
NATIONAL REPORT OF THAILAND

THE JOINT CONVENTION ON THE SAFETY

OF SPENT FUEL MANAGEMENT AND ON

THE SAFETY OF RADIOACTIVE WASTE

MANAGEMENT

The 7th Review Meeting

Office of Atoms for Peace
Ministry of Higher Education, Science, Research and Innovation

September, 2020

SUMMARY

There has been no nuclear power plant in operation in Thailand. The only nuclear facility in Thailand that produces spent fuel is the Thai Research Reactor-1 / Modification 1 (TRR-1/M1) operated by Thailand Institute of Nuclear Technology (Public Organization). As of 2019, there are 169 irradiated fuel elements that are still active and are kept on site in the reactor storage pool. When the irradiated fuel elements are no longer in use, they will be categorized as spent fuel elements and exported to their country of origin. Therefore, there has not yet been any spent fuel in Thailand.

In terms of radioactive waste, Thailand follows the principle of minimizing the waste. Depending on the type of waste, several treatment techniques are currently applied. Radioactive waste is categorized for treatment according to its half life and radioactivity. Treatments of radioactive waste are such as letting it decay, reducing the volume, burying it, or pre-treating it such as evaporating or dissolving the waste in the water.

Contents

List of Abbreviations	2
Section A: Introduction	3
Section B: Policies and Practices	5
Section C: Scope of Application	12
Section D: Inventories and Lists	13
Section E: Legislative and Regulatory System	17
Section F: Other General Safety Provisions	26
Section G: Safety of Spent Fuel Management	43
Section H: Safety of Radioactive Waste Management	57
Section I: Transboundary Movement	60
Section J: Disused Sealed Sources	61
Section K: General Efforts to Improve Safety	62
Appendix	63

List of Abbreviations

AEC	Atomic Energy Commissions for Peace
EIA	Environmental Impact Assessment
FSAR	Final Safety Analysis Report
IAEA	International Atomic Energy Agency
MHESI	Ministry of Higher Education, Science, Research and Innovation
MOST	Ministry of Science and Technology
NEC	Nuclear Energy Commission for Peace
NORM	Naturally Occurring Radioactive Material
NSSC	Nuclear Safety and Security Commission
OAEP	Office of Atomic Energy for Peace
OAP	Office of Atoms for Peace
PSAR	Preliminary Safety Analysis Report
RADW	The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management
TINT	Thailand Institute of Nuclear Technology (Public Organization)
TRR-1/M1	Thai Research Reactor-1/Modification 1
U.S. NRC.	United States Nuclear Regulatory Commission
VSLW	Very short lived waste
VLLW	Very low level waste
LLW	Low level waste
ILW	Intermediate level waste
HLW	High level waste

Section A: Introduction

Thailand deposited the instrument of accession for the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (RADW) with the Director General of International Atomic Energy Agency (IAEA) on July 3, 2018 and became a Contracting Party to RADW on October 1, 2018. The accession to RADW illustrates a national commitment on the peaceful uses of nuclear energy along with the responsibility to ensure the public and environment safety.

This is the first National Report of Thailand under Article 32 of RADW. The report describes national regulations that enable Thailand to adhere to obligations of RADW and tries to capture the practices and measures being implemented by relevant authorities in relation to spent fuel and radioactive waste management.

Currently, Thailand does not have any nuclear installation and does not have nuclear energy included in its power development plan. However, there is a 2-MW nuclear research reactor in operation with all spent fuel elements being exported to the country of origin. In addition, Thailand has three radioactive waste management facilities which operate only pre-disposal processes. Both nuclear research reactor and radioactive waste management facilities are operated by Thailand Institute of Nuclear Technology (Public Organization) (TINT).

Future projects which are expected to produce spent fuel or radioactive waste include a new research reactor and a miniature neutron source reactor. The new research reactor by TINT is under a feasibility study and projected to operate at 10 to 30 MW. The miniature neutron source reactor operated and owned by Suranaree University of Technology is in a process of site license application and its primary purposes will be medical and research. The reactor construction is expected to begin in 2020.

This report has been prepared by the Office of Atoms for Peace (OAP), as a National Contact Point for RADW, in consultation with TINT. While the report is aimed to demonstrate that Thailand meets the obligations of RADW, all relevant Thai authorities will continue improving spent fuel and radioactive waste management and policy not only to enhance national safety but also to contribute to the safety of the international community as a whole.

Section B: Policies and Practices

Spent Fuel Management Policy and Radioactive Waste Management Policy

Having been effective since February 1, 2017, the Nuclear Energy for Peace Act B.E. 2559 (2016) establishes the Nuclear Energy Commission for Peace (NEC) which is chaired by the Prime Minister. One of its obligated functions is to propose policies and recommendations to the Cabinet on the use of nuclear energy and nuclear and radiation regulation for safety. As spent fuel and radioactive waste are undoubtedly an issue of safety concern, OAP, as a secretariat of NEC, has started developing the draft National Policy of Spent Fuel and Radioactive Waste Management. With an assistance from the International Atomic Energy Agency (IAEA), the draft policy is based on IAEA Nuclear Energy Series No. NW-G-1.1. The draft policy is in a process of obtaining an approval from NEC before being tabled for the Cabinet's consideration. The draft policy provides an overarching scheme of managing spent fuel and radioactive waste in the country and its principles are highlighted below.

- Radioactive waste management is based on a justification which takes into account benefits and associated costs as well as practices minimizing amount of radioactive waste produced.
- Thailand strictly follows the international safety standard and requirement on radioactive waste management for the safety of the public and environment both in Thailand and neighboring countries. A list of safety standards and requirements is the following but not limited to:
 - Fundamental Safety Principles, IAEA Safety Standards Series No. SF-1, IAEA, Vienna (2006)
 - Radiation Protection and Safety of Radiation Sources: International

- Basic Safety Standards, IAEA Safety Standards Series No. GSR Part 3, IAEA, Vienna (2014)
- Policies and Strategies for Radioactive Waste Management, IAEA Nuclear Energy Series No. NW-G-1.1, IAEA, Vienna (2009)
 - Predisposal Management of Radioactive Waste, IAEA Safety Standard Series No. GSR Part 5, IAEA, Vienna (2009)
 - Disposal of Radioactive Waste, IAEA Safety Standard Series No. SSR-5, IAEA, Vienna (2011)
 - Safety Assessment for Facilities and Activities, IAEA Safety Standards Series No. GSR Part 4, IAEA, Vienna (2009)
 - The Safety Case and Safety Assessment for the Disposal of Radioactive Waste, IAEA Safety Standards Series No. SSG-23, IAEA, Vienna (2012)
 - Classification of Radioactive Waste, IAEA Safety Standards Series No. GSG-1, IAEA, Vienna (2009)
 - Application of the Concepts of Exclusion, Exemption and Clearance, IAEA Safety Standards Series No. RS-G-1.7, IAEA, Vienna (2004)
 - Regulatory Control of Radioactive Discharges to the Environment, IAEA Safety Standards Series No. WS-G-2.3, IAEA, Vienna (2000)
 - Governmental, Legal and Regulatory Framework for Safety, IAEA Safety Standards Series No. GSR Part 1 (Rev. 1), IAEA, Vienna (2016)
 - Model Regulations for the Use of Radiation Source and for the Management of the Associated Radioactive Waste, IAEA-TECDOC-1732, IAEA, Vienna (2013)
 - Storage of Radioactive Waste, IAEA Safety Standard Series No. WS-G-6.1, IAEA, Vienna (2006)
- The radioactive waste producers are responsible for safely managing their own waste.
 - Disused radioactive materials which are unable to be reused, recycled or released from the regulatory control must be properly and safely returned to the country of origin under their license conditions. If this is not possible, they must be managed by supplier or a competent authority who are legally designated as a radioactive waste managing agent.

- A national regulator is responsible for managing an orphan source and for transferring it to a competent authority who is legally designated as a radioactive waste managing agent.
- The government fosters the study and research related to spent fuel and radioactive waste.
- Any spent fuel elements produced from the research reactor must be safely and securely kept in the storage pool before returning them to the supplier or the country of origin.
- Management of spent fuel must carefully be examined when a nuclear power is considered as an alternative for energy production.
- The government will provide a financial support for development of human resource, infrastructure, technology and site location in a way to assure of sustainability of relevant organizations.
- Radioactive waste producers are financially responsible for managing their own wastes. However, the government will institute proper mechanisms to ensure that the budget for managing radioactive waste and spent fuel is sufficient.
- The government is financially responsible for managing radioactive waste and spent fuel in a case where the waste producers are unable to do so or in a case of nuclear and radiological emergency.
- The management of radioactive waste and spent fuel will be conduct in a transparent manner and information on the safety of the management is made available to the public.
- The stakeholders will have an opportunity to express their opinions and to make a decision regarding the radioactive waste and spent fuel management.

Spent Fuel Management Practices

As of 2019, there are 169 irradiated fuel elements that are safely kept in the reactor storage pool. All produced spent fuel elements in the future will be, by law, sent to the country of origin for further management.

Radioactive Waste Management Practices

TINT is currently the only organization in Thailand operating three radioactive waste management facilities. TINT manages all radioactive waste which cannot be exported for management outside Thailand.

Radioactive waste management in Thailand follows a principle of radioactive waste minimization. As a result, radioactive waste management begins with the waste producers themselves. It is required by law that radioactive waste producers shall be responsible for managing their own wastes by transferring them to TINT for further treatment and conditioning, unless the waste can be managed by the producers applying either management practice which is elaborated below.

Due to their high level of activity concentration, intermediate level waste (ILW) not from NORM and high level waste (HLW) must only be transferred to TINT for further management as prescribed by the regulation, whereas, all other radioactive wastes can be managed by the producers themselves, if possible. The management methods are described as follows.

Treatment of radioactive waste to reduce their volume, segregate radionuclides or change physical forms by incineration, evaporation or precipitation shall be applied to very short lived waste (VSLW) as well as very low level waste (VLLW) and low level waste (LLW) produced from industrial application.

On the other hand, VLLW and LLW not from NORM and VSLW generated from a licensed radioactive material, if applicable, are allowed to be temporarily stored up to 5 years by the producers in order to let its activity decay away. When the activity concentration is below applicable safety levels and meets requirements set forth by relevant regulations¹, the producers shall notify OAP of such management to release the radioactive waste from regulatory control. Subsequently, the waste can be discharged to the environment or disposed of as typical waste. Note that a storage on site must be previously approved as a part of licensing conditions of the radioactive material and the location cannot be changed unless approval from OAP Secretary General is granted.

ILW from NORM as well as VLLW and LLW can be conditioned for conveniences

¹Ministerial Regulation on Discharging Radioactive Waste B.E. 2561 (2018) and Notification of Nuclear Energy Commission for Peace on Safety Levels B.E. 2562 (2019)

in transportation, storage or disposal.

Aside from the mentioned methods, VLLW, LLW as well as ILW from NORM can be disposed in the different types of facilities depending on their levels of activity concentration. VLLW from NORM can be disposed in near surface landfill type facility. LLW from NORM that requires robust isolation and containment for periods of up to 300 years shall be disposed in near surface facility at the depth of at least 30 meters. And ILW from NORM which requires greater degree of isolation and containment for periods of more than 300 years shall be disposed at greater depths from 30 meters to 300 meters.

