

## Spectral Flavor of the Month: Spectroscopic challenges for technical experts

The science of spectrometry is well established but the method of doing the actual analysis can be varied based on instrumentation available and software used. This skill set is key across a range of applications in nuclear security – from an initial detection through material characterization. The Department of Energy’s National Nuclear Security Administration’s Office of Nuclear Smuggling Detection and Deterrence has developed a monthly round robin gamma spectrometry drill to hone and sustain the gamma spectrometry skills of their partner countries based only on their analytical skills. This is done by providing participants with a scenario, relevant spectra, and ancillary information and asking participants to provide responses to investigative questions and questions that focus on response efforts rather than giving analytical answers using multivariate techniques. The responses require justification for the answers the participants derive, which often lean on complex physics principles and may provide for instructive discussions internal to the teams. The drills are developed to be agnostic of any software requirements so the teams can use the tools available to them. Topics covered have ranged from Naturally Occurring Radioactive Material to medical to industrial sources, and are drawn from real-world experiences or observations. Drills have been submitted from participating teams as well as US organizers, encouraging discussion of shared experiences and increasing participant interaction. By continuing to practice this skill set, participants’ (and organizers’) confidence in their spectrometry and analysis methods can be increased and new methods can be learned and applied. Partners also retain the previous drills for internal use and potentially as a tool for new hires. This type of round robin spectroscopy on this scale is a new way of exercising spectrometry capabilities simultaneously on a multilateral level. Without the need for on-site or in-person activities, it has been a successful means of engaging partners in a virtual setting while travel restrictions are in place. This paper discusses the methods used as part of the Spectral Flavor engagements, addresses areas of success and improvement, and methodologies for path forward in remote multilateral capability exercises.

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