

THE SOCIALIST REPUBLIC OF VIET NAM



SECOND NATIONAL REPORT

**ON IMPLEMENTATION OF THE OBLIGATIONS
UNDER THE JOINT CONVENTION ON THE
SAFETY OF SPENT FUEL MANAGEMENT AND
ON THE SAFETY OF RADIOACTIVE WASTE
MANAGEMENT**

Ha Noi, 2017

TABLE OF CONTENTS

SECTION A. INTRODUCTION	1
SECTION B. POLICIES AND PRACTICES	2
B.1. Spent fuel and radioactive waste management policy	2
B.2. Spent fuel and radioactive waste management practices	3
B.3. Criteria used to define and categorize radioactive waste	4
SECTION C. SCOPE OF APPLICATION	5
SECTION D. INVENTORIES AND LISTS.....	5
D.1. A list of the spent fuel management facilities.....	5
D.2. An inventory of spent fuel	5
D.3. A list of the radioactive waste management facilities	5
D.4. An inventory of radioactive waste	6
D.5. Nuclear facilities in the process of being decommissioned	6
SECTION E. LEGISLATIVE AND REGULATORY SYSTEM	6
E.1. Implementing measures (Article 18).....	6
E2. Legislative and regulatory framework (Article 19).....	7
E.3. Regulatory body (Article 20).....	12
SECTION F. OTHER GENERAL SAFETY PROVISIONS	13
F.1. Responsibility of the license holder (Article 21).....	13
F.2. Human and financial resources (Article 22).....	14
F.3. Quality assurance (Article 23).....	15
F.4. Operational radiation protection (Article 24)	16
F.5. Emergency preparedness (Article 25)	18
F.6. Decommissioning (Article 26)	20
SECTION G. SAFETY OF SPENT FUEL MANAGEMENT	21
G.1. General safety requirements (Article 4).....	21
G.2. Existing facilities (Article 5).....	22
G.3. Siting of proposed facilities (Article 6).....	22
G.4. Design and construction of facilities (Article 7).....	23
G.5. Assessment of safety of facilities (Article 8)	24
G.6. Operation of facilities (Article 9).....	24
G.7. Disposal of spent fuel (Article 10).....	25
SECTION H. SAFETY OF RADIOACTIVE WASTE MANAGEMENT	26
H.1. General safety requirements (Article 11).....	26
H.2. Existing facilities and past practices (Article 12)	27

H.3. Siting of proposed facilities (Article 13).....	27
H.4. Design and construction of facilities (Article 14).....	28
H.5. Assessment of safety of facilities (Article 15).....	29
H.6. Operation of facilities (Article 16).....	29
H.7. Institutional measures after closure (Article 17).....	30
SECTION I. TRANSBOUNDARY MOVEMENT (Article 27)	31
SECTION J. DISUSED SEALED SOURCES (Article 28).....	33
SECTION K. GENERAL EFFORTS TO IMPROVE SAFETY	33
SECTION L. ANNEXES	35
Annex 1. Abbreviations	35
Annex 2. Classification of radioactive waste.....	36
Annex 3. List of radioactive waste management facilities	39
Annex 4. Inventory of radioactive waste	40
Annex 5. List of Relevant Laws, Decrees, Circulars and National Technical Standards....	41

SECTION A. INTRODUCTION

Vietnam supports the rights and responsibilities of states in the peaceful use of nuclear energy, with particular emphasis on ensuring nuclear safety and security. Vietnam has participated in 6 of 7 main conventions of the IAEA in this field. Viet Nam acceded to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (the Joint Convention) on the 9th October 2013 and become a Contracting Party on 7th January 2014. This is Viet Nam's second Report to the Sixth Review Meeting of the Joint Convention.

Viet Nam has no nuclear power reactors and only one operating research reactor in Da Lat. The operator of the reactor is the Nuclear Research Institute (NRI), which is under the Viet Nam Atomic Energy Institute (VINATOM). The reactor is used for the purposes of radioisotope production, neutron activation analysis, basic and applied research in nuclear physics, reactor physics and thermo-hydraulics, and training.

Vietnam has established a system of legal documents in the field of atomic energy in which Atomic Energy Law adopted by the National Assembly in 2008 is the highest document. Under the Atomic Energy Law, some decrees guiding the Law and the decisions of the Government and the circulars issued by the Ministries were also issued. Some of which are directly related to the management of spent fuel and radioactive waste management. Especially, on 28th December 2010, the Prime Minister signed Decision No 2376/QD-TTg approving of the orientation of the plan of the site for radioactive waste storage and disposal up to 2030 with the vision to 2050.

The organizational structure that manages and regulates its existing radiation and nuclear facilities in Viet Nam has been established in which the Ministry of Science and Technology (MOST) is responsible for the operations and regulations, under which the Agency for Radiation and Nuclear Safety (VARANS) was established in 2003 to be responsible for all aspects of national regulation on radioactive and nuclear field.

On November 22nd, 2016, at the second session, the XIV National Assembly approved the Resolution No 31/2016/QH14 to stop implementing the policy of Ninh Thuan Nuclear Power Project. This decision has a great impact on Vietnam's policies in the field of atomic energy, including the safety management of radioactive waste and spent fuel. Previously, in 2009, the XII National Assembly adopted the Resolution No. 41/2009/QH12 on the policy of investing in Ninh Thuan Nuclear Power Project. Accordingly, two nuclear power plants of Ninh Thuan 1 and Ninh Thuan 2 will be built, each of them will include two units. Vietnam Government issued Decision No. 2376/QD-TTg on December 28th, 2010 approving the orientation for the planning of the sites for storage and disposal of radioactive waste up to 2030 with a vision to 2050. After the decision of stopping the Ninh Thuan Nuclear Power Project, the operation of the National Nuclear Safety Council (established in 2010) is still maintained.

At present, Vietnam is considering the project for construction of Center for Nuclear Science and Technology, with a focus on the new nuclear research reactor with a power of 10-15MW. The project is in the pre-feasibility study phase. Ministry of Science and Technology is assigned as project investor. Pre-feasibility Study Report of the project was submitted to the Governmental Office first time in August 2015. Due to the Ninh Thuan NPP project has been suspended, the Prefeasibility Study Report had to be updated and submitted to the Interdisciplinary Review Committee in December 2016 for assessment. Based on the assessment report of the Interdisciplinary Review Committee, the last version of Prefeasibility Study Report has being revised and completed by MOST and will be submitted to the Prime Minister for approval. The cooperation in implementing the project has been incorporated into

the cooperation program between Vietnam and Russian Federation in the field of peaceful use of atomic energy signed on 23rd May 2017 in Hanoi and in the Joint Declaration between Vietnam and Russian Federation as the results of the visit to Russia of the President of the Socialist Republic of Vietnam from 28th June to 1st July 2017. In case the project will be decided to be invested by the Government, Vietnam's policies in the field of atomic energy, including the safety management of radioactive waste and nuclear spent fuel, will have significant changes.

After the decision of stopping the Ninh Thuan Nuclear Power Project, as radiation and nuclear applications in industry, health, research, education and training and so on are growing, Viet Nam still understands that planning for spent fuel and radioactive waste management is necessary, especially in case the new nuclear research reactor project with much greater capacity than that of the existing research nuclear research reactor was adopted. As such, Viet Nam commits itself to the highest level of safety, security and safeguards consistent with international standards throughout its peaceful applications of atomic energy.

The Ministry of Science and Technology has the primary responsibility for the implementation of Viet Nam's obligations under the Joint Convention, working in consultation with other relevant agencies and organizations. This report is a self-evaluation of Viet Nam's compliance with the obligations of the Joint Convention. It is concluded in the report that Viet Nam meets all obligations of the Convention.

This report is prepared in accordance with the Guidelines regarding the Form and Structure of National Reports (INFCIRC/604/Rev.3) revised by the Contracting Parties under Article 29 of the Convention at the Extraordinary Meeting at the IAEA May 2014.

SECTION B. POLICIES AND PRACTICES

Article 32 (Reporting), paragraph 1:

In accordance with the provisions of Article 30, each Contracting Party shall submit a national report to each review meeting of Contracting Parties. This report shall address the measures taken to implement each of the obligations of the Convention. For each Contracting Party the report shall also address its:

- (i) spent fuel management policy;*
- (ii) spent fuel management practices;*
- (iii) radioactive waste management policy;*
- (iv) radioactive waste management practices;*
- (v) criteria used to define and categorize radioactive waste.*

B.1. Spent fuel and radioactive waste management policy

The highest legal document in the field of nuclear energy is the Atomic Energy Law, which provides basic principles and fundamental requirements for all activities in the field of atomic energy, including spent fuel and radioactive waste management.

Article 6 of the Law specifies that nuclear energy activities shall serve peaceful and socio-economic development purposes and ensure that the public health and life, environment and social security are protected; and the State management on safety and security shall be independent and scientific based.

It is also specified in Article 7 of the Law that the Government shall unify the State management on activities in the field of atomic energy and the Ministry of Science and Technology shall be responsible before the Government for conducting State management on activities in the field of atomic energy.

The Law (Article 25) also sets out the principles for handling and storage of spent fuel and radioactive waste, that is: radioactive waste shall be immediately minimized at the generating source and shall be separated from conventional waste when selecting and handling by organizations and individuals owning radioactive waste; short half-life radioactive waste shall be stored for decay to the level lower than clearance levels or radioactivity level allowing to be discharged into the environment as regulated by state management agencies; radioactive waste will be disposed if disposal does not affect human health or the environment; radioactive waste shall be treated into a form that is less harmful to the people and the environment or if no other methods are applicable, stored under safe and secure conditions awaiting a decision on the final management. In addition, it specifies that licensees for using nuclear fuel shall establish a plan for spent fuel management and the Government invests to construct a national radioactive waste storage facility.

These principles are also specified in the Prime Minister's Decision No 2376/QĐ-TTg on approval of orientation for radioactive waste (including spent fuel) storage and disposal up to 2030 with the vision to 2050, which includes the Government unifies the management of radioactive waste and invests for construction of a national radioactive waste storage facility, ensuring the safety of people and the environment. According to the Decision No. 2241 / QĐ-TTg dated December 11th, 2014 of the Prime Minister approving the master plan for development of nuclear power infrastructure up to 2020, the Prime Minister assigned the Ministry of Construction to assume the prime responsibility for elaborating a planning on the storage and disposal of radioactive wastes up to 2030 with a vision toward 2050.

B.2. Spent fuel and radioactive waste management practices

Spent fuel management in Viet Nam has only been relevant in connection with the operation of Da Lat Research Reactor (500 kW) at the Nuclear Research Institute (NRI). The reactor was actually reconstructed and upgraded from the USA made 250 kW TRIGA-Mark II reactor. The upgraded reactor reached its first criticality on the 1st November 1983 and has been officially put into operation since March 1984 with an average operation of 1200 hrs per year.

