



The Ninth International Symposium on Naturally Occurring Radioactive Material (NORM IX)

NORM Transport and Safety Challenges and Opportunities – The Thai Perspective

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Laem Chabang Port



- Locates in Chonburi Province;
- Covers area of 2,572 acres;
- 6.78 Million TEUs
- Max 18.8 Million TEUs Capacity (3 Phases)



Customs Missions



1. Facilitate trade and promote national logistics system

2. Promote national economy by Customs-related measures and international trade information

3. Protect and secure society based on Customs control system

4. Collect revenue in a fair, transparent and efficient manner



Equipment & Technologies

**Risk
Management**

Technologies

**Central
Profile**



**Local
Profile**



CCTV



X-Ray



e-Lock



MI





Megaports Initiative Project



U.S. DEPARTMENT OF
ENERGY





Objectives

Deter

the terrorist from using the large seaport to ship illicit material

Detect

the radioactive and nuclear material if its ship in the sea cargo

Interdict

the harmful material before it is used



Equipment



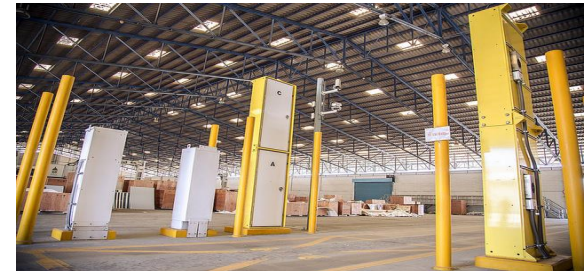
RPM System

- Radiation Portal Monitor: **RPM**
- Central Alarm Station: **CAS**



SPM System

- Spectroscopic Portal Monitor: **SPM**
- Supervisory Control Station: **SCS**
- Secondary Inspection Station: **SIS**



