



**ATOMIC ENERGY LICENSING BOARD**  
MINISTRY OF ENERGY, SCIENCE, TECHNOLOGY,  
ENVIRONMENT AND CLIMATE CHANGE



# Regulatory Requirements for the Security of Industrial Radiography and Well-Logging Radioactive Sources: **MALAYSIA**

Mexico, 23 October 2019

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**ATOMIC ENERGY LICENSING BOARD**  
[www.aelb.gov.my](http://www.aelb.gov.my)

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**(1) Regulatory Requirements**

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# Legislative and Organization Structure

## Main Acts

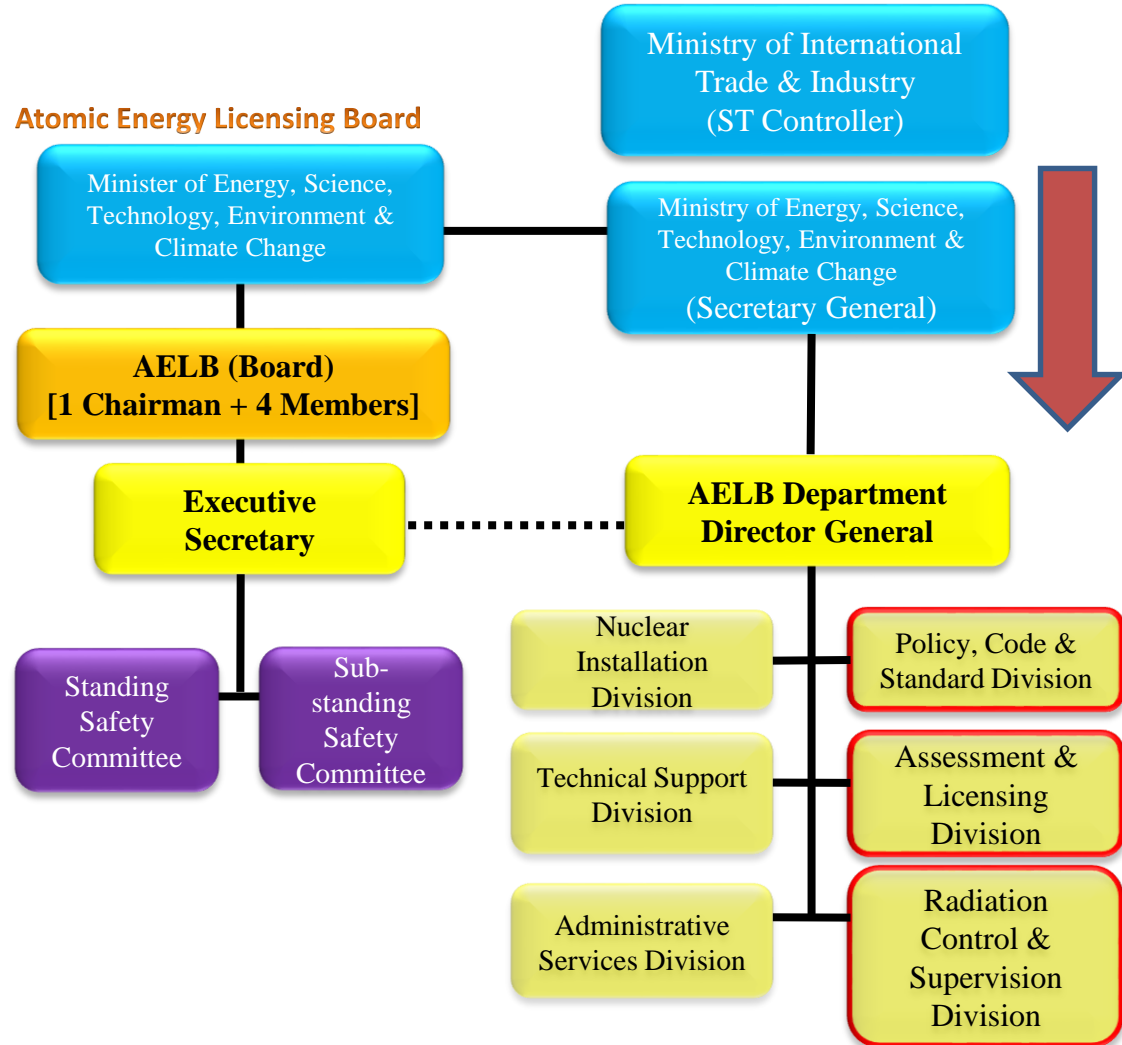
**Atomic Energy Licensing Act 1984 (Act 304)**  
**&**  
**Strategic Trade Act 2010 (Act 708)**

- To provide for the regulation and control of atomic energy **technology & its trade**.
- For the establishment of standards on liability for nuclear damage.
- For matters connected therewith or related thereto.

