = %stationId AND GSC.NAME = '%nuclideName' AND GSS.STATUS
in ('R' ,'Q') AND GSS.CATEGORY IS NOT NULL AND HOLD = 0 AND GSD.COLLECT_STOP <
to_date('%collectStop', 'YYYY/MM/DD HH24:MI:SS') ORDER BY GSD.COLLECT_STOP DESC

SELECT GSC.ACTIVITY FROM GARDS_SAMPLE_CAT GSC, GARDS_SAMPLE_DATA GSD,
GARDS_READ_SAMPLE_STATUS GSS WHERE GSC.SAMPLE_ID = GSD.SAMPLE_ID AND GSC.SAMPLE_ID =
GSS.SAMPLE_ID AND GSD.STATION_ID = %stationId AND GSC.NAME = '%nuclideName' AND GSS.STATUS
IN ('R' ,'Q') AND GSS.CATEGORY IS NOT NULL AND HOLD = 0 AND GSD.COLLECT_STOP <
to_date('%collectStop', 'YYYY/MM/DD HH24:MI:SS') ORDER BY GSD.COLLECT_STOP DESC

SELECT GSD.SAMPLE_ID, to_char(GSD.ACQUISITION_START, 'YYYY-MM-DD HH24:MI:SS') FROM
GARDS_SAMPLE_DATA GSD, GARDS_READ_SAMPLE_STATUS GSS, GARDS_SAMPLE_CAT GSC WHERE
HSD.STATION_ID = %stationId AND GSD.DETECTOR_ID = %detectorId AND GSD.ACQUISITION_START <
to_date ('%acquisitionStart','YYYY/MM/DD HH24:MI:SS') AND GSD.SAMPLE_ID = GSS.SAMPLE_ID AND
GSD.SAMPLE_ID = GSC.SAMPLE_ID AND GSS.STATUS IN ( 'R', 'Q' ) AND GSS.CATEGORY IS NOT NULL
AND GSC.NAME = '%nuclideName' AND GSC.HOLD = 0 ORDER BY ACQUISITION_START DESC

SELECT CAST(NVL(UPPER_BOUND,0.0) AS NUMBER), CAST(NVL(LOWER_BOUND,0.0) AS NUMBER),
CAST(NVL(CENTRAL_VALUE,0.0) AS NUMBER) FROM GARDS_SAMPLE_CAT WHERE SAMPLE_ID = %sampleId
AND NAME = '%nuclideName'

UPDATE GARDS_SAMPLE_STATUS SET AUTO_CATEGORY = %newAutoCategory, CATEGORY = NULL WHERE
SAMPLE_ID = %sampleId

SELECT AUTO_CATEGORY FROM GARDS_SAMPLE_STATUTS WHERE SAMPLE_ID = %sampleId
```

3.3.4.7. QC

The quality control (QC) consists of several independent QC checks performed at the end of sample processing. The QC checks performed are shown in Table 6. Each QC check can be separately enabled or disabled by the *autoSaint* configuration.

Table 6 – List of QC checks

Name	Condition
Acquisition time	The acquisition time of a sample must be longer than or equal to 20 hours.
Collection time	The collection time of a sample must be

Name	Condition
	between 21.6 and 26.4 hours
Decay time	The decay time of a sample must be between 21.6 and 26.4 hours
Reporting time	The reporting time of a sample must be shorter than 72 hours.
Air volume	The total air volume must be at least 500 cubic meters.
Collection gaps	The collection gaps must be in the range 0-30 minutes.
Preliminary samples	The number of preliminary samples must correspond to the sample acquisition time.
Flags	Be-7 FWHM test: FWHM (477.5) < 1.7 Ba-140 MDC test: MDC within defined limits
Flow 500	SOH flow rate higher than or equal to defined threshold.
Flow GAP	No gaps in flow data.
Flow ZERO	SOH blower data should be complete.
Flow	Measured quantity should match calculated quantity.
Drift MRP	The peak attributes are checked for drift problems (by comparing peak areas) within 10 days.
Drift 10 days	The peak attributes are checked for drift problems (by comparing peak areas) within 10 to 30 days.
Categorization	Auto category present and with value less than 4.
ECR	Check whether MRP_A or MRP_M was used for both ECR and RER calibration.
Nuclide identification	At least 80% of the peaks are identified.

SQL queries used in QC checks:

```
SELECT MDA FROM GARDS_NUCL_IDED WHERE (SAMPLE_ID = %sampleId) AND (NAME LIKE 'BA-140')

SELECT MDA_MIN, MDA_MAX FROM GARDS_MDAS2REPORT WHERE (NAME = 'BA-140') AND (SAMPLE_TYPE =
'%sampleType') AND (DTG_BEGIN < to_date ('%acquisitionStart','YYYY/MM/DD HH24:MI:SS')) AND
(DTG_END IS NULL OR DTG_END > to_date ('%acquisitionStart','YYYY/MM/DD HH24:MI:SS'))

SELECT D1.SAMPLE_ID, D1.COLLECT_STOP, D2.COLLECT_START FROM GARDS_SAMPLE_DATA D1,
GARDS_SAMPLE_DATA D2 WHERE D1.DATA_TYPE = D2.DATA_TYPE AND D1.SPECTRAL_QUALIFIER =
D2.SPECTRAL_QUALIFIER AND D1.STATION_ID = D2.STATION_ID AND D1.DETECTOR_ID = D2.DETECTOR_ID
AND (D2.ACQUISITION_STOP - D1.ACQUISITION_STOP) < 5.0 AND D1.ACQUISITION_STOP <
D2.ACQUISITION_STOP AND D2.SAMPLE_ID = (%sampleId) ORDER BY D1.ACQUISITION_STOP DESC

SELECT D1.SAMPLE_ID, D1.ACQUISITION_START, D1.ACQUISITION_STOP FROM GARDS_SAMPLE_DATA D1,
GARDS_SAMPLE_DATA D2 WHERE D1.COLLECT_START = D2.COLLECT_START AND D1.COLLECT_STOP =
D2.COLLECT_STOP AND D1.ACQUISITION_START = D2.ACQUISITION_START AND D1.SPECTRAL_QUALIFIER =
'PREL' AND D2.SAMPLE_ID = (%sampleId) ORDER BY D1.ACQUISITION_STOP

SELECT F.NAME FROM GARDS_SAMPLE_FLAGS S, GARDS_FLAGS F WHERE S.FLAG_ID = F.FLAG_ID AND
S.RESULT = 0 AND S.SAMPLE_ID = (%sampleId)

SELECT * FROM GARDS_PEAKS WHERE ENERGY >= 1460.3 AND ENERGY <= 1461.3 AND SAMPLE_ID =
(%sampleId)

SELECT VALUE, DTG_BEGIN, DTG_END FROM GARDS_SOH_NUM_DATA WHERE STATION_ID = %stationId AND
PARAM_CODE = %paramCode AND GARDS_SOH_NUM_DATA.DTG_BEGIN <
to_date('%collectStop','YYYY/MM/DD HH24:MI:SS') AND GARDS_SOH_NUM_DATA.DTG_END >
to_date('%collectStart','YYYY/MM/DD HH24:MI:SS') AND (GARDS_SOH_NUM_DATA.DTG_END -
to_date('%collectStop','YYYY/MM/DD HH24:MI:SS')) < (1/24) ORDER BY DTG_BEGIN, DTG_END

SELECT VALUE, DTG_BEGIN, DTG_END FROM GARDS_SOH_CHAR_DATA WHERE STATION_ID = %stationId AND
PARAM_CODE = %paramCode AND GARDS_SOH_CHAR_DATA.DTG_BEGIN <
to_date('%collectStop','YYYY/MM/DD HH24:MI:SS') AND GARDS_SOH_CHAR_DATA.DTG_END >
to_date('%collectStart','YYYY/MM/DD HH24:MI:SS') AND (GARDS_SOH_CHAR_DATA.DTG_END -
to_date('%collectStop','YYYY/MM/DD HH24:MI:SS')) < (1/24) ORDER BY DTG_BEGIN, DTG_END

SELECT SAMPLE_REF_ID FROM GARDS_SAMPLE_AUX WHERE SAMPLE_ID = %sampleId

SELECT SAMPLE_ID, ACQUISITION_START, ACQUISITION_STOP FROM GARDS_SAMPLE_DATA WHERE
DATA_TYPE = 'Q' AND STATION_ID = %stationId AND DETECTOR_ID = %detectorId AND ( to_date(
'%acquisitionStart','YYYY/MM/DD HH24:Mi:SS') - ACQUISITION_STOP ) < %gapThreshold

SELECT SAMPLE_ID, ACQUISITION_STOP FROM GARDS_SAMPLE_DATA WHERE DATA_TYPE = 'Q' AND
STATION_ID = %stationId AND DETECTOR_ID = %detectorId AND (to_date('%acquisitionStop',
'YYYY/MM/DD HH24:Mi:SS') - ACQUISITION_STOP) < %d AND SAMPLE_ID < %sampleId ORDER BY
ACQUISITION_STOP DESC

SELECT SAMPLE_ID, ACQUISITION_STOP FROM GARDS_SAMPLE_DATA WHERE DATA_TYPE = 'Q' AND
STATION_ID = %stationId AND DETECTOR_ID = %detectorId AND (to_date('%acquisitionStop',
'YYYY/MM/DD HH24:Mi:SS') - ACQUISITION_STOP) < %highThreshold AND
(to_date('%acquisitionStop', 'YYYY/MM/DD HH24:Mi:SS') - ACQUISITION_STOP) > %lowThreshold
AND SAMPLE_ID < %sampleId ORDER BY ACQUISITION_STOP DESC

SELECT SAMPLE_ID, CENTROID, FWHM, AREA FROM GARDS_PEAKS WHERE SAMPLE_ID IN (%sampleId1,
%sampleId2) AND AREA > %threshold ORDER BY SAMPLE_ID, CENTROID

SELECT PEAK_ID FROM GARDS_PEAKS WHERE (SAMPLE_ID = %sampleId) AND (IDED=1)

SELECT PEAK_ID FROM GARDS_PEAKS WHERE (SAMPLE_ID = %sampleId) AND (IDED!=1)