Since the first start-up, the reactor core utilized highly enriched uranium (HEU) fuel assemblies of 36 %. The fuel assemblies are of VVR-M2 type manufactured by the former USSR. During the period of 2006-2008, three projects at NRI were implemented, including modification and replacement of the reactor control system in 2007, the reactor partial core conversion from the use of HEU to low enriched uranium (LEU) of 19.75% fuels of the VVR-M2 type on the 12th September 2007, and upgrading the physical protection system for reactor area in 2008. The full conversion of the reactor from HEU to LEU was completed in 2011 and all the spent HEU fuel was repatriated to Russia in July 2013 for permanent storage under the Russian Research Reactor Fuel Return Program and radioactive waste from HEU fuel will not return to Viet Nam.

The Prime Minister's Decision No 2376/QĐ-TTg on approval of orientation for radioactive waste (including spent fuel) storage and disposal up to 2030 with the vision to 2050 provides for that spent fuel shall be stored (wet and dry storage) at the reactor site for 30-50 years awaiting for a decision on final management. In addition, Viet Nam is looking at long term

spent fuel disposal options that include fuel take-back, reprocessing outside of Viet Nam and repositories inside or outside of Viet Nam.

In practice, all radioactive waste has been to collect and store under safe and secure conditions at dedicated storage facilities at NRI in Da Lat and the Institute for Technology of Radioactive and Rare Elements (ITRRE) in Ha Noi. The stored radioactive waste comprises of waste from the operation of the research reactor and its radioisotope production activities, and the use of radioactive materials for medical, industrial and research purposes.

Currently, MOST is working with other relevant ministries and agencies on the development of Viet Nam's spent fuel and radioactive waste management policy.

B.3. Criteria used to define and categorize radioactive waste

Radioactive waste is defined in Atomic Energy Law (Article 3, paragraph 11) as follows: "Radioactive waste means wastes that contain or are contaminated with radioactive substances of radioactivity that shall be disposed of".

Further, Circular No. 22/2014/TT-BKHHCN dated August 25, 2014 on regulations on radioactive waste and disused sealed sources management (Article 2, paragraph 1), radioactive waste means wastes that contain or are contaminated with radionuclides having activity greater than the clearance levels specified in this Circular. Radioactive waste does not include disused sealed sources.

Radioactive wastes are defined in National Technical Standard No. 6868:2001 issued by the Ministry of Science and Technology as the wastes containing radioactive nuclei with a specific activity or total activity greater than the clearance level regulated by State regulatory body for radiation safety and control.

Decision No. 2376/QD-TTg dated December 28, 2010 by the Prime Minister on Approval of orientation for radioactive waste storage and disposal up to 2030 with the vision to 2050 specifies classifications of radioactive waste. The radioactive waste is classified into two groups, including:

a) Classification based on half-life:

- Radioactive waste of short half life of less than 100 days;
- Radioactive waste of medium half life of greater than 100 days and less than 30 years;
- Radioactive waste of long half life of greater than 30 years.

b) Classification based on radioactivity:

- Low and intermediate level waste;
- High level waste and spent fuel.

The categorization of radioactive waste is prescribed in Circular No. 22/2014/TT-BKHHCN dated August 25th, 2014 and National Technical Standard No. 6868:2001 developed by MOST, taking into consideration of the IAEA safety standards on the classification of radioactive waste.

Details of classification of radioactive waste are given in Annex 2.

SECTION C. SCOPE OF APPLICATION

As no reprocessing facilities exist, or are proposed, in Viet Nam, the discussion of management of spent fuel in this report does not include reprocessing activities.

Waste containing only naturally occurring radioactive materials that do not originate from the nuclear fuel cycle has not been declared as radioactive waste for the purpose of the Convention.

Viet Nam has no spent fuel within military or defense programs. Radioactive waste within military or defense programs has not been declared as radioactive waste for the purpose of this Convention.

SECTION D. INVENTORIES AND LISTS

Article 32: REPORTING

2. This report shall also include:

(i) a list of the spent fuel management facilities subject to this Convention, their location, main purpose and essential features;

(ii) an inventory of spent fuel that is subject to this Convention and that is being held in storage and of that which has been disposed of. This inventory shall contain a description of the material and, if available, give information on its mass and its total activity;

(iii) a list of the radioactive waste management facilities subject to this Convention, their location, main purpose and essential features;

(iv) an inventory of radioactive waste that is subject to this Convention that:

(a) is being held in storage at radioactive waste management and nuclear fuel cycle facilities;

(b) has been disposed of; or

(c) has resulted from past practices.

This inventory shall contain a description of the material and other appropriate information available, such as volume or mass, activity and specific radionuclides;

(v) a list of nuclear facilities in the process of being decommissioned and the status of decommissioning activities at those facilities.

D.1. A list of the spent fuel management facilities

Viet Nam has no spent fuel management facilities.

D.2. An inventory of spent fuel

As stated in section B.2, the last 11 kilograms of high enriched nuclear fuel in Viet Nam was repatriated to Russia in July 2013, and since then Da Lat nuclear research reactor has not refueled. Hence Viet Nam does not have spent fuel at present.

D.3. A list of the radioactive waste management facilities

Presently, Viet Nam does not have any radioactive waste management facilities subject to this Convention at present. All radioactive waste is stored at NRI and ITRRE. NRI is also designated to have the responsibility to receive orphan sources or disused radioactive sources if the facility who has such disused sources wishes to pay for the storage. The list of the

facilities and an inventory of radioactive waste are given in Table 3.1, Annex 3 and Table 4.1, Annex 4.

D.4. An inventory of radioactive waste

As stated in section D.3, an inventory of radioactive waste is given in Table 4.1, Annex 4.

D.5. Nuclear facilities in the process of being decommissioned

Viet Nam does not have any nuclear facilities that are in the process of being decommissioned at present.

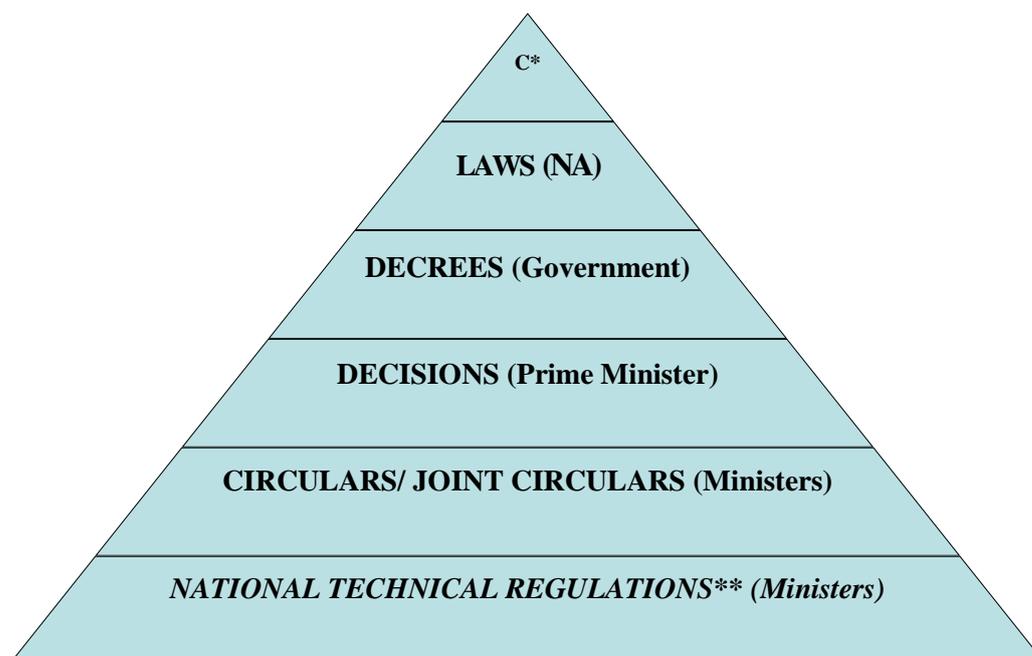
SECTION E. LEGISLATIVE AND REGULATORY SYSTEM

E.1. Implementing measures (Article 18)

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.

The Viet Nam legislation and regulation for spent fuel and radioactive waste management is part of the overall Viet Nam legislation and regulations. A list of relevant Laws, Decrees, Prime Minister's Decisions and Circulars relating to the management of spent fuel and radioactive waste is shown in Annex 5. It should be noted that while developing its legislative and regulatory system, Viet Nam always takes into consideration the IAEA relevant safety standards as well as internationally accepted standards and best practices.

The following is the diagram of the legal system of Viet Nam:



* Constitution 2013

** **National technical regulations** are not legal documents. However, according to the Clause 2, Article 3 of the *Law on Standard and Technical Regulation (Law No. 68/2006/QH11 passed on 29th June 2006)*, *National Technical regulations* issued by Ministers are legally binding.

E2. Legislative and regulatory framework (Article 19)

- 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 license;*
 - 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 licenses;*
 - 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.*

In 2008, Vietnam National Assembly passed the Atomic Energy Law, which comes into effect on 01 January 2009. This is the highest legal documents of Viet Nam in the field of nuclear energy.

The Law governs all activities in the field of atomic energy and the assurance of safety and security for those activities. It applies to Vietnamese organizations and individuals, overseas Vietnamese individuals, foreign individuals and international organizations who conduct activities in the field of atomic energy in Vietnam.

E.2.1. Allocation of responsibilities

The Law (Article 7) designates the responsibilities for the State management in the field of nuclear energy as follows:

1. The Government shall unify the State management on activities in the field of atomic energy.
2. The Ministry of Science and Technology shall be responsible before the Government for conducting State management on activities in the field of atomic energy.
3. Ministries, ministerial-level agencies, within their functions and authorities, shall perform the State management on activities in the field of atomic energy in accordance with their responsibilities designated by the Government.
4. Provincial/city People's Committees (hereinafter referred to as provincial level), within their functions and authorities, shall perform the State management on activities in the field of atomic energy in accordance with their responsibilities designated by the Government.

The Law (Article 33) specifies responsibilities of providing detailed regulations on radiation safety, nuclear safety, and security of radioactive sources, nuclear material and nuclear facilities as follows:

1. The Ministry of Science and Technology shall provide detailed regulations and guidelines on the followings:
 - a) Limited dose, control of occupational exposure and public exposure;
 - b) Implementation of defense- in- depth;
 - c) Radiation monitoring while conducting radiation practices;
 - d) De-contamination after completing radiation practices;
 - e) Radiation practices which requires safety officers;
 - f) Specialized qualifications, professional skills, safety- related training requirements for radiation worker;
 - g) Conditions, procedures, formalities for certificate issuance, the duration of certificate for radiation workers and the recognition of certificate for radiation worker issued by foreign organizations;
 - h) Reports on disposal conditions and mapping the radioactive waste repository;
 - i) Contents of records on radiation safety and archiving period for each type of document;
 - j) Handling and storage of radioactive waste, disused radioactive sources and spent nuclear fuel;
 - k) Exemption level for notification and licensing, clearance level, procedures for verification, appraisal, approval and measures for clearance of radioactive sources, radioactively- contaminated objects;
 - l) Identification of locations where natural exposure would possibly pose harmful impacts on people and would require intervention from the competent body;
 - m) Requirements for the national radioactive waste storage, disposal sites of radioactive waste, security and other issues within its competence.
2. The Ministry of Health shall be responsible for providing detailed regulations and guidance on the following issues:
 - a) Periodic health check for radiation workers;
 - b) Prescriptive radiation doses for patients and control of medical exposure.
3. The Ministry of Labor, Invalids and Social Affairs shall host and coordinate with relevant ministries, agencies to provide detailed regulations and guidance on wages, working hours, resting hours, occupational allowance and other special policies for radiation workers and employees who work in the environment of radiation hazards.