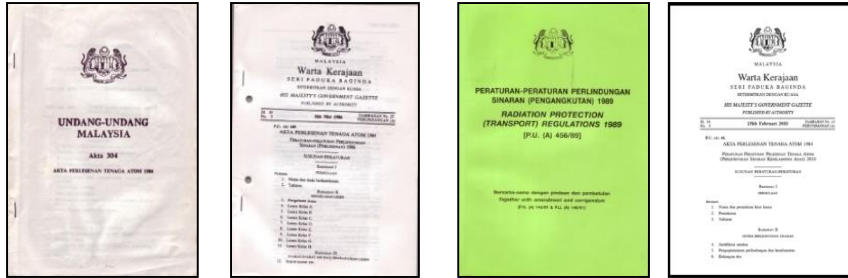
## Regulatory Body & ST Relevant Authority

- Atomic Energy Licensing Board (AELB) was established under Section 3 of the Act 304.
- Ensuring safety, security and safeguarding peaceful Nuclear Activities.

## Atomic Energy Licensing Board



# Regulatory Control Hierarchy



Act  
Regulations  
Orders  
License Conditions  
Code of Practice  
Material Advisor

Mandatory

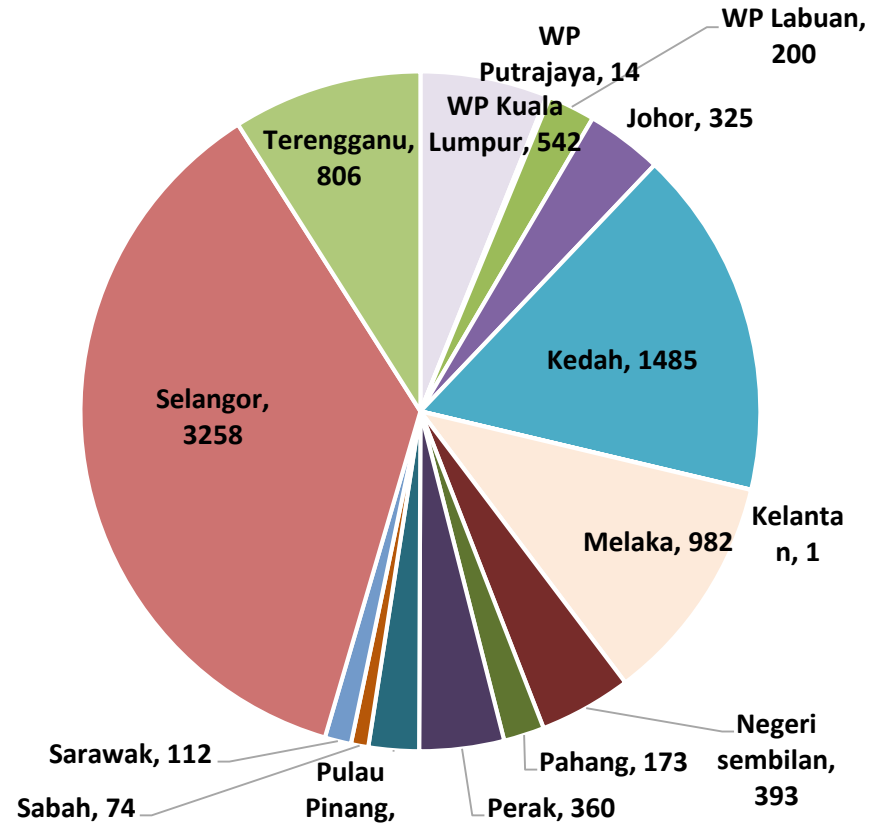
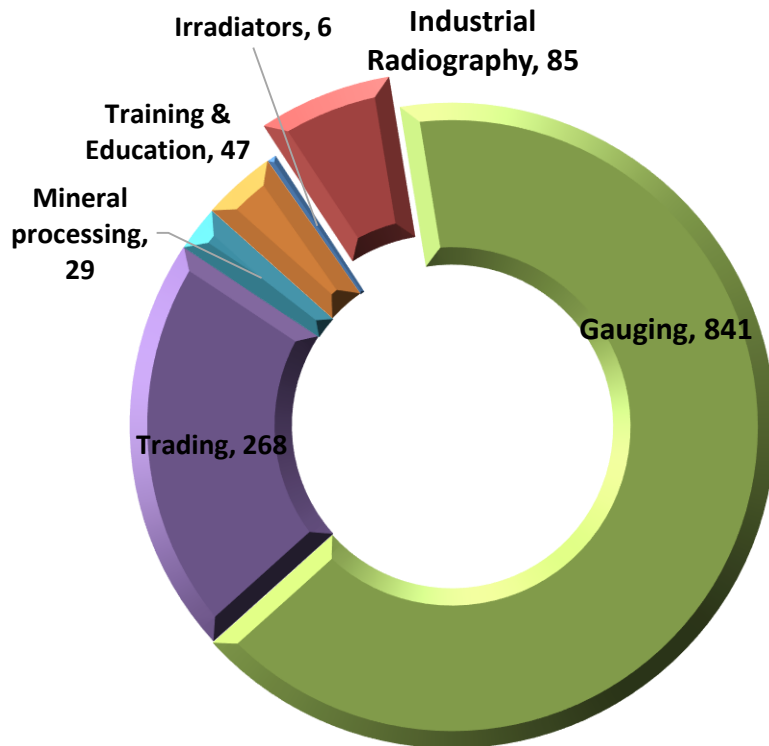
- Subsidiary Regulations under the Act 304:
  - Radiation Protection (Licensing) Regulations 1986
  - Radiation Protection (Transport) Regulations 1989
  - Atomic Energy Licensing (Appeal) Regulations 1990
  - Atomic Energy Licensing (Basic Safety Radiation Protection) Regulations 2010
  - Atomic Energy Licensing (Radioactive Waste Management) Regulations 2011