Upon completion of radioactive waste management process, the producers shall inform OAP within 30 days.

Depending on the type of radioactive waste, TINT applies the following treatment and conditioning techniques on radioactive waste within requirements given by the Ministerial Regulation on Radioactive Waste Management B.E. 2561 (2018) under the Nuclear Energy for Peace Act B.E. 2559 (2016).

- High-activity sealed sources are stored in a safe storage facility.
- Low-activity sealed sources are disintegrated and stored in a safe storage facility.
- Combustible wastes are first incinerated. Remaining ashes are stored in a 200-liter drum.
- Compress non-combustible, solid and low-activity waste and store compacted materials in a 200-liter drum .
- Liquid wastes are dried or, if possible, evaporated . Sediments are further treated the same way as the ash from combustible wastes.

Radioactive waste treatments and conditioning techniques for each waste type are summarized in Figure 1.

Criteria Used to Define and Categorize Radioactive Waste

Ministerial Regulation on Radioactive Waste Management B.E. 2561 (2018) under the Act classifies radioactive waste into five classifications according to its half life

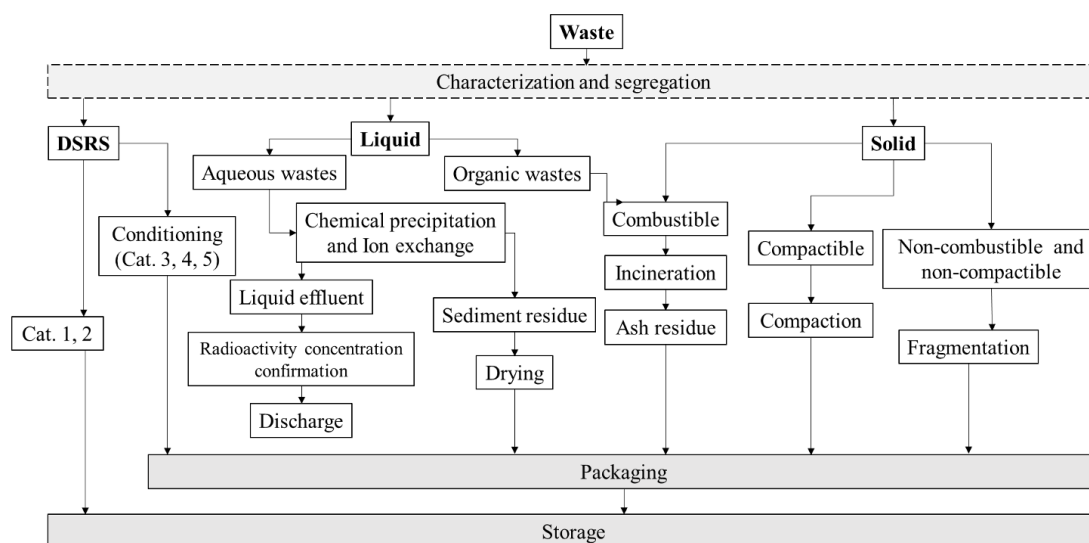


Figure 1: Schematic of Radioactive Waste Management

and radioactivity. The classifications resemble ones from IAEA General Safety Guide No. GSG-1: Classification of Radioactive Waste.

1. Very short lived waste (VSLW) is a waste that contains radionuclides with half-lives no longer than 100 days. Its activity is higher than its safety level.
2. Very low level waste (VLLW) is a waste that contains radionuclides with half-lives longer than 100 days. Its activity is less than 100 times of its safety level.
3. Low level waste (LLW) consists of:
 - (a) radioactive waste that consists of radionuclides with half-lives longer than 100 days, but no more than 30 years. Its activity is higher than 100 times of its safety level. OR
 - (b) radioactive waste that produces alpha ray with half-lives longer than 30 years and its maximum activity of any single package does not exceed 4,000 becquerels per gram. The average activity for all packages is no more than 400 becquerels per gram.
4. Intermediate level waste (ILW) consists of:
 - (a) radioactive waste that consists of radionuclides with half-lives longer than 30 years and its activity is higher than its safety level. The critical heat is no more than 2 kilowatts per cubic meter. OR

- (b) radioactive waste that produces alpha ray with half-lives longer than 30 years and its maximum activity of any single package exceeds 4,000 becquerels per gram. The average activity for all package is more than 400 becquerels per gram.
5. High level waste (HLW) is the radioactive waste that contains radionuclides which has the activity greater than the clearance level and the critical heat is more than 2 kilowatts per cubic meter.

Section C: Scope of Application

1. Thailand declares that reprocessing is a part of spent fuel management. Under the Act, a reprocessing plant is one of the nuclear facilities to be licensed and regulated.
2. Thailand does not consider RADW to apply to waste that contains only naturally occurring radioactive materials (NORM) and that does not originate from the nuclear fuel cycle.
3. Thailand does not consider RADW to apply to the safety of management of spent fuel or radioactive waste within military or defense programs.

Section D: Inventories and Lists

1. List of spent fuel management facility

There has not yet been any spent fuel management facility because all spent fuel elements have been exported to their country of origin. There is an interim storage on site of the research reactor at TINT.

2. Inventory of spent fuel

There has not yet been any spent fuel in Thailand.

3. List of radioactive waste management facility

TINT is the only organization in Thailand operating three radioactive waste management facilities as shown in Figure 2. The facilities are in Bangkok, Nakornnayok and Pathumthani Provinces served as storage facilities, incinerator, compactor, precipitation plant and in-drum cement mixer. Their details are provided below.

Headquarter: Nakornnayok

9/9 Moo 7, Sai Mun, Ongkharak District, Nakhon Nayok 26120

Facility: Incinerator and storage building no. 4

In Nakhon Nayok site, there is a storage building for the DSRS types, as shown in Figure 3. This building is divided into two main areas. The first area is for storing DSRS categories 1-2 and encapsulated DSRS waste packages. The other area is for those DSRS categories 3-5.

The waste incineration activity is moreover provided in this site area. The small incinerator and two 5-m³ stainless steel tanks for scintillation liquid wastes are also located in this site. The capacity of the equipment and waste management facilities is shown in the Appendix.

Chatuchak Facility: Bangkok

16 Vibhavadi-Rangsit Road, Lat Yao, Chatuchak, Bangkok 10900

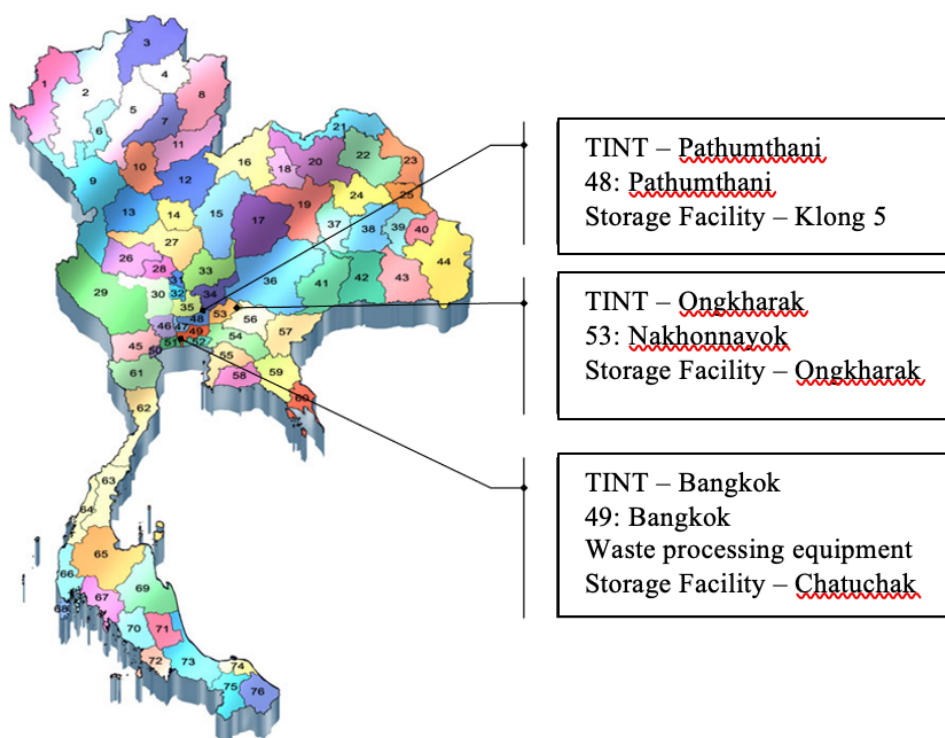


Figure 2: Three operating radioactive waste management facilities at TINT

Facility: Compactor, Chemical precipitation plant, storage building no.1 and 2 and In-drum cement mixer

In Bangkok site, the waste treatment plant shown in Figure 4 is used to deal with the aqueous liquid radioactive wastes. The main wastes from the TINT itself come from the operation of the 2 MW TRIGA Mark III research reactor, radiochemistry laboratories, and the production of radioisotopes, such as I-131, Tc-99m, P-32, etc. These wastes are temporarily stored in the outside underground storage tanks as shown in Figure 5, then pumped into the plant system equipped with the chemical precipitation process. This waste type is precipitated and then the resulted liquid wastewater is directly filtered using charcoal and ion-exchange resin. The filtered wastewater is sent to the retention pool. The wastewater is then released to the environment after confirmation that the activity concentrations of radionuclides in the liquid are below the legal allowable limits. The sludge obtained from the precipitation is filtered using the sludge filter press. The obtained sludge is dried, packaged and finally stored.

Moreover, a waste storage building for decay storage of very short-lived waste



Figure 3: The (a) outside and (b) inside of the storage building No.4

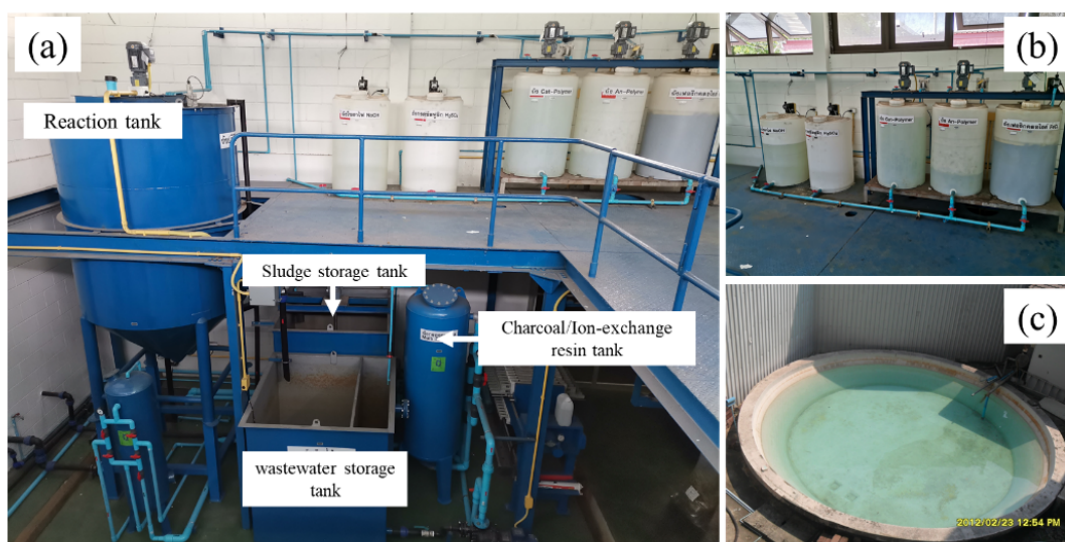


Figure 4: Liquid waste treatment system containing (a) reaction tank, sludge storage tank, Charcoal/ion-exchange resin tank, wastewater storage tank, (b) precipitation solutions and (c) retention pool

(VSLW) and the radioactivity measuring laboratory are also located at this site.