DELETE FROM GARDS_QC_RESULTS WHERE SAMPLE_ID = %sampleId

INSERT INTO GARDS_QC_RESULTS (SAMPLE_ID, TEST_NAME, FLAG, QC_COMMENT ) VALUES ( %sampleId,
'%testName', '%testResult', '%comment' )
```

3.3.4.8. IDC Efficiency Calibration

The IDC efficiency calibration is performed for CALIBPHD spectra after the nuclide identification step. IDC efficiency pairs obtained in efficiency calibration can subsequently be used in processing SPHD and SPIKE spectra. The processing sequence is shown in Figure 1.

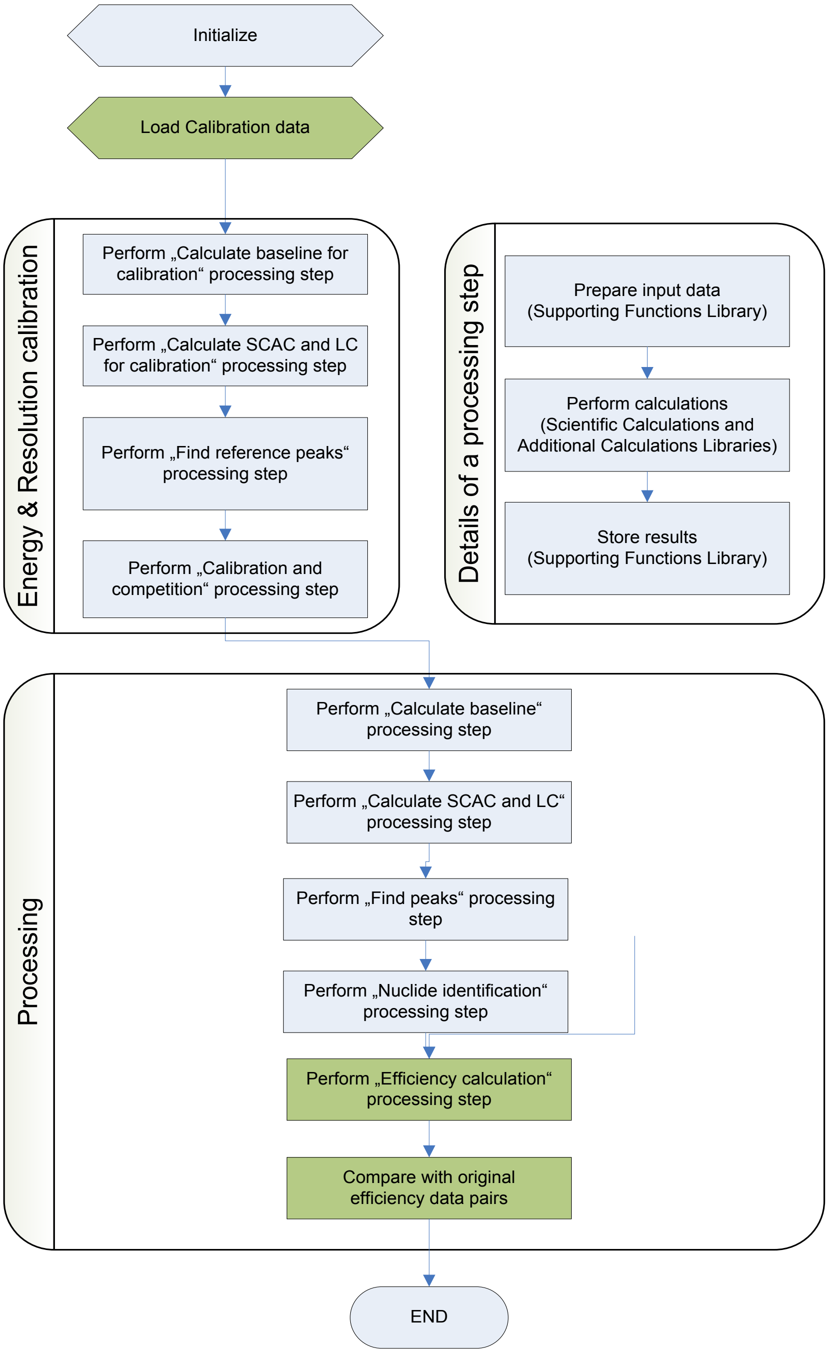

Figure 4 – Efficiency calibration processing sequence

3.3.4.8.1. Procedure to determine detection efficiencies

The detection efficiency, ε (counts per emitted gamma ray) at the full peak energy of radionuclide *i* is calculated according to the formula:

$$\varepsilon = \frac{N}{A_{Corr}.T_{Live}.S_{\gamma}.P_{\gamma}.K_C}$$

where

Energies of interest: ENERGY from **GARDS_SAMPLE_CERT_LINES**;

N Net peak area from **GARDS_PEAKS**;

T_{Live} Acquisition live time (s) = ACQUISITION_LIVE_SEC from **GARDS_SAMPLE_DATA**;

S_{γ} correction for true coincidence summing factor = SUMM_CORR from **GARDS_IRF** *(if not available in the database, use default* $S_{\gamma} = 1$*);*

P_{γ} gamma emission probability = ABUNDANCE/100 from **GARDS_SAMPLE_CERT_LINES**;

K_C decay correction during acquisition time;

$$K_C = \frac{1-\exp\left(-\lambda_i .T_{Real}\right)}{\lambda_i .T_{Real}}$$

λ_i decay constant for the isotope *i* (s^{-1}) = Ln(2)/HALFLIFE_SEC from GARDS**_NUCL_LIB**;

A_{Corr} Decay corrected activity at spectrum acquisition start;

$$A_{Corr} = A_{Ref}.\exp\left(-Ln(2).\frac{T_{decay}}{T_{\frac{1}{2}}}\right)$$

with A_{Ref} = ACTIVITY from **GARDS_SAMPLE_CERT_LINES**;

T_{decay} decay time between Reference date of the calibration source and Acquisition start date (days).

- Reference date = ASSAY_DATE from **GARDS_SAMPLE_CERT**;
- Aquisition start = ACQUISITION_START from **GARDS_SAMPLE_DATA**;

$T_{1/2}$ Radioactive half-life (days).

3.3.4.8.2. Uncertainty budget

The combined uncertainty ($\sigma\varepsilon$), as absolute value, for the efficiency (ε) at gamma energies of interest is derived with the following formula (a first approximation where the most significant contributions are taken into account):

$$\sigma\epsilon = \epsilon.\sqrt{\left(\frac{\sigma N}{N}\right)^2 + \left(\frac{\sigma A_{Ref}}{A_{Ref}}\right)^2}$$

Where:

σN: uncertainty in the net peak area – area uncertainty from **GARDS_PEAKS**.

$\left(\frac{\sigma A_{Ref}}{A_{Ref}}\right)$: relative uncertainty in reference activity of the nuclide

= ERROR/100 from **GARDS_SAMPLE_CERT_LINES** .

3.4. Supporting Functions Library

3.4.1. Overview

The Supporting Functions Library contains functions used to prepare the data for the calculations and to parse the results of these calculations. This library is used by the Pipeline Wrapper.

The purpose of the library is to separate the database and file access from the calculations to keep the software modular and to allow for an easy introduction of additional calculations.

3.4.2. Dependencies

The Supporting Functions Library depends on the Infrastructure Library to perform logging and to access the configuration and on the Data Access Library to access the data. The interfaces to the library are defined by their respective header files. There is one interface function for each prepare-data and one for each parse-results high-level function defined in the section 3.4.4.

3.4.3. Requirements

There are no explicit requirements listed in [AUTO_SAINT_SRS] and [AUTO_XE_SAINT_SRS]. The design of the supporting functions is based on the existing source code and prototypes and on the results of discussions with the IDC.

Note: Additional requirements were identified and corresponding software changes designed and implemented in the test use of autoSaint.

3.4.4. Design decisions

The following high-level functions are defined in the Supporting Functions Library:

- Get calibration arrays
- Prepare data for and parse results of baseline calculation
- Prepare data for and parse results of SCAC calculation
- Prepare data for and parse results of LC calculation
- Prepare data for and parse results of the calibration and competition
- Prepare data for and parse results of the peak search
- Prepare data for and parse results of nuclide identification
- Prepare data for and parse results of Xenon analysis

3.4.4.1. Get Calibration Arrays

The calibration is based on Most Recent Prior (MRP) values. It will use the MRP values during the calibration and it will update them based on the calibration results. The following MRP values are used in *autoSaint*:

- MRP_A: processing parameters from the previous automatic processing for that particular station, detector and sample type.
- MRP_M: processing parameters from the previous manual processing. The processing parameters are reading from Manual database source. The manual data source name, user name and password are read from the command line or the database.
- MRP_{QC}: processing parameters from the previous automatic processing for that particular station, detector and QC sample.
- INPUT: processing parameters calculated from the pairs defined in the sample itself.
- INITIAL: processing parameters calculated from the reference peaks identified in the sample itself.

It is possible to override the processing parameters by specifying them in the software configuration.

The energy and calibration arrays are being prepared using the MRP_A regression coefficients, if they are available. If they are not available, INPUT regression coefficients calculated from the input pairs are used.

Details of the calculations are defined in section **Error! Reference source not found.**.

SQL queries used to read MRPs:

```
SELECT GSD.SAMPLE_ID FROM GARDS_SAMPLE_DATA GSD, GARDS_SAMPLE_STATUS GSS WHERE
GSD.ACQUISITION_START < (SELECT ACQUISITION_START FROM GARDS_SAMPLE_DATA WHERE SAMPLE_ID =
%sampleId) AND GSD.DATA_TYPE = '%dataType' AND GSD.DETECTOR_ID = %detectorId AND
GSD.SAMPLE_TYPE = '%sampleType' AND GSD.SPECTRAL_QUALIFIER = '%spectralQualifier' AND
GSD.SAMPLE_ID = GSS.SAMPLE_ID AND GSS.STATUS IN ('P', 'R', 'Q', 'V') AND NOT (GSS.STATUS =
'Q' AND CATEGORY IS NULL) ORDER BY ACQUISITION_START DESC

