KEMENTERIAN SAINS, TEKNOLOGI DAN INOVASI
MINISTRY OF SCIENCE, TECHNOLOGY AND INNOVATION

AELB ATOMIC ENERGY LICENSING BOARD

REGIONAL WORKSHOP FOR CENTRAL GOVERNMENTS AND REGULATORY BODIES ON THE DEVELOPMENT OF NATIONAL STRATEGIES AND REGULATORY REQUIREMENTS FOR DECOMMISSIONING [EVT1905215]
4 – 7 APRIL 2022

COUNTRY PRESENTATION: MALAYSIA

PREPARED BY:
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RADIATION CONTROL & SUPERVISION DIVISION
ATOMIC ENERGY LICENSING BOARD MALAYSIA (AELB)

CONTENT

1) Malaysia legislative Infrastructure: Atomic Energy Licensing Act 1984 (Act 304), Regulations and Guidelines
2) Short overview of Malaysia:
    i. Nuclear and non-nuclear facilities' fleet approaching decommissioning in the coming 10 years
    ii. The licensees decommissioning approaches and strategies
    iii. Possible overlapping with other governmental authorities (Environmental, Health and Safety, Transport, etc.)
    iv. Provisions of resources: human, financial, technical, and mechanisms to provide these resources and to ensure that they are available when necessary
    v. National situation for radwaste management policy, roles, responsibilities and provisions for safe management and disposal of radioactive waste arising from decommissioning
    vi. Requirements for conducting radiological surveys for determining levels of contamination at the facility prior the decommissioning actions
    vii. Requirements and criteria for termination of licenses and the release of the site or facility without/with restrictions on their future use
3) Sharing experience: Decommissioning and Disposal Project Involving Facilities for Processing Naturally Occurring Radioactive Material in Malaysia 2003 – 2018
4) Challenges Faces
6) Conclusion

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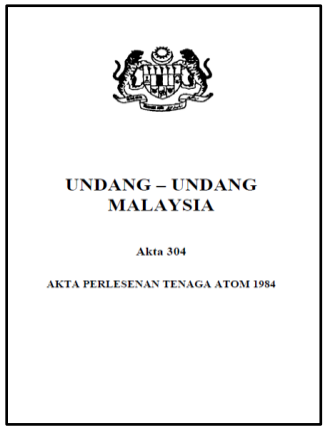
MALAYSIA LEGISLATIVE INFRASTRUCTURE: ATOMIC ENERGY LICENSING ACT 1984 (ACT 304), REGULATIONS AND GUIDELINES

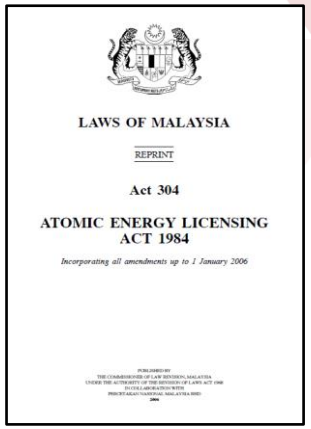
1. Main Legislation

- **Atomic Energy Licensing Act 1984 (Act 304)**
  - To provide for the regulation and control of atomic energy
  - For the establishment of standards on liability for nuclear damage; and
  - For matters connected therewith or related thereto


UNDANG – UNDANG MALAYSIA

Akta 304

AKTA PERLESENAN TENAGA ATOM 1984


LAWS OF MALAYSIA

REPRINT

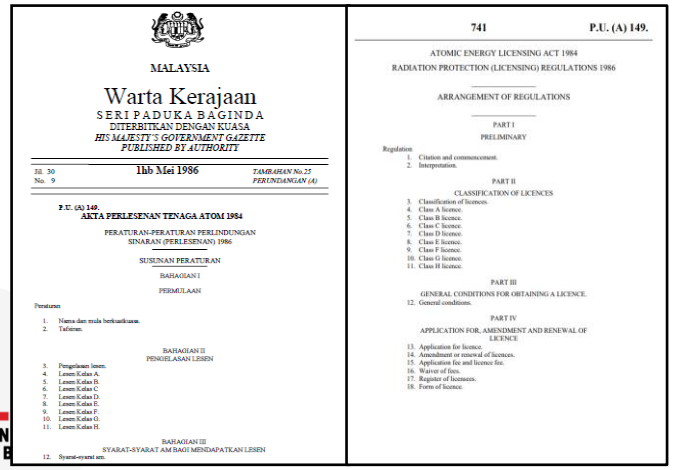
Act 304

ATOMIC ENERGY LICENSING ACT 1984

Incorporating all amendments up to 1 January 2006

2. Regulations

i. Radiation Protection (Licensing) Regulations 1986;
ii. Radiation Protection (Transport) Regulations 1989;
iii. Atomic Energy Licensing (Basic Safety Radiation Protection) Regulations 2010; and
iv. Atomic Energy Licensing (Radioactive Waste Management) 2011


MALAYSIA

Warta Kerajaan

SERI PADUKA BAGINDA

DITERBITKAN DENGAN KUASA

HIS MAJESTY'S GOVERNMENT GAZETTE

PUBLISHED BY AUTHORITY

Jil. 30 No. 9 — 1hb Mei 1986 — *TAMBAHAN No. 25 PERUNDANGAN (A)*

P.U. (A) 149.

