

OSI Radionuclide Techniques readiness to support the On-Site Inspection Team Functionality

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INTRODUCTION AND MAIN RESULTS

This presentation provides insights on the readiness status for radionuclides techniques in use at OSI. Systems which are operational for gamma radiation monitoring and low-resolution energy resolution analysis (GRM/ERAL), for in situ high-resolution energy resolution analysis (ERAH) and for environmental sampling (ENV) had been subject to periodic review of systems performance and obsolescence management; regular maintenance, ad-hoc troubleshooting, and tailored upgrades enhanced systems sustainability and standardized operability in the field. Lessons learned during the Directed Exercise in 2023 and the Build-Up Exercise in 2024 (BUE24), as well as recommendations from inspectors participating in the BUE24 and the IFE in 2025 preparatory training in 2024, were implemented: systems robustness was enhanced, procedures were updated and Field Guides developed. Field exercises and training sessions held during 2024 confirmed the operational status and readiness of radionuclide techniques for OSI deployment at the upcoming IFE, in support of the OSI Inspection Team Functionality.



Introduction

Gamma radiation monitoring (GRM), high (H) and low (L) resolution energy resolution analysis from the air, and at or under the surface (ERA), as well as environmental sampling (ENV) and analysis of solids, liquids and gases from above, at and below the surface are Radionuclide techniques specified in Protocol to the CTBT, Part II, Para. 69(c) and 69(d).

The aim of these techniques is to detect gamma radiation and identify OSI relevant radionuclides during On-site Inspection activities. The inspection team is trained to perform ERA-L and ERA-H surveys in the field and to collect environmental samples, such as air, soil, vegetation, dust, water, and other matrices for analysis at the OSI Field Laboratory located within the Inspection Area.

Sampling to detect radioactive particulates and radioactive gases from a suspected Nuclear Test has to be done as timely as possible, to ensure that radionuclides with short half-life can still be detected.



Inspection Team ready to perform ERA-H acquisition (left); Inspector training for ERA-H techniques (middle); filter change on air sampler (right).

Methods/Data

- Ground-based methods for **Gamma radiation monitoring** (GRM) consists of techniques using Spectrometric Portable Radiation Scanners based on scintillation detectors of different sizes and volumes. Initial air and ground-based surveys are carried out using low-resolution radiation detectors.



Preparation for ERA-L radiation survey training (left); sample collection procedures (middle); noble gas sampling (right).

- High-resolution Energy Resolution Analysis** (ERA-H) consists of portable Hyper Pure Germanium (HPGe) detectors, electrically cooled and battery operated, ready for In-situ data acquisition within 24 hours after deployment.
- Environmental sampling** (ENV) include kits to support air, soil, water, dust, vegetation and other matrices sampling. Aerosol sampling is using portable air samplers. Noble gas samples are collected into gas balloons using low-flow manual as well as automatic multi-line units which can be equipped with gas analyser capabilities, and a dedicated water degassing system for extracting air from water bodies such as lakes or streams.

Results

Inspectors experience and feedback during recent trainings and exercises lead to improvement in readiness of radionuclide techniques for an OSI. These improvements include updated procedures for sampling, energy resolution equipment data acquisition, sample collection and handover, enhanced field tablets performance and operation, field guides development

and verification, samples chain of custody (CoC) verification and advanced system maintenance including troubleshooting in the field as required.



Example of operational configuration: flight POD 21 (ERA) ready to support Inspection Team Functionality (ITF) in 24 hours after deployment at BoO

Conclusions

Field exercises and training sessions held during 2024 helped fine tuning and finally confirmed the operational status and readiness of all radionuclide techniques for OSI deployment at the upcoming Integrated Field Exercise (IFE), in support of the OSI Inspection Team Functionality.