Personal
Radiation
Detector



Radiation
Survey Meter



Radionuclide Identifier
Device



High-Purity Germanium
and Silicon Detector



Radiation Portal Monitors





Operation



1



Container passes the RPM

2



No Radiation, Get the Ticket

3



Alarm goes off, Go to SIS

4



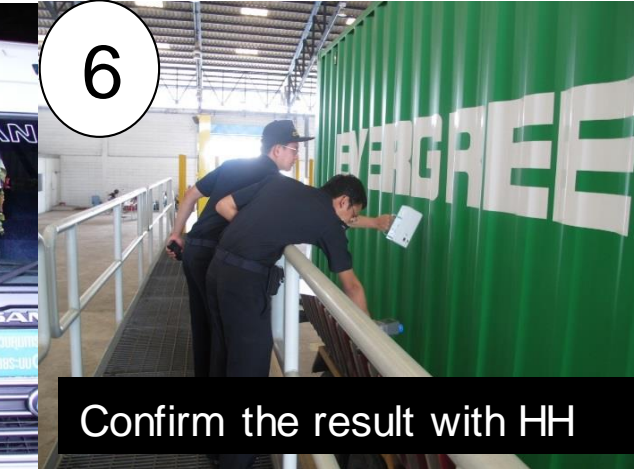
Container passes the SPM

5



No Threat, Get the Ticket

6



Confirm the result with HH



RPM Detection Result

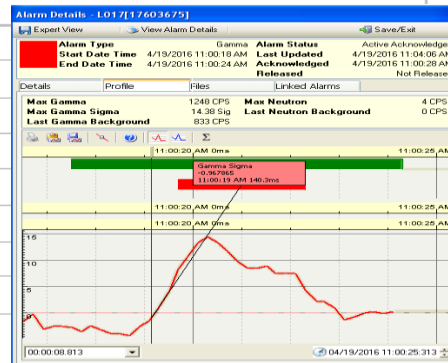


CAS System Reports CAS Alarm Details Report

Report Date: 24/06/2019 19:32

Generated By: SE-SVR-001ICAS


Alarm Record Summary	
Field Name	Field Value
Occupancy Record ID	14100164
RPM Name	L008 - Import Gate 1 Lane 2
Occupancy Start Date Time	24/06/2019 07:14:35
Occupancy End Date Time	24/06/2019 07:14:39
Speed (km/h)	17
Alarm Type	Gamma
Disposition Code	3. Innocent Alarm - Naturally Occurring Radioactive Material (NORM) Found
Last Updated By	SAKDA
Last Update Time	24/06/2019 19:32:06
Isotope	Th-232,U-235,SNM=H
Destination	Other
Send For Secondary Inspection	Yes
Send For Tertiary Inspection	No
Last Neutron Background Count	0.0
Last Gamma Background Count	1701.0
Max Neutron Count	7.0
Max Gamma Count	8981.0
Max Gamma Sigma	176.52
Alarm Reviewed	Yes



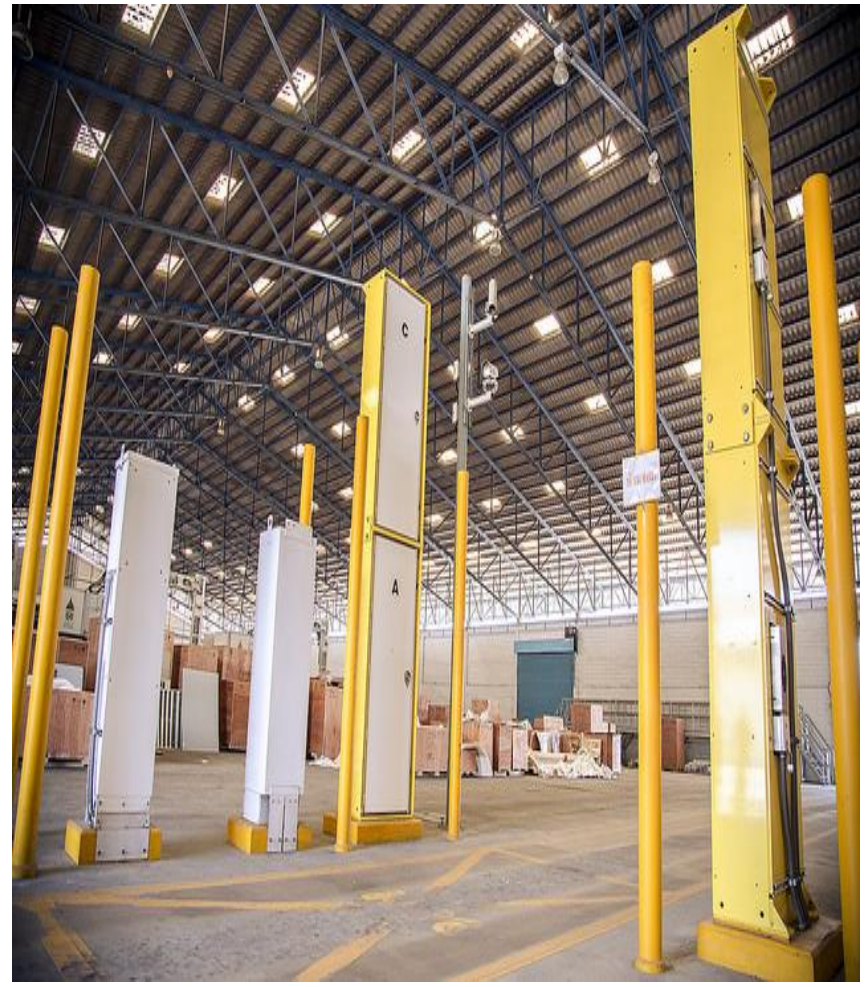
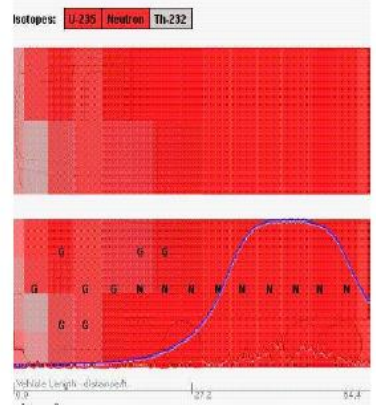