AKTA PERLESENAN TENAGA ATOM 1984

PERATURAN-PERATURAN PERLINDUNGAN SINARAN (PERLESENAN) 1986

SUSUNAN PERATURAN

BAHAGIAN I

PERMULAAN

Peraturan

1. Nama dan mula berkuatkuasa.
2. Tafsiran.

BAHAGIAN II

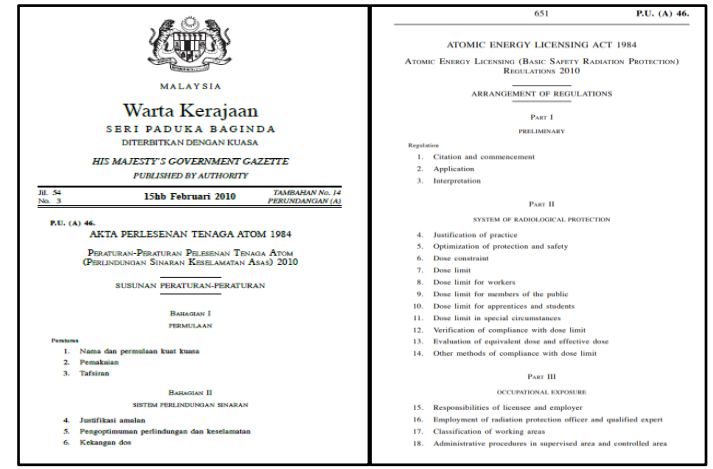
PENGELASAN LESEN

3. Pengelasan lesen.
4. Lesen Kelas A.
5. Lesen Kelas B.
6. Lesen Kelas C.
7. Lesen Kelas D.
8. Lesen Kelas E.
9. Lesen Kelas F.
10. Lesen Kelas G.
11. Lesen Kelas H.

BAHAGIAN III

SYARAT-SYARAT AM BAGI MENDAPATKAN LESEN

12. Syarat-syarat am.


741 P.U. (A) 149.

ATOMIC ENERGY LICENSING ACT 1984

RADIATION PROTECTION (LICENSING) REGULATIONS 1986

ARRANGEMENT OF REGULATIONS

PART I

PRELIMINARY

Regulation

1. Citation and commencement.
2. Interpretation.

PART II

CLASSIFICATION OF LICENCES

3. Classification of licences.
4. Class A licence.
5. Class B licence.
6. Class C licence.
7. Class D licence.
8. Class E licence.
9. Class F licence.
10. Class G licence.
11. Class H licence.

PART III

GENERAL CONDITIONS FOR OBTAINING A LICENCE

12. General conditions.

PART IV

APPLICATION FOR, AMENDMENT AND RENEWAL OF LICENCE

13. Application for licence.
14. Amendment or renewal of licences.
15. Application fee and licence fee.
16. Waiver of fees.
17. Register of licensees.
18. Form of licence.

MALAYSIA

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SERI PADUKA BAGINDA

DITERBITKAN DENGAN KUASA

HIS MAJESTY'S GOVERNMENT GAZETTE

PUBLISHED BY AUTHORITY

Jil. 54 No. 3 — 15hb Februari 2010 — *TAMBAHAN No. 14 PERUNDANGAN (A)*

P.U. (A) 46.

AKTA PERLESENAN TENAGA ATOM 1984

PERATURAN-PERATURAN PELESENAN TENAGA ATOM (PERLINDUNGAN SINARAN KESELAMATAN ASAS) 2010

SUSUNAN PERATURAN-PERATURAN

BAHAGIAN I

PERMULAAN

Peraturan

1. Nama dan permulaan kuat kuasa
2. Pemakaian
3. Tafsiran

BAHAGIAN II

SISTEM PERLINDUNGAN SINARAN

4. Justifikasi amalan
5. Pengoptimuman perlindungan dan keselamatan
6. Kekangan dos

651 P.U. (A) 46.

ATOMIC ENERGY LICENSING ACT 1984

ATOMIC ENERGY LICENSING (BASIC SAFETY RADIATION PROTECTION) REGULATIONS 2010

ARRANGEMENT OF REGULATIONS

PART I

PRELIMINARY

Regulation

1. Citation and commencement
2. Application
3. Interpretation

PART II

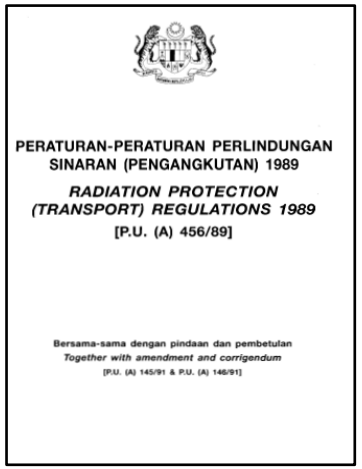
SYSTEM OF RADIOLOGICAL PROTECTION

4. Justification of practice
5. Optimization of protection and safety
6. Dose constraint
7. Dose limit
8. Dose limit for workers
9. Dose limit for members of the public
10. Dose limit for apprentices and students
11. Dose limit in special circumstances
12. Verification of compliance with dose limit
13. Evaluation of equivalent dose and effective dose
14. Other methods of compliance with dose limit

PART III

OCCUPATIONAL EXPOSURE

15. Responsibilities of licensee and employer
16. Employment of radiation protection officer and qualified expert
17. Classification of working areas
18. Administrative procedures in supervised area and controlled area


PERATURAN-PERATURAN PERLINDUNGAN SINARAN (PENGANGKUTAN) 1989

RADIATION PROTECTION (TRANSPORT) REGULATIONS 1989

[P.U. (A) 456/89]

Bersama-sama dengan pindaan dan pembetulan

Together with amendment and corrigendum

[P.U. (A) 145/91 & P.U. (A) 146/91]


16 Ogos 2011
16 August 2011
P.U. (A) 274

WARTA KERAJAAN PERSEKUTUAN

FEDERAL GOVERNMENT GAZETTE

PERATURAN-PERATURAN PERLESENAN TENAGA ATOM (PENGURUSAN SISA RADIOAKTIF) 2011

ATOMIC ENERGY LICENSING (RADIOACTIVE WASTE MANAGEMENT) REGULATIONS 2011

DISIARKAN OLEH/
PUBLISHED BY
JABATAN PEGUAM NEGARA/
ATTORNEY GENERAL'S CHAMBERS

MALAYSIA LEGISLATIVE INFRASTRUCTURE: ATOMIC ENERGY LICENSING ACT 1984 (ACT 304), REGULATIONS AND GUIDELINES….. (continue)

3. Guidelines – Decommissioning

i. LEM/TEK/38 (Technical document no. 38) – *Panduan Permohonan Pembubaran Pepasangan Pengilangan Mineral Radioaktif* (Guideline of application for decommissioning milling installation using radioactive mineral).