SELECT GSD.SAMPLE_ID FROM GARDS_SAMPLE_DATA GSD, GARDS_SAMPLE_STATUS GSS WHERE
GSD.ACQUISITION_START < (SELECT ACQUISITION_START FROM GARDS_SAMPLE_DATA WHERE SAMPLE_ID =
%sampleId) AND GSD.DATA_TYPE = '%dataType' AND GSD.DETECTOR_ID = %detectorId AND
GSD.SAMPLE_TYPE = '%sampleType' AND GSD.SPECTRAL_QUALIFIER = '%spectralQualifier' AND
GSD.SAMPLE_ID = GSS.SAMPLE_ID AND GSS.STATUS IN ('R', 'Q') AND NOT (GSS.STATUS = 'Q' AND
CATEGORY IS NULL) ORDER BY ACQUISITION_START DESC

SELECT COEFF1, COEFF2, COEFF3, COEFF4, COEFF5, COEFF6, COEFF7, COEFF8 FROM GARDS_ENERGY_CAL
WHERE SAMPLE_ID = %sampleId AND (WINNER='Y' OR WINNER IS NULL)

SELECT COEFF1, COEFF2, COEFF3, COEFF4, COEFF5, COEFF6, COEFF7, COEFF8 FROM
GARDS_RESOLUTION_CAL WHERE SAMPLE_ID = %sampleId AND (WINNER='Y' OR WINNER IS NULL)

SELECT COEFF1, COEFF2, COEFF3, COEFF4, COEFF5, COEFF6, COEFF7, COEFF8 FROM
GARDS_EFFICIENCY_CAL WHERE SAMPLE_ID = %sampleId
```

3.4.4.2. Prepare Data For and Parse Results of Baseline Calculation

Sample spectrum, energy array and the resolution array are prepared for the baseline calculation. The sample spectrum is read from the sample file and energy and resolution arrays are calculated as defined in section 3.4.4.1.

If configured, the inputs are stored as intermediate data files.

After the baseline calculation, the baseline is stored in the file based store and entries are created in the SQL database which point to the baseline file. The location of the file store is configurable.

SQL queries used to read baseline configuration:

```
SELECT INDEX_NO, CAST(NVL(ENERGY_LOW,-1.0) AS NUMBER), CAST(NVL(ENERGY_HIGH,-1.0) AS
NUMBER), MULT, NO_OF_LOOPS FROM GARDS_BASELINE WHERE DETECTOR_ID = %detectorId AND
DATA_TYPE = '%dataType'  ORDER BY INDEX_NO

SELECT CAST(INDEX_NO AS NUMBER(11,1)), CAST(NVL(ENERGY_LOW,-1.0) AS NUMBER),
CAST(NVL(ENERGY_HIGH,-1.0) AS NUMBER), CAST(MULT AS NUMBER), NO_OF_LOOPS FROM
GARDS_BASELINE WHERE DETECTOR_ID IS NULL AND DATA_TYPE = '%dataType' AND SAMPLE_TYPE =
'%sampleType' ORDER BY INDEX_NO
```

SQL queries used when storing results:

```
SELECT CAST(TYPEID AS NUMBER(11,1)) FROM GARDS_PRODUCT_TYPE WHERE PRODTYPE = 'BASELINE'

SELECT CAST(NVL(MAX(REVISION), 0) AS NUMBER(11,1))  FROM GARDS_PRODUCT WHERE SAMPLE_ID =
%sampleId AND TYPEID = %productTypeId

DELETE GARDS_PRODUCT WHERE SAMPLE_ID = %sampleId AND TYPEID = %productTypeId

INSERT INTO GARDS_PRODUCT (SAMPLE_ID, FOFF, DSIZE, DIR, DFILE, REVISION, TYPEID, AUTHOR,
MODDATE) VALUES (%sampleId, %offset, %size, '%path', '%filename', %revisionNumber, %typeId,
'auto_SAINT', to_date('%currentDateTime', 'YYYY-MM-DD HH24:MI:SS'))
```

3.4.4.3. Prepare Data for and Parse Results of SCAC Calculation

Sample spectrum and the resolution array are prepared for the SCAC calculation in the same way as for the baseline calculation described in section 3.4.4.2.

If configured, the inputs are stored as intermediate data files.

After the SCAC calculation, the SCAC is stored in the file based store and entries will be created in the SQL database which point to the SCAC file.

SQL queries used when storing results:

```
SELECT CAST(TYPEID AS NUMBER(11,1)) FROM GARDS_PRODUCT_TYPE WHERE PRODTYPE = 'SCAC'

SELECT CAST(NVL(MAX(REVISION), 0) AS NUMBER(11,1))  FROM GARDS_PRODUCT WHERE SAMPLE_ID =
%sampleId AND TYPEID = %productTypeId

DELETE GARDS_PRODUCT WHERE SAMPLE_ID = %sampleId AND TYPEID = %productTypeId

INSERT INTO GARDS_PRODUCT (SAMPLE_ID, FOFF, DSIZE, DIR, DFILE, REVISION, TYPEID, AUTHOR,
MODDATE) VALUES (%sampleId, %offset, %size, '%path', '%filename', %revisionNumber,
%productTypeId, 'auto_SAINT', to_date('%currentDateTime', 'YYYY-MM-DD HH24:MI:SS'))
```

3.4.4.4. Prepare Data For and Parse Results of LC Calculation

Sample spectrum, baseline and the resolution array are prepared for the LC calculation the same way as for the baseline calculation described in section 3.4.4.2.

3.4.4.5. Prepare Data For and Parse Results of Calibration and Competition

Inputs required by calibration and competition algorithms are prepared.

SQL queries used in calibration and competition:

```
SELECT GARDS_SAMPLE_DATA.SAMPLE_ID FROM GARDS_SAMPLE_AUX, GARDS_SAMPLE_DATA WHERE
(GARDS_SAMPLE_DATA.SAMPLE_ID=GARDS_SAMPLE_AUX.SAMPLE_ID) AND (SAMPLE_REF_ID = (SELECT
SAMPLE_REF_ID FROM GARDS_SAMPLE_AUX WHERE (SAMPLE_ID = %sampleId))) AND
(GARDS_SAMPLE_DATA.SAMPLE_ID <> %sampleId) AND (DETECTOR_ID = %detectorId) ORDER BY
GARDS_SAMPLE_DATA.ACQUISITION_STOP

SELECT REFPEAK_ENERGY FROM GARDS_REFLINE_MASTER WHERE DATA_TYPE = '%dataType' AND
SPECTRAL_QUALIFIER = '%spectralQualifier' AND (CALIBRATION_TYPE='%calibrationType' OR
CALIBRATION_TYPE IS NULL) ORDER BY REFPEAK_ENERGY

SELECT REFPEAK_ENERGY FROM GARDS_XE_REFLINE_MASTER WHERE DATA_TYPE = '%dataType' AND
SPECTRAL_QUALIFIER = '%spectralQualifier' AND (CALIBRATION_TYPE='%calibrationType' OR
CALIBRATION_TYPE IS NULL) ORDER BY REFPEAK_ENERGY

SELECT EFFIC_ENERGY, EFFICIENCY, EFFIC_ERROR FROM GARDS_EFFICIENCY_VGSL_PAIRS WHERE
DETECTOR_ID = %detectorId AND (BEGIN_DATE<=to_date('%acquisitionStart','YYYY/MM/DD
HH24:MI:SS') OR BEGIN_DATE IS NULL) AND (END_DATE>to_date('%acquisitionStop','YYYY/MM/DD
HH24:MI:SS') OR END_DATE IS NULL) ORDER BY EFFIC_ENERGY

SELECT CAST(ROW_INDEX AS NUMBER(11,1)), CAST(COL_INDEX AS NUMBER(11,1)), COEFF FROM
GARDS_ENERGY_CAL_COV WHERE SAMPLE_ID = %sampleId AND (WINNER='Y' OR WINNER IS NULL)

SELECT CAST(ROW_INDEX AS NUMBER(11,1)), CAST(COL_INDEX AS NUMBER(11,1)), COEFF FROM
GARDS_RESOLUTION_CAL_COV WHERE SAMPLE_ID = %sampleId AND (WINNER='Y' OR WINNER IS NULL)

SELECT CHANNEL, CAL_ENERGY, CAL_ERROR FROM GARDS_ENERGY_PAIRS WHERE SAMPLE_ID = %sampleId
AND (WINNER='Y' OR WINNER IS NULL)

SELECT CHANNEL, CAL_ENERGY, CAL_ERROR FROM GARDS_ENERGY_PAIRS_ORIG WHERE SAMPLE_ID =
%sampleId AND (WINNER='Y' OR WINNER IS NULL)

SELECT RES_ENERGY, RESOLUTION, RES_ERROR FROM GARDS_RESOLUTION_PAIRS WHERE SAMPLE_ID =
%sampleId AND (WINNER='Y' OR WINNER IS NULL)

SELECT RES_ENERGY, RESOLUTION, RES_ERROR FROM GARDS_RESOLUTION_PAIRS_ORIG WHERE SAMPLE_ID =
%sampleId AND (WINNER='Y' OR WINNER IS NULL)

SELECT EFFIC_ENERGY, EFFICIENCY, EFFIC_ERROR FROM GARDS_EFFICIENCY_PAIRS WHERE SAMPLE_ID =
%sampleId

DELETE GARDS_ENERGY_CAL WHERE SAMPLE_ID=%sampleId

DELETE GARDS_ENERGY_CAL_COV WHERE SAMPLE_ID=%sampleId

DELETE GARDS_RESOLUTION_CAL WHERE SAMPLE_ID=%sampleId

DELETE GARDS_RESOLUTION_CAL_COV WHERE SAMPLE_ID=%sampleId

DELETE GARDS_EFFICIENCY_CAL WHERE SAMPLE_ID=%sampleId

INSERT INTO GARDS_ENERGY_CAL (SAMPLE_ID, COEFF1, COEFF2, COEFF3, COEFF4, COEFF5, COEFF6,
COEFF7, COEFF8, ENERGY_UNITS, CNV_FACTOR, APE, DET, MSE, TSTAT, SCORE, TYPE, WINNER) VALUES
( %sampleId, %c1, %c2, %c3, %c4, %c5, %c6, %c7, %c8, ‘’, -1, -1, -1, -1, -1, %score,
'%type', '%winnerFlag')