SPM Detection Result



For Official Use Only	For Official Use Only	For Official Use Only
	THREAT (RED) ALARM DATE: 2019/06/24 07:13:06	Case Number: LC-L01-2019-06-24-00-13-06
	Isotope: Th-232U-235Neutron Source DetectedSNM=H	Occupancy: 24 Lane: 1
	Site: Port of Laem Chabang	Dose Rate: 529.956 uR/hr

Commodity:	Case Number: LC-L01-2019-06-24-00-13-06
Carrier:	Consignee:
Shipper:	Driver License#
Driver Name:	Driver Birth Date:
Vehicle License#	Passenger Name:
RIID Reading:	PRD Reading:
RIID Gamma[counts/s]:	RIID Neutron[count/s]:
RIID Dose Rate mR/h:	RIID Identification:
Comment: ROUND 2 14100164 CSLU1306425	



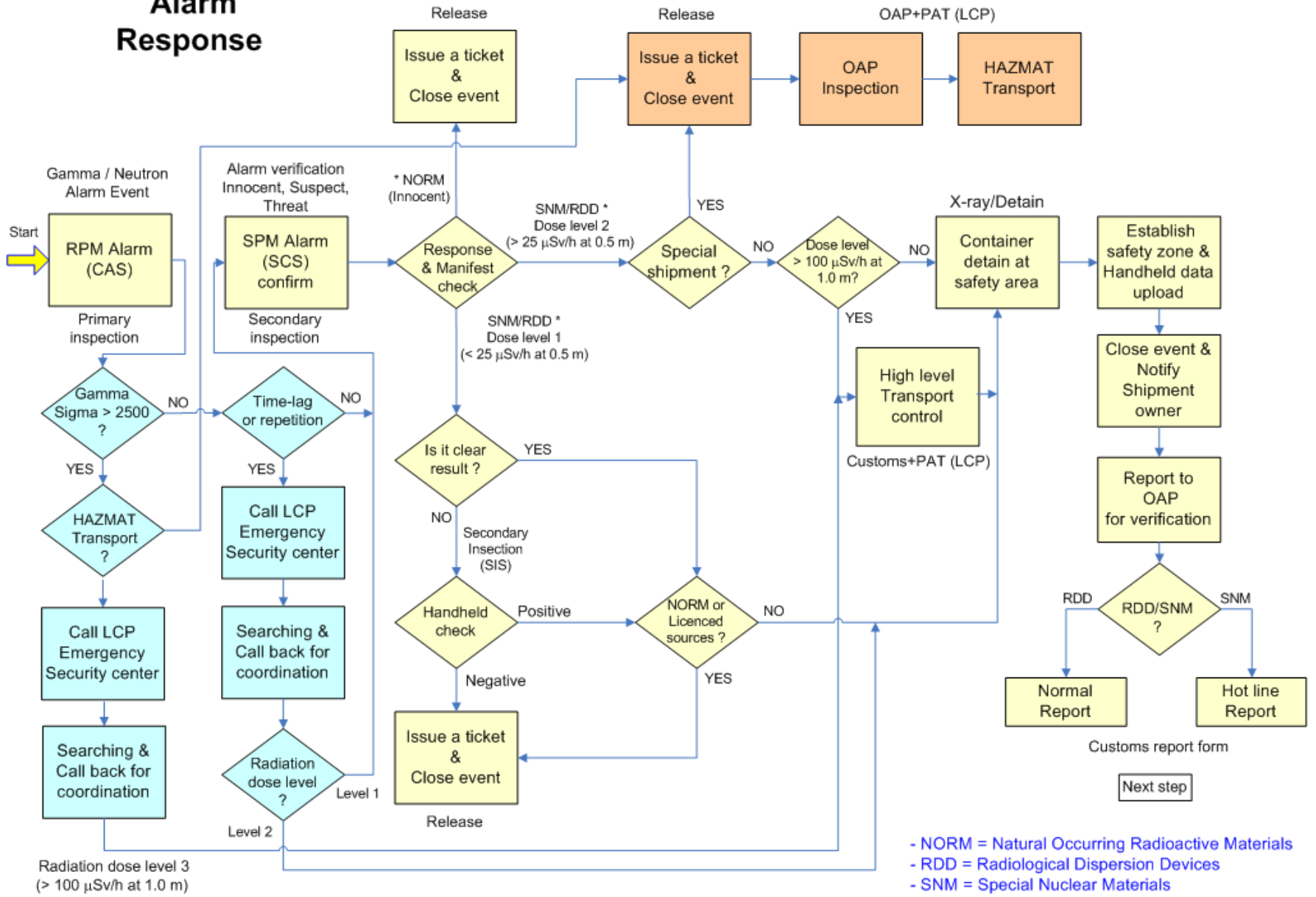


Secondary Inspection



Standard Operating Procedure (SOP)

Alarm Response



- NORM = Natural Occurring Radioactive Materials
 - RDD = Radiological Dispersion Devices
 - SNM = Special Nuclear Materials

Responsible Agencies: Customs, PAT (LCP), OAP



Number of Alarms

Year	RPM		Alarm Percentage	SPM	
	Total Passed	Alarm		Total Checked	Threat
2011	3,598,399	60,663	1.69	-	2
2012	3,536,406	49,601	1.40	36,690	11
2013	3,366,430	44,656	1.33	35,197	-
2014	2,785,446	35,595	1.28	15,729	-