LEM/TEK/38
22 Januari 1994

PANDUAN PERMOHONAN PEMBUBARAN KEMUDAHAN PEPASANGAN PENGILANGAN MINERAL RADIOAKTIF

AELB
ATOMIC ENERGY LICENSING BOARD

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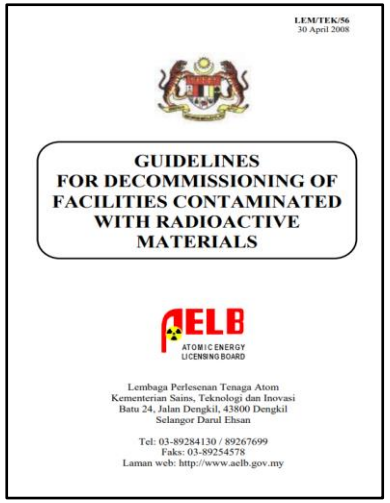
Homepage: http://www.aelb.gov.my

ii. LEM/TEK/56 (Technical document no. 56) - Guideline For Decommissioning of Facilities Contaminated With Radioactive Materials


LEM/TEK/56
30 April 2008

GUIDELINES FOR DECOMMISSIONING OF FACILITIES CONTAMINATED WITH RADIOACTIVE MATERIALS

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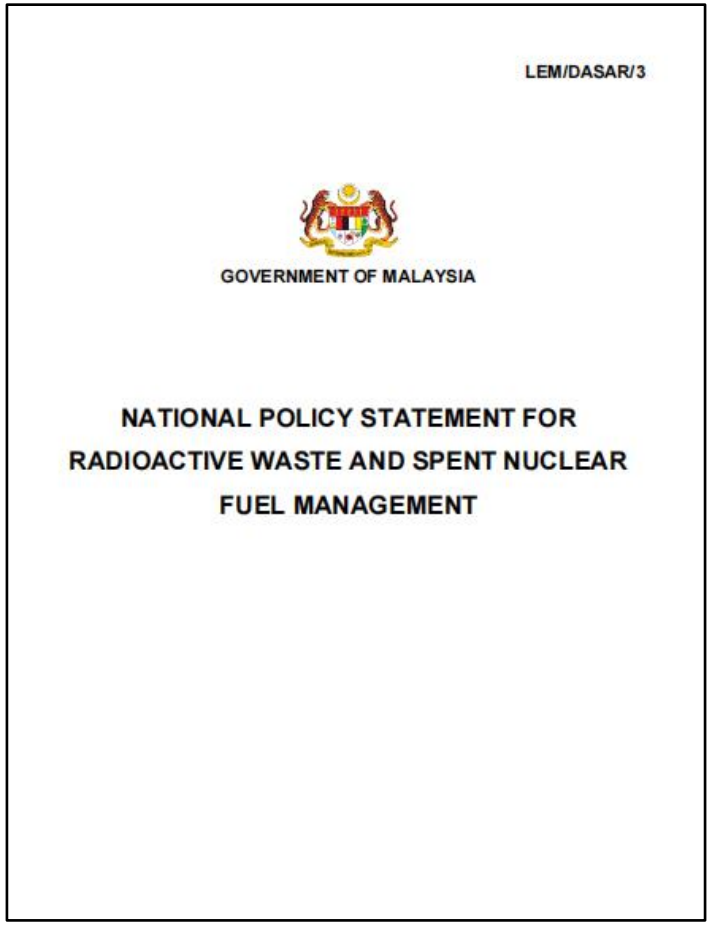
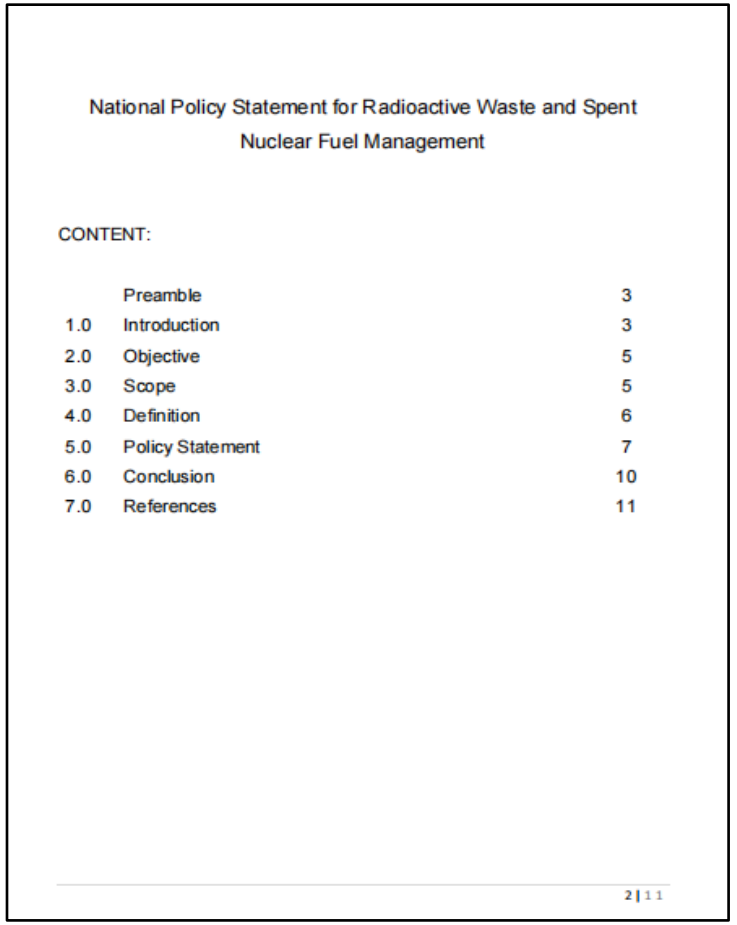
NATIONAL POLICY STATEMENT FOR RADIOACTIVE WASTE AND SPENT NUCLEAR FUEL MANAGEMENT (2nd AUGUST 2021)