Klong 5 Facility: Pathumthani

37 Moo 3, Khlong Ha, Khlong Luang District, Pathum Thani 12120

Facility: storage building no. 3

In Pathum Thani site, there is a waste storage building (Figure 6) for containing the treated and conditioned wastes such as cementation waste, unconditioned resin, contaminated metal, compacted glass, etc. The drums are stacked vertically with a maximum of four drum layers on the shelves.

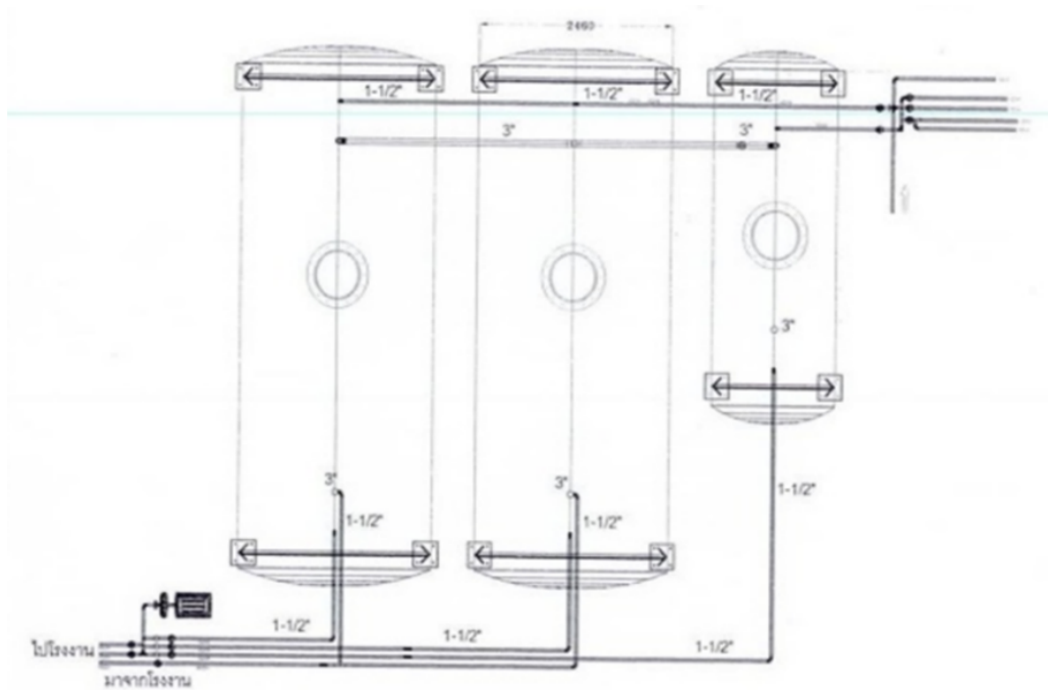


Figure 5: Underground storage tanks

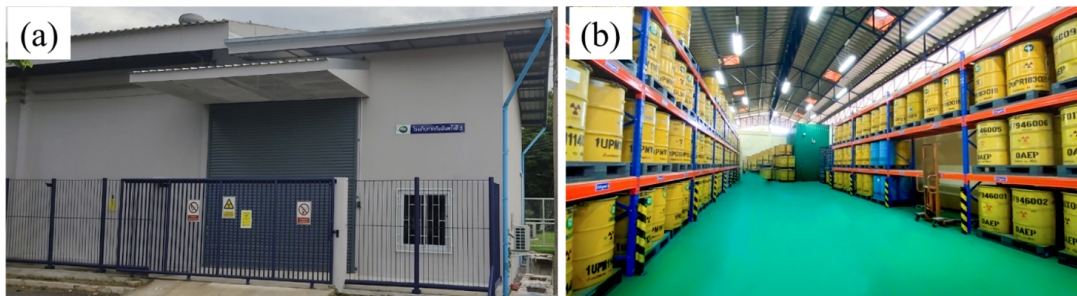


Figure 6: The (a) outside and (b) inside of the storage building No.3

4. Inventory of radioactive waste

The inventory of radioactive waste is listed in the Appendix.

Section E: Legislative and Regulatory System

Article 18: Implementing measures

Each Contracting Party shall take, within the framework of its national law, the legislative, regulatory and administrative measures and other steps necessary for implementing its obligations under this Convention.

Entering into force on February 1, 2017, the Nuclear Energy for Peace Act B.E. 2559 (2016), which replaces the Atomic Energy for Peace Act B.E. 2504 (1961), provides an overarching legal framework governing the development and utilization of nuclear energy and radiation. The objectives of the Act are to protect people and the environment from harmful radiation; to regulate radiation and nuclear activities on safety, security and safeguards; and to comply with necessary international legal instruments. It enables Thailand to accede RADW and to become a Contracting Party since October 1, 2018.

The Act put into effect excessively strict provisions on radiation generators that it was deemed impractical. The Act was subsequently amended by the Nuclear Energy for Peace No. 2, B.E. 2562 (2019). The amended Act creates more regulatory flexibility while maintaining high level of nuclear and radiation safety standards. The Amended Act creates a notification process for a radiation generator specifically designed for medical diagnosis. This radiation generator must not contain a radioactive material and must be used in a medical facility. Ministry of Public Health oversees all notification of this type of radiation generators.

Article 19: Legislative and regulatory framework

1. *Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of spent fuel and radioactive waste management.*
2. *This legislative and regulatory framework shall provide for:*
 - (i) *the establishment of applicable national safety requirements and regulations for radiation safety;*
 - (ii) *a system of licensing of spent fuel and radioactive waste management activities;*
 - (iii) *a system of prohibition of the operation of a spent fuel or radioactive waste management facility without a licence;*
 - (iv) *a system of appropriate institutional control, regulatory inspection and documentation and reporting;*
 - (v) *the enforcement of applicable regulations and of the terms of the licences;*
 - (vi) *a clear allocation of responsibilities of the bodies involved in the different steps of spent fuel and of radioactive waste management.*
3. *When considering whether to regulate radioactive materials as radioactive waste, Contracting Parties shall take due account of the objectives of this Convention.*

The safety of spent fuel management regarding research reactor and the safety of radioactive waste management are mainly governed by the Act. Section 75 to 83, Chapter 6 of the Act provides regulating provisions on radioactive waste and paves the way for developments of six subsidiary laws:

- Rule of Atomic Energy for Peace Commission on Radioactive Waste Repatriation and Management B.E. 2554 (2011)
- Ministerial Regulation on Importing and Exporting of Radioactive Waste B.E. 2561 (2018)
- Ministerial Regulation on Discharging Radioactive Waste B.E. 2561 (2018)
- Ministerial Regulation on Radioactive Waste Management B.E.2561 (2018)
- Draft Ministerial Regulation on Safety and Security During Transportation
- Draft Ministerial Regulation on Licensing on Providing and Terminating Service on Radioactive Waste Management

Furthermore, Section 84 to 87, Chapter 7 of the Act governs all regulatory processes involving spent fuel and allows for issuances of four subsidiary laws:

- Draft Ministerial Regulation to Specify Rules, Procedures and Conditions of Nuclear Material and Spent Fuel Licensing
- Draft Ministerial Regulation to Specify Rules, Steps and Procedures of Spent Fuel Management
- Draft Ministerial Regulation to Specify Rules, Procedures and Conditions on Loading Nuclear Fuel, Nuclear Material or Spent Fuel, for Commissioning Test of Nuclear Research Reactor, or for Loading Test of Nuclear Material or Spent Fuel, and Submitting Test Report
- Draft Ministerial Regulation on Safety and Security During Transportation

Radiation Safety

National requirements for radiation safety are set forth in the Ministerial Regulation on Radiation Safety B.E. 2561 (2018) issued under Section 5, 8 and 91 of the Act with the aim to protect individuals and environment against harmful radiation. The Ministerial Regulation is based on a safety principle “As Low As Reasonably Achievable” or ALARA to minimize radiation exposure and contains specific requirements namely appropriate radiation safety measure, controlled and supervised areas, the use of radiation symbol, safety of radiation worker, occupational limit of exposure and limited radioactive contamination on the surface.

Licensing of spent fuel and radioactive waste management activities

Regarding the management of radioactive waste, OAP is the competent authority to lay down provisions for the safe management of radioactive waste. The process of licensing is applied for siting, construction, operation as well as decommissioning of radioactive waste management facility. The treatment and conditioning activities can be carried out by radioactive waste producers or service providers and must be in accordance with licensing conditions of radioactive material which were previously approved. When the radioactive waste producers perform the treatment and conditioning activities, they must notify OAP within 30 days upon the completion of radioactive waste management to release it from regulatory control.

Prohibition of the operation without a license

The Act clearly defines punishments for the offence relating to operation of a spent fuel or radioactive waste management facility without a proper license.

According to Section 116 of the Act, anyone providing services for radioactive waste management who fails to obtain a site license, a construction license, an operating license and a decommissioning license is subject to be imprisoned for no more than two years and/or to be fined up to two hundred thousand baht.

Section 119 of the Act defines punishments of no more than six year imprisonment and/or up to six hundred thousand baht fine for anyone who fails to obtain a license for importing and exporting of spent fuel.

Enforcement of applicable regulations

Section 87 of the Act states that a holder of a license to operate a nuclear facility where spent nuclear fuel is originated shall store the spent nuclear fuel in accordance with the procedures specified in the final safety analysis report, which is a condition in the operating license, unless the spent nuclear fuel is transferred to the government agency with the assigned duty to store spent nuclear fuel, or is exported to be processed outside the Kingdom, or is repatriated to the vendor or lessor. The storage of spent nuclear fuel, transfer of spent nuclear fuel to the state agency, export of spent nuclear fuel to be processed outside the Kingdom and repatriation of spent nuclear fuel to the vendor or lessor shall be in accordance with the rules, steps, and procedures prescribed by the Ministerial Regulation².

Section 122 of the Act also stipulates that a license holder of nuclear facility where spent fuel is produced and stored or a radioactive waste management facility must adhere to licensing conditions. The license holder is subject to up to one year imprisonment and/or up to one hundred thousand baht fine.

Regulatory inspection

Spent fuel and radioactive waste management facilities are subject to regulatory inspection performed by OAP. The inspection mainly comprises an on-site inspection and the interview of relevant technical officers. During the on-site inspection, the inspector verifies physical presences of radioactive waste, making sure that they are consistent with a radioactive waste manifest OAP has previously licensed to such facility. Safety and security measures of radioactive waste storage are also examined during the on-site inspection.