**PARTIES WITH RESPONSIBILITIES FOR PROTECTION AND SAFETY SHALL ENSURE THAT THE PRINCIPLES OF RADIATION PROTECTION ARE APPLIED FOR ALL EXPOSURE SITUATIONS.**

# REGULATED ACTIVITIES

## NUMBERS OF LICENSE HOLDERS - 1193



## NUMBERS OF RADIOACTIVE MATERIALS - 8939

Sources : eSPP AELB 2018

# Code of Conduct on The Safety and Security of Radioactive Sources



- Approved by the IAEA Board of Governors on 19 September 2003.
- **Approved by the AELB's Board of Meeting for adaption on August 2007.**

# Adoption of CoC - Way Forward

AELB make compulsory to licensee to implements the elements of **Code of Conduct on the Safety and Security of Radioactive Sources** and the three supporting documents;

1. Categorization of Radioactive Sources
2. Security of Radioactive Sources
3. Guidelines on Import and Export of Radioactive Sources

In effective August **2008**.



## Security Implementations:

- Regulations
- License Condition
- Approval Application Procedures
- Assessment/Inspection Checklist
- Guidance
- Awareness Programmed

# Atomic Energy Licensing (Basic Safety Radiation Protection) Regulations 2010

## *PART VI : POTENTIAL EXPOSURE AND SAFETY OF RADIATION SOURCES*

### **Reg. 69: Accountability for Radiation Source**

The licensee shall maintain an accountability system that includes records of —

- (a) the location and description of each radiation source which is in his possession or under his control; and
- (b) the activity and description of each RAM, NM & PS which are in his possession or under his control.

### **Reg. 70: Security and Protection of Radiation Source**

The licensee shall take measures to protect all radiation sources to prevent theft or sabotage.



# Security Plan



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**Guidance on the Development of Security Plan of Radioactive Sources (LEM/TEK/62 Sem.2 29 Oktober 2018)**

## Contents:

- Security Measures (Technical and Administrative)
- Security Measures During Transportation and Storage
- Security of Information
- Inventory of Radioactive Sources
- Maintenance and Testing
- Personnel Screening
- Response Action
- Awareness programmed
- Example of Security Plan

# Purpose of a Security System

A security system should be designed to **prevent unauthorized access** to radioactive sources at all stages of their **life cycles** (storage, use, transport, decommissioning and disposal), in order to;

- ***Prevent unauthorized transfer and use of radioactive sources***
- ***Prevent damage to radioactive sources***
- ***Prevent loss of radioactive sources***
- ***Prevent theft of radioactive sources***
- ***Deter adversaries from committing a malicious act, or***
- ***Minimize through detection, delay and response the likelihood of an adversary succeeding in completing such a malicious act.***

# Security Level Base on Categorization System

| CATEGORY | TYPE OF SOURCES   | ACTIVITY RATIO<br>A/D     | SECURITY<br>LEVEL  |
|----------|---|---------------------------|--|
| 1        | <i>Irradiators</i><br><i>Teletherapy sources</i>  | $A/D \geq 1000$           | A  |
| 2        | Industrial gamma radiography sources<br>High/medium dose rate brachytherapy sources         | $1000 > A/D \geq 10$      | B  |
| 3        | Industrial gauges with high activity sources<br>Well logging gauges                         | $10 > A/D \geq 1$         | C  |
| 4        | Low dose rate brachytherapy sources<br>Industrial gauges with moderate/low activity sources | $1 > A/D \geq 0.01$       | *Apply measures as described in the Basic Safety Standards - Asset |
| 5        | Positron emission tomography (PET) sources<br>Electron capture devices                      | $0.01 > A/D$ & A > exempt |  |

Sources: IAEA Nuclear Security Series No. 11 -Security of Radioactive Sources

# CATEGORY 2

$$1000 > A/D \geq 10$$

## Examples:

- Industrial gamma radiography sources (Co-60, Ir-192)
- High/medium dose rate brachytherapy sources



# CATEGORY 3

$$10 > A/D \geq 1$$

## Examples :

- Fixed industrial gauges that incorporate high activity sources (Co-60, Cs-137)
- **Well logging gauges (Cs-137, Am-Be 241)**



