

The second integrated field exercise: Taking OSI capabilities to the next level

VERIFICATION SCIENCE

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Exercises have always played a central role in the development of the on-site inspection (OSI) element of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) verification regime. The same applies to other multilateral verification mechanisms such as Chemical Weapon Convention inspections.

A verification mechanism as complex as an OSI requires testing in an integrated manner so that the Member States of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) have confidence in its effectiveness.

Think of a car: all of the parts can be designed and built separately (engine, wheels, brakes, gearbox etc.) but if they are not put together and tested in an integrated manner, there is no guarantee that the car will function correctly and safely. For an OSI, an additional layer of complexity derives from the human interaction and interpretations of the Treaty, Protocol, and Operations Manual as well as the perceptions, interpretations and actions of the individual inspectors. An integrated field exercise (IFE) provides the environment in which to test the integration of all operational and technical elements of an OSI.

In 2008 the CTBTO conducted its first Integrated Field Exercise – IFE08 – at the former Soviet Union’s nuclear test site at Semipalatinsk in Kazakhstan. IFE08 was the final stage of the first development cycle of the OSI verification element. The lessons learned from IFE08 provided the basis for the 2010–2013 OSI Action Plan, which has been successfully completed to further develop OSI operational capabilities.

The next IFE will take place at the end of this year in Jordan, near the Dead Sea. Its main

TRAINING ACTIVITIES CONDUCTED FOR THE INTEGRATED FIELD EXERCISES	IFE08	IFE14
Introductory course	2 weeks	2 weeks
Advanced course	2 weeks	3 weeks
Health & safety course	0	1 week
Leadership course	1 week	1 week
Technical courses and tabletop exercises	2 weeks	10.5 weeks
Operation support centre training	< 0.5 week	0.5 week
Host country training	0	1 week
Final preparatory course	0	2 weeks
Build-up exercise courses	0	5 weeks
Field training exercise	0	Build-up exercise III/ field training exercise (2 weeks)
Total number of weeks	Approx. 7 weeks	Approx. 28 weeks

aim will be to test the level of operational capabilities and technical advancements achieved since IFE08.

There have been a number of different approaches when preparing for these two major events. These have been primarily in the areas of training, documentation, preparatory exercises, methodology and techniques, as well as logistics. The CTBTO and its Member States have invested considerably in both IFE08 and IFE14.

FOUR TIMES AS MUCH TRAINING

Preparations for IFE08 consisted of a 13-week training cycle that was eventually reduced to around seven weeks due to budgetary constraints. The training covered:

1. An introductory training course for all future (= surrogate) inspectors.
2. Five parallel advanced training courses for the inspection sub-teams.

3. Specialized training for exercise participants with leadership roles which included a table-top exercise.

Comprising a total of 28 weeks, preparatory training for IFE14 was four times longer than for IFE08. New elements included an entire week of health and safety training including radiation protection, training for the host country representatives who will assume the role of the inspected State Party, and a field training exercise.

Equipment handling during IFE08 – a good workout but not really efficient.



Equipment handling during Build-Up Exercise III in 2013 – will also be used during IFE14.



EXERCISES CONDUCTED IN PREPARATION FOR IFE08 AND IFE14	IFE08	IFE14
Directed exercises	2	2
Field tests	3	10
Build-up exercises	0	3

»IFE08 was only a test drive around the block – now we’re headed for the Autobahn.«

DOCUMENTATION

Based on lessons learned during IFE08, special attention has been given to developing the documentation system. The number of documents for IFE14 already stands at 92, compared to 14 for IFE08 (excluding equipment user manuals).

INNOVATION: BUILD-UP EXERCISES

Before IFE08, the main vehicles for developing different OSI techniques were directed exercises. These are small to medium scale events to test the operations and techniques of one or two specific elements of the OSI verification regime at a time. The two directed exercises in preparation for IFE08 were devoted to building up the logistical

capabilities and practising certain OSI techniques such as airborne magnetic field mapping, visual observations or gamma radiation surveys.

