

Competent Authority Expert Assistance in the Assessment of Nuclear and other Radiological Materials out of Regulatory Control

Richard Maurer

Department of Energy, National Nuclear Security Administration, Remote Sensing Laboratory,
Joint Base Andrews, Camp Springs, Maryland, 20752, USA
maurerrj@nv.doe.gov

Jill Zubarev

Department of Energy, National Nuclear Security Administration, Office of Nuclear Incident
Policy and Cooperation, Washington, D.C. 22002, USA

Abstract

Considerable resources are dedicated worldwide to detect illicit materials of all types amid the concern of their potential use in criminal acts or acts of terrorism. Of particular concern are illicit nuclear and radiological materials as they have potential to cause serious harm to the general public if not in regulatory control. As such, the international community has developed recommendations and guidance for State's and their Competent Authority to establish, implement, maintain, and strengthen their nuclear security regimes. The International Atomic Energy Agency (IAEA) provides recommendations for the security of nuclear and other radioactive material out of regulatory control through the publication *Nuclear Security Recommendations on Nuclear and Other Radioactive Material out of Regulatory Control, Nuclear Security Services No. 15*. Based on this guidance and national/international practical experience and best practices, the international community has made considerable advances in the detection and interdiction of nuclear and other radiological materials out of regulatory control.

Introduction

Best practices for the detection of illicit radioactive materials at international borders, ports-of-entry, and railways are to employ high sensitivity radiation portal monitors to scan cargo shipments. Radiation portal monitors are designed to passively detect the faint gamma-ray and neutron radiation emissions from radioactive materials. Using these systems, thousands of detections occur annually around the world, all of which need to be investigated to determine the cause of the alarm. The majority of these investigations result in a determination to be innocent alarms. Innocent alarms can occur from common legitimate commercial and industrial materials which contain very low activity levels of naturally occurring radioactive materials (NORM). When the radiation level on a radiation portal monitor exceeds the detection threshold, an alarm will sound alerting the security operator to initiate procedures and protocols to interdict and

investigate the cause of the alarm. Most alarms are resolved through a security investigation which involves a driver interview, manifest review, and identification of the radioisotope. If the incident cannot be resolved using established procedures and protocols, the best practice is to engage the State's Competent Authority or other qualified authority to conduct a technical assessment of the information collected to determine if the shipment is legitimate or a potential threat.

Competent Authority Expert Assistance

The ability to reach back to subject matter experts with experience in the analysis and interpretation of radiation data and receive timely advice is critical in resolving nuclear security events. The U.S. Department of Energy (DOE) maintains the radiological Triage program, which is a 24/7 reachback capability for radiation detector operators. The program provides access to radiation experts to aid in the assessment and interpretation of radiological data. The Triage program has a cadre of on-call scientists and engineers from the national laboratories with extensive experience in radiation measurements and data analysis and interpretation. The experts would analyze the information from the interview, manifest, radiation portal monitor, and radioisotope identification measurement and provide an initial verbal assessment via a telephone call within one hour. The radiation portal monitor scan data for gamma-rays and neutrons and the radioisotope identification spectrum contain a wealth of information about the radiation source when analyzed using specialized analysis tools. The assessment will include the nature of the radioactive material - *What is it?* - identify potential threats and provide detailed radioisotope identification, activity estimates, shielding materials, and radiation health and safety guidance. The experts can also provide advice on recovering and securing the radioactive material.

Practical Experience

Two case studies will be presented to share practical experience from Competent Authority experts who provided valuable assistance in the assessment of illicit radioactive materials detected and interdicted at shipping ports. Sample data sets will be discussed and the process of extracting information about the radioactive material and how it is used to identify radiological material out of regulatory control.

Summary

Radioactive materials are routinely detected and interdicted by radiation portal monitors at international borders, ports-of-entry, and railways all around the world. The majority of the detections are assessed and resolved by the portal operators using established protocols to be legitimate shipments and attributed to commercial and industrial materials containing naturally occurring radioactive materials. However, when the site assessment protocols cannot resolve the situation, the best practice is access to a technical reachback capability with experts from the State's Competent Authority or other qualified authority. The experts can review the data and provide timely assessments of potential threats or illicit radioactive materials.