# Description Of Security Measures

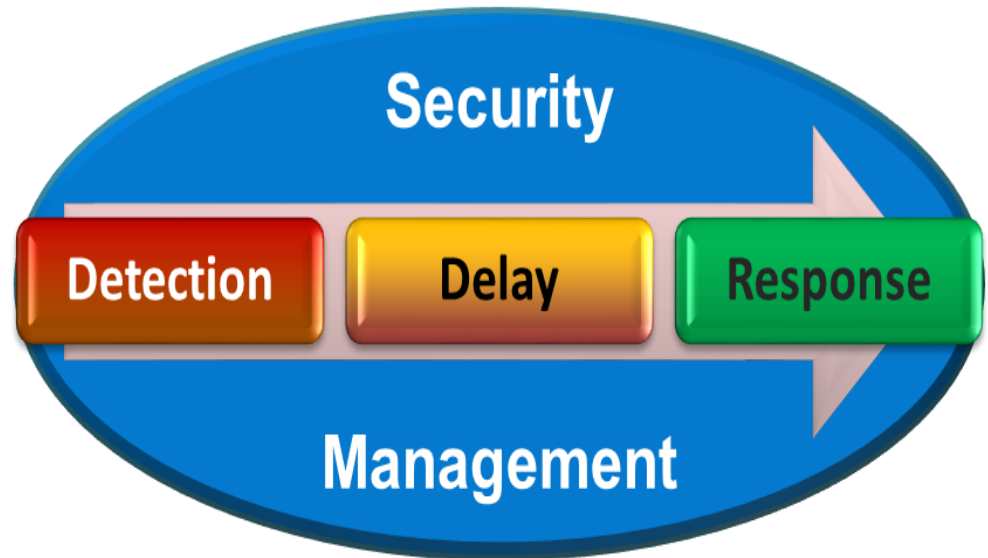
To meet the security objectives a combination of security measures, need to be implemented including;

- ***General administrative measures (common for the management of all sources)***
- ***Administrative measures (graded according to security level)***
- ***Technical measures (graded according to security level)***

# Security Functions

A security system to protect radioactive sources should be designed to perform basic security functions:

- ***Deterrence***
- ***Detection***
- ***Delay***
- ***Response***
- ***Security Management***



# Applicable Security Measures

## *Administrative*

- *Access control procedures;*
- *Alarmed access points (e.g. with radiation detectors);*
- *Key control procedures;*
- *Video cameras or personal surveillance;*
- *Records related to the management of sources;*
- *Source inventories;*
- *Regulations and guidance;*
- *Reliability and trustworthiness of personnel;*
- *Information security;*
- *Quality assurance measures; and*
- *Establishment of a safety culture and security culture.*





# Radioactive Storage (Industrial Radiography)

Example



Concrete Wall, Steel Door and Lock

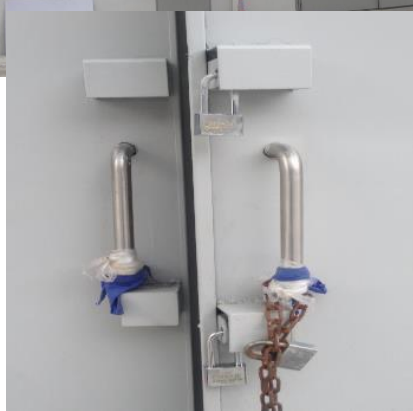
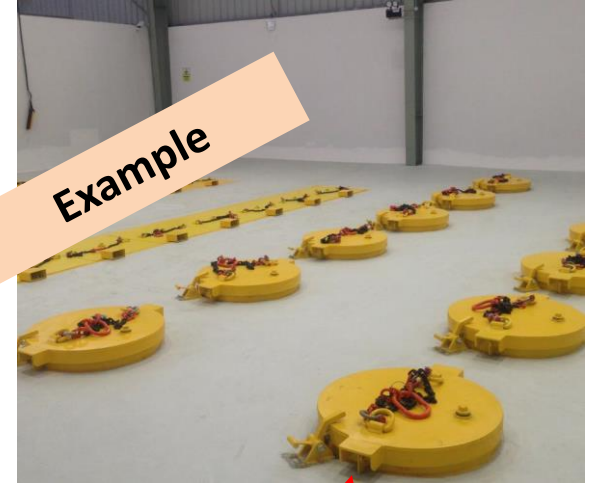


Example

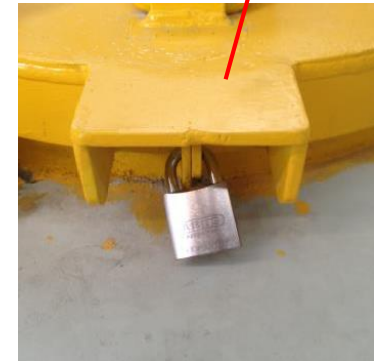


Storage Pit and Lock

# Radioactive Storage (Well-logging)



Double Lock and CCTV  
Inside/Outside Building



Storage Pit Lock

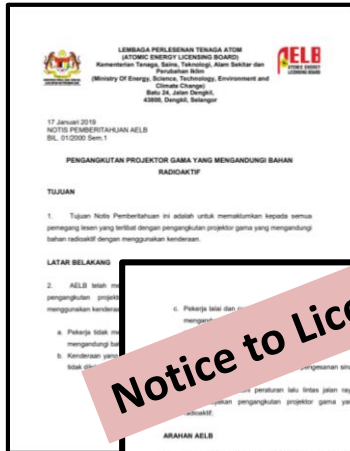
# Applicable Security Measures

## *Technical Measures*

- *Fences*
- *Walls*
- *Cages*
- *Transport packaging*
- *Locked*
- *Shielded containers*
- *Intrusion detection systems*
- *Locks, hinges and interlocks for doors*