In the run-up to IFE14, a series of field tests have been conducted to test equipment and develop the operational capabilities of specific techniques, for example multispectral imaging including infrared (MSIR) system. The main innovation for IFE14 has involved carrying out build-up exercises (BUEs), which test entire phases of the OSI inspection in an integrated way. To save costs, the three BUEs for IFE14 were conducted in Austria and Hungary.

LOGISTICS

Progress since IFE08 is evident in the field of logistics. The base of

operations’ set up has been further refined to ensure smooth operations and now features a comprehensive radionuclide and noble gas laboratory. As a result of the upgrade in the inspection equipment that is available to the CTBTO, around three times more equipment (150 tons) will be shipped to Jordan than was dispatched to Kazakhstan in 2008. The equipment is also easier to access. Most OSI equipment is already being stored in Vienna in special air freight containers that have been specially developed for an OSI. These Intermodal Rapid Deployment System containers allow for field equipment, servers or generators to be used straight from the containers. Other organizations with similar mandates have started to emulate the CTBTO’s OSI logistic system.

VSAT antenna used for IFE08 (2.4 metres, heavy, six hours to install)



VSAT antenna to be used during IFE14 (30 minutes to deploy, light, field VSAT antenna)

Comparison of inspection activities and technologies tested during IFE08 versus those planned for IFE14

INSPECTION ACTIVITIES AND TECHNIQUES #	PLAYED IN IFE08 (FULLY/LIMITED/NOT PLAYED)	AVAILABILITY FOR IFE14 (FULLY/LIMITED/NOT PLANNED)
Position finding from the air and surface	Fully played	Fully available
Visual observation from the air, at and below the surface	Fully played (ground visual observation not developed)	Fully available
Video from the air, at and below the surface	Not played	Fully available
Still photography from the air, at and below the surface	Fully played	Fully available
Multi-spectral imaging including infrared measurements from the air, at and below the surface	Not played	Fully available
Measurements of levels of radioactivity above, at and below the surface using gamma radiation monitoring and energy resolution analysis from the air, and at or under the surface	Limited play (contribution in-kind equipment not in accordance with specifications of the CTBTO's Working Group on verification)	Fully available
Measurements of the noble gas argon-37	Not played (demonstration only)	Fully available
Measurements of radionon	Not played	Fully available
Environmental sampling and analysis of solids, liquids and gases from above, at and below the surface	Limited play	Fully available
Passive seismology	Fully played (30 stations)	Fully available (full set of 50 stations)
Resonance seismometry	Not played	Not planned (not envisaged as part of Action Plan)
Active seismic surveys	Not played	Available – limited usage
Magnetic field mapping from the air and at the surface	Limited play (contribution in-kind equipment)	Available – limited usage
Gravitational field mapping	Not played	Fully available
Ground penetrating radar	Limited play	Fully available
Electrical conductivity measurements	Limited play	Fully available
Drilling	Not played	Not planned (not envisaged as part of Action Plan)

LOGISTICAL ELEMENTS OF IFE08 AND IFE14	IFE08	IFE14
Base of operations	Simple design, included accommodation	Very complex design does not include accommodation
Tons of equipment	51.2	~150
Power system	Two 40KVA generators (for IT), two 40KVA generators (for other parts of the base of operations)	Integrated 220 KVA UPS dual 110 KVA generators system
Shipping	7 x 40ft ISO containers	27 Intermodal Rapid Deployment System containers and 3 aircraft pallets to be shipped by air, 10 x 20ft containers to be shipped by sea
Handling equipment	3 simple field non-motorized pallet movers	2 simple field non-motorized pallet movers 1 motorized forklift 1 bobcat multifunctional vehicle
Communications equipment	2.4 m Parabolic Hard Dish VSAT (Type used also in IMS stations), 40 analog UHF radios, spot trackers, Broadband Global Area Network (BGAN) satellite communication system, Iridium satellite phones	Portable, fast deployable inflatable GATR VSAT, 80 digital UHF radios, 7 hybrid mobile UHF/VHF/HF systems, one stationary base of operations hybrid UHF/VHF/HF including a full dispatcher

IFE14: CTBTO'S LARGEST AND MOST TECHNOLOGICALLY ADVANCED SIMULATED OSI

A number of valuable lessons were learned during IFE08 which were incorporated into the OSI Action Plan for 2010–2013 and have provided the basis for further development, especially in the areas of training and procurement. The whole concept of operation for IFE14 will be different to IFE08 as the pool of techniques and equipment available will be much larger. Cross-cutting issues like health and safety procedures, inspection team functionality, data flow and data security, geographical information system and communications are much more advanced than they were in 2008. While IFE08 was unprecedented at the time in terms of the scope and dimension of the exercise, IFE14 will be the largest and most technologically advanced simulated OSI ever conducted by the CTBTO and will demonstrate the progress made since 2008.