LEM/DASAR/3

GOVERNMENT OF MALAYSIA

NATIONAL POLICY STATEMENT FOR RADIOACTIVE WASTE AND SPENT NUCLEAR FUEL MANAGEMENT



National Policy Statement for Radioactive Waste and Spent Nuclear Fuel Management

CONTENT:

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ATOMIC ENERGY LICENSING ACT 1984 (ACT 304)

means individual, partnership, private or public body

Under Subsection 12(1) of the Act 304 -

"No person shall:

a) site, construct of operate a nuclear installation;

b) deal in, possess or dispose of any radioactive material, nuclear material, prescribed substance or irradiating apparatus,

unless he is the holder of a valid license issued by the appropriate authority.

means any nuclear fuel, radioactive product or radioactive waste

means any activity involving the manufacturing, trading, producing, processing, purchasing, owning, using, transporting, transferring, handling, selling, storing, importing or exporting

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ATOMIC ENERGY LICENSING ACT 1984 (ACT 304).....continue

Security of the license

- 18. (1) The appropriate authority may require that before any licence is issued under this Act, such **security as it may specify shall be furnished** for the due observance of the conditions of the licence.

- 18.(2) Without prejudice to the other provisions of this Act, where there is any breach of any of the conditions of the licence, such security or part thereof as the appropriate authority may determine shall be forfeited to the Government of Malaysia.

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ATOMIC ENERGY LICENSING ACT 1984 (ACT 304).....continue

Control of disposal of radioactive waste

- 26. (1) No person shall dispose of or cause to be disposed any radioactive waste without the prior authorization in writing of the appropriate authority.

- 26.(2) Any authorization given under this section may be subject to such conditions as the appropriate authority may impose.

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ATOMIC ENERGY LICENSING ACT 1984
RADIATION PROTECTION (LICENSING) REGULATIONS 1986

A **Class G licence** is a licence:

a) to dispose of radioactive materials, nuclear materials, prescribed substances or their wastes;

b) to store radioactive materials, nuclear materials, prescribed substances or their waste prior to their disposal; or

c) to decommission a milling installation, nuclear installation, waste treatment facility, irradiating apparatus or sealed source apparatus.

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ATOMIC ENERGY LICENSING ACT 1984
ATOMIC ENERGY LICENSING (BASIC SAFETY RADIATION PROTECTION) REGULATIONS 2010

Control and monitoring of radioactive discharge

62. (1) The licensee shall **not discharge** any **radioactive material, nuclear material or prescribed substance into the environment unless**—

a) the discharge is within the discharge limit as authorized by the appropriate authority;

b) the discharge is controlled;

c) the public exposure caused by the discharge does not exceed the limit as specified in regulation 9; and

d) the control of the discharge is optimized in accordance with regulation 5.

62. (2) Subject to subregulation 9(1), **before discharging any solid, liquid or gaseous radioactive material, nuclear material or prescribed substance into the environment**, the licensee shall, as appropriate—

a) determine the **characteristics and activity** of the material to be discharged, the **potential points of discharge and the methods** of discharge;

b) determine **all significant exposure pathways** by which discharged radionuclides can cause public exposure by a pre-operational environmental monitoring study for a period of not less than twelve months;

c) identify the **critical pathways**;

d) assess the **doses to the critical group of members of the public** due to the planned discharges; and

e) submit the information mentioned in paragraph (a), (b), (c) and (d) **to the appropriate authority** for determining the discharge limit and conditions for discharge.

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ATOMIC ENERGY LICENSING ACT 1984 (ACT 304).....continue

Transport of radioactive waste with prior authorization of appropriate authority

- 30. (1) No person shall transport any radioactive waste without the prior **authorization in writing** of the appropriate authority.
- 30. (2) Any authorization given by the appropriate authority under this section may be subject to such conditions as the appropriate authority may think necessary to impose for the protection of the public.

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ATOMIC ENERGY LICENSING ACT 1984
RADIATION PROTECTION (LICENSING) REGULATIONS 1986

A **Class D licence** is a licence to transport

- radioactive materials,
- nuclear materials,
- prescribed substances, or
- **their wastes.**

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LICENSING APPLICATION - DECOMMISSIONING

[Technical Document No. 38]

Requirements

1) Apply offcially in writing to AELB
   - State the actual the date actual date to start decommissioning
   - prepare decommissioning implementation schedule (project timeline)
   - states how radioactive waste will be managed
2) Online license application - Management and Organization;
3) Appointment of Radiation Workers – Registered (Radiation Protection Officer/ Radioactive Waste Management Officer / Radiation Workers);
4) Storage facility (site availability);
5) Adequate expertise to perform decommissioning (consultant);
6) Adequate equipments to perform decommissioning;
7) Radiation Detection Equipment;
8) Radiation Protection Program;
9) Radioactive Waste Management Plan;
10) Emergency Plan;
11) Radiological Impact Assessment (RIA) - before & after decommissioning;

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LICENSING APPLICATION - DECOMMISSIONING)....continue [Technical Document No. 38]

Requirements

12) Environmental Monitoring Program - Applicant need to identify any parts/material/stuctures/site in the plant area whether any contamination occurs or vice versa;
13) Decontamination plan (including waste water management);
14) Dismantling - safety assessment before and after & radiological assessment of potential accidents occurring during dismantling;
15) Waste classification (radiological & non-radiological);
16) Waste transportation - license & proposal for the transportation of radioactive waste to the disposal facility;
17) Post monitoring (after decommissioning);
18) Site restoration;
19) Records management; and
20) Others - comply to other related authorities.