2015	2,339,348	30,648	1.31	23,976	1
2016	3,100,255	50,124	1.62	28,420	-
2017	3,649,844	48,131	1.32	29,243	4
2018*	2,765,409	37,094	1.34	21,819	6

* as of 30.10.2018



Innocent Alarms

- The sensitivity of the RPMs is such that containerized cargo containing radionuclides of natural origin often cause radiation alarms.



Rice, fully milled or semi-milled

100630 / K-40, Ra-226, Th-232



Tableware and kitchenware, of porcelain

691110 / Ra-226, Th-232



Bentonite

250810 / K-40, Ra-226, Th-232



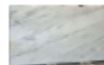
NPK Fertilizer

310520 / K-40



Cutting sheets (other agglomerated abrasives or of ceramics)

680422 / Ra-226, Th-232



Granite; articles thereof

680293 / K-40, Ra-226, Th-232



Potassium hydroxide (caustic potash)

281520 / K-40



Kaolin clays

250700 / Ra-226, Th-232



Roofing tiles

690510 / K-40, Ra-226, Th-232



Ceramic sanitary fixtures (other)

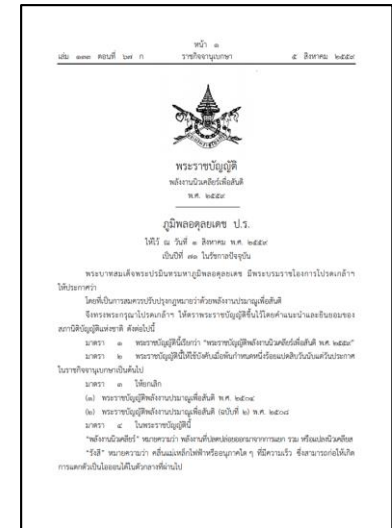
691090 / K-40, Ra-226, Th-232

- Some of the commodities with radionuclides of natural origin are present in enough quantity to be considered as naturally occurring radioactive material (NORM).