Article 8 of the Atomic Energy Law also specifies the agency for radiation and nuclear safety (VARANS under MOST) with the following responsibilities:

1. To develop draft legal and regulatory documents on radiation and nuclear safety;
2. To organize for the registration of radioactive sources, radiation devices, nuclear material, nuclear equipment, and to license for conducting radiation activities in accordance with its competency;
3. To conduct and organize verification on radiation and nuclear safety;
4. To carry out inspection, checking; to handle violations against regulations on radiation and nuclear safety; and to suspend radiation activities in accordance with its

- competency; to recommend to the relevant State competent authority to suspend research reactor, nuclear power plant operation if suspecting there is unsafe element;
5. To organize for nuclear safeguards activities in accordance with law;
 6. To take part in emergency response to radiation and nuclear incidents within its competency;
 7. To establish and maintain the national information system on radiation and nuclear safety;
 8. To organize and cooperate for professional trainings on radiation and nuclear safety;
 9. To carry out international cooperation activities in radiation and nuclear safety.

In addition, the Law (Article 25, paragraph 7, 9) provides for the responsibilities related to the national radioactive waste storage facility as follows:

- The State invests in construction of the national radioactive waste storage facility;
- The Ministry of Construction shall approve sites for the national radioactive waste storage and disposal in accordance with the approved plan and the environmental protection law.

The Atomic Energy Law specifies that spent fuel and radioactive waste management is one of the radiation practices that shall be licensed (Article 18) and the conduction of a radiation practice without license is prohibited (Article 12). In addition, Article 25 of the Law requires that the primary responsibility for spent fuel and radioactive waste management rest with the licensees:

- Organizations and individuals that generate radioactive waste shall comply with the following provisions (paragraph 1):
 - + To apply measures to minimize radioactive waste at the source;
 - + To separate radioactive waste from conventional waste;
 - + To establish a plan for classification and disposal of radioactive waste.
- Organizations and individuals that use nuclear fuel shall establish a plan for handling and storage of spent nuclear fuel under safety and security conditions (paragraph 3);
- Licensees shall notify the regulatory agency of the radioactive waste, disused radioactive sources or spent nuclear fuel generated from the performance of the radiation practices (paragraph 4).

E.2.2. Licensing

Article 12 of the Atomic Energy Law prohibits conduction of radiation practices (including spent fuel and radioactive source management) without licenses (paragraph 3); Importation of radioactive wastes (paragraph 4); Transportation of radioactive wastes, nuclear materials by post (paragraph 5) and transportation of radioactive wastes, nuclear materials without proper safety and security measures (paragraph 6).

Requirements for spent fuel and radioactive waste management licensees are provided for in Article 25, paragraph 5, 6 of the Law, which include:

- Organizations and individuals shall declare radioactive wastes, spent radioactive sources and nuclear fuel as a result of conducting radiation works.

- Organizations, individuals who provide radioactive waste storage services shall apply for licenses.
- Organizations, individuals may dispose of radioactive waste only after being licensed and shall report storage conditions and submit a map of the repository to the Agency for radiation and nuclear safety.

When applying for license for conducting radiation practices, including spent fuel and radioactive waste management, the applicant shall submit a safety assessment report to the agency for radiation and nuclear safety (Article 19, Atomic Energy Law). The report shall include the following:

- a) Procedure for conducting the radiation practice, including steps such preparing, implementing and terminating;
- b) Procedure on monitoring personal doses and working area;
- c) Provisions on logbook for conducting radiation practice;
- d) Rules/ procedure on conducting radiation practice;
- e) Postulated incidents and remedy measures;
- g) Responsibilities of individuals who conduct the radiation practice;
- h) Responsibilities for monitoring, safety and overall management.

For facilities that handle and store radioactive waste (Article 35, Atomic Energy Law), the safety analysis report for construction license shall include:

- a) The design, manufacturing;
- b) A plan for installation, operation testing, acceptance tests;
- c) Safety analysis for commissioning and operation;
- d) A plan for close, dismantlement and decontamination.

In addition to the safety analysis report (Article 76, Atomic Energy Law), the applicant shall also submit the following:

- a) Application request;
- b) Quantity, type, specifications, origin and uses of the radioactive substances, radiation, nuclear material and nuclear equipment;
- c) Justification for sufficient staffing and resources; staff training programs;
- d) Safety assessment reports or safety analysis reports for each radiation practice;
- e) Quality assurance program;
- g) Plan for radiation and nuclear incident response for each radiation activity;
- h) Filing and reporting system.

For facilities that handle and store spent fuel and radioactive waste (Article 76, Atomic Energy Law), the application shall also include the following:

- a) Estimated quantity, type, characteristics of radioactive wastes, disused radioactive sources and spent fuel;
- b) Methods and equipment used for processing radioactive wastes, disused radioactive sources and spent fuel;
- c) Estimated the possibility of radioactive release to the environment and plan for environmental radiation control;

- d) Intended research and development to support the management and processing of radioactive wastes, disused radioactive sources and spent fuel;
- e) Proposed sites for storage and disposal.

Procedures for applying licenses are specified in Circular No.08/2010/TT-BKHHCN dated 22nd July 2010 on guiding for notification, licensing application for conducting radiation practices and radiation staff certification issued by MOST.

Sanction on violation of license application is specified in Decree No.107/2013/ND-CP on administrative sanctions of violations in the field of atomic energy, in which the following administrative sanctions shall be applied:

- Forcible dismantlement of construction installations, parts of construction installations without license, not proper with license, or not proper with the approved design (Article 3, paragraph 8);
- A fine from VND 10,000,000 to 20,000,000 for one of the following acts without licenses (Article 6, paragraph 5):
 - + Transporting radioactive sources and radioactive wastes;
 - + Treatment, storing, or disposal of radioactive wastes or disused radiation sources.
- A fine from VND 30,000,000 to 50,000,000 for one of the following acts without licenses (Article 6, paragraph 7, c, e):
 - + Changing the operational scale or scope of the radiation facilities;
 - + Processing, storing or disposal of spent nuclear fuels.

E.2.3. Inspection

Regulatory inspections for verifying the compliance with license conditions and regulatory requirements are performed by inspectors appointed by MOST and under direction of the Director General of VARANS.

In general, inspectors may inspect, examine, take measurements, or conduct test. Records and documents may be inspected and copies of those documents may be obtained.

In accordance to the Atomic Energy Law (Article 8, paragraph 4), VARANS is responsible for specialized inspection on radiation and nuclear safety. The detailed provisions on appropriate institutional control, regulatory inspection, documentation and reporting is specified in Circular No. 19/2010/TT-BKHHCN dated December 28, 2010 on Guiding for specialized inspection on radiation and nuclear safety. This Circular includes the following provisions:

- The specialized inspection types for radiation safety and nuclear (Article 5);
- Requirements for the inspection team (Article 6);
- Inspection process (Article 7);
- Frequency of inspection (Article 8);
- Vehicles and equipment for inspection activities (Article 9);
- Inspection documentation (Article 10).

Special powers are also provided for inspectors to deal with hazardous situations, in which inspectors may give directions for steps to be taken that the inspector considers necessary.

E.2.4. Enforcement

Vietnamese competent authorities can apply administrative sanctions measures to ensure the compliance with the terms and conditions of the licenses.

Any violence against license conditions or regulatory requirements is executed with the following enforcement actions:

1. Warning note;
2. License suspension;
3. License revocation;
4. Penalties for nuclear energy utilization without a license.

The Decree No.107/2013/ND-CP (Article 7) specifies measures that shall be applied in case of violation of the conditions stated in the licenses for conducting radiation practices. These measures include:

- A fine of from VND 2,000,000 to 5,000,000, for acts violating one of conditions stated in licenses (paragraph 1);
- A fine of from VND 3,000,000 to 6,000,000, for act of using radioactive sources, radiation equipment for practice that is not specified in the license (paragraph 2);
- A fine of from VND 20,000,000 to 40,000,000, for organizations with nuclear facilities not complying with the work stated in licenses (paragraph 3); and
- Additional sanctioning measures include suspension of licenses from 01 month to 03 months.

E.3. Regulatory body (Article 20)

- 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.*

According to the Law on Atomic Energy (Article 8) and Decision No. 217/QĐ-BKHCHN dated 18 February 2014 of Minister of MOST on promulgating the organizational structure and functions and responsibilities of Vietnam Agency for Radiation and Nuclear Safety (VARANS), VARANS is responsible for developing and implementing the legislative and regulatory framework referred to in Article 19 of the Convention. VARANS is empowered to have direct access to facilities for inspection purposes and to suspend licenses and stop operation in case of unsafe or unsecure situations.

The fact that VARANS' mandate is specified in the law shows that the Government recognizes the importance of ensuring radiation and nuclear safety, including the safety of spent fuel and radioactive waste management, since the common legal practice in Vietnam is that no Agency under a Ministry would be mandated in a law.

In addition, the Law also specifies State policy on atomic energy, in which “the State takes due consideration to invest in infrastructure, technology and human resource so as to ensure safety and security of activities in the field of atomic energy” (Article 5, Item 3) and “the State shall establish a programme for human resource development, especially high level experts so as to meet the need for research, development and applications, and *assurance of safety and security in the field of atomic energy*” (Article 16, Item 1).

Recognizing the importance of radiation and nuclear safety and security, much attention has been paid to the human resource development of VARANS. A number of experienced professionals who had long been working in the nuclear sector have been seconded to VARANS. Over the past years, the staff number has increased from 8 in 2003 to 97 at present. VARANS has 06 staff holding PhD degrees; 28 with master degrees; and 61 with bachelor/ engineering degrees.

To perform its regulatory function, VARANS has established a technical support center for assessment, review of radiation safety and nuclear safety. Furthermore, VARANS may receive technical support from both domestic and foreign experts and consultants in fulfilling their tasks.

VARANS’ financial resource comes from the government budget in accordance with the annual budget plan approved by the Minister of Science and Technology and the Minister of Finance. VARANS may also use 85% of licensing fees for its activities. The rest contributes to the State revenue.

Viet Nam’s legislative and regulatory system described above has addressed the obligations under Article 18 (Implementing Measures), Article 19 (Legislative and Regulatory Framework) and Article 20 (Regulatory Body) of the Convention. It is also recognized that further work needs to be done to improve the system through the amendment and supplementation of the Atomic Energy Law proposed to be implemented in 2018.