SHORT OVERVIEW OF MALAYSIA

NO.	QUESTIONS	FEEDBACKS
1.	Nuclear and non-nuclear facilities' fleet approaching decommissioning in the coming 10 years	1) Malaysia have: • 1 research reactor (RR) (status: in operation) • Few facilities for processing naturally occurring radioactive material (status: all in operation) 2) At moment, there are no plan for decommissioning for both RR and others facilities.
2.	The licensees decommissioning approaches and strategies	1) To decommission of any facility, the licensee need to obtain valid license (Decommissioning License) from the regulator (Atomic Energy Licensing Board). Class G (Decommissioning) license under Atomic Energy Licensing Act 1984: *…..to decommission a milling installation, nuclear installation, waste treatment facility, irradiating apparatus or sealed source apparatus.* 2) Decommissioning approaches and strategies: Licensee shall prepare and submit Decommissioning Plan and Radioactive Waste Management Plan (part of license conditions). The documents shall be updated accordingly.

SHORT OVERVIEW OF MALAYSIA….. (continue)

NO.	QUESTIONS	FEEDBACKS
3.	Possible overlapping with other governmental authorities (Environmental, Health and Safety, Transport, etc)	Yes For example: • End use of the site – approval from AELB and local authorities. • Environmental Impact Assessment (EIA) – approval from Department of Environment Malaysia (DOE). EIA will be approved once Radiological Impact Assessment (RIA) is approve by Atomic Energy Licensing Board. • Waste Management – Radiological and Non-radiological aspect. Details information in Radioactive Waste Management Plan. • Other related approval from local authorities and agencies (decommissioning activities & disposal)
4.	Provisions of resources: human, financial, technical, and mechanisms to provide these resources and to ensure that they are available when necessary	Section 18 (Security for licences), Atomic Energy Licensing Act 1984 *The appropriate authority may require that before any license is issued under this Act, such security as it may specify shall be furnished for the due observance of the conditions of the license.*
5.	National situation for rad waste management policy, roles, responsibilities and provisions for safe management and disposal of radioactive waste arising from decommissioning	National Policy Statement For Radioactive Waste And Spent Nuclear Fuel Management (2nd August 2021)

SHORT OVERVIEW OF MALAYSIA..... (continue)

NO.	QUESTIONS	FEEDBACKS
6.	Requirements for conducting radiological surveys for determining levels of contamination at the facility prior the decommissioning actions	Yes. • LEM/TEK/38 (Technical document no. 38) – Guideline of application for decommissioning milling installation using radioactive mineral. (soil, water, ground water, flora & fauna, radon & thoron) • Radiological Impact Assessment (RIA) • Radioactive Waste Management Plan (RWMP)
7.	Requirements and criteria for termination of licenses and the release of the site or facility without/with restrictions on their future use	No specific criteria. The requirements are as in Technical Document No. 38 are as follows: • The applicant must restore the plant site so that the level of radioactivity at the plant site area is lowered to the background level (Final Radiation Status Survey); and • Re-use of the plant site must be authorized in writing from the AELB

DECOMMISSIONING AND DISPOSAL PROJECT INVOLVING FACILITIES FOR PROCESSING NATURALLY OCCURRING RADIOACTIVE MATERIAL IN MALAYSIA 2003 – 2018.

- Plant located at gazetted industrial area
- Processing heavy mineral – xenotime & monazite (from local tin tailing) for rare earth products
- Monozite - ^{238}U (0.16 %) and ^{232}Th (7.0 %)
- Plant incorporated 1979, start operation May 1982 & end the operation 1994 (**obtained license for storage, disposal & decommissioning from AELB**)
- May 1986, local state government approved the final disposal site.
- Waste generated:
  - NORM waste (radioactive waste)
  - Contaminated materials or CM
  - Total: ~ 87 000 drums (waste)