²Draft Ministerial Regulation to Specify Rules, Steps and Procedures of Spent Fuel Management

Article 20: Regulatory body

- 1. Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 19, and provided with adequate authority, competence and financial and human resources to fulfill its assigned responsibilities.*
- 2. Each Contracting Party, in accordance with its legislative and regulatory framework, shall take the appropriate steps to ensure the effective independence of the regulatory functions from other functions where organizations are involved in both spent fuel or radioactive waste management and in their regulation.*

The Act established the Nuclear Energy for Peace Commission (NEC) which is the regulatory authority of Thailand responsible for licensing and regulating radiation and nuclear facilities and activities. NEC consists of:

1. the Prime Minister as Chairperson
2. the Minister of Higher Education, Science, Research and Innovation as Vice Chairperson
3. Ten ex officio members: Eight Permanent Secretaries (the Ministry of Defense, the Ministry of Foreign Affairs, the Ministry of Natural Resources and Environment, the Ministry of Energy, the Ministry of Interior, the Ministry of Higher Education, Science, Research and Innovation, the Ministry of Public Health and the Ministry of Industry), the Secretary General of the Office of the National Economy and the Social Development and the Secretary General of the National Security Council.
4. No more than six qualified members who possess knowledge, skill and experience relating to nuclear energy and radiation with extensive background in science, engineering, medicine, agriculture or law and are appointed by the Cabinet.
5. Secretary General of OAP serves as a member and a secretary to NEC and Secretary General may appoint up to two government officials from OAP to be assistant secretaries.

By virtue of OAP being the secretary of the commission, OAP performs regulatory functions such as developing regulation, licensing and performing assessment and inspection.

NEC has the following authorities and duties:

1. To propose policies and recommendations to the Cabinet on the following issues:
 - (a) The use of nuclear energy
 - (b) Nuclear and radiation regulation for safety and for the purpose of preventing or suppressing nuisance, damage, or harm that affects persons, animals, plants, properties or the environment, or determining the guidelines or procedures on nuclear and radiation regulatory in accordance with the economic and social conditions
2. To advise the Minister of Higher Education, Science, Research and Innovation on issuing the Ministerial Regulations under the Act
3. To specify rules and oversee compliance with the terms or conditions in a license issued under the Act
4. To develop specific standards on nuclear energy
5. To promote and disseminate the knowledge on nuclear safety
6. To determine the Nuclear and Radiation Emergency Plan, a supporting plan in the National Disaster Protection and Relief Plan under the law on disaster protection and relief
7. To decide on an appeal against the order of the Secretary General of OAP under the Act
8. To perform other Acts as prescribed in the laws to be the powers and duties of NEC or as entrusted by the Cabinet

Structure of nuclear regulatory organizations in Thailand is shown in Figure 7.

Main responsibilities of OAP

As a secretary and functioning unit for NEC, OAP, which is a governmental office, has been tasked with the following responsibilities:

1. To be the Secretariat of NEC
2. To perform legal actions according to laws, regulations and rules relating to nuclear energy utilizations and others of relevance

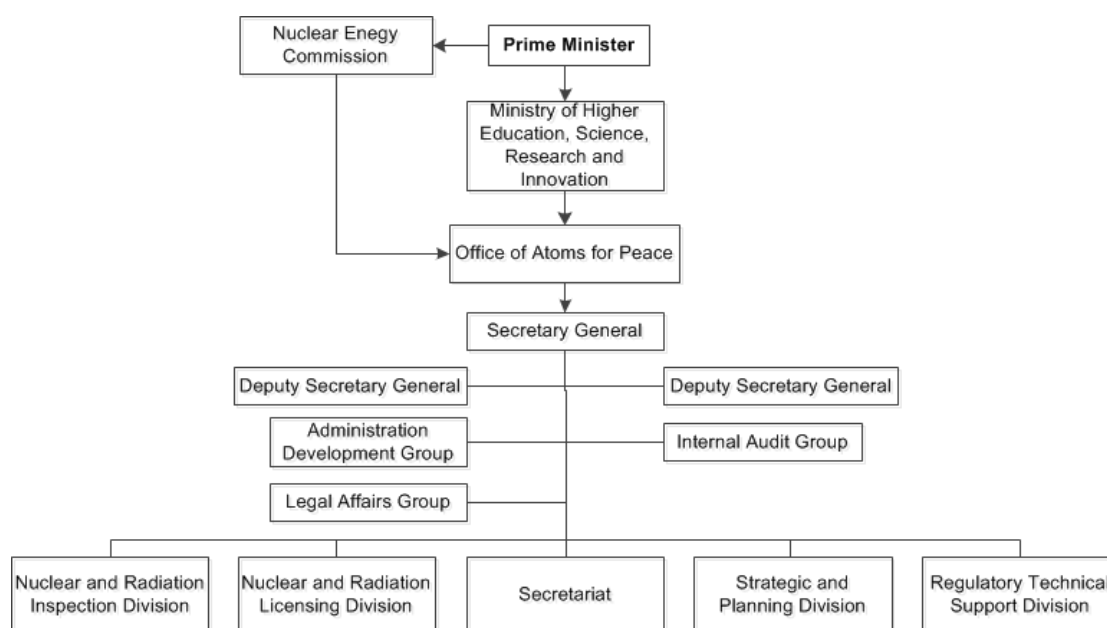


Figure 7: Nuclear Regulatory Structure in Thailand

3. To regulate safety, security and safeguards of nuclear energy and radiation
4. To formulate national policy and strategic plans on peaceful uses of nuclear energy and radiation
5. To perform research and development in the areas relating to safety, security and safeguards
6. To coordinate and carry out technical co-operation with organizations in Thailand and abroad in accordance with international obligations and agreements

Currently, the organizational structure of OAP is according to the Ministerial Regulation on Reorganization of the Office of Atoms for Peace B.E. 2561 (2018).

Place of the regulatory body in the governmental structure

On April 25, 1961, The Royal Thai Government proclaimed the enactment of the Atomic Energy for Peace Act, B.E. 2504 (1961) resulting in the establishment of the Atomic Energy for Peace Commission (AEC) and the Office of Atomic energy for Peace (OAEP). Since its inception, OAEP has been under different Ministries as follows:

1961 - 1963: The Office of Prime Minister

1963 - 1972: Ministry of National Development

1972 - 1979: Ministry of Industry

1979 - 1992: Ministry of Science Technology and Energy

1992 - 2002: Ministry of Science Technology and Environment

2002 - 2019: Ministry of Science and Technology

2019 - Present: Ministry of Higher Education, Science, Research and Innovation

The issuance of Government Reorganization Act in 2002, Article 39 and 39(2) renamed the "Office of Atomic Energy for Peace" to "Office of Atoms for Peace" or OAP.

Financial Resources

OAP has been allocated sufficient funds from the Government budget to meet program needs and routine functions. As a governmental office, OAP must strictly observe budget and procurement regulations laid out by the Budget Bureau and the Comptroller General's Department. In addition, OAP is subject to auditing process by the State Audit Office.

Human Resources

Currently, OAP has 308 employees. 202 of which are government officials. 81 of which are government employees. And 25 of which are OAP project employees.

Realizing the importance of human resource development for regulating rapidly growing nuclear and radiation technology, OAP continuously enhances its technical capabilities through cooperations with a number of external affiliations. With IAEA, staff from OAP regularly attend training courses, workshops and meetings under national technical cooperation projects and other programs offered by other departments of the IAEA. In addition, OAP fosters cooperations with leading organizations in the area of nuclear safety, including European Commission (EC), United States Nuclear Regulatory Commission (U.S. NRC.), Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and Nuclear Safety and Security Commission (NSSC) of Republic of Korea. While cooperations with various partners are different in nature in terms of implementation and activeness, they provide OAP with essential technical enhancements on nuclear safety.

Furthermore, national human resource development policy allows for OAP to dispatch its government officials to pursue graduate degrees relating to nuclear safety in advancing countries.

Means for the effective separation

Prior to April 21, 2006, OAP was assigned the functions of both utilizing nuclear energy and radiation as well as regulating its safety. The Royal Decree Establishing the Nuclear Institute of Technology (Public Organization) (TINT) B.E. 2549 (2006) which became effective on April 21, 2006 allowed OAP to become an effective national nuclear and radiation regulator. To fully complete the establishment of TINT, The Cabinet resolution on November 21, 2006 ordered the transfer of functions, business, property, authority, liability and budget involving nuclear research and development from OAP to TINT.

Section F: Other General Safety Provisions

Article 21: Responsibility of the licence holder

- 1. Each Contracting Party shall ensure that prime responsibility for the safety of spent fuel or radioactive waste management rests with the holder of the relevant licence and shall take the appropriate steps to ensure that each such licence holder meets its responsibility.*
- 2. If there is no such licence holder or other responsible party, the responsibility rests with the Contracting Party which has jurisdiction over the spent fuel or over the radioactive waste.*

Several Sections of the Act assign prime responsibility for the safety of spent fuel or radioactive waste management to a license holder who generates such spent fuel or radioactive waste and who operates spent fuel and radioactive waste management facilities. In case of a failure to do so, a relevant agency designated by the Secretary General of OAP will assume the responsibility, using a guarantee previously provided by the license holder. The Sections can be described below.

Section 79 of the Act states that any person who generates radioactive waste shall be responsible for the management of such radioactive waste under the rules, procedures and conditions prescribed by the Ministerial Regulation³. The Ministerial Regulation requires that radioactive waste producer has responsibilities to manage their own waste as follows:

- (i) To collect, classify and store radioactive waste according to radioactive waste management plan;
- (ii) To create inventory of radioactive waste including information on types of radionuclides, radioactivity level, weight or volume, physical and chemical

³Ministerial Regulation on Radioactive Waste Management B.E. 2561 (2018)

characteristic of radioactive waste as well as collection date, location and storing method of radioactive waste and;

- (iii) To affix radiation symbol on the radioactive waste package indicating important information namely, a name of radionuclides, radioactivity level and a contact dose.

Section 87 of the Act stipulates that a holder of a license to operate a nuclear facility where spent fuel is originated shall store the spent fuel in accordance with the procedures specified in the final safety analysis report, which is a condition in the operating license, unless the spent fuel is transferred to the government agency with the assigned duty to store spent fuel, or is exported to be processed outside the Kingdom, or is repatriated to the vendor or lessor.

The storage of spent fuel, transfer of spent fuel to the state agency, export of spent fuel to be processed outside the Kingdom and repatriation of spent fuel to the vendor or lessor shall be in accordance with the rules, steps, and procedures prescribed by the Ministerial Regulation⁴.

Section 31 of the Act states that a license holder under Section 19 and Section 26 have the duty to provide a guarantee upon obtaining the license as the guarantee for the radioactive waste management and the operation of a competent official under Section 104 in accordance with the rules, procedures, conditions, and periods of time prescribed by the Ministerial Regulation⁵.

The guarantee shall be cash, Thai government bond, bank guarantee, or any other guarantee prescribed by the Ministerial Regulation.

If the license holder does not provide the guarantee or provide the guarantee with a lesser amount and not within the period prescribed in Section 31, the license holder shall pay a surcharge at the rate of two percent per month of the required guarantee amount or the amount of shortfall, as the case may be, beginning from the due date. The Secretary General shall issue a notice to the license holder to provide the guarantee or the surcharge within thirty days upon receiving the notice. If the guarantee or the surcharge is still not provided, the Secretary General may issue an order to revoke the license.