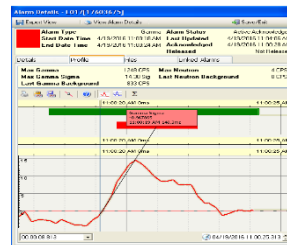


Regulations

- Nuclear Energy for Peace Act B.E. 2559 (2016)
- Office of Atoms for Peace (OAP) is responsible for issuing licenses for import, export, possession, and use of radioactive materials
- Materials containing radionuclides of natural origin or radionuclides of artificial origin with activity concentration above the clearance limit must be subjected to regulatory control



Declared Commodity Type and Weight



RPM & SPM Detection Result



Identification & Dose Rate

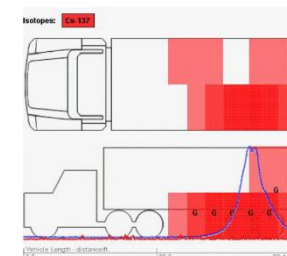
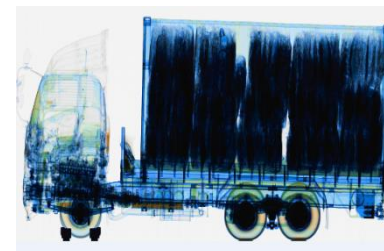
Need a tool to help determining whether the measurements are as expected from the declared information and whether this should be subjected to regulatory control



Cases

Description of Goods	Isotopes	Dose Rate
Toothbrush, Screw, Mirror	Co-60	0.25 μ Sv/hr
Plastic Bottle	Co-60	2-3 μ Sv/hr
Used Diesel Engines & Part	Cs-134/Cs-137	0.26 μ Sv/hr
Used Auto Parts	Cs-134/Cs-137	0.17 μ Sv/hr
Electrical Massage Chair	Cs-134/Cs-137	0.34 μ Sv/hr
Stainless Steel Scrap	Cs-137	200 μ Sv/hr
Plastic Toys	Co-60	0.50 μ Sv/hr
Used Excavator & Used Machine	Cs-134/Cs-137	1.17 μ Sv/hr
Electrical Massage Chairs	Cs-134/Cs-137	1.63 μ Sv/hr
Used Auto Parts	Cs-134/Cs-137	0.12 μ Sv/hr
Used Van	Cs-134/Cs-137	0.09 μ Sv/hr
Toothbrush, Screw, Mirror	Co-60	0.25 μ Sv/hr
Heavy Melting Steel Scrap	Co-60	0.20 μ Sv/hr

Description of Goods	Isotopes	Dose Rate
Used Vehicles	Cs-134/Cs-137	0.25 μ Sv/hr
Used Hydraulic Pump And Used Crane	Cs-137	0.6 μ Sv/hr
Used Vehicles	Cs-137	0.68 μ Sv/hr
Steel Scrap	Cs-137	50.74 μ Sv/hr
Electrical arc furnace dust And Waste Steel	Cs-137	0.2 μ Sv/hr
Steel Scrap	MN-54 , Se-75	0.85 μ Sv/hr
Zinc Oxide Powder	Cs-137	9.69 μ Sv/hr
Stainless Steel Melting Scrap	Cs-137	73.3 μ Sv/hr
Steel Scrap	Cs-137	99.0 μ Sv/hr
Electrical Arc Furnace Dust	Cs-137	52.7 μ Sv/hr
Used Auto Parts	Cs-137	0.7 μ Sv/hr



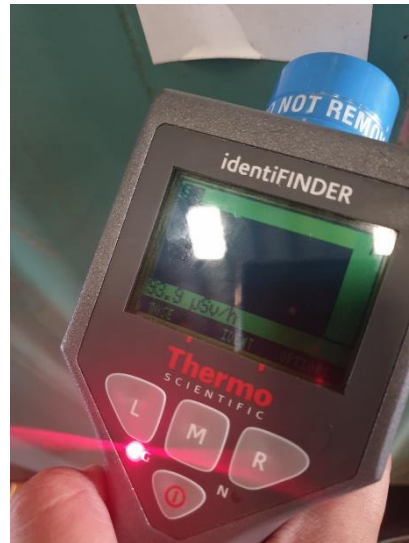
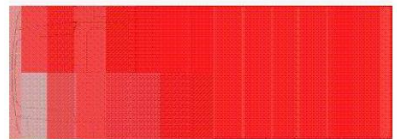