SECTION F. OTHER GENERAL SAFETY PROVISIONS

F.1. Responsibility of the license holder (Article 21)

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

As stated in section E.2.1, the prime responsibility for safety of spent fuel or radioactive waste management rests with licensees.

Article 26 of Atomic Energy Law also specifies that the head of organizations or individuals having license to perform radiation practices shall have the following responsibilities:

- To bear responsibility for safety and security, and comply with this Law's provisions on performance of radiation practices;
- To fully comply with the terms and conditions of their licenses.

As stated in D.3, radioactive waste is stored at NRI and ITRRE. As a part of their licenses, the facilities are licensed to store and condition radioactive waste that is generated from their

operation. The facilities are subject to VARANS inspection, VARANS can suspend or stop the facilities' operation due to safety concern or other reasons such as the licensees do not meet their license conditions.

F.2. Human and financial resources (Article 22)

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

- (i) qualified staff is 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.*

F.2.1. (Paragraph 1)

The Law on Atomic Energy (Article 5) states the Viet Nam's policy in the field of nuclear energy, in which:

- The State focuses its investment on nuclear power development and on technological infrastructure, human resource, scientific research and technological development to facilitate the development of nuclear power.
- The State takes due consideration to invest in infrastructure, technology and human resource so as to ensure safety and security of activities in the field of atomic energy.

As for promoting atomic energy development and application in Viet Nam, the Law (Article 16) also specifies that Viet Nam: (1) formulates programs on training and building of human resources, especially high-level experts, to meet the requirements of research, development, application and assurance of safety and security in the domain of atomic energy; (2) adopts a policy of priority to attract Vietnamese and foreign experts to be involved in activities in atomic energy in Vietnam; and (3) encourages domestic organizations and individuals, overseas Vietnamese, foreign organizations and individuals, and international organizations to participate in implementing programs on training and building of human resources specified in Clause 1 of Article 16.

The Decree No. 07/2010/ND-CP also specifies measures to attract and sustain people to work for nuclear energy field, including providing favorable conditions for those working in the field of nuclear energy. The Ministry of Education and Training in cooperation with relevant Ministries is responsible for carrying out the National Program for human resource development. By Decision No 1558/QD-TTg on 18 August 2010, the Prime Minister approved the project "Training and Human resource development (HRD) in nuclear energy field" (with the budget of 3,000 billion VND). Under this project, Electricity of Vietnam developed "Project for Human Resources Training and Development for Nuclear Power plants in Ninh Thuan" which was approved by Decision No. 584/QD-TTg dated April 11th, 2013. On October 15th, 2015, The Prime Minister signed the Decision No. 1756/QD-TTg approving the project on training and retraining personnel for state management, research and development, technical support up to 2020 for the development of nuclear power. In framework of this project, the Ministry of Science and Technology had sent number delegations of management agencies, research and development institutions to participate in domestic and foreign training courses to serve the nuclear power program. However, after the

Government's decision to stop implementing Ninh Thuan Nuclear Power Project, since 2017, the Project 584 and 1756 have been no longer funded.

As stated in E.2.2, for facilities, when applying for licenses the applicants shall provide VARANS with justification for sufficient staffing and training programs. This is one of the conditions for the issuance of license.

F.2.2. (Paragraph 2)

The Atomic Energy Law (Article 5) also specifies the policy of the Government in financial resources. In addition to this, Viet Nam also encourages and creates conditions for organizations and individuals, overseas Vietnamese, foreign organizations and individuals, and international organizations to invest in developing nuclear power.

For the decommissioning of radioactive waste management facilities (radiation facilities) and spent nuclear fuel management facilities (nuclear facilities), this Law specifies that facilities shall submit to VARANS for approval a plan on dismantlement, radioactive decontamination and disposal of its radioactive sources or radioactive waste, and organize the implementation of the approved plan (Article 36, paragraph 1; Article 40, paragraph 1). And facilities shall bear all expenses for the dismantling and storage or disposal of radioactive waste generated from the decommissioning process (Article 36, paragraph 3; Article 40, paragraph 3).

F.2.3. (Paragraph 3)

As specified in Article 25 of Atomic Energy Law, the State invests in construction of a national radioactive waste storage facility, and hence the finance will be secure in order to ensure adequate financial resources to meet the requirements to the safety of the storage facility.

In addition, the Law (Article 36, 40) also specifies the requirements upon the closure of nuclear facilities and radiation facilities, in which the facilities shall bear all expenses for the dismantling and storage or disposal of radioactive wastes or spent fuel generated in the process of dismantlement. However, it is also recognized that financial arrangement should be provided for. As such, Viet Nam is developing regulations to specify how this financial arrangement shall be.

F.3. Quality assurance (Article 23)

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.

A general requirement on quality assurance is prescribed in Article 76, Paragraph 1, Clause (e) of Atomic Energy Law, in which quality assurance program shall be submitted when applying for license for all radiation practices including operation of spent nuclear fuel management facilities and radioactive waste management facilities.

At this stage, Viet Nam has no spent fuel or radioactive waste management facilities. Any such facilities would be subject to MOST/VARANS licensing under the provisions of Viet Nam Atomic Energy Law. This gives VARANS authority to regulate quality assurance of the overall radiation and nuclear sector in Viet Nam.

F.4. Operational radiation protection (Article 24)

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; and

(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; and

(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.

The Atomic Energy Law has adopted principles from the IAEA BSS-115, i.e.: defense in depth, good engineered practices, and safety verification. It also adopts the basic concepts of justification, limitation and optimization through dose constraint and dose limits. Article 21 specifies that:

1. Radiation control includes:

- a) Control of professional exposure;
- b) Control of medical exposure;
- c) Control of public exposure.

2. Organizations, individuals conducting radiation practices shall comply with the following principles of dose control:

- a) Ensuring radiation doses to the public and radiation workers do not exceed the dose limit; and doses to patients comply with the prescription;
- b) Ensuring personal dose, number of exposed people and possibility of being exposed at the lowest level reasonably;
- c) Ensuring the benefit from the radiation activities can trade off the risk, damage that might pose to the people and the environment.

Article 26 of the Atomic Energy Law specifies the responsibilities of the manager of the licensed organization and licensees conducting radiation practices: To ensure safe working conditions, and provide technical training, periodic health check and radiation dose monitoring for radiation workers; To monitor and control radioactive waste, and ensure that the radiation dose does not exceed dose limit.

Article 27 of the Law on Atomic Energy specifies the responsibilities of radiation worker: To apply measures for dose monitoring and safety protection while conducting radiation practices, have periodic health check in accordance with instructions of radiation officer; refuse to work in inadequate safety conditions, except for emergency response to radiation and nuclear incidents.

The Atomic Energy Law (Article 19) specifies that licensees shall submit safety analysis report which shall include postulated incidents and remedy measures. Article 20 of the Law requires that licensed facilities or individuals shall periodically submit a report on the safety of work carried out, including a radiation incident (if any) and remedy measures.

For nuclear installations, the Law (Article 44, 52) governs that:

- The facilities owning nuclear installation shall conduct environmental radiation monitoring where the nuclear reactor is located; report the agency for radiation and nuclear safety the monitoring results each 6 months; and immediately report when abnormal monitoring results are detected
- The licensee shall continuously, periodically and/or randomly monitor the environmental radioactivity. The level of environmental radioactivity shall not exceed the established limit of environmental radioactivity.
- Applicants shall submit the report of environmental management and environmental monitoring program.

VARANS in cooperation with VINATOM evaluates the radiation worker dose and environmental monitoring program. The results from the evaluation of NRI show that the radiation exposure on radiation workers is below the limitation dose established by regulations.

This Law (Article 33, paragraph 1, clause a) also specifies responsibility of the Ministry of Science and Technology to provide for and guide in detail the dose limit, control of occupational irradiation and control of irradiation to the public. As such, the Ministry of Science and Technology promulgated the Circular No. 19/2012/TT-BKHCHN on occupational radiation protection and public radiation protection. This Circular (Article 3, paragraph 2) specifies the requirements for controlling the occupational exposure to radiation and public exposure to radiation, in which the organizations and individuals that perform radiation practices shall reasonably minimize the personal doses of radiation workers and the public by taking the technical and administrative measures prescribed in this Circular including the following measures:

- Training in radiation protection for radiation workers (Articles 5);
- Controlling radiation sources (Article 6);
- Designing radiation covers (Article 7);
- Setting up the controlled areas and supervised areas (Article 8);
- Controlling the access to radiation sources, the entry and exit of controlled areas and supervised areas (Article 9);
- Controlling the surface radioactive contamination and air radioactive contamination (Article 10);
- Providing the personal protective equipment and radiation measuring instruments (Article 11);
- Developing the regulation on radiation protection and the work process (Article 12);

- Controlling the exposure to radiation of visitors, caretakers, and discharged patients (Article 13);
- Inspecting radiation in workplaces (Article 14);
- Monitoring and assessing occupational exposure to radiation (Article 15);
- Providing health-checks for radiation workers (Article 16);
- Making, updating, and documenting the radiation safety documents (Article 17);
- Reconsidering internal supervision about the compliance to the requirements of controlling occupational exposure to radiation (Article 18);
- Controlling public exposure to radiation (Article 19) and;
- Reporting the assessment result on occupational and public exposure to radiation (Article 20).

The Circular No. 19/2012/TT-BKHHCN also specifies that the organizations and individuals that perform radiation jobs shall ensure that the personal radiation doses of radiation workers and the public do not exceed the dose limits prescribed in Annex I to this Circular.

F.5. Emergency preparedness (Article 25)

- 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.*

The Law stipulates that the applicant shall submit the emergency preparedness program when applying for license. In addition, the Law governs that licensees are responsible for and shall have their own capability for emergency response based on their emergency preparedness program. According to the Law, national disaster responses, including nuclear accident, shall be carried out by the National Committee for Search and Rescue (NCSR). The Law devotes Chapter X, Section 1 to emergency response to radiation and nuclear incidents, which includes the following:

- The definition of radiation and nuclear accidents and the classification of these incidents (five groups of incidents) for the purpose of response plans (Article 82);
- Response plans and the classification of these plans including plans on response to facility-level incidents, plans on response to provincial-level incidents and plans on response to national-level incidents (Article 83);
- Responsibilities of concerned organizations and individuals upon the occurrence of incidents (Article 84);
- Principles for providing information on the radiation and nuclear incidents (Article 85);
- Emergency response to radiation and nuclear incidents (Article 86).

According to the Atomic Energy Law (Article 82, paragraph 2, clause e) incidents are classified into 5 groups. In case of a group 5 incident occurs, the plan on response to national-level incidents are applied. The Ministry of Science and Technology shall, in cooperation with

the Ministries of Industry and Trade, Health, Defense, Public Security and provincial-level People's Committees and relevant organizations, agencies to develop a national plan on response the incidents and submit the plan to the Prime Minister for approval (Article 83, paragraph 4, 5). Article 83 also specifies that annual drills and exercises shall be conducted.