⁴Draft Ministerial Regulation to Specify Rules, Steps and Procedures for Spent Fuel Management

⁵Draft Ministerial Regulation on Guarantee

In the case where the Secretary General assigns another party to manage radioactive waste for the license holder, the expense for that party shall be payable from the guarantee. If the guarantee is insufficient, the license holder shall be liable for the remaining expense. The remaining balance from the guarantee, if any, shall be returned to the license holder.

The guarantee shall not be subject to the execution of judgment but shall still be part of liability under this Act.

Maintenance and disbursement of the guarantee shall be in accordance with the rules, procedures, and conditions prescribed by the Ministerial Regulation⁵.

Section 32 of the Act requires that the state agencies, prescribed by the Ministerial Regulation, as the license holder under Section 19 and Section 26 shall be exempted from providing the guarantee under Section 31.

Section 19 of the Act states that any person who intends to conduct the following activities shall obtain a license from the Secretary General of OAP

- (i) to produce, possess, or use a radioactive material;
- (ii) to import, export, or transit a radioactive material.

Applying for a license, granting a license, and granting a license substitute for each type of radioactive materials shall be in accordance with the rules, procedures, and conditions prescribed by the Ministerial Regulation⁶.

Section 26 of the Act states that any person who intends to conduct the following activities shall obtain a license from the Secretary General of OAP

- (i) to make a radiation generator;
- (ii) to possess or use a radiation generator;
- (iii) to import or export a radiation generator.

Applying for a license, granting a license, and granting a license substitute for each type of radiation generator shall be in accordance with the rules, procedures, and

⁶Draft Ministerial Regulation on Licensing Radioactive Material

conditions prescribed by the Ministerial Regulation⁷.

Section 104 of the Act stipulates that in the case where an order of license suspension or an order of license revocation is issued, OAP Secretary General may order a competent official to take control of the radioactive material, radiation generator, nuclear material, nuclear reactor, radioactive waste or spent fuel associated with the activities under that license as deemed necessary for radiation protection, for nuclear and radiation safety and security, or for nuclear safeguards. Any expense incurred by such control shall be deducted from the guarantee. If the guarantee is insufficient, the license holder shall be liable for the remaining expense.

Article 22: Human and financial resources

Each Contracting Party shall take the appropriate steps to ensure that:

- (i) qualified staff are available as needed for safety-related activities during the operating lifetime of a spent fuel and a radioactive waste management facility;*
- (ii) adequate financial resources are available to support the safety of facilities for spent fuel and radioactive waste management during their operating lifetime and for decommissioning;*
- (iii) financial provision is made which will enable the appropriate institutional controls and monitoring arrangements to be continued for the period deemed necessary following the closure of a disposal facility.*

To ensure that spent fuel and radioactive waste management facilities are operated by qualified personnel and with adequate financial resources during their operating lifetime and decommissioning process, provisions of the Act are devoted to specify qualifications of an establisher of such facilities. Moreover, a sufficient guarantee to cover all expenses for radioactive waste management, decommissioning and operation from relevant competent officials must be provided before the license application is considered.

Section 46 of the Act stipulates that any person who wishes to establish a nuclear facility, which includes spent fuel management facility and radioactive waste management facility by definition, shall have the qualifications and shall not be under the prohibitions as follows:

⁷Draft Ministerial Regulation on Licensing Radiation Generator

- (i) being a limited company, a public limited company, or other juristic person under a specific law;
- (ii) having technical and financial qualification as prescribed by the Ministerial Regulation⁸;
- (iii) not being bankrupt or under the financial protection;
- (iv) not having the license suspended under this Act;
- (v) never having the license revoked under this Act, except the license has been revoked for more than five years before the license application date;
- (vi) never being sentenced by a final judgement to imprisonment for an offence committed under this Act, except the punishment has undergone for more than five years before the license application date.

Section 69 requires a license holder for a nuclear facility, which includes spent fuel management facility and radioactive waste management facility by definition, to provide a guarantee, upon obtaining the license, for covering all management expenses as a result of facility operation and facility decommissioning.

Article 23: Quality assurance

Each Contracting Party shall take the necessary steps to ensure that appropriate quality assurance programmes concerning the safety of spent fuel and radioactive waste management are established and implemented.

Quality assurance is such an important aspect to ensure safety of spent fuel management facility and radioactive waste management facility. Several provisions in the Act and their subsidiary regulations require that Quality assurance program must be detailed in the preliminary safety analysis report (PSAR) and the safety analysis report (SAR) which are mandatory documents for applying for siting, design and construction, operation and decommissioning licenses.

TINT is legally authorized to deal with the radioactive wastes generated in Thailand. The wastes are usually generated from the use of radioactive sources in the research and development (R&D) laboratories, the operation of a research reactor, the nuclear medical applications, industries, etc. Our focus has always

⁸Draft Ministerial Regulation to Specify Technical and Financial Qualifications of an Establisher of Nuclear Facility

been on improving waste management techniques and raising levels of safety in the waste treatment operations and the waste storage. TINT treats the safety of the public and environment as its first priority. The comprehensive quality assurance program applied to all stages and elements of predisposal radioactive waste management conducts a bearing on safety. It includes operation and maintenance of radioactive waste management facilities. The quality assurance program applied to the processing of the waste to ensure that all waste acceptance requirements are fulfilled. This will provide an assurance of adequate quality and will ensure compliance with the relevant standards and criteria. TINT operates under a certified ISO 9001: 2015, Quality Management System accredited by Bureau Veritas 1828, recognition of the organization's Environmental Management System which complies with ISO 14001:2015 in the scope of Radioactive Waste Management Services accredited by United Registrar of Systems and Radioactivity Measurement Laboratory. TINT is also certified of Testing Laboratory ISO17025:2005 accredited by Bureau of Laboratory Accreditation, Department of Science Service, Ministry of Higher Education, Science, Research and Innovation.

Article 24: Operational radiation protection

1. *Each Contracting Party shall take the appropriate steps to ensure that during the operating lifetime of a spent fuel or radioactive waste management facility:*

- (i) the radiation exposure of the workers and the public caused by the facility shall be kept as low as reasonably achievable, economic and social factors being taken into account;*
- (ii) no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection;*
- (iii) measures are taken to prevent unplanned and uncontrolled releases of radioactive materials into the environment.*

2. *Each Contracting Party shall take appropriate steps to ensure that discharges shall be limited:*

- (i) to keep exposure to radiation as low as reasonably achievable, economic and social factors being taken into account;*
- (ii) so that no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection.*

3. *Each Contracting Party shall take appropriate steps to ensure that during the operating lifetime of a regulated nuclear facility, in the event that an unplanned or uncontrolled release of radioactive materials into the environment occurs, appropriate corrective measures are implemented to control the release and mitigate its effects.*

According to Section 91 of the Act, radiation protection during the operation of a spent fuel and radioactive waste management facility must adhere to conditions prescribed by the Ministerial Regulation⁹. The Ministerial Regulation contains specific requirements described below.

- (i) Appropriate radiation safety measures according to the criteria specified by the law that are aligned with radiation security must be applied. Review of safety measures shall be conducted at least once a year. Moreover, any modification of the measures is to be approved by OAP Secretary General.

⁹Ministerial Regulation on Radiation Safety B.E. 2561 (2018)

- (ii) Controlled and supervised areas must be properly identified considering expected radiation exposure from routine operation or from incident and accident.
- (iii) Radiation symbols with detailed warnings must be apparently displayed at the entrance and other spots of controlled and supervised areas and be affixed to any radioactive equipment, material, generator and nuclear material.
- (iv) Radiation workers operating in the controlled area must be at least 18 years old and are under radiation dose assessment program conducted by a license holder. Moreover, all workers shall be informed of criteria and relevant safety standards required by the law before they start operating.
- (v) Radiation exposure of workers must be kept as low as reasonably achievable and does not exceed the level specified by law. The Ministerial Regulation sets the limit for occupational effective dose at 20 mSv which is generally accepted among international communities.
- (vi) Radioactive contamination on the surface in controlled and supervised areas must be limited not to exceed the level prescribed by law.

Section 78 of the Act states that any person shall not discharge radioactive waste to the environment unless the activities and half-lives of such radioactive waste are in accordance with the Ministerial Regulation¹⁰ and the disposal of such radioactive waste is conducted in accordance with the rules, procedures, and quantities of radioactive waste discharge prescribed by the Ministerial Regulation¹⁰. According to the Ministerial Regulation, radioactive waste discharger shall ensure that the annual public dose shall not exceed 0.30 mSv.

Article 25: Emergency preparedness

- 1. Each Contracting Party shall ensure that before and during operation of a spent fuel or radioactive waste management facility there are appropriate on-site and, if necessary, off-site emergency plans. Such emergency plans should be tested at an appropriate frequency.*
- 2. Each Contracting Party shall take the appropriate steps for the preparation and testing of emergency plans for its territory insofar as it is likely to be affected in the event of a radiological emergency at a spent fuel or radioactive waste management facility in the vicinity of its territory.*

¹⁰Ministerial Regulation on Discharging Radioactive Waste B.E. 2561 (2018)

It is required by Section 100 of the Act that a license holder has the duty to initially suppress the incident under the radiation protection plan and immediately notify a competent official as well as provide information and cooperate with the competent official in order to resolve, mitigate and abate such harm and damage. TINT is in compliance with this measure by having emergency procedures for its three radioactive waste management facilities prepared and reviewed on a regular basis.

Furthermore, Section 101 provides a provision in case of the harm or damage extending to a public damage or in case where a competent official finds that conducting an activity under a license may cause a public damage, as official with the authority under the law on disaster protection and relief shall have the authority to immediately suppress the cause of such public damage, including the authority to declare measure for the purpose of suppressing such cause. In suppressing the cause of the public damage, the official performs under the law on disaster protection and relief with the National Nuclear and Radiological Emergency Plan as a support plan under the National Disaster and Relief Protection Plan. OAP has the duty to provide recommendations and support personnel for such performance. Similar approach is taken if a nuclear or radiation incident take place in a foreign state that affects Thailand.

In case of harm or damage resulting from a nuclear or radiation incident in a foreign state that affects Thailand, the provisions in Section 101 shall be applied *mutatis mutandis*.

A licensee of spent fuel management facility and radioactive waste management facility is entirely responsible for preparing an on-site emergency plan which is a mandatory document during all regulatory steps: siting, design and construction, operation and decommission. According to relevant regulations, the on-site emergency plan must be included in site evaluation report, preliminary safety analysis report and safety analysis report.

License holder has a full responsibility if the emergency event is limited within the facility. In case of an unfortunate accident which escalates to affect area outside a facility, handling the accident involves coordinations from a number of authorities. Scale and impact of the event determine the authority who is in charge. If the impact of event extends beyond the facility but within a province,



Figure 8: Key Ministries in the National Nuclear and Radiological Emergency Plan

the governor of the province is in charge. Greater events will be called by the Prime Minister. OAP is always a technical support providing recommendations and guidelines on radiation safety. In addition, OAP has formulated the National Nuclear and Radiological Emergency Plan ¹¹ which involves a number of agencies as shown in Figure 8. Their roles and responsibilities are clearly defined as follows:

1. The Prime Minister's Office

- (a) Office of the National Security Council

- Give advice and opinions on the formulation of national strategies on national security dimension or national security issues or the amendment or revision of the law on national security to the Prime Minister, the Cabinet or relevant state agencies.
- Formulate guidelines or measures for the prevention or mitigation of national security problems and submit them to the Prime Minister or the Cabinet for consideration.