INSERT INTO GARDS_RESOLUTION_CAL (SAMPLE_ID, COEFF1, COEFF2, COEFF3, COEFF4, COEFF5,
COEFF6, COEFF7, COEFF8, TYPE, WINNER) VALUES ( %sampleId, %c1, %c2, %c3, %c4, %c5, %c6,
%c7, %c8, '%type', '%winnerFlag')

INSERT INTO GARDS_EFFICIENCY_CAL (SAMPLE_ID, DEGREE, EFFTYPE, COEFF1, COEFF2, COEFF3,
COEFF4, COEFF5, COEFF6, COEFF7, COEFF8) VALUES ( %sampleId, %polyDegree, '%vgslOrEmp', %c1,
%c2, %c3, %c4, %c5, %c6, %c7, %c8)

INSERT INTO GARDS_ENERGY_CAL_COV (SAMPLE_ID, ROW_INDEX, COL_INDEX, COEFF, TYPE, WINNER)
VALUES (%sampleId, %row, %col, %coeff, '%type', '%winnerFlag')

INSERT INTO GARDS_RESOLUTION_CAL_COV (SAMPLE_ID, ROW_INDEX, COL_INDEX, COEFF, TYPE, WINNER)
VALUES (%sampleId, %row, %col, %coeff, '%type', '%winnerFlag')

DELETE FROM GARDS_ENERGY_PAIRS WHERE SAMPLE_ID = %sampleId AND TYPE='%type'

DELETE FROM GARDS_ENERGY_PAIRS WHERE SAMPLE_ID = %sampleId AND (TYPE='%type' OR TYPE IS
NULL)

DELETE FROM GARDS_RESOLUTION_PAIRS WHERE SAMPLE_ID = %sampleId AND TYPE='%type'

DELETE FROM GARDS_RESOLUTION_PAIRS WHERE SAMPLE_ID = %sampleId AND (TYPE='%type' OR TYPE IS
NULL)
```

```
INSERT INTO GARDS_ENERGY_PAIRS (SAMPLE_ID, CAL_ENERGY, CHANNEL, CAL_ERROR, TYPE, WINNER)
VALUES (%sampleId, %energy, %channel, %energyUncertainty, 'INITIAL', 'N')

INSERT INTO GARDS_RESOLUTION_PAIRS (SAMPLE_ID, RES_ENERGY, RESOLUTION, RES_ERROR, TYPE,
WINNER) VALUES (%sampleId, %energy, %resolution, %resolutionUncertainty, 'INITIAL', 'N')

INSERT INTO GARDS_ENERGY_PAIRS (SAMPLE_ID, CAL_ENERGY, CHANNEL, CAL_ERROR, TYPE, WINNER)
(SELECT SAMPLE_ID, CAL_ENERGY, CHANNEL, CAL_ERROR, 'INPUT', '%winnerFlag' FROM
GARDS_ENERGY_PAIRS_ORIG WHERE SAMPLE_ID = %sampleId AND (WINNER='Y' OR WINNER IS NULL))

INSERT INTO GARDS_RESOLUTION_PAIRS (SAMPLE_ID, RES_ENERGY, RESOLUTION, RES_ERROR, TYPE,
WINNER) (SELECT SAMPLE_ID, RES_ENERGY, RESOLUTION, RES_ERROR, 'INPUT', '%winnerFlag' FROM
GARDS_RESOLUTION_PAIRS_ORIG WHERE SAMPLE_ID = %sampleId AND (WINNER='Y' OR WINNER IS NULL))

INSERT INTO GARDS_ENERGY_PAIRS (SAMPLE_ID, CAL_ENERGY, CHANNEL, CAL_ERROR, TYPE, WINNER)
(SELECT %d, CAL_ENERGY, CHANNEL, CAL_ERROR, '%type', '%winnerFlag' FROM GARDS_ENERGY_PAIRS
WHERE SAMPLE_ID = %sampleId AND (WINNER='Y' OR WINNER IS NULL))

INSERT INTO GARDS_ENERGY_PAIRS (SAMPLE_ID, CAL_ENERGY, CHANNEL, CAL_ERROR, TYPE, WINNER)
(SELECT %d, CAL_ENERGY, CHANNEL, CAL_ERROR, '%type', '%winnerFlag' FROM
%manAccount.GARDS_ENERGY_PAIRS WHERE SAMPLE_ID = %sampleId AND (WINNER='Y' OR WINNER IS
NULL))

INSERT INTO GARDS_RESOLUTION_PAIRS (SAMPLE_ID, RES_ENERGY, RESOLUTION, RES_ERROR, TYPE,
WINNER) (SELECT %sampleId, RES_ENERGY, RESOLUTION, RES_ERROR, '%type', '%winnerFlag' FROM
GARDS_RESOLUTION_PAIRS WHERE SAMPLE_ID = %sampleId AND (WINNER='Y' OR WINNER IS NULL))

INSERT INTO GARDS_RESOLUTION_PAIRS (SAMPLE_ID, RES_ENERGY, RESOLUTION, RES_ERROR, TYPE,
WINNER) (SELECT %sampleId, RES_ENERGY, RESOLUTION, RES_ERROR, '%type', '%winnerFlag' FROM
%manAccount.GARDS_RESOLUTION_PAIRS WHERE SAMPLE_ID = %sampleId AND (WINNER='Y' OR WINNER IS
NULL))
```

3.4.4.6. Prepare Data for and Parse Results of Peak Search

Sample spectrum, energy array, resolution (in channels and energy) arrays, baseline, SCAC and LC arrays and efficiency coefficients are prepared for peak search.

SQL queries used when storing results:

```
DELETE FROM GARDS_PEAKS WHERE SAMPLE_ID = %sampleId

INSERT INTO GARDS_PEAKS (SAMPLE_ID, PEAK_ID, CENTROID, CENTROID_ERR, ENERGY, ENERGY_ERR,
LEFT_CHAN, WIDTH, BACK_COUNT, BACK_UNCER, FWHM, FWHM_ERR, AREA, AREA_ERR, ORIGINAL_AREA,
ORIGINAL_UNCER, COUNTS_SEC, COUNTS_SEC_ERR, EFFICIENCY, EFF_ERROR, BACK_CHANNEL, IDED,
FITTED, MULTIPLET, PEAK_SIG, LC, PSS, DETECTABILITY) VALUES (%sampleId, %peakId, %centroid,
%centroidUncertainty, %energy, %energyUncertainty, %leftChannel, %width, %bkgndCounts,
%bkgndCountsUncertainty, %fwhm, %fwhmUncertainty, %area, %areaUncertainty, NULL, NULL,
%counts, %countsUncertainty, %efficiency, %efficiencyUncertainty, %backChannel, %idedFlag,
NULL, NULL, NULL, %lc, NULL, %detectability)
```

3.4.4.7. Prepare Data for and Parse Results of Nuclides Identification and Particulate Activities Calculations

In addition to the inputs and the results of the peak search, nuclide characteristics are loaded from the database before the nuclide identification.

The results are stored in the database tables **GARDS_NUCL_LINES_IDED** and **GARDS_NUCL_IDED**. The entries generated during nuclide identification are later updated in the activities calculation step.

SQL queries used to prepare for calculations:

```
SELECT DISTINCT NUCLIDE_NAME FROM GARDS_IRF WHERE DETECTOR_ID = %detectorId AND
(BEGIN_DATE<=TO_DATE('%acquisitionStart','YYYY/MM/DD HH24:MI:SS') OR BEGIN_DATE IS NULL)
AND ( END_DATE>TO_DATE('%acquisitionStop','YYYY/MM/DD HH24:MI:SS') OR END_DATE IS NULL)

SELECT ENERGY, IRF, IRF_ERROR, SUM_CORR FROM GARDS_IRF WHERE DETECTOR_ID = %detectorId AND
NUCLIDE_NAME = '%nuclideName' AND (BEGIN_DATE<=TO_DATE('%acquisitionStart', 'YYYY/MM/DD
HH24:MI:SS') OR BEGIN_DATE IS NULL) AND (END_DATE>to_date('%acquisitionStop','YYYY/MM/DD
HH24:MI:SS') OR END_DATE IS NULL)

SELECT NAME, NID_FLAG FROM GARDS_NUCL_IDED WHERE SAMPLE_ID = %sampleId

SELECT ACTIVITY, ACTIV_ERR, MDA, KEY_FLAG, CSC_RATIO, CSC_RATIO_ERR, CSC_MOD_FLAG,
NUCLIDE_ID FROM GARDS_NUCL_LINES_IDED WHERE SAMPLE_ID = %sampleId AND NAME = '%nuclideName'

SELECT NAME, ENERGY, ABUNDANCE, KEY_FLAG FROM GARDS_NUCL_LINES_LIB WHERE ABUNDANCE!=0

SELECT ENERGY_ERR, ABUNDANCE, ABUNDANCE_ERR, ENERGY FROM GARDS_NUCL_LINES_LIB WHERE NAME =
'%nuclideName' AND ENERGY BETWEEN %energyLow AND %energyHigh

SELECT ENERGY_ERR, ABUNDANCE, ABUNDANCE_ERR, ENERGY FROM GARDS_NUCL_LINES_LIB WHERE NAME =
'%nuclideName' AND KEY_FLAG = 1

SELECT NUCLIDE_ID, TYPE, HALFLIFE, HALFLIFE_SEC FROM GARDS_NUCL_LIB WHERE NAME =
'%nuclideName'
```

SQL queries used when storing results:

```
UPDATE GARDS_PEAKS SET IDED = 1 WHERE (SAMPLE_ID = %sampleId) AND (PEAK_ID IN (SELECT
DISTINCT PEAK FROM GARDS_NUCL_LINES_IDED WHERE (SAMPLE_ID = %sampleId)))