BIOGRAPHICAL NOTES



GORDON MACLEOD

is the Project and Exercise Manager for IFE14 and the Chief of Policy Planning and Operations within the On-Site Inspection (OSI) Division of the CTBTO. He has been involved in nuclear security and non-proliferation for nearly 30 years. Most of this time was spent at the Nevada National Security Site (Nevada Test Site). He was involved with the CTBT from a national perspective during negotiations in 1993 and joined the CTBTO in 2011.



MATJAZ PRAH

is the Coordinator of the OSI Division. He has spent nearly 25 years in the field of nuclear safety and security. He was Licensing Manager at the Krško Nuclear Power Plant in Slovenia and Director General of the Croatian National Nuclear Safety and Security Regulatory Body. He was also Chairman of the National Authority for CTBT implementation in the Republic of Croatia. He joined the CTBTO in 2009.

ON-SITE INSPECTION

IFE14

JORDAN الأردن

AT A GLANCE

THE INTEGRATED FIELD EXERCISE 2014 IFE14

ULTIMATE VERIFICATION MEASURE

Under the Comprehensive Nuclear-Test-Ban Treaty (CTBT), an on-site inspection (OSI) is the ultimate and most powerful verification measure. Up to 40 inspectors search a defined area for evidence of a nuclear explosion, using a wide range of activities and techniques.

An OSI can only be launched after the CTBT has entered into force. In preparation for that day, the CTBTO regularly conducts OSI exercises to fine-tune its procedures and techniques.

The Integrated Field Exercise 2014 – IFE14 – is the second full scale simulation of all phases of an OSI under realistic and challenging conditions. The first such simulation – IFE08 – took place in Kazakhstan in 2008.

OBJECTIVE

The main goal of IFE14 is to evaluate the progress made regarding the CTBTO's operational capability to conduct an OSI and to further refine this capability.

SETTING

IFE14 will take place in Jordan's Dead Sea region from 3 November to 9 December 2014 in an inspection area of almost 1,000 km².

PARTICIPANTS

Over 200 experts from the CTBTO and its Member States will fulfil functions within the inspection team, the operations support centre, the inspected State Party, the control team, the exercise management team and the evaluation team.

In order to provide Member States with the possibility to observe IFE14 activities, both a VIP visit and various observer programmes will be arranged.

THOROUGH PREPARATION

The four individual phases of an OSI were practiced in three separate build-up exercises during 2012 and 2013.

Training of experts from the second training cycle as 'surrogate' inspectors as well as additional training in preparation for IFE14 amounted to a total of 28 weeks.

Two OSI workshops in 2012 (Austria) and China (2013) were dedicated to identifying lessons in relation to the build-up exercises and preparations for IFE14.

REALISTIC & CHALLENGING SCENARIO

The OSI simulation will be based on a complex, scientifically credible and challenging scenario developed and peer-reviewed over a period of two years with the support of the CTBTO's Member States.

LOGISTICS: A HERCULEAN TASK

Several Member States are providing the CTBTO with high-end inspection equipment as contributions in-kind. The respective agreements have been concluded and most of the equipment is already in Vienna for final testing and training.

Around 150 tons of equipment including sensitive and dangerous goods will be dispatched from Austria to Jordan.

HEALTH AND SAFETY: TOP PRIORITY

A comprehensive health and safety plan for IFE14 is being developed and provisions for the medical examination of IFE14 participants are currently being implemented.

STRINGENT EVALUATION

IFE14 will be evaluated by an independent team of experts from Member States in order to identify lessons for further improvement.