¹¹Office of Atoms for Peace, Ministry of Science and Technology. 2014. National Nuclear and Radiological Emergency Plan

- Perform other acts under the National Security Council Act B.E. 2559 (2016) and by other laws or as entrusted by the Prime Minister or the Cabinet.

(b) Government Public Relations Department

- Disseminate information to the public
- Coordinate with the regulatory government agencies related to confidential information and news broadcasting which may be a threat to security
- Support communication equipment and materials in terms of public relations to provide security information services

2. Ministry of Interior

- Be responsible for providing temporary shelters, and other remuneration package to the victims radically and expeditiously
- Control and maintain normal state during a disaster

(a) Department of Disaster Prevention and Mitigation

- Draft and propose the National Disaster Prevention and Mitigation Plan to the National Disaster Prevention and Mitigation Committee (NDPMC)
- Conduct research on procedures and measures to prevent and mitigate all impacts of disasters
- Provide assistance to government agencies and relevant stakeholders
- Provide training to government agencies and relevant stakeholders on disaster prevention and mitigation
- Follow up all activities related to disaster prevention and mitigation
- Perform other duties as required by Commander in Chief, Prime Minister, NDPMC, and the Cabinet

3. Ministry of Defence

- Establish measures on prevention and mitigation of nuclear and radiological disaster as well as a plan for evacuation
- Provide aids to those affected by nuclear and radiological disaster
- Warn and report updated events
- Support civil prevention in the areas

(a) Defence Mobilisation Department

- Provide aids to those affected by nuclear and radiological disaster
- Provide support on resources information of military forces, military arms, devices, equipment, communication tools for nuclear and radiological disaster prevention and mitigation

(b) Directorate of Civil Affairs

- Propose the policy and implementation plan on prevention and resolution of nuclear and radiological disaster
- Support the operational sectors of the Royal Thai Armed Forces Headquarter
- Serve as coordinating centers among military agencies of the Royal Thai Armed Forces Headquarter
- Disseminate information regarding nuclear and radiological disaster

(c) Royal Thai Army Chemical Department

- Procure forces, equipment, and tools to assist on emergency operations to prevent, mitigate, and suppress nuclear and radiological threats

(d) The Naval Science Department

- Procure forces, equipment, and tools relating to preliminary nuclear and radiological public disaster mitigation to provide aids to the victims

(e) Research and Development Centre for Space and Aeronautical Science and Technology, Royal Thai Air Force

- Deploy the Chemical - Biological - Radiological - Nuclear (CBRN) Team to join the operation as requested

4. Ministry of Higher Education, Science, Research and Innovation

(a) The Office of Atoms for Peace (OAP)

- Be responsible for preliminary assessing situations for mitigating nuclear and radiological accidents and emergencies
- Receive notification and report nuclear and radiological incidents and accidents
- Coordinate with the Nuclear and Radiological Suppression Forces Operations and other local and international relevant agencies

- Follow up and collect information on nuclear and radiological accident to eventually suppress emergency situations
- Manage database and statistics of nuclear and radiological emergencies
- Provide training to relevant organizations on emergency preparedness and response

(b) Thailand Institute of Nuclear Technology (TINT)

- Support response activities of nuclear and radiological emergency
- Provide consultancy and recommendations on formulating nuclear and radiological emergency plan to other agencies

5. Ministry of Public Health

- Provide support on the formulation of National Nuclear and Radiological Emergency Plan
- Collaborate with other relevant agencies to formulate Capability Building Implementation Plan

6. Ministry of Natural Resources and Environment

- Provide recommendations and guidelines on the formulation of Chemical Substances and Hazardous Materials Emergency Plan in the risk areas
- Coordinate with other agencies according to the Disaster Prevention and Mitigation Plan to prevent explosion, fire, and chemical and hazardous material leaks to the public and the environment
- Follow up the effects of hazardous residuals on the environment
- Plan and develop permanent and sustainable natural resources and environment

(a) Pollution Control Department

- Provide recommendations on guidelines of the National Nuclear and Radiological Emergency Plan
- Coordinate with relevant agencies to prevent potential hazards
- Provide recommendations on guidelines to rehabilitate and remedy damages on the environment

7. Ministry of Transport

- Support transportation vehicles, drivers, transportation equipment, and supply fuel
- Prepare back-up routes and fix damaged roads, rails or bridges

(a) Department of Land Transport

- Support information of vehicle registration and drivers

8. Ministry of Foreign Affairs

- Coordinate with international organizations, especially when support on civil defence is needed

9. Ministry of Finance

- Allocate budget as needed in urgent situations
- Provide recommendations on allocation and integrated utilization of budget

10. Ministry of Digital Economy and Society

- Support communication resources
- Coordinate on information and relevant communicative infrastructure for disaster warning, aide, and suppression of nuclear and radiological emergency
- Provide weather information to support a decision support system (DSS)

(a) National Disaster Warning Centre

- Simulate various scenarios of disasters to make a better decision
- Exchange of disaster information both domestically and internationally
- Provide accurate information on the severity of the disaster via the Television Pool of Thailand, radio, telephone, and other government and private media
- Monitor disaster situations closely to assess causalities of both lives and assets
- Guide and cooperate training to the officials and public to have knowledge on guidelines and means of minimizing losses, evacuation, avoidance, and mitigation of disaster

11. The Royal Thai Police

- Control and maintain peaceful state, safety of lives and properties of the people and provide social services
- Evaluate the situation and disseminate disaster warning to the public
- Organize traffic systems to mitigate the disaster
- Set up Frontline Operational Center to facility operational activities
- Deploy Mobile Medical Team to provide medical services to the people

12. Bangkok Metropolitan Administration

- Direct and control the operational activities in the Bangkok Metropolitan areas
- Support the operational activities of relevant agencies
- Coordinate with relevant agencies in the Bangkok Metropolitan areas

Article 26: Decommissioning

Each Contracting Party shall take the appropriate steps to ensure the safety of decommissioning of a nuclear facility. Such steps shall ensure that:

- (i) qualified staff and adequate financial resources are available;*
- (ii) the provisions of Article 24 with respect to operational radiation protection, discharges and unplanned and uncontrolled releases are applied;*
- (iii) the provisions of Article 25 with respect to emergency preparedness are applied;*
- (iv) records of information important to decommissioning are kept.*

Both spent fuel management facility and radioactive waste management facility are considered, by law, a nuclear facility; therefore, provisions on decommissioning of a nuclear facility legally apply to both of them. They are the followings. Section 46 of the Act stipulates that any person who wishes to establish a nuclear facility, which includes spent fuel management facility and radioactive waste management facility by definition, shall have the qualifications and shall not be under the prohibitions as follows:

- (i) being a limited company, a public limited company, or other juristic person under a specific law;

- (ii) having technical and financial qualification as prescribed by the Ministerial Regulation¹²;
- (iii) not being bankrupt or under the financial protection;
- (iv) not having the license suspended under this Act;
- (v) never having the license revoked under this Act, except the license has been revoked for more than five years before the license application date;
- (vi) never being sentenced by a final judgement to imprisonment for an offence committed under this Act, except the punishment has undergone for more than five years before the license application date.

Section 70 of the Act states that an operating license holder who wishes to decommission a nuclear facility shall submit a decommissioning application, together with the decommissioning plan as specified in the final safety analysis report, to the Secretary General. Such decommissioning plan shall be updated accordingly.

A submission of a decommissioning application and the details of the decommissioning plan for each type of nuclear facilities shall be in accordance with the rules, procedures, and conditions prescribed by the Ministerial Regulation¹³.

Section 71 of the Act stipulates that in the case where the Secretary General with the approval of NEC consents to decommissioning, the Secretary General shall issue a decommissioning license to an applicant under Section 70 and specify the revocation of the operating license in the decommissioning license.

A decommissioning license shall be valid for a term not exceeding the duration specified in a decommissioning plan.

Section 72 of the Act requires that if a decommissioning license holder wishes to revise the decommissioning plan, the license holder shall submit a revised decommissioning plan to the Secretary General for approval in accordance with the rules, procedures, and conditions prescribed by the Ministerial Regulation¹³.

¹²Draft Ministerial Regulation to Specify Technical and Financial Qualifications of an Establisher of Nuclear Facility

¹³Draft Ministerial Regulation on Decommissioning Nuclear Facility

In the case where decommissioning technology changes or for the benefits of safety, the Secretary General with the approval of NEC shall have discretion to order the decommissioning license holder to revise the decommissioning plan.

Section 73 of the Act states that a decommissioning license holder who wishes a nuclear facility in whole or partially be released from the regulatory control under this Act shall make a request to the Secretary General.

If the Secretary General is of the opinion that the decommissioned part that the license holder requested is in accordance with the decommissioning plan and has the radiation level in accordance with the criteria prescribed by NEC, the Secretary General with the approval of NEC may issue an order to declare that part of the nuclear facility be released from the regulatory control under this Act.

Section 74 of the Act stipulates that a decommissioning license holder shall complete the decommissioning activities according to the decommissioning plan. If the Secretary General is of the opinion that the decommissioning activities may not be completed within the period of time as planned, the Secretary General has the power to authorize other person to conduct the decommissioning on behalf of or in cooperation with the license holder at the expense of the guarantee of license holder. If the guarantee is insufficient, the decommissioning license holder shall be liable for the remaining expense. The remaining balance from the guarantee, if any, shall be returned to the decommissioning license holder.

Section G: Safety of Spent Fuel Management

Article 4: General safety requirements

Each Contracting Party shall take the appropriate steps to ensure that at all stages of spent fuel management, individuals, society and the environment are adequately protected against radiological hazards. In so doing, each Contracting Party shall take the appropriate steps to:

- (i) ensure that criticality and removal of residual heat generated during spent fuel management are adequately addressed;*
- (ii) ensure that the generation of radioactive waste associated with spent fuel management is kept to the minimum practicable, consistent with the type of fuel cycle policy adopted;*
- (iii) take into account interdependencies among the different steps in spent fuel management;*
- (iv) provide for effective protection of individuals, society and the environment, by applying at the national level suitable protective methods as approved by the regulatory body, in the framework of its national legislation which has due regard to internationally endorsed criteria and standards;*
- (v) take into account the biological, chemical and other hazards that may be associated with spent fuel management;*
- (vi) strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation;*
- (vii) aim to avoid imposing undue burdens on future generations.*

Section 87 of the Act stipulates that a license holder of nuclear facility where spent fuel is produced must manage spent fuel in accordance with the rules, steps, and procedures prescribed by the Ministerial Regulation¹⁴. The draft Ministerial Regulation provides technical requirements for managing spent fuel. It specifically addresses the following aspects: storage of spent fuel, criticality, heat removal, radiation protection and transfer of spent fuel.