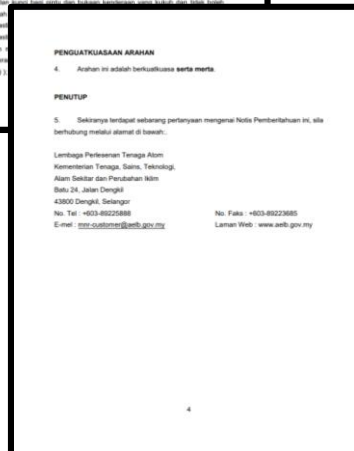
# Transportation of Radioactive Material



Notice to Licensee



Example



# Way Forward?

GPS tracking system towards all mobile sources; still under technical review and consideration.

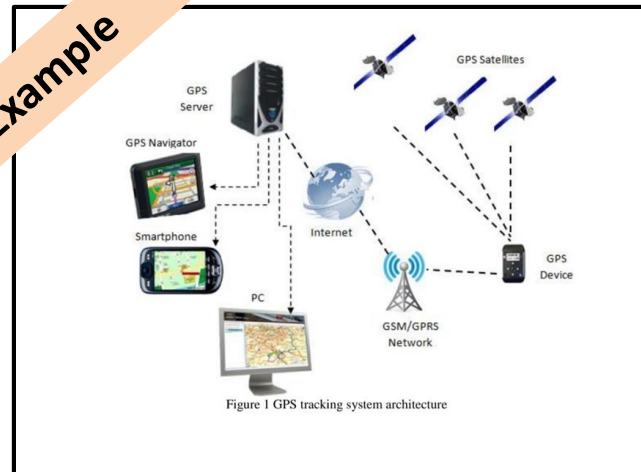
## BENEFIT vs COST

Example



START-88S - KOREA

Example



# INSTITUTIONALIZE KNOWLEDGE & EXPERIENCE

| APPROACH                                      | ACTIVITIES   |
|---|--|
| COMMUNICATION & COORDINATION                  | ➤ BRIEFING, TALKS, VISITS, INTRODUCTION TO DETECTION EQUIPMENT, MOCK DEMONSTRATION   |
| JOINT TRAINING & EXERCISE                     | ➤ CLASSROOM LECTURE, TABLE TOP EXERCISE, FAMILIARIZATION OF EXERCISE FLOW  |
| INTEGRATED OPERATIONAL PROTOCOLS & PROCEDURES | ➤ APPLY THE EXISTING LAW<br>➤ ENHANCE & MODIFY PROCEDURES FOR RESPONSE TO INCLUDE THE THREAT OF RADIOLOGICAL CONSEQUENCES FOR RESPONDERS |
| AWARENESS ON THE EXISTENCE OF MATERIAL        | ➤ FAMILIARIZATION OF NUCLEAR & RADIOACTIVE MATERIAL, ITS DANGER AND PROTECTION PROCEDURES  |

# INCORPORATING LAW ENFORCEMENT AGENCIES FOR NUCLEAR SECURITY

| APPROACH   | METHOD   | FUNCTIONAL RESPONSIBILITY   | REFERENCE  |
|------------|--|---|--|
| PREVENTION | DETER, DISSUADE, PROTECT, SECURE   | <ul style="list-style-type: none"> <li>✓ COUNTER TERRORISM DIVISION</li> <li>✓ CUSTOM &amp; BORDER PROTECTION</li> <li>✓ FACILITY OWNER</li> </ul>  | <ul style="list-style-type: none"> <li>▪ SOSMA / PENAL CODE (<b>CHAPTER VIA</b>)</li> <li>▪ OTHER RELEVANT LAWS</li> <li>▪ ACT 304</li> </ul>  |
| DETECTION  | THREAT ASSESSMENT, DETECT THREAT, ALARM ASSESSMENT, ALERT THE AUTHORITY                              | <ul style="list-style-type: none"> <li>✓ CUSTOM &amp; BORDER PROTECTION</li> <li>✓ FACILITY OWNER</li> <li>✓ COUNTER TERRORISM DIVISION</li> <li>✓ GENERAL DUTY POLICE</li> </ul>   | <ul style="list-style-type: none"> <li>▪ SOSMA / PENAL CODE (<b>CHAPTER VIA</b>)</li> <li>▪ LICENSING CONDITIONS ISSUED BY AELB (REGULATOR)</li> <li>▪ ACT 304</li> </ul>  |
| RESPONSE   | INTERDICT, MANAGE CRIME SCENE, PROTECT EVIDENCE, ANALYZE EVIDENCE, ATTRIBUTE, RETURN ITEM, PROSECUTE | <ul style="list-style-type: none"> <li>✓ COUNTER TERRORISM DIVISION</li> <li>✓ FORENSIC CAPABILITY</li> <li>✓ GENERAL DUTY POLICING</li> <li>✓ CRIME PREVENTION &amp; COMMUNITY SAFETY</li> <li>✓ LOCAL POLICE &amp; CROWD CONTROL</li> <li>✓ LOCAL COUNCILS &amp; VOLUNTARY CORPS</li> <li>✓ SPECIAL FORCES IF NEEDED</li> </ul> | <ul style="list-style-type: none"> <li>▪ SOSMA / PENAL CODE (<b>CHAPTER VIA</b>)</li> <li>▪ NSC DIRECTIVE 20 (MANAGEMENT OF DISASTER)</li> <li>▪ NSC DIRECTIVE 18 (MANAGEMENT OF TERRORISM INCIDENT)</li> <li>▪ ACT 304</li> </ul> |