Cases - Monazite

Commodity: Monazite Ore
HS-Code: 253090
Weight: 26,900 kg

For Official Use Only	For Official Use Only	For Official Use Only
	THREAT (RED) ALARM DATE: 2019/06/24 07:13:06	Case Number: LC-L01-2019-06-24-00-13-06
	Isotope: Th-232U-235Neutron Source DetectedSNM=H	Occupancy: 24 Lane: 1
	Site: Port of Laem Chabang	Dose Rate: 529.956 uR/hr

	Gamma Background (cps)	Gamma Max (cps)	Neutron Background (cps)	Neutron Max (cps)
RSP-A	33024	597694	12	52
RSP-B	33024	602241	12	28
RSP-C	33024	609253	12	32
RSP-D	33024	611964	12	7



93.9 uSv/hr
at surface



NORM Th
NORM Ra-226



Th-228
Ra-226



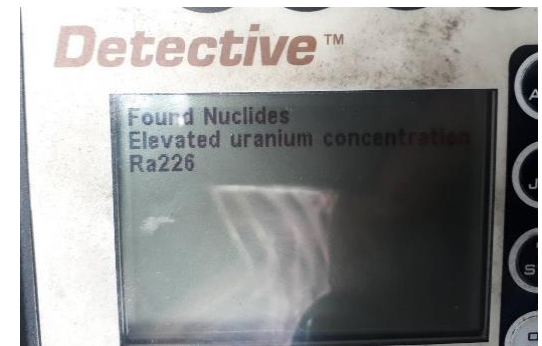
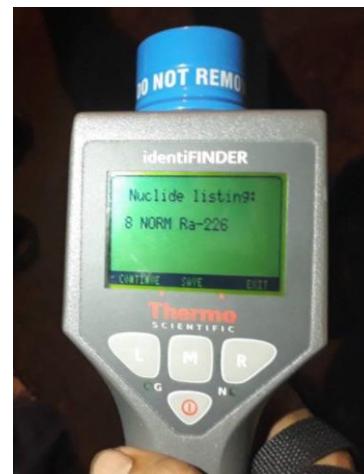
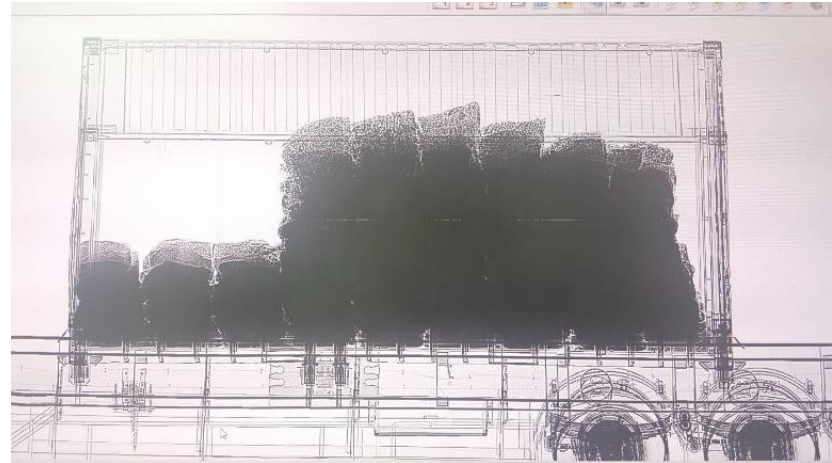
Cases - Antimony