DELETE FROM GARDS_NUCL_LINES_IDED WHERE SAMPLE_ID = %sampleId

INSERT INTO GARDS_NUCL_LINES_IDED (SAMPLE_ID, STATION_ID, DETECTOR_ID, NAME, ENERGY,
ENERGY_ERR, ABUNDANCE, ABUNDANCE_ERR, PEAK, ACTIVITY, ACTIV_ERR, EFFIC, EFFIC_ERR, MDA,
KEY_FLAG, NUCLIDE_ID, CSC_RATIO, CSC_RATIO_ERR, CSC_MOD_FLAG, ID_PERCENT ) VALUES (
%sampleId, %stationId, %detectorId, '%nuclideName', %energy, %energyUncertainty,
%abundance, %abundanceUncertainty, %peak, %activity, %activityUncertainty, %efficiency,
%efficiencyUncertainty, %mda, %keyFlag, %nuclideId, %cscRatio, %cscRatioUncertainty,
%cscModFlag, %idPercent )

DELETE FROM GARDS_NUCL_IDED WHERE SAMPLE_ID = %sampleId

INSERT INTO GARDS_NUCL_IDED (SAMPLE_ID, STATION_ID, DETECTOR_ID, NAME, NID_FLAG) ( SELECT
DISTINCT SAMPLE_ID, STATION_ID, DETECTOR_ID, NAME, 1 FROM GARDS_NUCL_LINES_IDED WHERE
SAMPLE_ID = %sampleId )

INSERT INTO GARDS_NUCL_IDED (SAMPLE_ID, STATION_ID, DETECTOR_ID, NAME, NID_FLAG) (SELECT
%sampleId, %stationId, %detectorId, NAME, 0 FROM GARDS_NUCL_LIB WHERE GARDS_NUCL_LIB.TYPE
NOT LIKE 'FISSION (G)' AND GARDS_NUCL_LIB.TYPE NOT LIKE 'FISSION(G)' AND NAME NOT IN
(SELECT DISTINCT NAME FROM GARDS_NUCL_IDED WHERE SAMPLE_ID = %sampleId ))

INSERT INTO GARDS_NUCL_IDED (SAMPLE_ID, STATION_ID, DETECTOR_ID, NAME, NID_FLAG (SELECT
%sampleId, %stationId, %detectorId, NAME, 0 FROM GARDS_XE_NUCL_LIB WHERE GARDS_XE_
NUCL_LIB.TYPE NOT LIKE 'FISSION (G)' AND GARDS_XE_NUCL_LIB.TYPE NOT LIKE 'FISSION(G)' AND
NAME NOT IN (SELECT DISTINCT NAME FROM GARDS_NUCL_IDED WHERE SAMPLE_ID = %sampleId ))

UPDATE GARDS_NUCL_IDED SET NUCLIDE_ID = %nuclideId, TYPE = '%nuclideType', HALFLIFE =
'%halflife', AVE_ACTIV = %averageActivity, AVE_ACTIV_ERR = %averageActivityUncertainty,
ACTIV_KEY = %keyLineActivity, ACTIV_KEY_ERR= %keyLineActivityUncertainty, MDA = %mda,
MDA_ERR = 0, CSC_RATIO = %cscRatio, CSC_RATIO_ERR = %cscRatioUncertainty, CSC_MOD_FLAG =
%cscModFlag, PD_MOD_FLAG = %pdModFlag, ACTIV_DECAY_ERR = 0, NID_FLAG = %nidFlag,
ACTIV_DECAY = %activityDecay, REPORT_MDA = ( SELECT COUNT(*) FROM GARDS_MDAS2REPORT WHERE
NAME = GARDS_NUCL_IDED.NAME AND SAMPLE_TYPE = '%sampleType' AND DTG_BEGIN <
to_date('%acquisitionStart', 'YYYY-MM-DD HH24:MI:SS') AND ( DTG_END >
to_date('%acquisitionStop', 'YYYY-MM-DD HH24:MI:SS') OD DTG_END IS NULL) ) WHERE SAMPLE_ID
= %sampleId AND NAME = '%nuclideName'
```

3.4.4.8. Prepare Data for and Parse Results of Xenon Calculations and Xenon Activities Calculations

Energy array, resolution array, efficiency coefficients and/or pairs, the description of Xenon isotopes and full and preliminary samples data are prepared for Xenon analysis.

The results of the analysis are stored in the database table **GARDS_XE_RESULTS**.

SQL queries used to prepare for calculations:

```
SELECT NAME, ENERGY, ABUNDANCE, KEY_FLAG FROM GARDS_XE_NUCL_LINES_LIB WHERE ABUNDANCE!=0

SELECT ENERGY_ERR, ABUNDANCE, ABUNDANCE_ERR, ENERGY FROM GARDS_XE_NUCL_LINES_LIB WHERE NAME
= '%nuclideName' AND ENERGY BETWEEN %energyLow AND %energyHigh

SELECT ENERGY_ERR, ABUNDANCE, ABUNDANCE_ERR, ENERGY FROM GARDS_XE_NUCL_LINES_LIB WHERE NAME
= '%nuclideName' AND KEY_FLAG = 1

SELECT NUCLIDE_ID, TYPE, HALFLIFE, HALFLIFE_SEC FROM GARDS_XE_NUCL_LIB WHERE NAME =
'%nuclideName'

SELECT ABUNDANCE FROM GARDS_XE_NUCL_LINES_LIB WHERE NAME='%nuclideName' AND ENERGY BETWEEN
%energyLow AND %energyHigh

SELECT ACTIV_DECAY FROM GARDS_NUCL_IDED WHERE SAMPLE_ID=%sampleId AND NAME='%nuclideName'

SELECT ENERGY, ABUNDANCE FROM GARDS_XE_NUCL_LINES_LIB WHERE NAME='%nuclideName' ORDER BY
ENERGY
```

SQL queries used when storing results:

```
DELETE GARDS_XE_RESULTS WHERE SAMPLE_ID=%sampleId

DELETE GARDS_XE_UNCORRECTED_RESULTS WHERE SAMPLE_ID=%sampleId

DELETE GARDS_XE_RESULTS WHERE SAMPLE_ID=%sampleId AND METHOD_ID=%methodId

DELETE GARDS_XE_UNCORRECTED_RESULTS WHERE SAMPLE_ID=%sampleId AND METHOD_ID=%methodId

INSERT INTO GARDS_XE_RESULTS (SAMPLE_ID,METHOD_ID,NUCLIDE_ID,CONC,CONC_ERR,MDC,MDI,
NID_FLAG,LC,LD,SAMPLE_ACT,COV_XE_131M,COV_XE_133M,COV_XE_133,COV_XE_135,COV_RADON) VALUES
(%sampleId,%methodId,%nuclideId,%concentration,%concentrationUncertainty,NULL,%mdi,%nidFlag
,%lc,%ld,%activity,%covXe131m,%cpvXe133m,%covXe133,%covXe135,%covRadon)

INSERT INTO GARDS_XE_UNCORRECTED_RESULTS (SAMPLE_ID, METHOD_ID, NUCLIDE_ID, CONC,
CONC_ERROR, MDC, MDI, LC) VALUES
(%sampleId,%methodId,%nuclideId,%concentration,%concentrationUncertainty,NULL,%mdi,%lc)

INSERT INTO GARDS_XE_RESULTS (SAMPLE_ID, METHOD_ID, NUCLIDE_ID, CONC, CONC_ERR, MDC, MDI,
NID_FLAG,LC,LD,SAMPLE_ACT,COV_XE_131M,COV_XE_133M,COV_XE_133,COV_XE_135,COV_RADON) VALUES
(%sampleId,%methodId,%nuclideId,%concentration,%concentrationUncertainty,%mdc,NULL,%nidFlag
,%lc,%ld,%activity,%covXe131M,%covXe133M,%covXe133,%covXe135,%covRadon)