To implement regulations on emergency response in the Atomic Energy Law, Ministry of Science and Technology has issued Circular No. 25/2014/TT-BKHHCN dated 08th October 2014 regulating the preparation of emergency response and emergency response to radiation and nuclear incidents, development and approval of plans on emergency response to radiation and nuclear incidents.

On August 31, 2010, the Prime Minister issued Decision No. 1636/QD-TTg on approval of the Master Plan for radiological environment monitoring and warning network. The objective of this Master Plan is to establish a national network on radiological monitoring and warning in order to promptly detect abnormal radiation in the territory of Vietnam and to actively assist the response to radiological and nuclear incidents and to provide radiological data to support the state management on nuclear energy, and radiation and nuclear safety. Under this Master Plan, up to 2020, 4 regional monitoring stations and 16 local/provincial monitoring stations will be established in various Provinces.

On June 16th, 2017, the Prime Minister signed the Decision No. 884/QD-TTg to issue the National Plan on Emergency Response to Radiation and Nuclear Incidents. The objective of the Plan is to establish an organizational system, to allocate responsibilities, to administer and coordinate the organizations and individuals involved in responding to radiation and nuclear incidents; To ensure the necessary material and technical facilities, equipment and means and human resources for timely and effective response and minimization of human, environmental and property losses when an incident occurs; To ensure that the direction, operation and command of the emergency response comply with the principles of unification, specific assignment, initiative, timeliness and are suitable with the actual situation of the incidents. The national emergency response organization system includes the Vietnam National Committee for Emergency Response to Incidents, Disaster and Search and Rescue; Field Command Post; organizations involved in emergency responding to incidents at the national level; technical support organizations. The Vietnam National Committee for Emergency Response to Incidents, Disaster and Search and Rescue is an inter-agency coordinator which is responsible for commanding and coordinating the implementation of emergency response nationwide and for regional and international cooperation; directly direct the Field Command Post and the organizations involved in emergency responding to the incidents. The Plan outlines the manner of deploying national incident to each of the participating organization, including the the Vietnam National Committee for Emergency Response to Incidents, Disaster and Search and Rescue, the Field Command Post, Ministry of Science and Technology, Ministry of Defense, Ministry of Public Security, Ministry of Industry and Trade, Ministry of Natural Resources and Environment, Ministry of Health, Ministry of Agriculture and Rural Development, Ministry of Foreign Affairs, Ministry of Information and Communications, Ministry of Transport, The provincial-level People's Committees, localities where incidents occur or affected by incidents; organizations and individuals conducting radiation jobs causing incidents, other organizations and individuals response to the incident. The plan also sets out resource assurance requirements for national incident response to each of these organizations. It is expected that in 2018, the Ministry of Science and Technology will carry out a research project to develop a process to response to nuclear and radiation incidents.

At present, with the support from VARANS and VINATOM some Provincial Emergency Plans have been developed. Exercises on emergency response were conducted in Hanoi and 10 provinces. VINATOM organizes training courses on nuclear and radiological emergency preparedness in Ha Noi or/and Da Lat annually.

Viet Nam is a party to the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accidents or Radiological Emergency Conventions.

F.6. Decommissioning (Article 26)

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; and*
- (iv) records of information important to decommissioning are kept.*

Viet Nam has no decommissioned facilities.

It is specified in the Atomic Energy Law that when applying for construction of a radiation facility or a nuclear facility, the applicant shall submit their plan for decommissioning of the facility. Requirements for decommissioning of a radiation facility or nuclear facility are provided for in Article 36 and Article 40 of the Law, respectively, as follows:

1. When a radiation or nuclear facility is planning to terminate its operation, the facility shall apply to the agency for radiation and nuclear safety for approval of the plan for decommissioning, decontamination, handling nuclear fuel, nuclear equipment, radioactive waste, and shall organize to execute the approved plan.
2. The agency for radiation and nuclear safety shall organize to inspect the decontamination, handling of nuclear fuel, nuclear equipment and radioactive waste and shall certify that the radiation and nuclear facility is released from its responsibilities for ensuring safety.
3. Radiation and nuclear facilities shall bear all the cost associated with dismantlement, storage and handling of radioactive waste resulted from decommissioning process.
4. Decommissioning, decontamination, handling of radiation sources, nuclear fuel, nuclear equipment and radioactive waste shall be complied with national technical standards.
5. The Ministry of Science and Technology shall specify procedures, formalities of verification and approval of plan for decommissioning, decontamination, handling of radiation sources, nuclear fuel, nuclear equipment and radioactive waste.

As for nuclear power plants, specific requirements are provided for in Chapter V of Decree No. 70/2010/ND-CP on detailing and guiding a number of articles of the law on atomic energy regarding nuclear power plants, in which Article 34 specifies requirements for application for decommissioning of a nuclear power plant to be submitted to the Agency for radiation and nuclear safety. The application shall include a plan for dismantling (specified in Article 35), a safety analysis report, an environment impact report and a quality assurance program. It is responsibility of the operator that financial arrangement is made to ensure sufficient funding for all stages of the decommissioning process (Article 36). Since the first nuclear power plants are State owned, Article 39 requires that the Ministry of Industry and

Trade shall, in cooperation with the Ministry of Finance, develop and submit to the Prime Minister a proposal for the financial arrangement for approval.

The Decree (Article 37) also requires that the Agency for radiation and nuclear safety shall be responsible to inspect during the decommissioning process.

Furthermore, the Decision No. 09/2014/QĐ-TTg dated January 23, 2014 of the Prime Minister on financial obligations of organizations having nuclear power plants, modes of financial management to ensure the closure and decommissioning of nuclear power plants also specifies obligations of nuclear power plant operators on establishment of a fund to ensure sufficient amount for closure and decommissioning of nuclear power plants. The regulations include the following:

- Requirements on the management of the fund (Article 4);
- Sources of the fund (Article 5);
- Use of the fund (Article 6);
- Assurance of foreign currency resource for the fund (Article 7);
- Temporary use of the idle fund (Article 8);
- Accounting of the fund (Article 9);
- Reporting regime (Article 10);
- Monitoring and audit of the operation of the fund (Article 11);
- Management of the fund (Article 12);
- Finalization of the fund (after conclusion of decommissioning) (Article 13).

SECTION G. SAFETY OF SPENT FUEL MANAGEMENT

G.1. General safety requirements (Article 4)

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.*

General safety requirements for activities in the field of atomic energy, including spent fuel and radioactive waste management are stipulated in the Atomic Energy (Article 6) as follows:

- Activities in the field of atomic energy shall be conducted for peaceful purposes and socio-economic development;
- Activities in the field of atomic energy shall ensure safety for people's health and life and the environment, and social security and safety;
- The management of safety and security in atomic energy activities shall be objective and scientifically based.

Although requirements for spent fuel management is not explicitly specified, Article 25 of Atomic Energy Law requires that organizations, individuals using nuclear fuel shall have measures to handle, store spent nuclear fuel under safe and secured conditions.

The Prime Minister's Decision No 2376/QĐ-TTg on approval of orientation for radioactive waste (including spent fuel) storage and disposal up to 2030 with the vision to 2050 provides for that spent fuel shall be stored (wet and dry storage) at the reactor site for 30-50 years awaiting for processing according to the level of development of nuclear science and technology in the world and national radioactive waste management policy.

The Government of Viet Nam is planning to revise the Atomic Energy Law so that the revised Law will address the principles specified in the Convention. It should be also noted that in accordance with the Law on Signing, Accession and Implementation of International Instruments 2005, in case of conflict between the national laws and international legal instruments that Viet Nam has been a party to, the provisions of the international legal instruments shall apply.

G.2. Existing facilities (Article 5)

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.

Viet Nam does not have any spent fuel management facilities. As stated in section B.2, spent fuel management in Viet Nam has only been relevant in connection with the operation of a research reactor (500 kW) at the Nuclear Research Institute in Da Lat. All spent HEU fuels rising from the operation of this reactor were repatriated to Russia in July 2013.

G.3. Siting of proposed facilities (Article 6)

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.

As stated above, at present, Vietnam does not have any spent fuel management facility. However, research reactors and nuclear power plants may have spent fuel storage facilities/systems. Therefore, the report will present Vietnam's regulations regarding spent fuel storage facilities/systems in the research reactors and nuclear power plants.

Siting is specified in Article 38 of the Atomic Energy Law, in which the site for nuclear facilities, including spent fuel management facilities, shall be approved before the construction of the facility by the Ministry of Science and Technology. Application for site approval shall include the following:

- Report on site selection;
- Preliminary design of the nuclear facility;
- Report on environmental impact assessment;
- Results from the verification of environmental impact assessment report (by the Ministry of Environment and Natural Resources);
- Preliminary safety analysis report;
- Safety assessment report (by the Agency for radiation and nuclear safety);
- Plan for environmental monitoring of the land, air, ground water and surface water in the areas affected by the operation of the facility

The criteria for site selection are specified in Decision No. 2376/QĐ-TTg dated 28/12/2010 by the Prime Minister on approval of orientation for radioactive waste storage and disposal up to 2030 with the vision to 2050. The criteria are divided into 5 groups, including: Group of criteria on natural conditions; Group of criteria on environment protection; Group of criteria on social conditions; Group of criteria on safety and security; and Group of criteria on economy.

G.4. Design and construction of facilities (Article 7)

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.*

The Law on Atomic Energy (Article 39, paragraph 1) specifies that nuclear facilities shall submit safety analysis reports when applying for construction permits, modification of their operation scale and scope, termination of the facility operation, including nuclear research reactors or nuclear power plants.

Section 9 of Circular No. 30/2012/TT-BKHCHN dated 28th December 2012 provides nuclear safety requirements for the design of nuclear power plants, including systems for treatment

and storage of nuclear fuels including spent fuel. Article 4 "General Requirements for Designing of Nuclear Power Plants" designates that "Design of Nuclear Power Plants and other important items to safety shall be able to safely dismantle and minimize environmental impacts"; to ensure the activity, the amount of radioactive waste generated and the radioactive emissions at a minimum level"; to be considered through the experience gained during design, construction and operation at other nuclear power plants, as well as results of relevant research programs".

G.5. Assessment of safety of facilities (Article 8)

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).*

In accordance with Article 39 of the Atomic Energy Law, an applicant for construction or operation or change the operation scale and scope or decommissioning of a nuclear facility shall submit a safety analysis report.

Article 41 and Article 48 of the Atomic Energy Law respectively specify dossier for the construction of research nuclear reactors and nuclear power plants which may include a spent fuel management facility. The dossier includes the environmental impacts assessment report, the results of the appraisal of environmental impact assessment report, the safety analysis reports and the safety assessment reports.

In addition to the safety analysis report, as specified in paragraph 2, Article 76 of the Atomic Energy Law, the dossier for treatment and storage of radioactive waste, spent radioactive source and nuclear fuel shall include the following supplementary documents:

- a) Estimated quantity, type, characteristics of radioactive waste, disused radioactive sources and spent fuel;
- b) Methods and equipment used for processing radioactive waste, disused radioactive sources and spent fuel;
- c) Estimated the possibility of radioactive release to the environment and plan for environmental radiation control;
- d) Intended research and development to support the management and processing of radioactive waste, disused radioactive sources and spent fuel;
- e) Proposed sites for storage and disposal.