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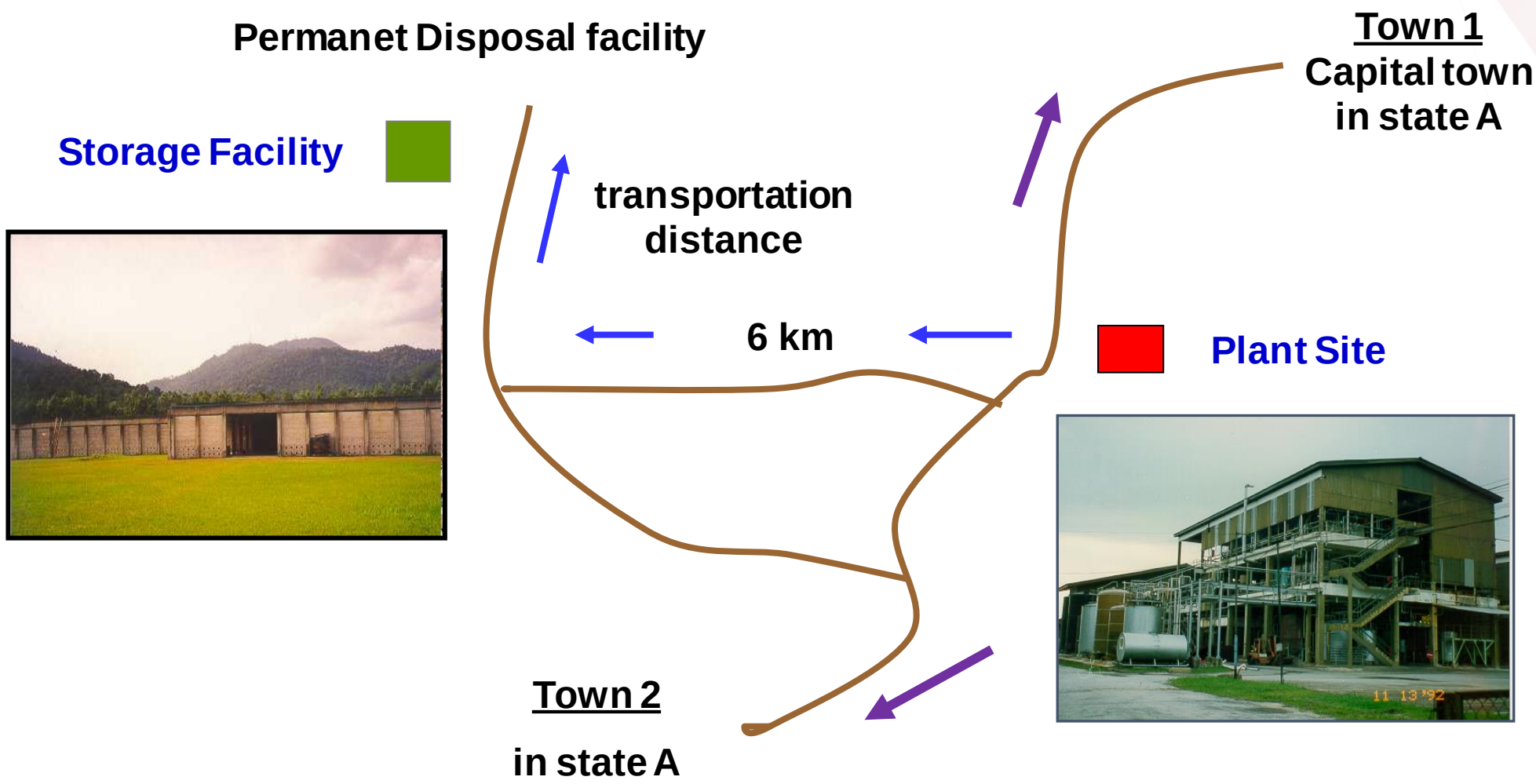
DECOMMISSIONING AND DISPOSAL PROJECT INVOLVING FACILITIES FOR PROCESSING NATURALLY OCCURRING RADIOACTIVE MATERIAL IN MALAYSIA 2003 – 2018…..(continue)



DECOMMISSIONING AND DISPOSAL PROJECT INVOLVING FACILITIES FOR PROCESSING NATURALLY OCCURRING RADIOACTIVE MATERIAL IN MALAYSIA 2003 – 2018…..(continue)

PHASE 1

PLANT
Decommissioning & Decontamination (D&D)

- Decommissioning of the plant & decontaminate and remediate the plant site
- To transport the contaminated Materials (CM) to disposal facility (EC1)

Start : May 2003
End : April 2006

PHASE 2

Storage Facility
Decommissioning & Disposal (D&D)

To transfer the NORM waste and contaminated material (CM) from the long term storage facility (LTSF) and dispose in the disposal facility (EC 2)

Start : January 2010
End : November 2015

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DECOMMISSIONING AND DISPOSAL PROJECT INVOLVING FACILITIES FOR PROCESSING NATURALLY OCCURRING RADIOACTIVE MATERIAL IN MALAYSIA 2003 – 2018…..(continue)

PHASE 1: Decommissioning & Decontamination

- Started work May 2003
- Declared as clean and decontaminated area by AELB 2006
- Scope
  - ❖demolition of all structures and equipment
  - ❖excavation of contaminated soils
  - ❖construction of Engineered Cell (EC-1)
  - ❖disposal of materials into EC-1

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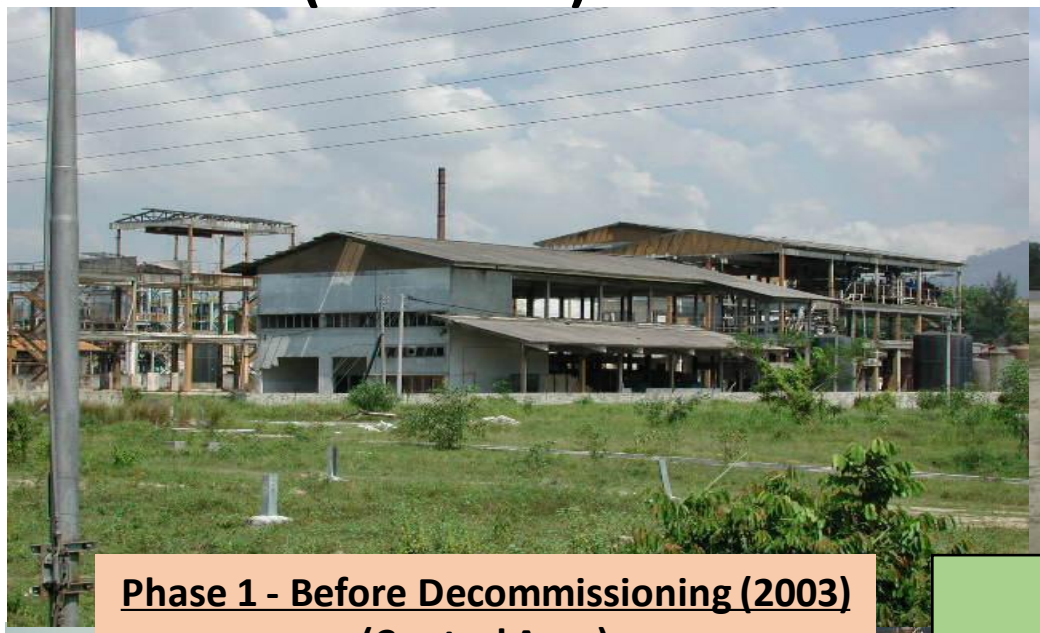
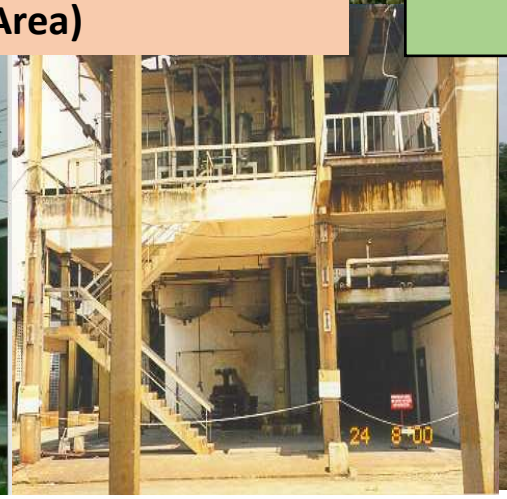
DECOMMISSIONING AND DISPOSAL PROJECT INVOLVING FACILITIES FOR PROCESSING NATURALLY OCCURRING RADIOACTIVE MATERIAL IN MALAYSIA 2003 – 2018…..(continue)