# RMP Support for Nuclear Security

RMP are likely to be the first to encounter nuclear security threats while conducting their routine security and public safety work

- Security patrols
- Traffic stops/checkpoints
- Public safety
- Investigations
- Intelligence
- Strategic locations and critical infrastructure security
- Border Control



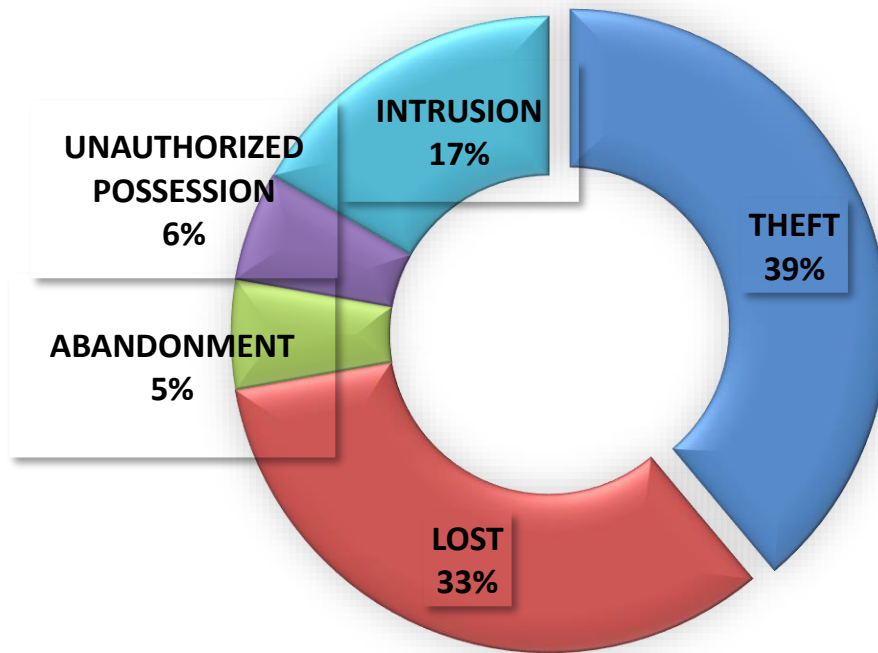


# Engagement with AELB

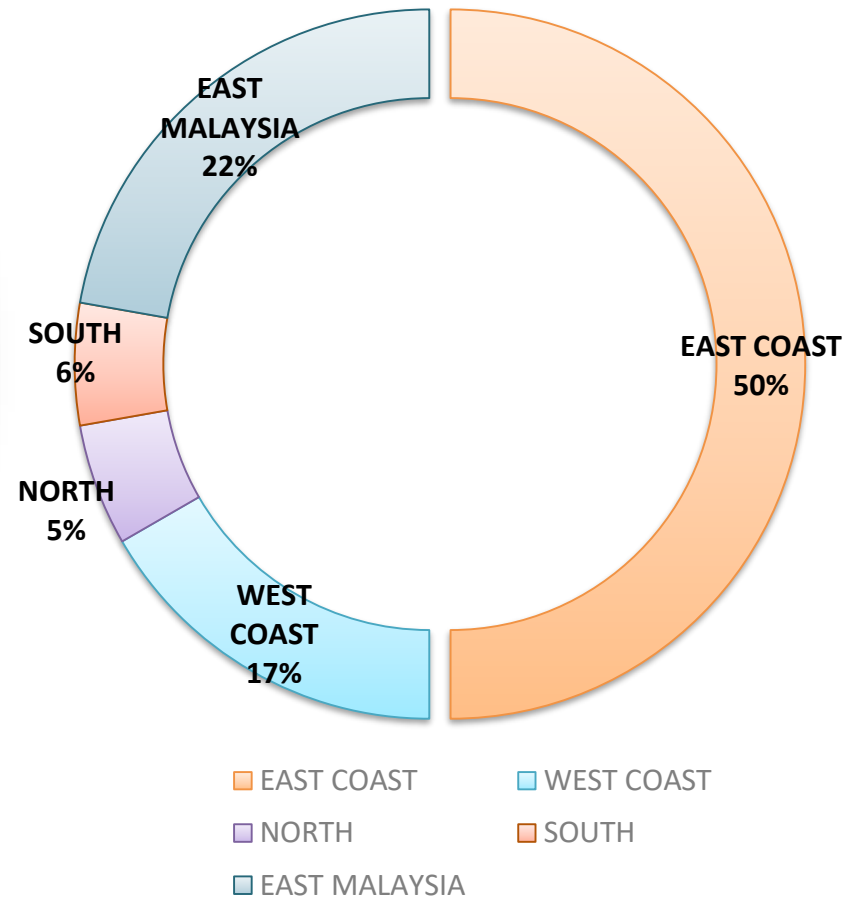


# Statistical analysis

## CLASSIFICATION OF INCIDENTS



## LOCATION OF INCIDENTS



# Stolen of gamma projector

## The Background

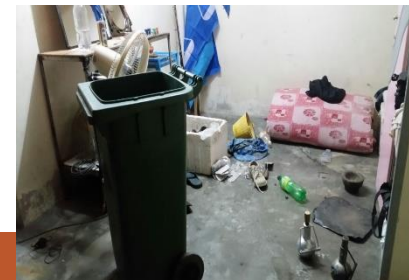
- Year : 2017
- Location : Klang, Selangor
- Material : 2 unit of Gamma Projector (Ir-192: 43.6 & 35.8 Ci)

## The Incident

- On February 09th 2017 two (2) units of gamma projectors model Sentinel 880 Delta belongs to an industrial radiography company was stolen from a vehicle parked at commercial building in Klang, Selangor.
- The gamma projectors contained Ir-192 sources with 43.6 and 35.8 Ci respectively. The incident was reported to local Police and AELB immediately.

## The Response

- On the same day, joint search effort was conducted by AELB Emergency Response Team with a cooperation from IPD Klang Selatan and the company around the city.
- On February 11th 2017, as a result from extensive search effort, the remaining of gamma projector was found at an illegal scrap metal premise at Jalan Kebun, Klang and the Ir-192 sources were found at a residential area of Sri Era Apartment, Shah Alam.



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# RADIOACTIVE BOMB THREAT?

**EXCLUSIVE**

A SECURITY expert warns that radioactive material stolen from a company in Klang is much sought after by terror groups which want to make dirty bombs. The material, Iridium-192, is easily found in Malaysia, but not in other Asean countries, he says.

» REPORTS BY  
**C. PREMANANTHINI & FERNANDO FONG**  
 ON PAGES 2 & 3