VARANS would expect the safety analysis report at the stage of seeking construction permit.

G.6. Operation of facilities (Article 9)

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

- (i) the license 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.*

Article 41 and Article 48 of the Atomic Energy Law respectively specify the dossiers for construction of nuclear research reactors and dossiers of feasibility study on construction of nuclear power plants (before construction phase) which may include spent fuel management facilities/systems including Environmental Impact Assessment Report, Results from the verification of environmental impact assessment report, Safety Analysis Report, Safety assessment report. Organizations that have research nuclear reactors shall submit commissioning report and safety analysis report with explanation of changes in technical specifications, operating limit in comparison with the design approved at construction phase and send to the radiation and nuclear safety agency. The agency for radiation and nuclear safety shall conduct assessment of the reports on results from operation testing and safety analysis report for nuclear research reactor, and shall make a proposal to the Ministry of Science and Technology in regard to the issuance of an official operation license of the nuclear research reactor.

According to paragraph 1, Article 84 of the Atomic Energy Law, organizations and individuals conducting radiation practices shall report the incident and the incident place to the superior agencies, organizations, the local People's Committee, local police, the agency for radiation and nuclear safety, and the Ministry of Science and Technology, initial assessment on the cause and impact of the incident to humans and environment.

Paragraph 1, Article 40 of the Atomic Energy Law specifies: When a nuclear facility is planning to terminate its operation, the facility shall apply to the agency for radiation and nuclear safety for approval of the plan for decommissioning, decontamination, handling nuclear fuel, nuclear equipment, radioactive waste, and shall organise to execute the approved plan. Point g, paragraph 1, Article 41 specifies: Application dossier for permit of construction of nuclear research reactors shall include the plan for decommissioning nuclear reactors. Point g, paragraph 1, Article 48 of the Atomic Energy Law stipulates that dossier for the investment project for construction of a nuclear power plant to be submitted to the Prime Minister by the investor for approval shall include Plan for decommissioning of the nuclear power plant, and financial insurance for decommissioning, for managing spent fuel and radioactive waste.

G.7. Disposal of spent fuel (Article 10)

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.

Should Viet Nam designate spent fuel disposal as part of its strategy for spent fuel and radioactive sources management, the provision shall be applied.

SECTION H. SAFETY OF RADIOACTIVE WASTE MANAGEMENT

H.1. General safety requirements (Article 11)

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.*

Article 25 of the Law specifies general requirements for radioactive waste management as follows:

1. Organizations, individuals generating/possessing radioactive waste shall comply with the following requirements:
 - a) Measures to minimize radioactive waste shall be implemented at the generating source;
 - b) Radioactive waste shall be separated from conventional wastes when being collected, treated;
 Measures for classification and treatment of radioactive waste shall be in place.
2. Radioactive waste shall be processed applying the following options:
 - a) Storing for the radioactive waste of short half-life;
 - b) Disposing of radioactive waste, if it does not pose harmful impacts on human health and the environment;
 - c) Transforming radioactive waste into the form that causes less harmful to people and the environment;
 - d) Temporarily storing the waste under safe and secured conditions for further decisions if the methods specified in points a, b and c of this item are not applicable.

In addition to the above principles, the Circular No. 22/2014/TT-BKHHCN dated August 25, 2014 on regulations on radioactive waste and disused sealed sources management specifies that: radioactive waste shall be managed so as not to impose harmful effect to people and the environment now and in the future from which it is generated to when it can be discharged as unarmful waste or disposed of or recycled (in case of radioactive contaminated metal material); the total doses to occupational workers and the public shall not exceed the level specified in Circular No. 19/2012/TT-BKHHCN issued by the Minister of Science and Technology on control of occupational doses and the public doses; radioactive waste containing other hazards shall also be complied with other relevant regulations and laws governing hazardous substances.

Although some of the principles of the Convention have not explicitly covered in the Law, these principles would be applied by VARANS.

As stated earlier, the principles in Article 6 of the Law on Atomic Energy are applied for all activities in the field of atomic energy.

The Government of Viet Nam is planning to revise the Atomic Energy Law so that the revised Law will address the principles specified in the Joint Convention. It should be also noted that in accordance with the Law on Signing, Accession and Implementation of International Instruments 2005, in case of conflict between the national laws and international legal instruments that Viet Nam has been a party to, the provisions of the international legal instruments shall apply.

H.2. Existing facilities and past practices (Article 12)

Each Contracting Party shall in due course take the appropriate steps to review:

- (i) the safety of any radioactive waste 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;*
- (ii) the results of past practices in order to determine whether any intervention is needed for reasons of radiation protection bearing in mind that the reduction in detriment resulting from the reduction in dose should be sufficient to justify the harm and the costs, including the social costs, of the intervention.*

As stated earlier, Viet Nam has no radioactive waste management facilities as defined in this Convention. All radioactive waste from activities (such as research, application in industry, health...) is stored under safe and secure conditions at NRI and ITRRE. Circular No. 22/2014/TT-BKHHCN on regulations on radioactive waste and disused sealed sources management issued on August 25, 2014 by Minister of Science and Technology. The Circular has been developed based on the IAEA safety standards relating to radioactive waste management.

H.3. Siting of proposed facilities (Article 13)

1. Each Contracting Party shall take the appropriate steps to ensure that procedures are established and implemented for a proposed radioactive waste management facility:

- (i) to evaluate all relevant site-related factors likely to affect the safety of such a facility during its operating lifetime as well as that of a disposal facility after closure;*
- (ii) to evaluate the likely safety impact of such a facility on individuals, society and the environment, taking into account possible evolution of the site conditions of disposal*

facilities after closure;

(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 11.

In accordance with Article 35 of the Atomic Energy Law, an applicant for construction of a radioactive waste management facility shall submit a safety analysis report. The content of the report are as follows:

- Design, manufacturing;
- A proposed plan for installation, operation testing, handing over;
- Safety analysis for commissioning;
- Tentative plan for operation termination, dismantlement and decontamination.

The criteria for site selection are specified in Decision No. 2376/QĐ-TTg dated 28/12/2010 by the Prime Minister on approval of orientation for radioactive waste storage and disposal up to 2030 with the vision to 2050. The criteria are divided into 5 groups, including: Group of criteria on natural conditions; Group of criteria on environment protection; Group of criteria on social conditions; Group of criteria on safety and security; and Group of criteria on economy.

H.4. Design and construction of facilities (Article 14)

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

(i) the design and construction of a radioactive waste 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 radioactive waste management facility other than a disposal facility are taken into account;

(iii) at the design stage, technical provisions for the closure of a disposal facility are prepared;

(iv) the technologies incorporated in the design and construction of a radioactive waste management facility are supported by experience, testing or analysis.

According to paragraph 1, Article 35 of the Law on Atomic Energy, radiation waste management facilities shall make reports on safety analysis when applying for construction licenses. This Law also specifies that a report on safety analysis for application of a construction license shall include the following contents:

- Design and manufacture;
- Tentative plan on installation, test operation and pre-handover test;
- Safety analysis when the facility is put into operation;

- Tentative plan on operation termination, dismantlement and radioactive decontamination.

As mentioned earlier, Circular No. 22/2014/TT-BKHCN on regulations on radioactive waste and disused sealed sources management dated August 25, 2014 issued by the Minister of Science and Technology provides general requirements on the design and operation of a radioactive waste management facility and specific requirements on the design of the radioactive waste management facility.

H.5. Assessment of safety of facilities (Article 15)

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

- (i) before construction of a radioactive waste 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) in addition, before construction of a disposal facility, a systematic safety assessment and an environmental assessment for the period following closure shall be carried out and the results evaluated against the criteria established by the regulatory body;*
- (iii) before the operation of a radioactive waste 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).*

As specified in Article 8 of Atomic Energy Law, VARANS is responsible for conducting safety verification and inspection at all stages of a radiation facilities, including radioactive waste management facilities. Circular No. 22/2014/TT-BKHCN on regulations on radioactive waste and disused sealed sources management also provides for the responsibilities of VARANS in verification for licensing and inspection to ensure the compliance with the requirements set out in the Circular as well as other relevant regulations.

Environment assessment will be carried out by the Ministry of Environment and Natural Resources.

H.6. Operation of facilities (Article 16)

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

- (i) the licence to operate a radioactive waste management facility is based upon appropriate assessments as specified in Article 15 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 15 are defined and revised as necessary;*
- (iii) operation, maintenance, monitoring, inspection and testing of a radioactive waste management facility are conducted in accordance with established procedures. For a disposal facility the results thus obtained shall be used to verify and to review the validity of assumptions made and to update the assessments as specified in Article 15 for the period after closure;*
- (iv) engineering and technical support in all safety-related fields are available throughout the operating lifetime of a radioactive waste management facility;*
- (v) procedures for characterization and segregation of radioactive waste are applied;*
- (vi) incidents significant to safety are reported in a timely manner by the holder of the licence to the regulatory body;*

(vii) programmes to collect and analyze relevant operating experience are established and that the results are acted upon, where appropriate;

(viii) decommissioning plans for a radioactive waste management facility other than a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility, and are reviewed by the regulatory body;

(ix) plans for the closure of a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility and are reviewed by the regulatory body.

According to Article 35, paragraph 1 of the Law on Atomic Energy, radiation facilities, including radioactive waste management facilities shall make reports on safety analysis when applying for modification of their operation scale and scope.

According to Article 19, paragraph 2 of the Atomic Energy Law, the safety assessment report on the treatment, storage and disposal of radioactive waste shall include procedure for conducting the radiation practice, including preparing, carrying out and terminating steps. In addition, according to Article 10 of Circular No.22/2014-TT-BKHCN, the radioactive waste storage facility shall have an operating procedure including the following: operating conditions and limits; management system; Regulations on internal check and inspection; regulations on staff training; the program on ensuring radiation safety and security of the radiation facility, supervising the emission of radioactive waste into the environment; acceptance criteria for radioactive waste bales; the emergency response program ensuring that damage is minimized when an incident occurs; regulation on documentation and storage of records of radioactive waste management.

Circular 22/2014-TT-BKHCN also provides regulations on the classification and separation of radioactive waste.

As stated above, according to Article 84, paragraph 1, point c of the Atomic Energy Law, organizations and individuals treating, storing and disposing radioactive waste, spent radioactive sources and nuclear fuels shall report the incident and the incident place to the superior agencies, organizations, the local People's Committee, local police, the agency for radiation and nuclear safety, and the Ministry of Science and Technology, initial assesment on the cause and impact of the incident to humans and environment.

Article 35, paragraph 3 of the Atomic Energy Law, when applying for a construction permit, the radioactive waste management facility shall have a tentative plan for operation termination, dismantlement and decontamination. According to Article 36, paragraph 1 of the Atomic Energy Law, when planning for operation termination, radiation facilities shall submit plans for dismantlement, decontamination and handling of radioactive sources, radioactive waste to the agency for radiation and nuclear safety for approval, and shall organise to execute the approved plans.