Phase 1 - Before Decommissioning (2003)
(Control Area)

Phase 1 – After Decommissioning (2006)
(Clean Area)



The release of the site from regulatory control (April 2006)

DECOMMISSIONING AND DISPOSAL PROJECT INVOLVING FACILITIES FOR PROCESSING NATURALLY OCCURRING RADIOACTIVE MATERIAL IN MALAYSIA 2003 – 2018…..(continue)

Plant Site

- ✓ 20,000 cubic meters
- ✓ 1,700 trucks
- ✓ 0 accidents

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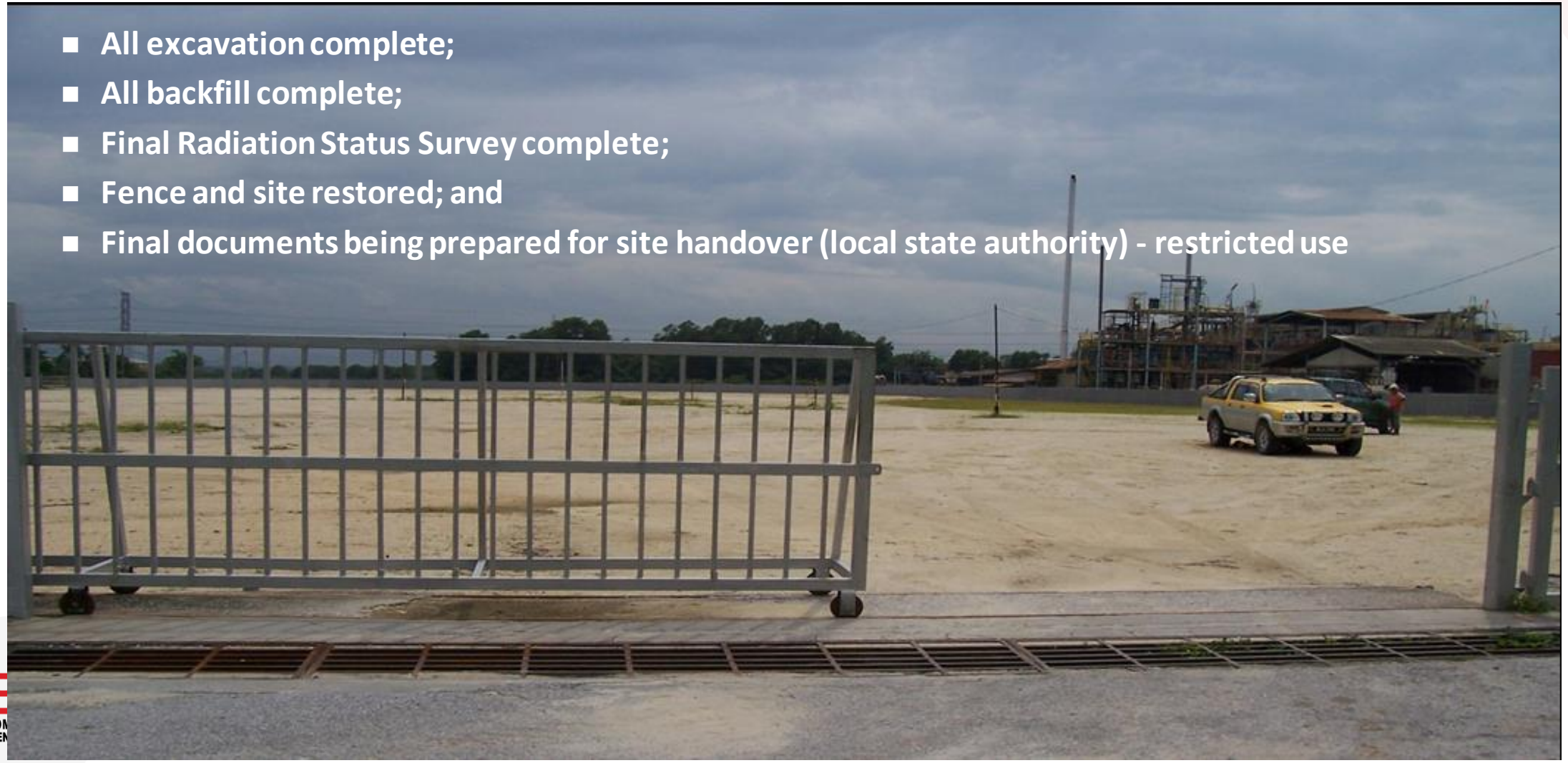
DECOMMISSIONING AND DISPOSAL PROJECT INVOLVING FACILITIES FOR PROCESSING NATURALLY OCCURRING RADIOACTIVE MATERIAL IN MALAYSIA 2003 – 2018…..(continue)



DECOMMISSIONING AND DISPOSAL PROJECT INVOLVING FACILITIES FOR PROCESSING NATURALLY OCCURRING RADIOACTIVE MATERIAL IN MALAYSIA 2003 – 2018…..(continue)

PHASE 2: Decommissioning & Disposal

Start : January 2010
End : November 2015

- 2 years post closure monitoring period (2015 – 2017)
- The plant site has been returned to the state government (the land owner) in December 2017
- Termination of the license & complete handover process January 2018.