Article 5: Existing facilities

Each Contracting Party shall take the appropriate steps to review the safety of any spent fuel management facility existing at the time the Convention enters into force for that Contracting Party and to ensure that, if necessary, all reasonably practicable improvements are made to upgrade the safety of such a facility.

Currently, Thailand has no spent fuel management facility. Thailand has only one nuclear facility at TINT which produces and stores irradiated fuel elements on site.

¹⁴Draft Ministerial Regulation to Specify Rules, Steps and Procedures for Spent Nuclear Fuel Management

Article 6: Siting of proposed facilities

1. *Each Contracting Party shall take the appropriate steps to ensure that procedures are established and implemented for a proposed spent fuel management facility:*
- (i) to evaluate all relevant site-related factors likely to affect the safety of such a facility during its operating lifetime;*
 - (ii) to evaluate the likely safety impact of such a facility on individuals, society and the environment;*
 - (iii) to make information on the safety of such a facility available to members of the public;*
 - (iv) to consult Contracting Parties in the vicinity of such a facility, insofar as they are likely to be affected by that facility, and provide them, upon their request, with general data relating to the facility to enable them to evaluate the likely safety impact of the facility upon their territory.*
2. *In so doing, each Contracting Party shall take the appropriate steps to ensure that such facilities shall not have unacceptable effects on other Contracting Parties by being sited in accordance with the general safety requirements of Article 4.*

According to Section 4 of the Act, spent fuel management facility is, by definition, a nuclear facility. Therefore, siting of a spent fuel management facility must adhere to the same rules and procedures as one of a nuclear facility.

Section 51 of the Act states that in establishing a nuclear facility, the establisher shall obtain a site license from the Secretary General with the approval of NEC. When applying for a license, an applicant shall submit a license application together with a site evaluation report.

The site evaluation report shall be prepared in accordance with the specifications prescribed by NEC with at least the following details:

- (i) The effect of external events on the nuclear facility site either of natural origin or human induced
- (ii) The characteristics of a site
- (iii) A site environmental report
- (iv) Population demography surrounding a nuclear facility site

- (v) Evacuation routes for the population in the case of radiological or nuclear emergency
- (vi) Protection and mitigation of possible harm to people and the environment

Applying for a license, granting a license, and granting a license substitute for a site shall be in accordance with the rules, procedures, and conditions prescribed by the Ministerial Regulation¹⁵.

Two independent national laws require both license applicant and OAP to perform a series of public hearings before reaching a conclusion on a site license application for a nuclear facility.

- (i) A license applicant is subject to the Notification of the Ministry of Natural Resources and Environment on Projects, Undertakings, or Operations Which May Seriously Impact Natural Resources, Environmental Quality, Health, Sanitation, Life Quality of People in a Community that are Required to Provide an Environmental Impact Assessment Report and Rules, Procedure, and Conditions in Providing an Environmental Impact Assessment Report B.E. 2562 (2019). The license applicant must arrange three public hearings with different objectives. The first public hearing is devoted to focus on defining a scope of the EIA report. The second public hearing is a part of the assessment and development of the EIA report. And the third public hearing is aimed to review the results of the EIA report as well as to receive further comments and recommendations from the public.
- (ii) OAP is subject to Section 52 of the Act which states that during the consideration to issue a site license, OAP shall arrange a public hearing for the people living in the site vicinity. The public hearing results shall be used in the consideration to issue the site license. The arrangement for a public hearing shall be in accordance with the rules, procedures, and conditions prescribed by the Ministerial Regulation¹⁵.

Section 53 of the Act states that a site license is valid for the term specified in the license, but not exceeding ten years. Its extension may be requested and approved for a term not exceeding ten years at a time.

If a site license holder wishes to renew the license, the license holder shall submit a request not less than one year in advance but not exceeding three years before

¹⁵Draft Ministerial Regulation on Siting of a Nuclear Facility

the current license expires. The request shall be accompanied by an updated site evaluation report.

Applying for a license renewal and a renewal of a license shall be in accordance with the rules, procedures, and conditions prescribed by the Ministerial Regulation.

Section 54 of the Act states that after the Secretary General with the approval of NEC has issued a site license, if it later becomes apparent that any changes have occurred or the site characteristics have changed, and such changes may affect people and the environment, the Secretary General with the approval of NEC shall order the license holder to submit a revised site evaluation report reflecting such changes within an imposed period.

If the license holder cannot submit the revised site evaluation report as ordered within the imposed period , the license holder shall make an extension request to the Secretary General. The Secretary General shall have discretion to extend the submission period of such report up to two times. Each time, the period shall not exceed than one hundred and eighty days. If the license holder does not submit the revised site evaluation report within the imposed period or the extended period, the Secretary General with the approval of NEC shall issue an order to revoke the site license.

If the Secretary General with the approval of NEC has considered the site evaluation report and is of the opinion that the site no longer meets the site license conditions for a nuclear facility site, the Secretary General with the approval of NEC shall revoke the site license.

Article 7: Design and construction of facilities

Each Contracting Party shall take the appropriate steps to ensure that:

- (i) the design and construction of a spent fuel management facility provide for suitable measures to limit possible radiological impacts on individuals, society and the environment, including those from discharges or uncontrolled releases;*
- (ii) at the design stage, conceptual plans and, as necessary, technical provisions for the decommissioning of a spent fuel management facility are taken into account;*
- (iii) the technologies incorporated in the design and construction of a spent fuel management facility are supported by experience, testing or analysis.*

Section 55, Part 3 Construction and Equipment Installation, Chapter 5 Nuclear Facility, of the Act states that a site license holder who wishes to construct a nuclear facility shall apply for a construction license from the Secretary General with the approval of NEC.

When applying for the license, the applicant shall submit the application together with the site license, a Preliminary Safety Analysis Report (PSAR), and financial documents or evidence.

The financial documents or evidence that the applicant has to submit shall be in accordance with the Ministerial Regulation¹⁶ and may be prescribed according to the different types of nuclear facilities.

Applying for a license, granting a license, and granting a license substitute for a construction license shall be in accordance with the rules, procedures, and conditions prescribed by the Ministerial Regulation¹⁶.

Section 56 of the Act states that PSAR shall provide information on a construction drawing, nuclear and radiation safety and security, and other information prescribed by the Ministerial Regulation¹⁷.

¹⁶Draft Ministerial Regulation on Construction of a Nuclear Facility

¹⁷Draft Ministerial Regulation to Specify Details of a Preliminary Safety Analysis Report

The Ministerial Regulation may prescribe requirements according to the different types of nuclear facilities.

Section 57 of the Act states that after the Secretary General with the approval of NEC has issued a construction license and it later becomes apparent that any changes have occurred and such changes may affect the safety analysis in PSAR, the Secretary General with the approval of NEC shall order the construction license holder to submit a revised PSAR reflecting such changes within an imposed period. The license holder shall also perform safety analysis for the changes that have occurred.

If the license holder cannot submit PSAR as ordered within the imposed period, the license holder shall make an extension request to the Secretary General. The Secretary General shall have discretion to extend the submission period of such report up to two times. Each time, the period shall not exceed than one hundred and eighty days. If the construction license holder does not submit the revised PSAR within the imposed period or the extended period, the Secretary General with the approval of NEC shall issue an order to revoke the construction license.

If the Secretary General with the approval of NEC has considered the revised PSAR and is of the opinion that the construction may no longer be continued, the Secretary General with the approval of NEC shall revoke the construction license.

Section 58 of the Act states that a construction license is valid for the term specified in the license, but not exceeding ten years. Its extension may be requested only once for a term not exceeding ten years.

If a construction license holder wishes to renew the license, the license holder shall submit a request not less than one year in advance but not exceeding three years before the current license expires. The request shall be accompanied by an updated PSAR.

Applying for a license renewal and a renewal of a license shall be in accordance with the rules, procedures, and conditions prescribed by the Ministerial Regulation.

Section 59 of the Act states that a construction license holder shall report updates

on construction progress to the Secretary General according to the schedule specified in the PSAR.

Section 60 of the Act states that a construction license holder shall not carry out construction that deviates from what is authorized in the license unless the Secretary General with the approval of NEC authorizes a change in the construction plan in PSAR.

If the construction has deviated from what is authorized in the license, the Secretary General with the approval of NEC shall have the power to suspend such construction. If the Secretary General with the approval of NEC is of the opinion that such deviations are still acceptable according to the safety standards, the Secretary General with the approval of NEC may order the license holder to revise the construction plan.

If the construction that has deviated from what is authorized in the license may cause harm to people and the environment, the Secretary General with the approval of NEC has the power to cease such construction and order the license holder to dismantle the whole or part of the construction within the imposed period.

Section 61 of the Act states that if the installations of equipment, machines, and tools are different from what are specified in PSAR, Section 60 shall be applied *mutatis mutandis*.

Article 8: Assessment of safety of facilities

Each Contracting Party shall take the appropriate steps to ensure that:

- (i) before construction of a spent fuel management facility, a systematic safety assessment and an environmental assessment appropriate to the hazard presented by the facility and covering its operating lifetime shall be carried out;*
- (ii) before the operation of a spent fuel management facility, updated and detailed versions of the safety assessment and of the environmental assessment shall be prepared when deemed necessary to complement the assessments referred to in paragraph (i).*

Safety and environmental assessment involving with a spent fuel management facility must be performed during the siting and design and construction phase of facility. A site evaluation report which must be submitted when applying for a site license contains at least the following details:

- (i) the effect of external events on the nuclear facility site either of natural origin or human induced;
- (ii) the characteristics of a site;
- (iii) a site environmental report;
- (iv) population demography surrounding a nuclear facility site;
- (v) evacuation routes for the population in the case of radiological or nuclear emergency and;
- (vi) protection and mitigation of possible harm to people and the environment.

Before the construction of a spent fuel management facility, Section 55 of the Act requires that a site license must be granted and PSAR must be submitted. By law, PSAR shall provide information on a construction drawing, nuclear and radiation safety and security, and other information prescribed by the Ministerial Regulation¹⁸.

¹⁸Draft Ministerial Regulation to Specify Details of a Preliminary Safety Analysis Report

Before the operation of a spent fuel management facility, Section 64 of the Act stipulates that Final Safety Analysis Report (FSAR) is to be submitted together with financial documents and the construction license when applying for an operating license. FSAR shall at least contain the updated content of PSAR, a report on testing of the machines and equipment and a report on activities relating to initial loading of spent fuel. Moreover, an initial loading of spent fuel in a reprocessing process acquires authorization from OAP Secretary General. Subsequently, competent official is assigned to observe a compliance during an initial spent fuel loading.

In addition, Section 67 of the Act states that an operating license holder is responsible for reviewing and updating FSAR at the periods and under the circumstances prescribed by the Ministerial Regulation¹⁹.

