Countering the Evolving Threat of Nuclear and Other Radioactive Material out of Regulatory Control: Jamaica’s Experience

C.O. Boyd
International Centre for Environmental and Nuclear Sciences, Kingston, Jamaica

Abstract
Developing sustainable approaches to strengthen the safety and security of nuclear and other radioactive materials in Jamaica was propelled by the International Atomic Energy Agency’s (IAEA) initiative to support the development of the country’s regulatory framework. The initiative has been ongoing since 2006, with a focus on creating a legal, institutional, and technical framework to ensure the safety and security of nuclear and other radioactive materials. The initiative has also been instrumental in identifying and addressing challenges and gaps in the country’s regulatory framework.

Introduction
- Jamaica currently has the only nuclear reactor in the English-speaking Caribbean, a small 20 kW 93% highly enriched uranium reactor, established since 1968.
- The introduction of the Megaports Initiative in 2009 revealed gaps and issues in Jamaica’s regulatory framework.

Methods
- There are two (2) pairs of radiation portal monitors (RPMs) at entrance and exit check points at the port, with one straddle carrier dedicated to transshipment cargo. Each RPM consists of two (2) gamma and two (2) neutron detectors, control electronics, power supplies, and occupancy sensors; a battery backup and communication equipment are also installed.
- The equipment possesses detection radiations, however five (5) alarms can be triggered. These include alarms for neutron and gamma radiation, as well as tampering, high/low background readings, and internal faults.

Results
- Neutron Gamma Signature Profile: An alarm triggered demanding an investigation.
- Source Recovery and Inspection for a Neutron-Gamma Alarm. Surface Gamma Density Glage with Co-60 and Am-241,Be Sources.
- Source Recovery and Inspection for a Gamma Alarm. Atomic Distance, d = 2-26 milli-cm of Metal.

Conclusion
- As of May 2013, the “Alarm Details” section of the Jamaica Customs’ Central Alarm Station (CAS) report indicated that a total of 5462 alarms were recorded. Of these, 4440 were alarms classified as ‘Innocent’ or ‘False’ alarms that had to be investigated.
- The detection of radioactive materials and sources out of regulatory control is being uncovered in scrap metal and imported trade.
- Challenges highlighted by the Megaports Initiative in Jamaica:
  - Lack of a dedicated nuclear forensics infrastructure.
  - Lack of a national management strategy for nuclear events.
  - Lack of a comprehensive legislative framework for safety and security.
  - Lack of a State System for the Control and Accounting of Radioactive Sources.

The discovery of radioactive sources in scrap indicates the management systems in place for accounting and control of nuclear and other radioactive materials are inadequate. An efficient regulatory framework is needed to minimize the movement of unsafeguarded sources and maintain control over these currently in peaceful operation. With these challenges in mind, the focus should be on the responsibility of nuclear security rests with each individual Member State. The development of a regulatory framework that is comprehensive and meets the needs of nuclear security is crucial.