*A replica of a projector that contains the radioactive material, Iridium-192. The projector was stolen from a company in Klang.*



# News and Media

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## Thieves unwittingly expose themselves to deadly radiation

**NATION** Monday, 13 Feb 2017 4:07 PM MYT

KLANG: Greedy company workers stole two industrial radiography projectors, dismantled the lead covers for sale and dumped the radioactive innards of the equipment in a rubbish bin.

Not realising that they had exposed themselves to deadly radiation, the thieves then sold the covers to a scrap dealer.

Acting on a report made by the company, police and officers from the Atomic Energy Licensing and the a

The proje in the oil a

South Kla from a ve

By Wani Muthiah

facebook Daftar

Email atau Tel



**Buletin TV3**  
12 Februari

Objek Menyerupai Bom Ditemui Di Kedai Besi Buruk

Satu objek menyerupai bom ditemui di sebuah kedai besi buruk di Kampung Jawa, Klang, Selangor. Lebih membimbangkan, ia dipercayai mengandungi bahan radioaktif.

Ketua Polis Daerah Klang Selatan, ACP Alzafni Ahmad ketika dihubungi memberitahu, pihaknya masih menyiasat perkara itu, dengan kerjasama Lembaga Perlesenan Tenaga Atom, AELB.


Laporan polis mengenai penemuan itu, dibuat sendiri pemilik kedai besi buruk berkenaan, yangimbang berlaku sesuatu tidak diingini.

ACP Alzafni ketika mengesahkan mengenai penemuan objek tersebut bagaimana penemuan enggan mengulas lanjut, sebelum laporan penuh mengenai perkara ini diperolehi esok.

## Bomb-shaped objects turn out to be radioactive

Bernama | February 12, 2017

They were stolen from an oil exploration company in Klang recently.



SHAH ALAM: Police detained a group of men after finding several objects containing radioactive materials, believed to be stolen from an oil exploration company, last night.

A police source said the objects were found at the owner of a scrap metal yard.

"Initial investigations revealed the objects were stolen from an oil exploration company."