¹⁹Draft Ministerial Regulation to Specify Review and Update on Safety Analysis Report

Article 9: Operation of facilities

Each Contracting Party shall take the appropriate steps to ensure that:

- (i) the licence to operate a spent fuel management facility is based upon appropriate assessments as specified in Article 8 and is conditional on the completion of a commissioning programme demonstrating that the facility, as constructed, is consistent with design and safety requirements;*
- (ii) operational limits and conditions derived from tests, operational experience and the assessments, as specified in Article 8, are defined and revised as necessary;*
- (iii) operation, maintenance, monitoring, inspection and testing of a spent fuel management facility are conducted in accordance with established procedures;*
- (iv) engineering and technical support in all safety-related fields are available throughout the operating lifetime of a spent fuel management facility;*
- (v) incidents significant to safety are reported in a timely manner by the holder of the licence to the regulatory body;*
- (vi) programmes to collect and analyse relevant operating experience are established and that the results are acted upon, where appropriate;*
- (vii) decommissioning plans for a spent fuel management facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility, and are reviewed by the regulatory body.*

The Act institutes several provisions to ensure that operation of spent fuel management facilities are in compliance with RADW. Details of the provisions are classified and elaborated below.

Commissioning

Section 62, Part 4 Commissioning and Operation, Chapter 5 Nuclear Facility, of the Act states that after the completion of the construction and before applying for an operating license, a construction license holder shall test the installed machines and equipment. The date and time of the testing, together with the testing duration of the installed machines and equipment, shall be notified in advance to the Secretary General not less than fifteen days in order that a competent official comes to inspect such testing.

When the testing of the machines and equipment is completed, the construction license holder shall prepare and submit a test report to the Secretary General for approval.

Section 63 of the Act states that for the following activities, a construction license holder shall acquire an authorization from the Secretary General:

- (i) an initial loading of nuclear fuel into a nuclear reactor and a commissioning test of a nuclear reactor
- (ii) an initial loading of nuclear material in an enrichment process or an initial loading of spent fuel in a reprocessing process. The Secretary General shall authorize the activities only after the test report under Section 62 has been approved.

During the initial loading of nuclear fuel, nuclear material or spent fuel, OAP Secretary General or a competent official assigned by the Secretary General shall also inspect such activities.

When the authorized activity is completed, the construction license holder shall prepare and submit a test report to the Secretary General for approval.

An authorization request, loading of nuclear fuel, nuclear material or spent fuel, a commissioning test of a nuclear reactor or a loading test of nuclear material or spent fuel, and reporting such tests shall be in accordance with the rules, procedures, and conditions prescribed by the Ministerial Regulation²⁰.

Operation

Section 64 of the Act states that a nuclear facility establisher who wishes to operate a nuclear facility shall obtain an operating license from the Secretary General with the approval of NEC.

When applying for the license, an applicant shall submit an application together with financial documents and evidence, the construction license, and FSAR.

²⁰Draft Ministerial Regulation to Specify Rules, Procedures and Conditions on Loading Nuclear Fuel, Nuclear Material or Spent Fuel, for Commissioning Test of Nuclear Research Reactor, of for Loading Test of Nuclear Material or Spent Fuel, and Submitting Test Report

FSAR shall at least contain the updated content of PSAR, a report on testing machines and equipments, and a report on activities relating initial loading of spent fuel.

The documents that the applicant shall submit shall be prescribed by the Ministerial Regulation. The documents and the periods of time for submission may be prescribed according to the different types of nuclear facilities.

Applying for a license, granting a license, and granting a license substitute for an operating license shall be in accordance with the rules, procedures, and conditions prescribed by the Ministerial Regulation²¹.

Section 65 of the Act states that an operating license is valid for the term specified in the license, but not exceeding sixty years. Its extension may be requested in accordance with the rules, procedures, and conditions prescribed by the Ministerial Regulation.

Section 67 of the Act states that an operating license holder is responsible for reviewing and updating the safety analysis report at the periods and under the cases prescribed by the Ministerial Regulation²² or when the Secretary General is of the opinion that there is a cause rendering FSAR no longer suitable for present circumstances.

If the license holder cannot submit the revised safety analysis report as requested within the imposed period, the license holder shall make an extension request to the Secretary General. The Secretary General shall have discretion to extend the submission period of such report up to two times. Each time, the period shall not exceed one hundred and eighty days. If the license holder does not submit the revised safety analysis report within the imposed period or the extended periods, the Secretary General with the approval of NEC shall issue an order to revoke the operating license.

If the Secretary General with the approval of NEC has considered the safety analysis report and is of the opinion that it is necessary to reevaluate the safety analysis of the nuclear facility in order to continue the operation of the nuclear

²¹Draft Ministerial Regulation on Licensing the Operation of Nuclear Facility

²²Draft Ministerial Regulation to Specify Review and Update on Safety Analysis Report

facility, the Secretary General with the approval of NEC shall order the license holder to revise the safety analysis report.

If the Secretary General with the approval of NEC disapproves the safety analysis report or the license holder does not revise the safety analysis report, the Secretary General with the approval of NEC shall issue an order to suspend the operating license until the license holder revises the safety analysis report and the report is approved.

Decommissioning Plan

The licensee is required to include a decommissioning plan in PSAR when applying for the construction license. The decommissioning plan must contain at least the following details:

- (i) Site;
- (ii) Building and related systems;
- (iii) Identification of activated area and equipment;
- (iv) Decommissioning operation;
- (v) Expected decommissioning activities;
- (vi) Amount and types of radioactive waste to be generated;
- (vii) Requirements on record during operations; and
- (viii) Experience from the decommissioning of other similar nuclear facilities, if applicable.

Article 10: Disposal of spent fuel

If, pursuant to its own legislative and regulatory framework, a Contracting Party has designated spent fuel for disposal, the disposal of such spent fuel shall be in accordance with the obligations of Chapter 3 relating to the disposal of radioactive waste.

Thailand currently does not have a designated permanent spent fuel repository. A nuclear installation which produces spent fuel is responsible for managing spent fuel in accordance with the procedures specified in FSAR.

Section H: Safety of Radioactive Waste Management

Article 11: General safety requirements

Each Contracting Party shall take the appropriate steps to ensure that at all stages of radioactive waste management individuals, society and the environment are adequately protected against radiological and other hazards. In so doing, each Contracting Party shall take the appropriate steps to:

- (i) ensure that criticality and removal of residual heat generated during radioactive waste management are adequately addressed;*
- (ii) ensure that the generation of radioactive waste is kept to the minimum practicable;*
- (iii) take into account interdependencies among the different steps in radioactive waste management;*
- (iv) provide for effective protection of individuals, society and the environment, by applying at the national level suitable protective methods as approved by the regulatory body, in the framework of its national legislation which has due regard to internationally endorsed criteria and standards;*
- (v) take into account the biological, chemical and other hazards that may be associated with radioactive waste management;*
- (vi) strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation;*
- (vii) aim to avoid imposing undue burdens on future generations.*

Section 79 of the Act stipulates that any person who generates radioactive waste

shall be responsible for the management of such radioactive waste or the person may transfer such radioactive waste to the government agency for management as prescribed by the Ministerial Regulation.²³

Article 12: Existing facilities and past practices

Currently, Thailand has three radioactive waste management facilities operated by TINT. These facilities are subject to regulatory inspection. OAP is responsible for the inspection of all nuclear facilities which have been licensed. In general, OAP follows the inspection guidelines which are based on safety standards or guidelines from IAEA and other well-regarded regulatory organizations and are adapted to better suit nuclear activities and regulatory framework in Thailand.

Thailand commits to the international safety standards on radioactive waste management in order to achieve and demonstrate a high level of safety, as the followings:

- The license holders, who generate, process, or possess radioactive waste, will be responsible for the safe management of radioactive waste until the waste is accepted by the waste management organization which is TINT in this case.
- The radioactive waste is transferred to TINT within a timeframe specified in a license.
- TINT is responsible for the safe management of radioactive waste, including disused sealed radioactive sources.
- Radioactive sources of which owners cannot be identified (often referred to as “orphan sources”) are recovered by OAP and managed by TINT.
- Disused sealed radioactive sources that cannot be otherwise reused or cleared, will be repatriated to the country of origin according to the license conditions. Should this not be possible, they will be considered radioactive waste.

²³Ministerial Regulation on Radioactive Waste Management B.E. 2561 (2018)

- Radioactive waste will be carefully managed in such a way that human health and the environment are protected and without imposing undue burdens on future generations.

Article 13: Siting of proposed facilities

Article 14: Design and construction of facilities

Article 15: Assessment of safety of facilities

Article 16: Operation of facilities

Like a spent fuel management facility, a radioactive waste management facility is considered a nuclear facility. All provisions in the Act relating to siting, design and construction, and operation of a spent fuel management facility as aforementioned are applied; however, Draft Ministerial Regulation on Licensing on Providing and Terminating Service on Radioactive Waste Management is followed. This regulation has been being developed to provide a complete legal framework on a radioactive waste management facility.

Article 17: Institutional measures after closure

There is no further measure enforced on a facility after it is released from regulatory control.

Section I: Transboundary Movement

Section 75 of the Act stipulates that no radioactive waste shall be imported into Thailand unless it was previously produced from the domestic usage and then reprocessed or treated outside the country. The transboundary movement of radioactive waste must comply with the Ministerial Regulation on Importing and Exporting of Radioactive Waste B.E. 2561 (2018) which was issued in accordance with Section 75. The Ministerial Regulation specified licensing processes for importing and exporting of radioactive waste.

In addition, transport of radioactive waste during the transboundary movement must be in accordance with the draft Ministerial Regulation on Safety and Security During Transportation.

Section J: Disused Sealed Sources

It is recommended that disused sealed radioactive source (DSRS) should be returned to its manufacturer. In case of no further usage, it is declared as radioactive waste and transferred to TINT for end-of-life management. Thailand only permits a re-entry of DSRS into its territory if it is previously exported for treatment outside the country.

Section K: General Efforts to Improve Safety

As radiation safety is the top priority, TINT always focuses on radiological protection in order to provide safety and security for the workers and the public. At this moment, TINT has general efforts to improve the radiation safety measure. TINT is now in a process of improving safety with the safety culture program being implemented. All of the existing waste management facilities are also being developed to enhance the radiation safety. The other effort to enhance radiation safety is the regular observation of exposure dose to TINT staff. Figure 9 shows the average annual dose to the staff, and it is clearly demonstrated that the observed exposure is far below the dose limit of 20 mSv/y.

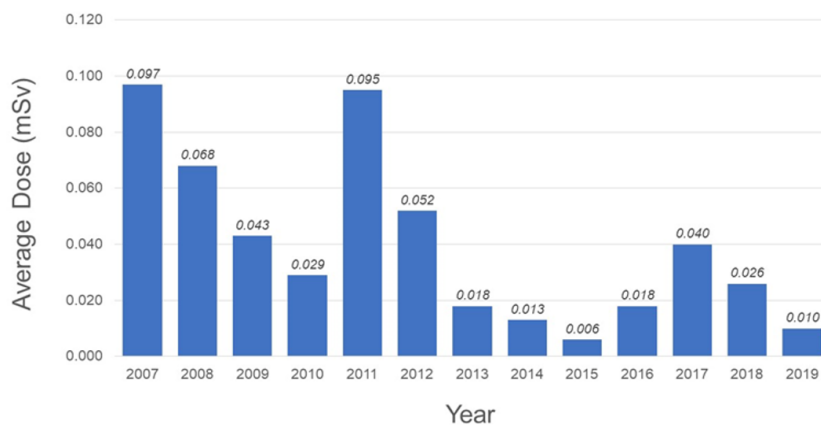


Figure 9: Average dose of TINT staff at radioactive waste management facilities (2007-2019)

Appendix