In accordance with Article 25, paragraph 6 of the Atomic Energy Law, organizations, individuals can only dispose of radioactive waste after being licensed and shall report storage conditions and submit a map of the storage facility to the agency for radiation and nuclear safety.

H.7. Institutional measures after closure (Article 17)

Each Contracting Party shall take the appropriate steps to ensure that after closure of a disposal facility:

- (i) records of the location, design and inventory of that facility required by the regulatory body are preserved;*
- (ii) active or passive institutional controls such as monitoring or access restrictions are carried out, if required; and*
- (iii) if, during any period of active institutional control, an unplanned release of radioactive materials into the environment is detected, intervention measures are implemented, if necessary.*

The Law on Atomic Energy (Article 35, paragraph 1) specifies that radiation facilities shall make reports on safety analysis when applying for construction licenses, modification of their operation scale and scope or terminating their operation. This article (paragraph 5) also specifies the content of safety analysis reports when applying for a license for termination as follows:

- Reason for operation termination;
- Plan on dismantlement and radioactive decontamination;
- Plan on disposal of radiation source or radioactive waste.

The Circular No. 08/2010/TT-BKHHCN also specifies application for a license to terminate the operation of a radiation facility, including the following:

- An application for a license to perform radiation practices, made according to form 01-11/ ATBXHN provided in Appendix II to this Circular;
- A report on safety analysis of the termination of the operation of a radiation facility, made according to form 10-III/ATBXHN provided in Appendix III to this Circular.

Other regulations on dismantlement and radioactive decontamination of radiation facilities are specified in Article 36 of the Law on Atomic Energy. These regulations include:

- When planning for operation termination, radiation facilities shall submit plans for dismantlement, decontamination and handling of radioactive sources, radioactive waste to the agency for radiation and nuclear safety for approval, and shall organise to execute the approved plans.
- The agency for radiation and nuclear safety shall organize inspection on dismantlement, decontamination and handling of radioactive sources, radioactive waste and shall certify that the radiation facility is released from its responsibilities for ensuring radiation safety.
- The radiation facility shall bear all the cost associated with dismantlement, storage and handling of radioactive waste resulted from the decommissioning process.
- The dismantlement, decontamination and handling of radioactive sources, radioactive waste shall be complied with national safety standards.
- The Ministry of Science and Technology shall specify procedures, formalities for verification and approval of plans for dismantlement, decontamination and handling of radioactive sources, radioactive waste.

SECTION I. TRANSBOUNDARY MOVEMENT (Article 27)

1. Each Contracting Party involved in transboundary movement shall take the appropriate steps to ensure that such movement is undertaken in a manner consistent with the provisions of this Convention and relevant binding international instruments.

In so doing:

(i) a Contracting Party which is a State of origin shall take the appropriate steps to ensure that transboundary movement is authorized and takes place only with the prior notification and consent of the State of destination;

(ii) transboundary movement through States of transit shall be subject to those international obligations which are relevant to the particular modes of transport utilized;

(iii) a Contracting Party which is a State of destination shall consent to a transboundary movement only if it has the administrative and technical capacity, as well as the regulatory structure, needed to manage the spent fuel or the radioactive waste in a manner consistent with this Convention;

(iv) a Contracting Party which is a State of origin shall authorize a transboundary movement only if it can satisfy itself in accordance with the consent of the State of destination that the requirements of subparagraph (iii) are met prior to transboundary movement;

(v) a Contracting Party which is a State of origin shall take the appropriate steps to permit re-entry into its territory, if a transboundary movement is not or cannot be completed in conformity with this Article, unless an alternative safe arrangement can be made.

2. A Contracting Party shall not license the shipment of its spent fuel or radioactive waste to a destination south of latitude 60 degrees South for storage or disposal.

3. Nothing in this Convention prejudices or affects:

(i) the exercise, by ships and aircraft of all States, of maritime, river and air navigation rights and freedoms, as provided for in international law;

(ii) rights of a Contracting Party to which radioactive waste is exported for processing to return, or provide for the return of, the radioactive waste and other products after treatment to the State of origin;

(iii) the right of a Contracting Party to export its spent fuel for reprocessing;

(iv) rights of a Contracting Party to which spent fuel is exported for reprocessing to return, or provide for the return of, radioactive waste and other products resulting from reprocessing operations to the State of origin.

As a Contracting Party of the Convention, Viet Nam supports the objective of Article 27. The importation of radioactive waste is prohibited under the Atomic Energy Law (Article 12). Article 12 also specifies that transportation of radioactive waste without appropriate safety and security measures is prohibited.

As the transportation of spent fuel and radioactive waste is defined as a radiation practice, it shall be subject to all requirements concerning conducting radiation practices, including licensing, inspection and enforcement.

Requirements for safety of transportation, including transboundary movement are especially specified in Circular No. 23/2012/TT-BKHHCN on requirements on transportation of radioactive materials (including spent fuel and radioactive waste). The Circular was developed based on the IAEA Safety Standards TS-R-1.

The transboundary movement of spent fuel in Viet Nam has only been relevant in connection with the repatriation of HEU spent fuel to Russia. The spent fuel assemblies were loaded into a licensed transport cask. The cask was vacuum dried, sealed and tied down in a special ISO container, and transported by road to an airport. Air transportation was carried out by a dedicated aircraft.

SECTION J. DISUSED SEALED SOURCES (Article 28)

1. Each Contracting Party shall, in the framework of its national law, take the appropriate steps to ensure that the possession, remanufacturing or disposal of disused sealed sources takes place in a safe manner.

2. A Contracting Party shall allow for reentry into its territory of disused sealed sources if, in the framework of its national law, it has accepted that they be returned to a manufacturer qualified to receive and possess the disused sealed sources.

By definition in the Atomic Energy Law (Article 18), possession of disused radioactive source is a radiation practice that shall be licensed and subject to all safety and security requirements for radiation practices.

Viet Nam has no suppliers or manufacturers of radioactive sources, but there are about 1800 spent radioactive sources. The collection and storage of spent radioactive sources are of particular interest, with priority given to the collection, transport and storage of radioactive sources at radiation facilities that are at high risk of loss to the INST and the NRI. At present, the collection and storage of spent radioactive sources is receiving the support from the IAEA through the project of radioactive source conditionalization.

On July 10th, 2015, the Prime Minister signed Directive No.17/CT-TTg to improve the effectiveness and efficiency of enforcement of the laws on radiation safety and security of radioactive sources. One of the tasks to implement the Directive 17/CT-TTg of the Prime Minister is to collect and store radioactive sources nationwide. Vietnam is also studying to build a national resource store to collect and store spent radioactive sources nationwide.

Circular No. 22/2014/TT-BKHCN dated August 25, 2014 on regulations on radioactive waste and disused sealed sources management specifies provisions for the management of disused radioactive sources. The principles for disused sources management are as follows:

- Transfer to another user if the source is intact and can be re-used;
- Return to suppliers or manufacturers if they have policies to take back;
- Transfer to a radioactive waste storage facility;
- Store permanently at the facility if the facility have sufficient capacity and capability for management of radioactive waste as specified in Article 10 of this Circular and the facility is licensed by VARANS; or
- Store the source under safety and security conditions for a period not exceeding 3 years for one of the above 4 options be implemented.

SECTION K. GENERAL EFFORTS TO IMPROVE SAFETY

The discussion in this report of actions taken by Viet Nam as a Contracting Party to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management to fulfill its commitment to the obligations of the Convention confirms its conscientious and systematic effort by relevant bodies in Viet Nam in developing Viet Nam's programme for peaceful use of nuclear energy. The Government of Viet Nam has recognized the importance of having in place a comprehensive legislative and regulatory framework to ensure the safety, security and environmental acceptability of its spent fuel and radioactive waste management. This is the second National Report submitted by Viet Nam and hence, reflects the fact that additional measures shall be needed over the coming years as the

program progresses. Relevant organizations of Viet Nam are fully committed to meeting the obligations of the Convention.

Further effort to improve safety will include:

- Revising the Atomic Energy Law so as to accommodate all principles and requirements specified in the Convention. It is planned that the revised Law will be submitted to the National Assembly in 2018;
- Developing regulations to propose fundamental principles and requirements for a radioactive waste management facility in accordance with international obligations and recommendations.
- Focus on ensuring safety and security of used radioactive sources, which may lead to lost of safety and security through storage at the radiation facilities and concentrated storage at radiation source stores, continue to study the plan to build national source store.

SECTION L. ANNEXES**Annex 1. Abbreviations**

EVN	:	Electricity of Vietnam
	:	Highly enriched uranium
HEU	:	International Atomic Energy Agency
HRD	:	Institute for Technology of Radioactive and Rare Elements
IAEA	:	Low enriched uranium
ITRRE	:	Ministry of Science and Technology
LEU	:	Nuclear Power Plant
MOST	:	Nuclear Research Institute
NPP	:	National Committee for Search and Rescue
NRI	:	Vietnam Agency for Radiation and Nuclear Safety
NCSR	:	Viet Nam Atomic Energy Institute
VARANS	:	
VINATOM	:	
	:	
	:	

Annex 2. Classification of radioactive waste

I. According to Decision No. 2376/QĐ-TTg dated December 28, 2010 by the Prime Minister on Approval of orientation for radioactive waste storage and disposal up to 2030 with the vision to 2050 specifies classifications of radioactive waste

a) Classification based on half-life:

- Radioactive waste of short half life of less than 100 days;
- Radioactive waste of medium half life of greater than 100 days and less than 30 years;
- Radioactive waste of long half life of greater than 30 years.

b) Classification based on radioactivity:

- Low and intermediate level waste
- High level waste and spent fuel.

II. According to Circular No. 22/2014/TT-BKHCHN dated August 25, 2014 on regulations on radioactive waste and disused sealed sources management

a) Classification based on characteristics of the radionuclides contained in the waste

No.	Classification	Characteristics
1	Low level waste – very short lived (LLW-VSL)	Waste contains only very short lived radionuclides (their half-life is shorter than 100 days) and can decay to the level lower than clearance levels within 5 years from generation
2	Low and intermediate level waste – short lived (LILW-SL)	Radioactive waste cannot decay to the level lower than clearance levels within 5 years from generation, and contains radionuclides emitting beta/gamma with half-life from 100 days to 30 years or contains radionuclides emitting alpha with average activity concentration equal to or lower than 400 Bq/g
3	Low and intermediate level waste – long lived (LILW-LL)	Radioactive waste contains radionuclides having half-life longer than 30 years or contains radionuclides emitting alpha with average activity concentration higher than 400 Bq/g but activity concentration equal to or lower than 10^4 TBq/m ³
4	High level waste (HLW)	Radioactive waste contains radionuclides with activity concentration higher than 10^4 TBq/m ³

b) Classification based on physical, chemical and biological characteristics of waste

Based on physical, chemical and biological characteristics, waste is classified as follow:

- Solid, liquid or gas waste;
- Waste can be burned;
- Waste can be compressed;
- Organic waste;
- Metal waste.