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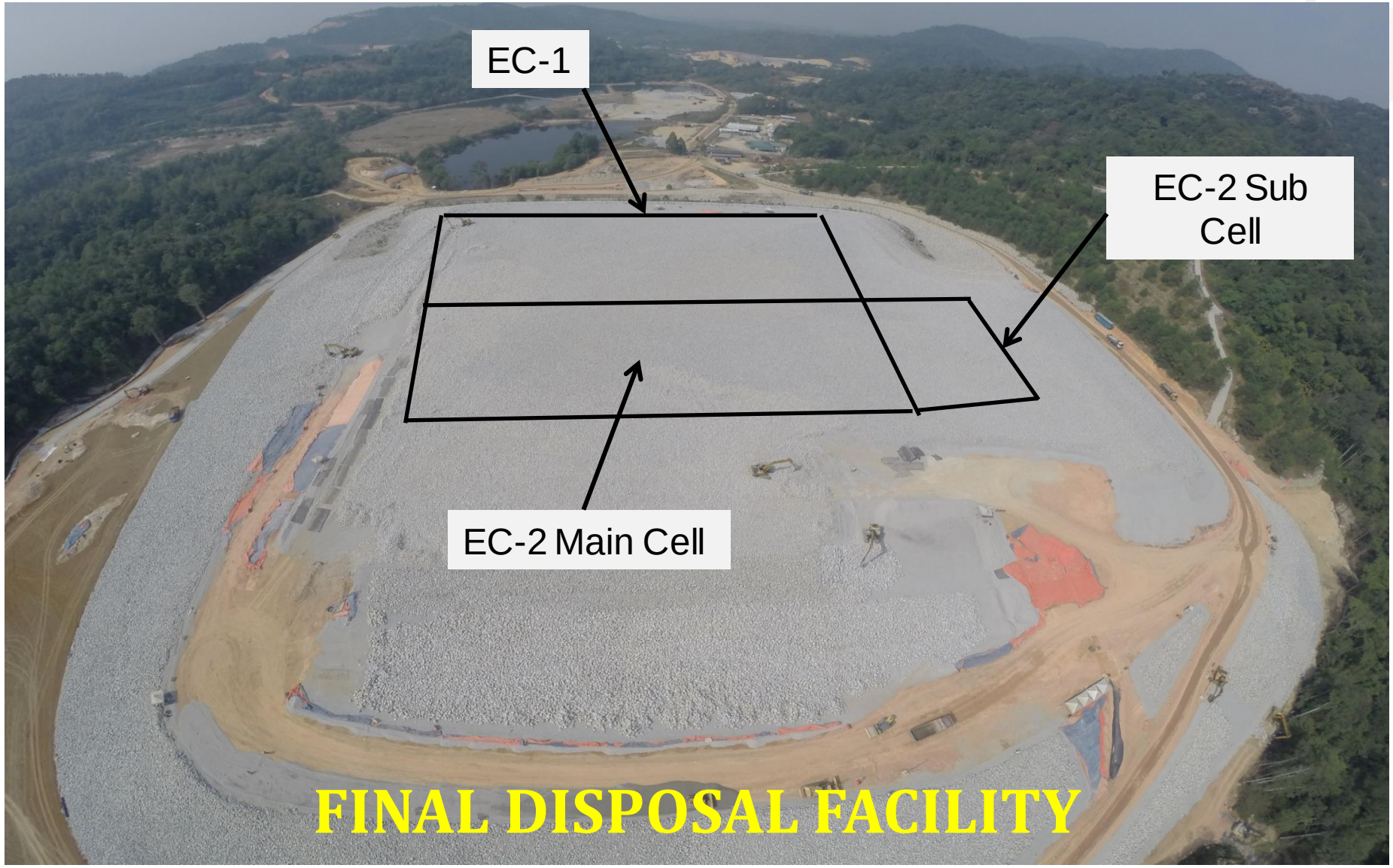
DECOMMISSIONING AND DISPOSAL PROJECT INVOLVING FACILITIES FOR PROCESSING NATURALLY OCCURRING RADIOACTIVE MATERIAL IN MALAYSIA 2003 – 2018…..(continue)

Disposal of the waste

- ✓ 11,269 Loads
- ✓ 202,000 km
- ✓ 900,000 man-hours
- ✓ 0 accidents



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CHALLENGES FACES

- The need of requirements and criteria for termination of licenses and the release of the site or facility without / with restrictions on their future use;
- Project management i.e. planning & implementation (involving various stakeholders – federal government vs state government / local authorities);
- Public engagement (awareness and public acceptance).
- Safety Assessment (modelling) including Safety Case; and
- Media – Negative and incorrect input to public (RB, the decommissioning & remediation process, the radiological risk etc.)

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CONCLUSION

- Each process of decommissioning and site remediation is unique and case-by-case assessment – not straight forward!;
- Adequate national policy & legislative frameworks;
- Work must be done according to national requirements as well as IAEA standards and best practice;
- Continuous monitoring and maintenance - The disposal facility area subject to Institutional Control period & responsibilities of licensees and other related parties;
- Good communication between the regulator, project owner, project consultant, local authority and other federal & state authorities (non-radiological); and
- Politician, regulators, operators – ensure safety of the public, worker and protection of the environment!

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THANK YOU