**NOW TRENDING:**

365 NEWS • 新華網 • BERITA

## PENDUDUK DINASIHAT JALANI PEMERIKSAAN KESEHATAN KERANA PENUMUAN BAHAN BERADIOAKTIF

February 13, 2017 | Uncategorized | No Comments

Share

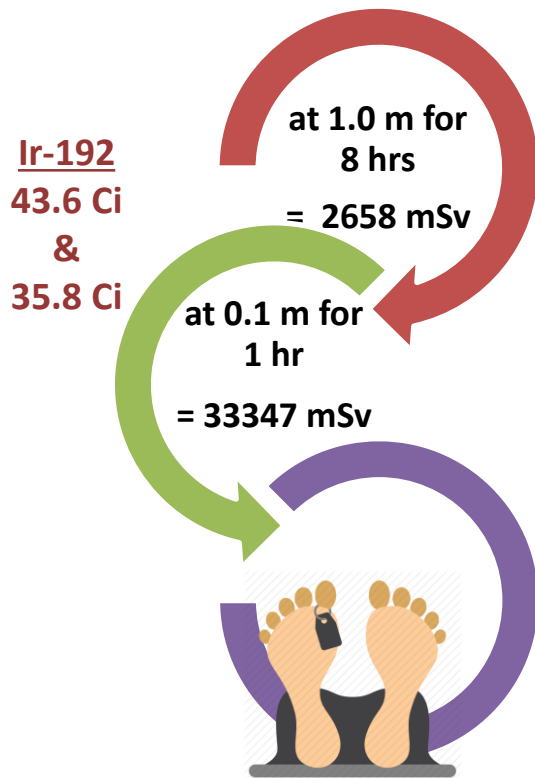


Posted: 3:12 pm, February 13, 2017 by editor KLANG, 13 Feb: Penduduk Apartmen Seri Era, Jalan Naga Sari, Shah Alam dekat sini dinasihatkan membuat pemeriksaan kesihatan susulan penemuan dua kanister beradioaktif di Bilik Rukun Tetangga apartmen itu Sabtu lepas.

Ketua Polis Daerah Klang Selatan, ACP Alzafny Ahmad berkata ini kerana kanister berkenaan yang

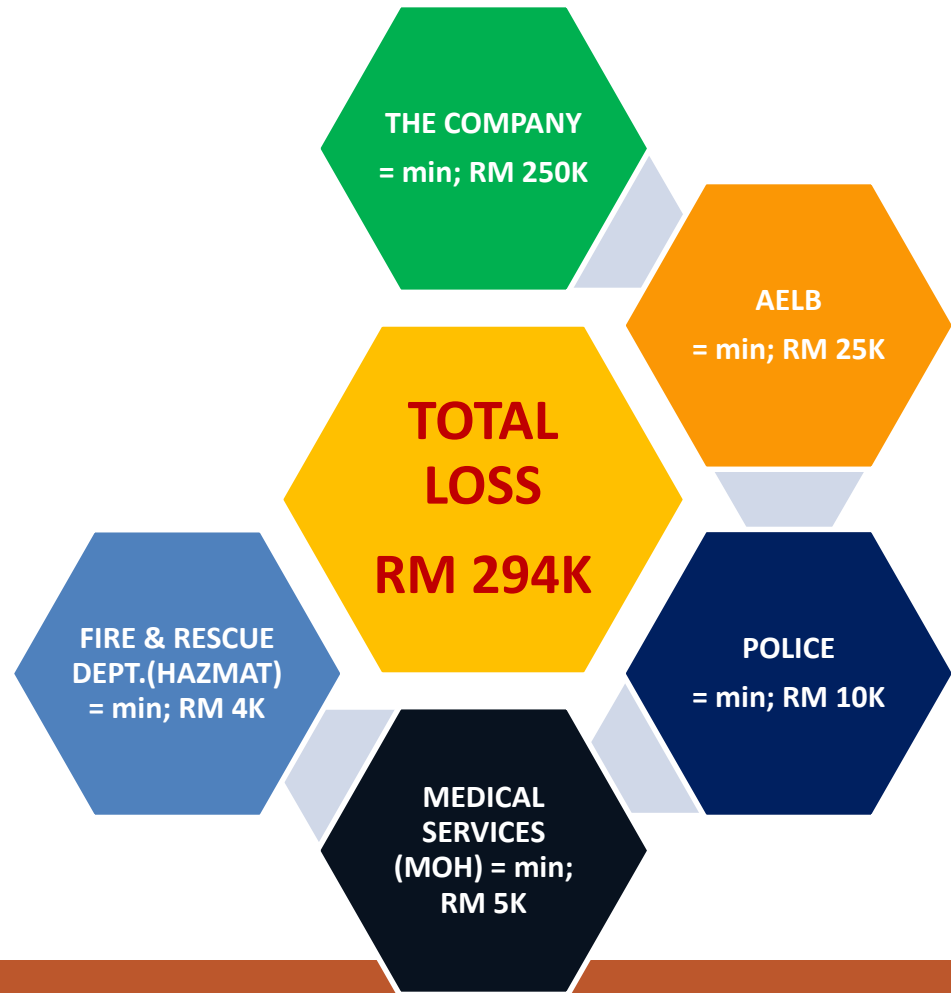
# ESTIMATED COST & FINANCIAL LOSS 2017

## Radiological Cost



**Worst Possibility 1<sup>st</sup>  
Death in Malaysia !!!**

## Financial Cost



# References

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- Canadian Nuclear Safety Commission (CNSC) - REGDOC-2.12.3, Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Materials, Version 2

***THANK YOU***

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