INSERT INTO GARDS_XE_UNCORRECTED_RESULTS (SAMPLE_ID, METHOD_ID, NUCLIDE_ID, CONC,
CONC_ERROR, MDC, MDI, LC) VALUES
(%sampleId,%methodId,%nuclideId,%concentration,%concentrationUncertainty,%mdc,NULL,%lc)
```

3.5. Infrastructure Library

3.5.1. Overview

The Infrastructure Library contains functions used to access the software configuration, write log entries and handle errors. This library is used by all other components of the *autoSaint* software.

3.5.2. Dependencies

The Infrastructure Library depends on the Data Access Library to read the configuration entries defined in the SQL database. The interface to the library is defined by its respective header file.

3.5.3. Requirements

Table 7 – Requirements allocated to Infrastructure Library

Requirement	Addressed by
The software shall flush the write buffer every time a message is written to the log file.	3.5.4.2
The software shall have the capability to send all log messages to the standard UNIX facility Syslog.	3.5.4.2
The Syslog functionality shall meet the standards defined in [IDC_SYSLOG_2003].	3.5.4.2
The software shall have the capability to send the Syslog messages to standard output.	3.5.4.2
The software shall log the date and time, to the nearest second, the software was started.	3.5.4.2
The software shall display a descriptive list of all possible parameters if it is started with a –“h” parameter.	3.5.4.1
The number of hard-coded parameters should be reduced to a minimum.	Appendix II CONFIGURATION PARAMETERS
The user shall be able to operate and control the software via any combination of the following: (a) Command line parameters; (b) Parameters in the database.	3.5.4.1
Each configurable parameter shall have a default value.	Appendix II CONFIGURATION PARAMETERS
The software shall allow a set of default values to be defined for each detector.	Software uses the configuration defined in the database.

Requirement	Addressed by
The software shall log details of each error or warning raised by the application, including: (a) The Sample identifier, (b) The reason for the error or warning. The software shall attempt to log the date, the time to the nearest second, and the reason the software was terminated. It is expected that in some situations it will be impossible for the software to log this information, for example, if a Unix kill –9 is sent.	3.5.4.2
The software shall allow the user to specify a debug level between 0 and 9. Syslog messages shall be unaffected by the debug level.	3.5.4.2, Table 8
If the debug level is 0, then only start-up and close-down messages shall be sent to standard output.	3.5.4.2, Table 8
If the debug level is 1 then all Syslog messages shall also be sent to standard output.	3.5.4.2, Table 8
If the debug level is between 2 and 9 inclusive then additional debug messages shall be sent to standard output (where 9 provides the maximum volume of debug messages).	3.5.4.2, Table 8
The debug levels used should mirror the debug levels used in the *bg_analyze* software as closely as possible.	3.5.4.2, Table 8

Note: Additional requirements were identified and corresponding software changes designed and implemented in the test use of autoSaint.

3.5.4. Design decisions

3.5.4.1. Software Configuration

The Infrastructure Library implements the functions used to read the software configuration. There are three places where the configuration can be defined: command line parameters, database entries (**GARDS_SAINT_DEFAULT_PARAMS** table) and default values defined in the *autoSaint* software.

The search for the configuration items is performed in the following order (first occurrence wins):

- command line parameters
- configuration items that are stored in the database
- default values (defined in the source code)

If requested by the command line parameter, the list of all configuration attributes and their description is displayed and the software exits.

3.5.4.2. Logging

The *autoSaint* software writes two types of log entries.

The syslog entries uses the syslog libraries to write entries of the types (“`err`”, “`warning`”, ‟`notice`” and “`info`”). The Syslog functionality meets the standards defined in [IDC_SYSLOG_2003].

The syslog messages contain the sample ID to link the message to the processed sample.

The debug log entries write messages to the standard error console. The level of logging is configurable from 0 to 9. The software flushes the standard error output each time the message is written to make sure that all messages are stored. This mechanism safeguards against messages being lost due to software failure (i.e. crashing). The syslog messages are also written to the debug log entries if a high enough log level is used.

The log messages contain the timestamp, source of the message, message text and message details.

Table 8 contains descriptions of log event types and the minimum log levels required to write the log messages to that particular event type.

Table 8 – Logging verbosity

Event Type	Log Level
`START_STOP`: An application start or stopping message.	This message is always written to the system log and will be written to the debug log if the log level >= 0.
`ERROR`: An application error message.	This message is always written to the system log and will be written to the debug log if the log level >= 1.
`WARNING`: An application warning message.	This message is always written to the system log and will be written to the debug log if the log level >= 1.
`ANALYST_INFO:` Processing intermediate data and results.	This message is written to the debug log if the log level >= 2.
`PROCESSING_PARAMETERS`: A message regarding the value of a processing parameter.	This message is written to the debug log if the log level >= 3.
`CONTROL_FLOW:` A message indicating when a function is entered and left.	This message is written to the debug log if the log level >= 6.
`DB_ACCESS:` Executed SQL queries.	This message is written to the debug log if the log level >= 5.
`QC_ROUTINE_FAILURE:` Warnings on QC routines failures.	This message is always written to the system log and will be written to the debug log if the log level >= 1.
`CALIBRATION:` Sample calibration.	This message is written to the debug log if the log level >= 4.

4. INTERFACE ENTITIES

4.1. Data Access

4.1.1. Overview

The *autoSaint* software accesses the file based data store and the SQL database. The file based store is managed using the IDC **FPDESCRIPTION** and **FILEPRODUCT** database tables. The SQL database is accessed using the gODBC library provided by IDC.

4.1.2. Dependencies

The data access depends on the gODBC library to access the SQL database and on **FPDESCRIPTION** and **FILEPRODUCT** database tables to access the file based data store.

4.1.3. Requirements

Table 9 – Requirements allocated to Data Access Layer

Requirement	Addressed by
If a file operation fails (e.g. open, read, write, seek, close) then the software shall generate an error and terminate.	0
If the software is unable to write, to the database, any of the intermediate or final results then the software shall generate an error message and terminate.	0
The software shall only write results from sample processing to the database if the processing of the sample completes successfully.	0
The software shall only access the database through Open Database Connectivity (ODBC).	0
The software shall only access ODBC through the 'gODBC' library (provided free-of-charge as part of gbase-1.1.9 by IDC).	0
The user shall have read and write access to all files written by the software. By default, the software shall grant read privileges to all users.	0

Note: Additional requirements were identified and corresponding software changes designed and implemented in test use of autoSaint.

4.1.4. Design Decisions

There is no dedicated module for data access. The data access is a part of the Supporting Functions and Infrastructure libraries.

The following common attributes apply to all data access calls:

- The file based data store is accessed through the IDC **FPDESCRIPTION** and **FILEPRODUCT** tables. The access mask to the generated files will is configurable. By default, the software will grant read privileges to all users.
- The SQL database is accessed through the gODBC library provided by IDC.
- Functions that require data access take responsibility for error handing. A data access error will result in a managed termination of the application.
- There is only one connection to the SQL database per instance of the application. This connection will be opened during the initialization and closed at the end of the processing. In the case of successful processing, the SQL transaction will be committed. When an error occurs the SQL transaction will be rolled back.

APPENDIX I
ADDITIONAL REQUIREMENTS

Table 10 – Requirements not allocated to specific software components

Requirement	Addressed by
Security requirement: The software will contain only the functionality described in this document. The software will not contain any additional functionality.	The Contractor has implemented the software as defined in this document and as requested in customer defined change requests.
The software shall be able to complete the automatic processing for a single sample in 1 minute or less.	The software design described in this document and its implementation have attempted to implement a performance-effective solution to the processing of samples.
The software shall be able to automatically process 1000 sets of sample data per day.	The software design described in this document and its implementation have attempted to implement a performance-effective solution to the processing of samples.
The software shall be able to process 100 samples, under typical operational conditions, without any crashes or memory leaks (with the exception of memory leaks from third party libraries).	The Contractor has applied the quality practices in the software development as defined in the [AUTO_SAINT_QP]. While no software practice can completely eliminate the risk of crashes and memory leaks in C language programs, it reduces it significantly.
The software, with the exception of third-party libraries, shall have no memory leaks.	The Contractor has applied the quality practices in software development as defined in the [AUTO_SAINT_QP]. While no software practice can completely eliminate the risk of memory leaks in C language programs, it reduces it significantly.
The software shall meet IDC documentation standards.	This requirement does not affect the design or the implementation of the software.
All user documentation shall be written in English.	This requirement does not affect the design or the implementation of the software.
All user documentation shall follow the requirements specified in the IDC Corporate Identity Style Manual (2002).	This requirement does not affect the design or the implementation of the software.
A user manual shall be provided that follows the [IDC_SUT_2003]. The user manual format and structure should be as close as possible to the [BG_ANALYZE_SUT].	This requirement does not affect the design or the implementation of the software.
There shall be a full set of man pages describing how to use the system.	This requirement does not affect the design of the software.

Requirement	Addressed by
The user documentation shall stress that the process that performs the automatic processing leading to an Automatic Radionuclide Report (ARR) should only access the Auto database.	This requirement does not affect the design or the implementation of the software.
The user documentation shall stress that the process that performs the automatic processing leading to a Reviewed Radionuclide Report (RRR) should only access the Man database.	This requirement does not affect the design or the implementation of the software.
