Challenges in Applying Safety and Security Measure in NORM Alarm Assessment in Colombo, Sri Lanka Seaport

I.U.W. Liyanage (Sri Lanka Customs)
P.N.G. Rathnaweera (Sri Lanka Atomic Energy Board)
C. Massey (International Atomic Energy Agency)
K.M.N.P. Silva (Sri Lanka Port Authority)

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The Port of Colombo is the largest and busiest port in Sri Lanka. Located in Colombo, on the southwestern shores on the Kelani River, it serves as an important terminal in Asia due to its strategic location in the Indian Ocean.

Currently with a capacity of 7 million TEUs, it has an annual cargo tonnage of 30.9 million tons.
In 2006, Sri Lanka installed 17 Radiation Portal Monitors (RPMs) at the Port of Colombo to screen import, export, and transshipment cargoes for the presence of illicitly trafficked nuclear and other radioactive material.
At the Port of Colombo, Sri Lanka Customs is involved in radiation detection issues with the support of Sri Lanka Ports Authority.

- The Sri Lanka Customs Megaport Surveillance Unit oversees the operation of the RPMs that were installed for nuclear security purposes.

- The Harbour Safety Section of Sri Lanka Ports Authority is responsible for dangerous goods that can include Class 7 and 9 cargoes that contain high quantities of NORM.

- The Sri Lanka Atomic Energy Board provides expert support to Customs for assessment of alarms and examination of identified suspicious cargoes.

- The Sri Lanka Atomic Energy Regulatory Council also has a role in transport safety and security.
Radiation Detection System (Primary Detection)

Central Alarm Station (CAS)

Local Alarm Station (LAS)

Radiation Portal Monitor (RPM)

Software: Citect Schneider Electric
Radiation Detection System (Secondary Inspection)

- Using Secondary Portal Monitor (SPM)

- Using Hand Held Instruments

X-ray Scanning
Radiation Detection System (Tertiary Inspection)

Tertiary Inspections are performed by the technical reach back, Sri Lanka Atomic Energy Board (SLAEB) & Sri Lanka Atomic Energy Regulatory Council (SLAERC)
Radiation detection and isotope identification equipment

SPM

RIIDS

PRDs

Backpacks

Pager

Survey Meter
Standard Operating Procedure (SOP)

MEGAPORT SURVEILLANCE UNIT
Central Alarm Station

STANDARD OPERATING PROCEDURE
Port of COLOMBO

02-21-2018

Figure 2. Site Alarm Response Procedure
## Alarm Statistics

### Alarm Details in 01/01/2018 - 19/11/2018

<table>
<thead>
<tr>
<th>LANE</th>
<th>Occupancies</th>
<th>Achieved Occupancies</th>
<th>Total Alarms</th>
<th>Active Alarms</th>
<th>Released Alarms</th>
<th>Prior Open Alarms</th>
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<td><strong>19681</strong></td>
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<td><strong>19681</strong></td>
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<td><strong>118</strong></td>
<td><strong>9</strong></td>
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Common Alarming Commodities in Sri Lanka

- Sand
  - Ilmenite sand, Rutile sand, Mineral Concentrate
- Fertilizer
  - Muriate of potash, Potassium Nitrate
- Tiles
  - Floor tiles, Wall tiles
- Clay
  - Kaolin, China clay, Hydrous clay
- Granite Slab
- Ceramic ware
  - Cups, Gift items, Shackle insulators
- Fly Ash
- Sanitary ware
  - Cups, Gift items, Shackle insulators
- Zirconium Silicate
- Gas Mantal
- Zircobit
- Aluminum silicate
- Bleaching Earth
- Top Seal
- Glass Beads
- Tobacco Products
- Coated Abrasives
- Potassium permanganate
- Potassium hydroxide
- Poly Aluminum Chloride
- Perlite
- Aluminum Scrap tense, Melting Scraps
- Stainless steel Mugs & Dishes
- Machinery Items
  - Used Machines, Spare parts
Problems

• On a daily basis, almost a hundred alarms of such innocent alarms need to be resolved quickly and confidently to facilitate trade without compromising security.
• Separating alarms that are caused by nuclear and other radioactive material out of regulatory control and those caused by NORM can be quite difficult.
• Job rotation of FLOs in every 6 months time is also a challenge.
• The training to evaluate alarms and to do alarm processing is expensive and time-consuming = not sustainable.
Interesting cases

CASE1: Gamma Alarmed Cargo with Wooden Cupboards.

