INTRODUCTION
A station sample with multiple anthropogenic nuclides, at least one of which is a fission product, is classified as Level 5 and is split and sent to two CTBT laboratories for confirmatory analysis. In 2011, after the Fukushima accident, 445 samples from 37 certified stations were classified as Level 5. Three samples from JPJP38 Takasaki exceeded the exempt quantities for routine transport to a laboratory based on IAEA Safety Standards on Regulations for the Safe Transport of Radioactive Material (2003) and were kept at the station. As lesson learned, the PTT developed a procedure for shipment of a UN2910 excepted package from a station to a laboratory for the Station-specific Operational Manual (SSOM) in case the need for it again arises. An excepted package contains limited quantity of radioactive material and must comply with the requirements of the Standards. Further, it was also recommended at CTBT Laboratory Workshops that logistical and technical issues involved in laboratory re-analysis of these samples should be identified. Thus, a “hot sample” transport exercise was organized by PTT involving the shipment and analysis of a reference sample shipped with CTBT-relevant nuclides and with a total activity which requires shipment as UN2910 excepted package. Five certified laboratories, ATL03, FIL07, ILL09, GBL15 and USL16 volunteered to participate in this exercise.

OBJECTIVES
- Validate the SSOM procedure for shipping a UN2910 excepted package from a station to a laboratory;
- Identify and address radiation safety and high dead time issues when measuring a relatively high-activity sample;
- Check data quality of gamma-ray measurements by a laboratory of a relatively high-activity sample by comparing laboratory results with certified activity values.

DESCRIPTION OF THE EXERCISE

Sample Geometry
Radionuclide Aerosol Sampler and Analyser (RASA) is a type of an automatic radionuclide station in the International Monitoring System (IMS). There are currently 20 certified RASA stations in the IMS, including JPJP38. The RASA filter geometry is rectangular in shape and requires folding and compressing by a laboratory to transform it into a cylindrical disk for measurement by gamma-ray spectrometry using a high-purity Germanium detector (HPGe). The sample geometry used in the Exercise was a split RASA filter.

OBJECTIVES

- UN2910 excepted package type should meet activity limits, not exceed 5 μSv/h at any point on external surface of package, and be appropriately labelled, but does not require special handling.
- IDC summary on nuclides present in Level 5 samples and their activity concentrations are provided to labs so they are aware of activity levels beforehand.
- Labs have designated areas for handling IMS samples which are typically low.
- Additional Nuclides Reported by Labs: 137I, 89Zr, 144Pm, 139Ba, 137Cs, 152Eu, 154Eu, 135Cs, 137Cs, 144Ce, 147Nd
- No false positives were reported.

Dead Time Issues
- Relatively high activity samples can lead to higher dead time (approximately 10 to 15%) when measured on top of the detector, which is the usual counting geometry for IMS samples for higher efficiency.
- Several labs used remote counting geometry (Figs. 6 & 7) which also reduced/eliminated cascade summing effects, suppressed appearance of sum peaks and reduced effects of vertical inhomogeneity; this however, requires efficiency calibration in same geometry by empirical methods or Monte Carlo-based numerical methods.
- One lab used satisfactorily the pulser method (Fig. 8) to increase precision and dynamic range of dead time correction.

ACCURACY OF MEASUREMENTS

- Laboratory results were compared with certified values using %difference and zeta tests (ISO 13528:2005).
- %difference from certified value should not exceed ±15% and zeta score should be <3 to be acceptable.
- All participants performed very well, except for one lab which removed the scintillators prior to compression which led to loss of radioactive particles and underestimated of activity/activity concentration.

SUMMARY OF RESULTS AND OBSERVATIONS

The participants found the exercise successful and very beneficial, as reported at the 2015 CTBT Lab Workshop.