Commodity: Antimony Ore

HS-Code: 261710

Weight: 25,250 kg

ID		Date Time	Alarm Type	Max NC	Max Sig	Container No. 1
Age Up	10486451	7/6/2561 15:29:58	NeutronGamma	20.0	17.438	TEMU5163663
	10484041	7/6/2561 12:06:07	NeutronGamma	24.0	40.559	MSKU2706639
Resize Columns	10488602	7/6/2561 18:06:33	Gamma	6.0	30.612	<No Container ID>
	10488166	7/6/2561 17:34:47	Gamma	17.0	20.223	TEMU5129254
Reset Filters	10488023	7/6/2561 17:25:17	Gamma	6.0	8.133	DFSU3046652
	10487863	7/6/2561 17:12:44	Gamma	20.0	15.881	TRHU3219033
Advanced Filter	10487807	7/6/2561 17:09:09	Gamma	12.0	14.890	TEMU5304188
	10487492	7/6/2561 16:46:05	Gamma	14.0	15.737	TRHU2483083
Silence	10487163	7/6/2561 16:21:02	Gamma	13.0	49.880	SKLU1306601
	10485920	7/6/2561 16:04:33	Gamma	17.0	14.438	YCLU2960544
NeutronGamma	10486718	7/6/2561 15:49:16	Gamma	14.0	18.332	NYKU3710031
	10486438	7/6/2561 15:27:54	Gamma	5.0	255.616	CBHU5568103
Neutron	10486436	7/6/2561 15:27:50	Gamma	2.0	12.994	CBHU5568103
	10486421	7/6/2561 15:26:13	Gamma	6.0	263.918	CBHU5568103
Gamma	10486400	7/6/2561 15:24:56	Gamma	5.0	255.761	CBHU5568103
No Alarm	10486364	7/6/2561 15:21:50	Gamma	7.0	207.134	CBHU5568103
	10486361	7/6/2561 15:21:46	Gamma	6.0	19.399	CBHU5568103
Low Confidence	10485384	7/6/2561 13:58:03	Gamma	6.0	240.748	CBHU5568103



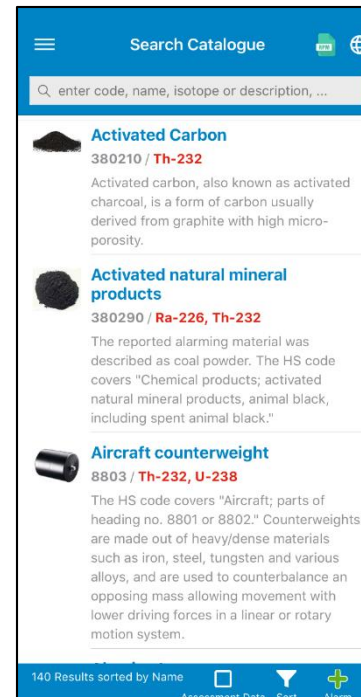
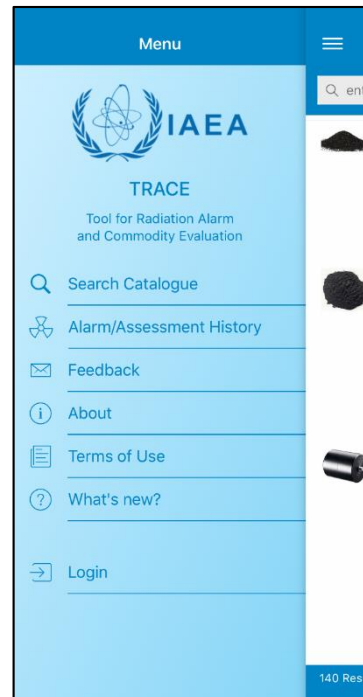
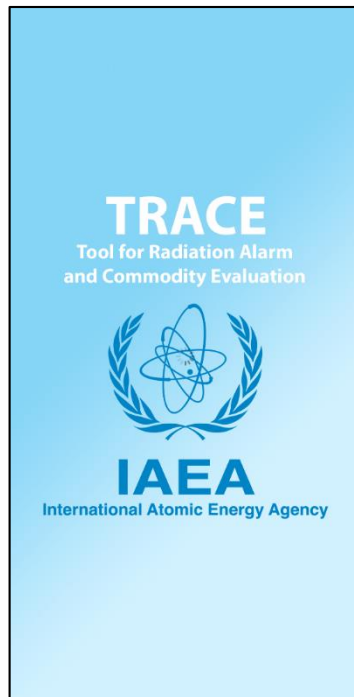
NORM Ra-226





TRACE Application

- Thai Customs participated in the development of IAEA smart phone Application, “**Tool for Radiation Alarm and Commodity Evaluation (TRACE)**” through a Coordinated Research Project (CRP) J02005 “Improved Assessment of Initial Alarms from Radiation Detection Instruments”





TRACE Alarm Assessment Feature (under development and testing)

← Cutting stones (other ...