A design shall be provided that follows the IDC Software Design Description Template (2003).	This document conforms to the IDC Software Design Description Template (2003).
A software acceptance test plan shall be provided that follows the IDC Software Test Plan Template (2003).	This requirement does not affect the design or the implementation of the software.
A software acceptance test description shall be provided that follows the IDC Software Test Description Template (2003).	This requirement does not affect the design or the implementation of the software.
The software acceptance test plan format and structure should be as close as possible to the ‘Bg_analyze software acceptance test plan’ (IDC, 2005)	This requirement does not affect the design or the implementation of the software.
The software acceptance test description format and structure should be as close as possible to the ‘Bg_analyze software acceptance test description’ (IDC, 2005)	This requirement does not affect the design or the implementation of the software.
An installation manual shall be provided that follows the IDC Software Installation Plan Template (2003).	This requirement does not affect the design or the implementation of the software.
The installation plan document, and installation procedures described therein, should be as close as possible to the installation procedures described in the ‘National Data Centre Software Installation Plan’ (IDC, 2006).	This requirement does not affect the design or the implementation of the software.
It shall be possible to legally distribute the software to all States Parties.	The software does not use any components which would not allow for a legal distribution of the software to all State Parties.
It shall be possible to install the software at a National Data Centre (NDC).	It is possible to install the software at the NDCs if their computer infrastructure is compatible with the infrastructure of the IDC.

Requirement	Addressed by
The software shall not depend on third-party products that require a run-time license.	The software does not depend on third-party products that require a run-time license, apart from the Oracle database and Operating System.
The software shall allow for different efficiency equations, where each is defined by a code number between 1 and 99 (see CTBT/PTS/INF.96/Rev.6,Appendix I, §3.1. In this text the two equations mentioned here are given the codes 8 and 5 respectively). For each efficiency calibration one of these numbers (equations) should be selected and their corresponding parameters calculated. The efficiency curve was referred to by the pIDC in Arlington as the EER, the Efficiency vs. Energy Regression curve.	Not implemented.
The software shall prevent any user from deliberately or inadvertently changing any data in the Auto database.	The software can not protect the Auto database. This protection must be achieved on the level of database access rights.

Note: Additional requirements were identified and corresponding software changes designed and implemented in the test use of autoSaint.

APPENDIX II
CONFIGURATION PARAMETERS

Table 11 – *autoSaint* configuration parameters

Name	Type	Values range	Allowed in			Default value	Mandatory	Description
			Cmd line	DB	Default			
AVERAGEENERGYCALIBRATION	Boolean	YES, NO	Y	Y	Y	NO	N	If set, energy is based on average of energies calculated based on (0..N-1) and (1..N). If not set, energy is calculated based on (1..N)
BASELINEDIR	String	Up to 250 characters	Y	Y	N		Y	Baseline result directory (under RMS Home directory)
CAREATHRESHOLD	Float	Floating point number	Y	Y	Y	1000	N	Area threshold in the reference peak search for Calibration samples
COMPETITIONMAXENERGY	Integer	0-Max energy	Y	Y	Y	2000	N	High limit (in keV) for particulates competition search
COMPETITIONMINENERGY	Integer	0-Max energy	Y	Y	Y	100	N	Low limit (in keV) for particulates competition search
CONFIDENCELEVEL	Integer	0-100	Y	Y	Y	95	N	Calibration shift test confidence level (%)
DBDEFAULT	Boolean	YES, NO	Y	N	N		N	If set, *autoSaint* searches for the connect string file in the user's home directory
DBENVIRONMENT	Boolean	YES, NO	Y	Y	Y	DEFAULT	N	If set, autoSaint reads the connection details from the environment
DBFILE	String	max file path length	Y	N	N		Y *	The FILE_NAME of the file containing the database connect string. *Either connect string, user/password/server or connect string file must be specified.
DBPASSWORD	String	max password length	Y	N	N		Y *	Database password. *Either connect string, user/password/server or connect string file must be specified.

Name	Type	Values range	Allowed in			Default value	Mandatory	Description
			Cmd line	DB	Default			
DBSERVER	String	max server name length	Y	N	N		Y *	Database server name. *Either connect string, user/password/server or connect string file must be specified.
DBSTRING	String	max database connection string length	Y	N	N		Y *	Database connect string. *Either connect string, user/password/server or connect string file must be specified.
DBUSER	String	max user name length	Y	N	N		Y *	Database username. *Either connect string, user/password/server or connect string file must be specified.
EFFICIENCYCOEFFS	Comma separated list of floats	Floating point numbers	Y	Y	N		N	Efficiency coefficients in the form c0,c1,...,cn/error
EFFICIENCYCALPOLYDEGREE	Integer	Integer number greater than 0	Y	N	Y	3	N	Efficiency Calibration Polynomial Degree
EFFIDCPAIRS	Boolean	YES, NO	Y	Y	Y	NO	N	Use IDC efficiency pairs, if available
EFFVGSLPAIRS	Boolean	YES, NO	Y	Y	Y	YES	N	Use VGSL efficiency pairs, if available
EMPIRICALENERGYERRORFACTOR	Float	Floating point number	Y	Y	Y	0.5	N	Empirical energy error factor a of Error = centroid_energy_error + a * FWHM
EMPIRICALFWHMERRORFACTOR	Float	Floating point number	Y	Y	Y	0.01	N	Empirical FWHM error factor a of Error = centroid_fwhm_error + a * FWHM
ENERGY CALIBRATION COEFFS	Comma separated list of floats	Floating point numbers	Y	Y	N		N	Energy calibration coefficients in the form c0,c1,...,cn/error

Name	Type	Values range	Allowed in			Default value	Mandatory	Description
			Cmd line	DB	Default			
ENERGYCAL POLYDEGREE	Integer	Integer number greater than 0	Y	N	Y	3	N	Energy Calibration Polynomial Degree
ENERGYCOEFFS	Comma separated list of floats	Floating point numbers	Y	Y	N		N	Energy coefficients in the form c0,c1,...,cn/error
ENERGYCOMPETITIONMODE	Enum	default, covariance, refpeaks, nuclides	Y	Y	Y	DEFAULT	N	Energy competition mode
ENERGYIDTOLERANCEA	Float	Floating point number	Y	Y	Y	0.5	N	Empirical energy tolerance factor "a" in nuclides identification. Empirical tolerance = a+b*fwhm
ENERGYIDTOLERANCEB	Float	Floating point number	Y	Y	Y	0.0	N	Empirical energy tolerance factor "b" in nuclides identification. Empirical tolerance = a+b*fwhm
ENERGYWINNER	Enum	MRPA, MRPM, MRPQC, INPUT or INITIAL	Y	Y	N		N	Energy competition winner. One of MRP_A, MRP_M, MRP_{QC}, INPUT or INITIAL.
HELP	Boolean	YES, NO	Y	N	Y	NO	N	Help=YES to get this help
INTERMEDIATE RESULTFILE	String	Up to 250 characters	Y	Y	N		N	Intermediate result file name
LOGLEVEL	Integer	0-9	Y	Y	Y	2	N	Log level (0-9)
MANUALBASELINE	String	Up to 250 characters	Y	Y	N		N	Path to manual baseline file
MANUALDB	String	Up to 250 characters	Y	Y	N		N	Manual Data Source
MANUALDB PASSWORD	String	Up to 250 characters	Y	Y	N		N	Manual DB Password
MANUALDB USER	String	Up to 250 characters	Y	Y	N		N	Manual DB User

Name	Type	Values range	Allowed in			Default value	Mandatory	Description
			Cmd line	DB	Default			
MINCOMPETITIONSCORE	Float	Floating point number	Y	Y	Y	0.1	N	Minimal plausible competition score
MIN CALIBRATION PEAKS	Integer	Integer number	Y	Y	Y	10	N	Minimal number of reference peaks needed for the calibration
NUCLIDDETECTABILITYTHRESHOLD	Float	Floating point number	Y	Y	Y	0.2	N	Detectability threshold in nuclide identification
OVERWRITE	Boolean	YES, NO	Y	Y	Y	NO	N	YES to overwrite existing results
QAREATHRESHOLD	Integer	NUMBER	Y	Y	Y	2500	N	Area threshold in the reference peak search for QC samples
QCAIRVOLUME	Boolean	YES, NO	Y	Y	Y	YES	N	Enables QC air volume check
QCATIME	Boolean	YES, NO	Y	Y	Y	YES	N	Enables QC acquisition time check
QCCAT	Boolean	YES, NO	Y	Y	Y	YES	N	Enables QC auto category check
QCCOLLECTIONGAPS	Boolean	YES, NO	Y	Y	Y	YES	N	Enables QC collection gaps check
QCCTIME	Boolean	YES, NO	Y	Y	Y	YES	N	Enables QC collection time check
QCDRIFT10D	Boolean	YES, NO	Y	Y	Y	YES	N	Enables QC 10 days drift check
QCDRFITMRP	Boolean	YES, NO	Y	Y	Y	YES	N	Enables QC MRP check
QCDTIME	Boolean	YES, NO	Y	Y	Y	YES	N	Enables QC decay time check
QCECR	Boolean	YES, NO	Y	Y	Y	YES	N	Enables QC ECR check
QCFLAGS	Boolean	YES, NO	Y	Y	Y	YES	N	Enables QC Ba-140_MDC and Be7_FWHM checks
QCFLOW	Boolean	YES, NO	Y	Y	Y	YES	N	Enables QC Flow check
QCFLOW500	Boolean	YES, NO	Y	Y	Y	YES	N	Enables QC flow 500 check
QCFLOWGAPS	Boolean	YES, NO	Y	Y	Y	YES	N	Enables QC flow gaps check
QCFLOWZERO	Boolean	YES, NO	Y	Y	Y	YES	N	Enables QC flow zero check
QCIDS	Boolean	YES, NO	Y	Y	Y	YES	N	Enables QC IDs check
QCPRELIMINARYSAMPLES	Boolean	YES, NO	Y	Y	Y	YES	N	Enables QC preliminary samples check

Name	Type	Values range	Allowed in			Default value	Mandatory	Description
			Cmd line	DB	Default			
QCRTIME	Boolean	YES, NO	Y	Y	Y	YES	N	Enables QC reporting time check
REFLINETHRESHOLDA	Float	Floating point number	Y	Y	Y	1	N	Refline delta threshold coefficient a of a+be in the reference peak search
REFLINETHRESHOLDB	Float	Floating point number	Y	Y	Y	0.005	N	Refline delta threshold coefficient b of a+bc in the reference peak search
RESOLUTION CALIBRATION COEFFS	Comma separated list of floats	Floating point numbers	Y	Y	N		N	Resolution calibration coefficients in the form c0,c1,...,cn/error
RESOLUTIONCAL POLYDEGREE	Integer	Integer number greater than 0	Y	N	Y	3	N	Resolution Calibration Polynomial Degree
RESOLUTION COEFFS	Comma separated list of floats	Floating point numbers	Y	Y	N		N	Resolution coefficients in the form c0,c1,...,cn/error
RESOLUTIONWINNER	Enum	MRPA, MRPM, MRPQC, INPUT or INITIAL	Y	Y	N		N	Resolution competition winner. One of MRP_A, MRP_M, MRP_{QC}, INPUT or INITIAL.
RISKLEVELINDEX	Integer	1-8	Y	Y	Y	3	N	Risk Level Index Index Risk Level k 1 0.000100 4.753420 2 0.000500 4.403940 3 0.001000 4.264890 4 0.010000 3.719020 5 0.050000 3.290530 6 0.100000 3.090230 7 1.000000 2.326350 8 5.000000 1.644850
RMSHOME	String	Up to 250 characters	Y	Y	N		Y	RMS Home Directory
SAMPLEID	Integer	Integer number	Y	N	N		Y	Sample ID

Name	Type	Values range	Allowed in			Default value	Mandatory	Description
			Cmd line	DB	Default			
SAREATHRESHOLD	Integer	1000	Y	Y	Y	1000	N	Area threshold in the reference peak search for data samples
SCACDIR	String	Up to 250 characters	Y	Y	N		Y	SCAC result directory (under RMS Home directory)
SKIPCATEGORIZATION	Boolean	YES, NO	Y	Y	Y	NO	N	If set, categorization will be skipped
USEMRPAIRS	Boolean	YES, NO	Y	Y	Y	NO	N	If set, MRP parameters are recalculated from MRP pairs
VERSION	Boolean	YES, NO	Y	N	Y	NO	N	Version=YES to get the version
XECOMPETITIONMAXENERGY	Integer	0-Max energy	Y	Y	Y	300	N	High limit (in keV) for Xenon competition search
XECOMPETITIONMINENERGY	Integer	0-Max energy	Y	Y	Y	25	N	Low limit (in keV) for Xenon competition search
XEGAMMAFACTOR	Float	Floating point number	Y	Y	Y	15.5188682	N	Xenon Gamma Factor
XESIGMAFACTOR	Float	Floating point number	Y	Y	Y	3.0	N	Sigma Factor

APPENDIX III
PARTICULATES PROCESSING SEQUENCE AS DEFINED IN TOR AND AS IMPLEMENTED

As Defined in TOR	**As Implemented in *autoSaint***
Perform a set of actions (like checking analyst permissions, dumping info into standard input…)	Initialize logging, DB connection, load configuration. Set processing status to “A” Load sample data. Load MRPs.