- Maximum Gamma Sigma - 10.10
- Cargo Size – 20 feet
- Commodity declared as Wooden Cupboards
- Results of SPM & HPGE (Ortec) Detector - Th-228, Ra-226
- Found Tiles in high dense area shown in x-ray image.
CASE2: Gamma Alarmed Cargo with Timber

- Maximum Gamma Sigma- 13
- Commodity declared as Pine sawn timber
- Origin - Ukraine
- Results of SPM & Handheld detectors- Cs-137
- A widespread radiation field can be observed on front and back sides of the container (Gamma radiation level is between 0.07 μSv/h to 0.12 μSv/h)
- It can be suspected that the contamination in the wood inside the container is an after effect of the Chernobyl power plant accident.
Legal Background of Safety/ Transport for NORM

- No specific National Regulations for NORM.
- Under the Provisions of Sri Lanka Customs ordinance all import, export and Transshipment cargo are monitored by Sri Lanka Customs.
- In general, license from Sri Lanka Atomic Energy Regulatory Council should be necessary to transport or import and export of nuclear and radioactive materials, including radioactive waste. All licenses are issued following the IAEA guidelines specially IAEA safety standard on “Regulations for the Safe Transport of Radioactive Material (SSR-6)”.
- National regulations of transport the radioactive materials are in drafting stage and studies are ongoing to requirements to implement the regulations for NORM.
Experience using TRACE

By participating the IAEA CRP on Improved Assessment of Initial Alarms from Radiation Detection Instruments,

- Support the development of IAEA TRACE App and include it in the current training program at Megaport
- Enhance and update knowledge of customs officers
- Technical assistance for alarm assessment
- Establish the better network of experts in the field and custom officers in CRP member countries.
Time study of Alarmed Cargo Release

Management of SL Customs

CAS Operators

360 degree feedback about Alarmed Cargo Release

LAS Operators

Consignees
Sri Lanka Experience

“With TRACE, we get instant confirmation of the material, enabling customs officers to make quicker decisions with more confidence, ultimately contributing to increased trade facilitation, which is our goal”

“The mobile app has shortened the time needed to train officers to assess radiation alarms from days to hours”
TRACE User Training

- Bi-annually Sri Lanka Customs conducting training programmes under NSDD operator courses for FLOs
- 30 minutes topic (English) - Front Line Officers Operator training curricular (NSDD) in 2019 March
- Conducted 2 training sessions so far
- Giving an awareness to all Customs officers in general training programmes (ASC/ SC / Appraisers)
TRACE Training Materials

Materials

• IAEA TRACE Presentation

• Video clip
Incorporate TRACE into workflow

- Update the SOP by including TRACE.

- Collection of data for CRP and Verification of Alarm Assessment added to the job description (List of Duties) of Assistant Superintendent of Customs attached to Megaport Surveillance Unit.

<table>
<thead>
<tr>
<th>Date</th>
<th>Lane</th>
<th>Container No</th>
<th>Cusdec No</th>
<th>HS CODE</th>
<th>Gamma Counts(CPS)</th>
<th>MAX. Gamma</th>
<th>Size</th>
<th>Weight /kg</th>
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<td>BG</td>
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</tbody>
</table>

Record Book for CRP  Data base for Verification of Alarm Assessment- TRACE

- Introduce TRACE among the other related parties such as Consignees, Port Authority, Navy, Military Police etc. through existing awareness programs.
Challenges and lesson learned

• Current legal background is not satisfied to handle the high NORM materials. Need better legal framework for safe and secure handling of NORM at the port.

• Handle the alarms of transshipment of NORM is very difficult due to time bounded and lack of confirmation method for information of shipment.

• In general practice, reshipping procedure is hard to apply when it is necessary. Clear definitions of acceptance of NORM (Concentration, Activity, Dose rate etc) is required minimized the unnecessary reshipments.

• Required more opportunities for share the best practices and enhance the knowledge of the field.
Thank you!