Cutting stones (other mill stones, grind stones or wheels, of natural stones)

HS Code: **680423**

Reported Isotopes: **Ra-226, Th-232**

Packaging: Not Recorded

Description
Cutting stones are natural stones used for grinding, sharpening, polishing, trueing or cutting, and hand sharpening or polishing.

Uses/Application
Cutting stones are natural stones used for grinding, sharpening, polishing, trueing or cutting, and hand sharpening or polishing.

Assessment Export

← Alarm Assessment

HS Code * **680423**

Isotopes * **Ra-226, Th-232**

Commodity * Cutting stones (other mill stones, grind stones or wheels, of natural stones)

RPM Type *
TSA VM 250 (vehicle)

Background Counts * 800

Max Counts * 2000

Length (foot) * 20

Weight (kg) * 20000











Origin

Note

This is a verified alarm with content for record keeping and/or submittal.

Calculate History

Alarm/Assessment History

	Alumina Ingot 260600 / Ra-226, Th-232 8/1/2018, 8:02:48 AM	
	Kaolin clays 250700 / Ra-226, Th-232 7/29/2018, 2:38:25 PM	
	Aluminium silicate 250700 / Ra-226, Th-232 7/29/2018, 2:37:58 PM	
	Alumina Ingot 260600 / Ra-226, Th-232 7/29/2018, 2:37:13 PM	
	Aircraft counterweight 8803 / Th-232, U-238 7/27/2018, 2:39:43 PM	

0/15 selected



If the weight and RPM count information was entered correctly AND there is no issue with the shipment paperwork (commodity and shipper), then the alarm appears reasonable to release.



The alarm information entered provides a result that is higher than expected for this commodity. Please check the paperwork for commodity, weight, and shipper information. Also check the RPM data entered. If there are any questionable aspects, then a secondary inspection should be considered.



The alarm information entered exceeds expected results. A secondary inspection with a RID (isotope identification) is highly recommended.



TRACE Development

- TRACE is used primarily to assist in determining the presence of illicit nuclear materials

Innocent

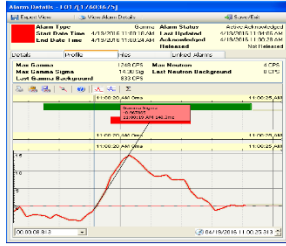
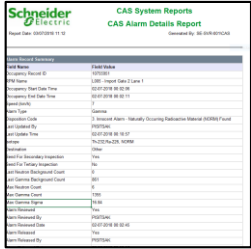


Suspicious

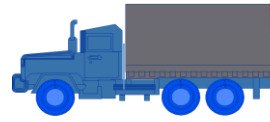
- The tool potentially has an ability to also assist in the evaluation of cargoes with radionuclides of natural origin and NORM cargoes for purposes of trade facilitation and transport and public safety rule compliance



Alarm Evaluation



Alarm Information



Innocent goods containing radionuclides of natural origin

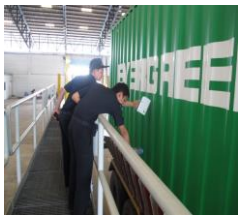


Commodity & Container Information



NORM with level of activity that required regulation

Goods contaminated with radioactive materials



Secondary Spectroscopic Inspection



Illegal trafficking of nuclear and other radioactive materials



Questions

All inquiries are welcome
yanapan_ha@customs.go.th

