Contribution ID: **48** Type: **Poster**

Initial characterization of neutron sources out of regulatory control at the scene of a nuclear security event

The German Federal Office for Radiation Protection (Bundesamt für Strahlenschutz, BfS) has gathered considerable experience over the last decade in the identification and characterization of nuclear and other radioactive materials at the scene of a nuclear security event. This experience has been gained through numerous exercises, alarm exercises, training situations and deployments. The technical capabilities and expertise of the BfS is used, on request, to support eiother the police or radiation protection authorities during the response to a nuclear security event. In particular, the BfS can support nuclear forensics as part of an overarching police investigation. The measurement team structure of the BfS has been presented previously [1].
This contribution will focus on the initial characterization of neutron sources out of regulatory control at the scene of a nuclear security event. The initial, non-destructive, measurement of the doserate (both gamma and neutron) with handheld detectors is used to characterize the source and, for californium sources, is utilized to estimate the age (time since last chemical separation) of the source. This information could be important for the police investigation of a nuclear security event and will be measured in the event that the source number is not readable (for instance if the source is damaged or has been tampered with deliberately). The results of doserate measurements with several handheld detectors on californium sources over a range of ages (time since last chemical separation) will be discussed and compared with calculated results deriving from a combination of Monte-Carlo simulations and decay calculations using WebKORIGIN [2].
The contribution will show how simple, non-destructive measurements made at the scene can support radiation protection and nuclear forensics. Further non-destructive measurements with high purity germanium detectors can be made at the scene in order to gain further information to support nuclear forensics of californium neutron sources, for instance the age (time since the last chemical separation) or the presence of a Eu-154 impurity [3]. Our measurement equipment for these tasks, together with a discussion of the advantages and disadvantages of the chosen range of detectors, will be presented in the interest of sharing best practice. In particular, the response of various neutron detectors will be compared and the use of high purity germanium detectors in neutron fields will be discussed.
The challenges of maintaining a deployment-ready capability for the identification and characterization of nuclear and other radioactive materials in the field will be summarized and shared in this contribution, in order to contribute to lessons learned and good practice.

References

[1] „Scientific Measurement Teams in the Field for the Response to Nuclear Security Events: Experience gathered by the German Federal Office for Radiation Protection“, E.A. Kröger & B. Lange, IAEA International Conference on Nuclear Security, 2016, Vienna
[2] www.nucleonica.net
[3] „Nuclear forensics information obtained from the gamma-ray spectra of Cf-252 sources of differing provenance“, J. Gregor, J. Kesten, E.A. Kroeger, M. Baron, J.-T. Eisheh, Nuclear Instruments and Methods in Physics Research B, 437 (2018) 13-19

Gender

Male

State

Germany

Authors: Dr KESTEN, Jürgen (Bundesamt für Strahlenschutz); Mr GREGOR, Joachim (Bundesamt für Strahlenschutz); Dr BARON, Martin (Bundesamt für Strahlenschutz); Dr KROEGER, Emily Alice (Federal Office for Radiation Protection)

Presenter: Dr BARON, Martin (Bundesamt für Strahlenschutz)

Track Classification: MORC: Nuclear forensics