III. According to Vietnam Technical Standard No. 6868:2001

1. Classification based on safety requirements: this classification is put on the first because of its importance in almost cases. And radioactive waste is classified into 3 groups:

a. *Exempt waste (EW)*: waste contains such small concentrations of radionuclides that it does not require the control. The specific activity or total activity of radionuclides is equal at or below the clearance level specified by the state agency for radiation safety and control (Pursuant Circular No. 15/2010 / TT-BKHHCN);

b. *Low and intermediate level waste (LILW)*: waste contains radionuclides and specific activity or total activity of these radionuclides is higher than clearance level specified; and the decay heat capacity is lower than 2 kW/m^3 .

This group is divide into 2 secondary groups:

b.i. *Low and intermediate level waste – short lived (LILW-SL)*: waste contains mostly short lived radionuclides (half-life shorter than 30 years), the specific activity of the long lived radionuclides do not exceed the limit (specific activity of the long-lived alpha-emitting radionuclides in waste are not higher than 4000 Bq/g and the maximum of average specific activity of the long-lived alpha-emitting radionuclides in waste is 400 Bq/g).

b.ii. *Low and intermediate level waste – long lived (LILW-LL)*: waste contain long-lived radionuclides (half-life longer than 30 years) which are higher than the limit of low and intermediate level waste – short lived stated in paragraph (b.i).

c. *High level waste (HLW)*: waste contain long-lived radionuclides with specific activity exceeding the limits for short-lived waste. The specific activity is from 5.10^4 to 5.10^5 TBq/m^3 , and decay heat capacity is equal to or higher than 2 kW/m^3 .

2. Classification based on shielding in operation and transportation processes: radioactive waste is classified into 4 groups:

a. *Exempt waste (EW)*: is radioactive waste and specific activity or total activity equal to or below the clearance levels.

b. *Low level waste (LLW)*: is radioactive waste and specific activity or total activity of higher than the clearance levels and the surface dose rate without treating lower than 2 mSv/h .

c. *Intermediate level waste (ILW)*: is radioactive waste and the surface dose rate without treating equal to or higher than 2 mSv/h and decay heat capacity lower than 2 kW/m^3 .

d. *High level waste (HLW)*: is radioactive waste and decay heat capacity equal to or higher than 2 kW/m^3 .

3. Classification based on the half-life of radionuclides related to temporary storage: radioactive waste is classified into 3 groups:

a. *Very short lived waste (VSLW)*: waste contains only radionuclides and their half-lives shall be shorter than 100 days.

b. *Short lived waste (SLW)*: waste contains only radionuclides with half-lives shorter than 30 years. However this type of waste can contain a small amount of alpha emitting

radionuclides with long half-lives and their average specific activity shall be lower than 400 Bq/g.

c. *Long lived waste (LLW)*: waste contains radionuclides and their half-lives shall be longer than 30 years.

4. Classification based on chemical and physical characteristic of waste related to treatment activities: the radioactive waste is classified to the following groups:

- a. Solid radioactive waste can be compressed (glass, small metal fragments...);
- b. Solid radioactive waste can be burned (clothes, cotton, plastic, paper...);
- c. Solid radioactive waste can be decomposed (animal carcasses, animal dung...);
- d. Solid radioactive waste can not be compressed, can not be burned (big metal fragments, brick, rock...);
- e. Liquid radioactive waste in aqueous solution;
- f. Liquid radioactive waste in organic solvent;
- g. Oily liquid radioactive waste.

Annex 3. List of radioactive waste management facilities

As mentioned in section D, Viet Nam has no radioactive waste management facilities as the definition of this Convention. This Annex provides the list of facilities where radioactive waste is stored.

Table 3.1: List of facilities storing radioactive waste in Viet Nam

No.	Facility	Address	Telephone number	Fax	Type of radioactive job
1	Institute for Technology of Radioactive and Rare Elements (ITRRE)	No.48 Lang Ha Street, Dong Da, Ha Noi, Viet Nam	+84-4-37760304	+84-4-38350966	<ul style="list-style-type: none"> + Researching and testing the production of uranium compounds from radioactive ores; + Transporting radiation substances generated from research activities at the Institute; + Researching, evaluating and implementing technology to treat environmental contaminated radioactive materials; + Researching, designing, manufacturing equipment used in chemical technology for processing ores containing radioactive material; + Handling and storing radioactive waste; + Using and storing radioactive sources, radiation equipment.
2	Nuclear Research Institute (NRI)	No.01 Nguyen Tu Luc Street, Da Lat, Lam Dong, Viet Nam	+84-63-3822191	+84-63-3821107	Research reactor exploitation and utilization, such as radioisotope production, neutron activation analysis, etc.

Annex 4. Inventory of radioactive waste

Table 4.1: Inventories of Radioactive waste in storage as of 15 July 2014

Facility	No	Classification	Condition	Volume (m ³)	Mass (kg)	Total activity (Bq)	Origin
Institute for Technology of Radioactive and Rare Elements (ITRRE)	1	LILW-LL	Cementation	146.4	292,800	----	Uranium ore and monazite ore processing
Nuclear Research Institute (NRI)	1	LILW-SL	Compressing and packing in cylindrical 200 liters volume drums.	20.4	5657,8	88,92E+10	Exploitation and utilization of reactor
	2	LILW-SL	Consolidating by cement in cylindrical 200 liters volume drums.	2.0	~4400	14.95E+6	Exploitation and utilization of reactor
	3	LILW-SL	Conditioning in cylindrical 200 liters volume drums.	22,6	~50,600	3,15E+10	Exploitation and utilization of reactor
	4	LILW-SL	Packing in cylindrical 200 liters volume drums.	2.0	3400	2,02E+8	Co-60 contaminated soil
	5	LILW-SL	Unconditioned	~5.0	~450	~1.56E+10	Exploitation and utilization of reactor
	6	LILW-SL	Unconditioned	~0.4	----	----	Exploitation and utilization of reactor
	7	LILW-SL	Unconditioned	~3,5	~3500	~1,12E+8	Exploitation and utilization of reactor
	8	LILW-SL	Unconditioned	~9,0	~11.800	~1,69E+7	Exploitation and utilization of reactor

Note: LILW-LL: Low and intermediate level waste – long lived; LILW-SL: Low and intermediate level waste – short lived; ~: approximate; ----: undetermined.

Annex 5. List of Relevant Laws, Decrees, Circulars and National Technical Standards

Law:

- Law on Atomic Energy dated June 03, 2008.

Degree:

- Decree No.107/2013/ND-CP dated September 20, 2013 on regulating sanctioned of administrative violations in atomic energy;
- Decree No. 70/2010/ND-CP dated June 22, 2010 on detailing and guiding a number of articles of the law on atomic energy regarding nuclear power plants;
- Decree No. 07/2010/ND-CP dated January 25, 2010 on guiding for implementation of some provisions of the Atomic Energy Law;
- Decree No. 213/2013/ND-CP dated December 20, 2013 on the organization and functions of the science and technology inspectorate.

Prime Minister's Decisions:

- Decision No. 2376/2010/QD-TTg dated December 28, 2010 on approval of orientation for radioactive waste storage and disposal up to 2030 with the vision to 2050;
- Decision No. 01/2006/QD-TTg dated January 03, 2006 on approval of Strategy for peaceful uses of atomic energy up to 2020;
- Decision No. 446/QD-TTg dated April 07, 2010 on establishment of the National Nuclear Safety Council;
- Decision No. 580/QD-TTg dated May 04, 2010 on establishment of the State Steering Committee for Ninh Thuan Nuclear Power Project;
- Decision No. 1558/QD-TTg dated August 18, 2010 on approval of the scheme on training and development of human resources in the field of atomic energy;
- Decision No. 1636/QD-TTg dated August 31, 2010 on approval of the Master Plan for radiological environment monitoring and warning network;
- Decision No. 775/QD-TTg dated June 2nd, 2010 approving the detailed plan for development and application of radiation in agriculture till 2020.
- Decision No. 906/QD-TTg dated June 17th, 2010 approving orientations for planning development of nuclear power in Vietnam up to 2030.
- Decision No. 957/QD-TTg dated June 24th, 2010 approving the master plan for development and application of atomic energy for peaceful purposes up to 2020.
- Decision No. 127/QD-TTg dated January 20th, 2011 approving the master plan on development of radiation application in industry and other economic-technical branches up to 2020.
- Decision No.899/QD-TTg dated June 10th, 2011 approving the detailed plan for development and application of radiation in meteorology, hydrology, geology, minerals and environmental protection till 2020.
- Decision No. 1958/QD-TTg dated November 4th, 2011 approving the detailed plan for development and application of radiation in health to 2020.
- Decision No. 09/2014/QD-TTg dated January 23, 2014 on financial obligations of organizations having nuclear power plants, modes of financial management to ensure the closure and decommissioning of nuclear power plants;

- Decision No. 2241/QĐ-TTg dated August 15th, 2004 approving the master plan for development of nuclear power infrastructure up to 2020.

Circulars:

- Circular No. 22/2014/TT-BKHHCN dated August 25, 2014 on regulations on radioactive waste and disused sealed sources management;
- Circular No.08/2010/TT-BKHHCN dated July 22, 2010 on guiding for declaring, licensing to perform radiation Practices and radiation staff certification;
- Circular No. 15/2010/TT-BKHHCN dated September 14th, 2010 promulgating national technical regulation QCVN 05: 2010 on radiation safety - exemption of declaration and licensing;
- Circular No. 19/2010/TT-BKHHCN dated December 28, 2010 on guiding for specialized inspection on Radioactive and Nuclear safety;
- Circular No. 19/2012/TT-BKHHCN dated November 08, 2012 on occupational radiation protection and public radiation protection;
- Circular No. 23/2012/TT-BKHHCN dated November 23, 2012 on requirements on transportation of radioactive materials;
- Circular No. 16/2013/TT-BKHHCN dated July 30, 2013 on issuing the National technical regulation on National environmental radiation monitoring and warning network;
- Circular No. 24/2012/TT-BKHHCN dated December 04, 2012 on guiding the establishment and approval of a provincial level plan for response to radiological and nuclear accidents;
- Circular No. 02/2011/TT-BKHHCN dated March 16, 2011 on guiding the control of nuclear materials and source nuclear materials.
- Joint-circular No. 13/TTLT-BKHHCN-BYT dated September 6th, 2017 on radiation safety assurance in health.
- Circular No. 27/TT-BKHHCN dated October 10th, 2014 detailing a number of articles of Decree No. 107/2013/ND-CP dated September 20th, 2013 of the Government regulating administrative violations in the field of atomic energy.
- Joint-circular No. 112/2015-TTLT-BTC-BKHHCN dated July 29th, 2015 guiding the coordination and handling mechanism in inspection and detection radioactive substances at border gates.

Vietnamese Technical Standard:

- Vietnamese Technical Standard No. 6868:2001 on Radioactive waste management and classification of radioactive waste.