	Calculate baseline.
Get initial processing parameters	
	Calculate LC. Calculate SCAC.
Run initial peak search	Run initial peak search.
Find reference peaks	Find reference peaks.
Update processing parameters using last output	Perform calibration using found reference peaks and perform competition.
	Calculate baseline.
	Write baseline to file.
	Calculate LC. Calculate SCAC.
	Write SCAC to file.
Run final peak search	Find peaks.
Reject peaks according to certain criteria	
Run Nuclide Identification routine	Run Nuclide Identification routine.
Calculate Minimum Detectable Concentrations (MDCs)	Calculate Activities and Minimum Detectable Concentrations (MDCs) *Note: Not calculated for Detector Background spectra.*
Run categorization routine	(Optional, currently unused) Perform categorization.
Populate Data Base with analysis results	
Run Quality Control program and write into files	Run Quality Control.

As Defined in TOR	As Implemented in *autoSaint*
	Set processing status to “P”

XENON PROCESSING SEQUENCE AS DEFINED IN TOR AND AS IMPLEMENTED

As Defined in TOR	**As Implemented in *autoSaint***
Perform a set of actions (like checking analyst permissions, dumping info into standard input, fault check…)	Initialize logging, DB connection, load configuration. Set processing status to “A” Load sample data. Load MRPs.
Calculate BASELINE	Calculate baseline for main and preliminary samples.
Get initial processing parameters	
Calculate LCC/SCAC	Calculate LC for main and preliminary samples. Calculate SCAC for main and preliminary samples.
Run initial peak search	Run initial peak search.
Find reference peaks	Find reference peaks.
Update processing parameters using last output	Perform calibration using found reference peaks and perform competition.
Re-calculate BASELINE	Calculate baseline for main and preliminary samples.
Store BASELINE	Write baseline to file.
Re-calculate LCC/SCAC	Calculate LC for main and preliminary samples. Calculate SCAC for main and preliminary samples.
Store SCAC	Write SCAC to file.
	Run method 1 for Xe-isotopes quantifications
	Run method 2 for Xe-isotopes quantifications
Calculate Activities	Calculate Xe-Isotopes Activities *Note: Not calculated for Detector Background spectra.*

As Defined in TOR	**As Implemented in *autoSaint***
Calculate MDAs/MDCs	Calculate Xe-Isotopes MDAs/MDCs *Note: Not calculated for Detector Background spectra.*
	(For Calibration spectra) Calculate IDC efficiency pairs
	(Optional, currently unused) Perform categorization.
Run Quality Control program	Run Quality Control.
	Set processing status to “P”.

APPENDIX IV
ABBREVIATIONS

ANSI	American National Standards Institute
ARR	Automatic Radionuclide Report
CTBTO	Comprehensive Nuclear-Test-Ban Treaty Organization
CCF	Coincidence Correction Factor
DCF	Decay Correction Factor
ECR	Energy Channel Regression
FWHMC	Full Width at Half Maximum in Channels
GUI	Graphical User Interface
gODBC	gbase Open Database Connectivity
IDC	International Data Centre
IEC	International Electrotechnical Commission
ISO	International Standard Organization
LCC	Critical Level Curve
MDA	Minimum Detectable Activity
MDC	Minimum Detectable Concentration
MRP	Most Recent Prior
NDC	National Data Centre
ODBC	Open Database Connectivity
PTS	Provisional Technical Secretariat
QC	Quality Control
RER	Resolution Energy Regression
RRR	Reviewed Radionuclide Report
SAINT	Simulation Assisted Interactive Nuclear Review Tool
SCAC	Single Channel Analyzer Curve
SDD	Software Design Document
SQL	Structured Query Language
TOR	Terms Of Reference

REFERENCES

[IDC_CS_2002]	International Data Centre (2002). IDC Software Coding Standard
[AUTO_SAINT_SRS]	Auto-SAINT Software Requirements Specification. IDC/auto/saint/SRS, 2003-07-20
[AUTO_XE_SAINT_SRS]	Auto-Xe-SAINT Software Requirements Specification. IDC/auto_Xe_saint/SRS, 2007-06-15
[IDC_SYSLOG_2003]	Using Syslog at CTBTO' (IDC, 2003)
[AUTO_SAINT_QP]	Radionuclide Software Development Quality Plan, AWST-TR-07/01, version 1.0, 2007-01-21
[IDC_SUT_2003]	Software User Tutorial Template, IDC/TBD1/SUT, 2003-05-27
[BG_ANALYZE_SUT]	Bg_analyze Software User Tutorial, IDC/bg_analyze/SUT, 2005-02-05

STATEMENT OF CONFIRMATION

On behalf of (name of firm or organization):__________________________________, I hereby attest and confirm that:

a) The firm/organization possesses the legal status and capacity to enter into legally binding contracts with the Commission for the supply of equipment, supplies, services or work.

b) The firm/organization is not insolvent, in receivership, bankrupt or being wound up, and not under administration by a court or a judicial officer, and that it is not subject to the suspension of its business or legal proceedings for any of the foregoing reasons.

c) The firm/organization has fulfilled all its obligations to pay taxes and social security contributions.

d) The firm/organization has not, and that its directors and officers have not, within the last five years been convicted of any criminal offense related to professional conduct or the making of false statements or misrepresentations as to their capacity or qualifications to enter into a procurement or supply contract.

e) The Commission, in the event that any of the foregoing should occur at a later time, will be duly informed thereof, and in any event, will have the right to disqualify the firm/organization from any further participation in procurement proceedings.

f) The firm/organization did not/will not attempt to influence any other bidder, organization, partnership or corporation to either submit or not submit a proposal/bid/quotation.

g) The firm/organization will not, in the absence of a written approval from the Commission, permit a person to contribute to, or participate in, any process relating to the preparation of a Quotation/Bid/ Proposal or the procurement process if the person:

   a. at any time during the 12 months immediately preceding the date of issue of the Solicitation was an official, agent, servant or employee of, or otherwise engaged by the Commission;
   b. at any time during the 24 months immediately preceding the date of issue of the Solicitation was an employee of the Commission personally engaged, directly or indirectly, in the definition of the requirements, project or activity to which the Solicitation relates.

h) Neither the organization/firm, its parent entities (if any), nor any of its subsidiary or affiliated entities (if any) have been identified on, or associated with any individual, groups, undertakings and entities identified on, the list established pursuant to the UN Security Council Resolution 1267 (Consolidated Sanctions List).[1]

i) Neither the organization/firm, its parent entities (if any), nor any of its subsidiary or affiliated entities (if any) are subject to any form of sanction imposed by an organization or body within the United Nations System, including the World Bank.

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[1] The Consolidated United Nations Security Council Sanctions List can be found on the following website: **https://www.un.org/securitycouncil/content/un-sc-consolidated-list**

j) Neither the organization/firm, its parent entities (if any), nor any of its subsidiary or affiliated entities (if any), is engaged in any practice inconsistent with the rights set forth in the Convention on the Rights of the Child, including Article 32 thereof, which, inter alia, requires that a child shall be protected from performing any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development.

k) Neither the organization/firm, its parent entities (if any), nor any of its subsidiary or affiliated entities (if any) will use the funds received under contracts/purchase orders with the Commission to provide support to individuals, groups, undertakings or entities associated with terrorism.

l) The prices in the firm/organization's proposal/bid/quotation have been arrived at independently, without consultation, communication or agreement with any other interested companies, competitor or potential competitor with a view to restricting competition.

m) The Commission shall have the right to disqualify the firm/organization from participation in any further procurement proceedings, if it offers, gives or agrees to give, directly or indirectly, to any current or former staff member of the Commission a gratuity in any form, an offer of employment or any other thing of service or value, as an inducement with respect to an act or a decision of, or a procedure followed by, the Commission in connection with a procurement proceeding.

n) The Commission shall have the right to disqualify the firm/organization from participation in any further procurement proceedings if it does not disclose to the Commission any situation that may appear as a conflict of interest, and if it does not disclose to the Commission if any official or professional under contract with the Commission have an interest of any kind in the firm/organization's business or any kind of economic ties with the firm/organization.

o) The firm/organization expressly agrees to abide by the United Nations Supplier Code of Conduct.[1]

Name (print):___________________________ Signature: ________________________

Title/Position: _________________________

Place (City and Country):_________________________ Date: _________________________

[1] https://www.un.org/Depts/ptd/about-us/un-supplier-code-conduct

VENDOR PROFILE FORM (VPF) – FOR PRODUCTS/SERVICES/WORK	
1. Name of Company:	
2. Street Address:	3. Telephone:
P.O. Box: City:	4. E-Mail:
Zip Code: Country:	5. Website:
6. Contact Person:	Title:
7. Legal Status (e.g. Partnership, Private Limited Company, Government Institution) PLEASE INCLUDE A COPY OF THE CERTIFICATE OF INCORPORATION	
8. Year Established:	9. Number of Employees:
10. Gross Corporate Annual Turnover (US$m)*:	11. Annual Export Turnover (US$m)*:
12. Type of Business/Products: Manufacturer ☐ Sole Agent ☐ Supplier ☐ Other ☐ (please explain)	
13. Type of Business/Services/Work: Engineering ☐ Civil Work ☐ Governmental Institution ☐ Other ☐ (please explain)	
14. References (your main customers, country, year and technical field of products, services or work): **	
15. Previous Supply Contracts with United Nations Organizations (over the last 3 years)** Organization: Value in US$ Equivalent: Year: Organization: Value in US$ Equivalent: Year:	
16. Summary of any changes in your company's ownership during the last 5 years:	

* Please provide a copy of the most recent audited annual report and accounts. Note: Export includes services or work performed abroad or for foreign clients.

** Please provide supplementary documentation on these items.

17. List of Products/Services/Work offered:

Product/Service/Work #	Product/Service/Work Description

18. This section shall be **<u>signed and stamped</u>** by an official legally authorized to enter into contracts on behalf of your organization:

Name: Title: Signature: Date:

Bank Details	**Beneficiary Details**
Bank Name:	Beneficiary Name: (exactly as stated on bank statements)
Bank Address:	IBAN: (if applicable)
Exact Account Holder Name:	Account number:
	SWIFT/BIC:
	ABA/Sort Code:

Additional Details (if applicable)

Correspondent bank:

Correspondent account number:

Correspondent SWIFT/BIC:

Tax Identification Number:

FOR CTBTO USE ONLY		
Evaluated By:	Initials	Date:
Updated By:	Initials	Date:
Remarks:		

* Please provide a copy of the most recent audited annual report and accounts. Note: Export includes services or work performed abroad or for foreign clients.
** Please provide supplementary documentation on these items.