

3.9 Radioactive Waste Management (RWM) Status in Viet Nam

Since the beginning of the 20th century, nuclear techniques have been applied in Vietnam by using the radium needles for radiotherapy treatment and X-ray machine for diagnostic radiology.

In the past ten years, the nuclear techniques were intensively and broadly applied in the different branches such as health care, industry, agriculture, biology and research. With the development of nuclear technical application, the radioactive waste is increased.

The majority of radwaste arise from:

- The activity of nuclear research reactor
- Uranium waste created in the uranium processing
- Radwaste contained radioactive elements after monazite treatment

The remaining of radwaste comes from radioactive sources used and unused in research, industry and medical profession.

3.9.1 RWM Policy

On the basic of atomic law, the government of the Socialist Republic of Viet Nam set the policy about the peaceful use of atomic energy and radioactive waste management as following:

- Radioactive waste must be controlled and safety managed in accordance with internationally agreed principles
- Radioactive wastes need to be classified and then treated by suitable methods before conditioning and disposal
- Minimization of radioactive waste generation

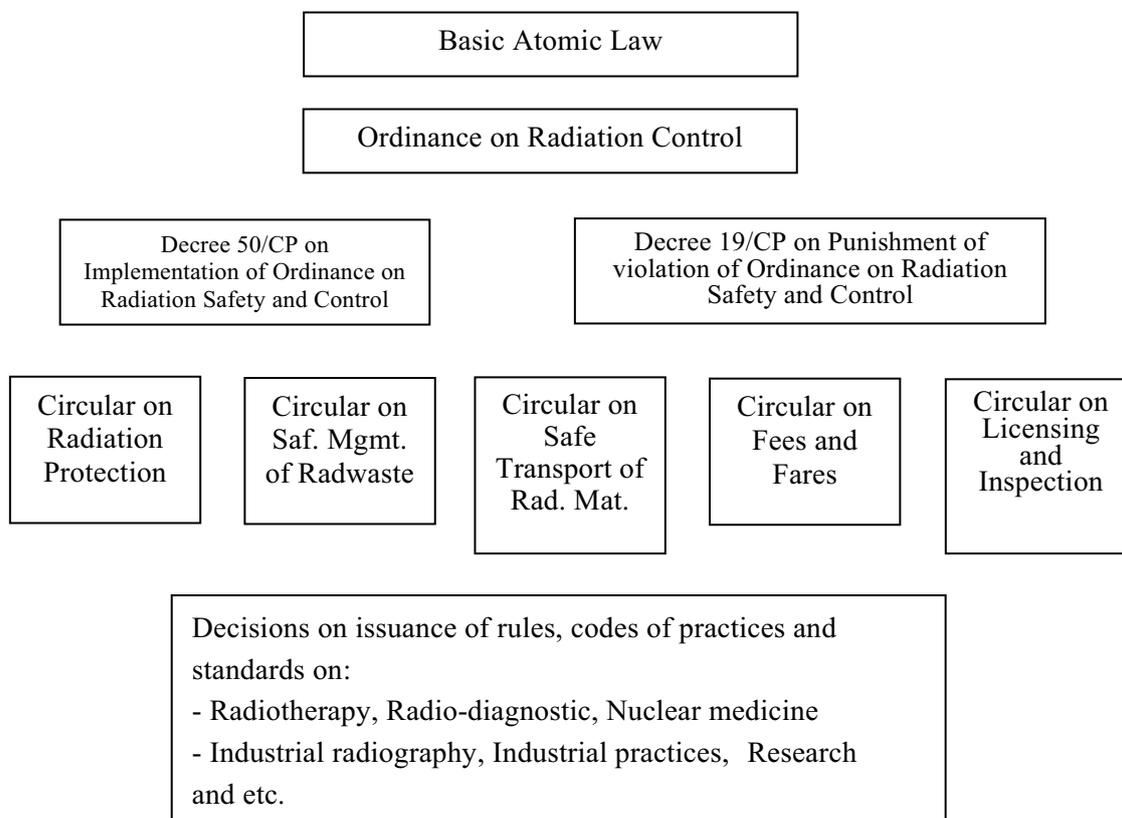
3.9.2 RWM Practices

3.9.2.1 Legislative Framework

According to articles 91, 103 of Statute of the Socialist Republic of Vietnam, the order of legislative framework is as following:

- Laws will be enacted by the National Assembly of the Socialist Republic of Vietnam.
- Ordinances will be enacted by the Standing Committee of the National Assembly.
- Decrees will be enacted by the prime minister of the Socialist Republic of Vietnam.
- Circulars, guidance, codes of practices will be enacted by the minister or some ministers.

The diagram of national legal framework concerning radiation protection and control is as follows:



The legal documents concerning the safe use of ionizing radiation:

- Ordinance on Radiation Safety and Control (ORSC) was passed on June 25, 1996, by the Standing Committee of the National Assembly of the Socialist Republic of Vietnam and went into effect on January 1, 1997. There are eight chapters with 38 articles in this ORSC.
 - Decree on the Detail Directions for implementing of ORSC. This decree was enacted on July 16, 1998, by the Prime Minister of the Socialist Republic of Vietnam and went into effect on August 1, 1998. There are seven chapters with 49 articles in this Decree.
 - Decree on the Punishment on violation of the ORSC and Decree 50/CP/1998. This Decree was enacted on May 11, 2001. There are five chapters with 40 articles in this.

- Circulars/Regulations on radiation protection:
 - On December 28, 1999, two Ministers of the MOSTE (Ministry of Science Technology and Environment) and MOH (Ministry of Health) enacted the Ministerial on Guidelines for implementing Radiation Safety in Medical Practices
 - Safety Regulations for ionizing radiation TCVN 4397-87: Before the enacting of ORSC, in 1987 Safety Regulation for ionizing radiation TCVN 4397-87 was issued by the Minister of the MOSTE in series of Vietnam Standard TCVN. It went into effect on January 1, 1988.
 - Regulation for Safe Transport of Radioactive Materials -TCVN 4955-89 was enacted by MOSTE on December 25, 1989, and went into effect on July 1, 1990.
 - The Safety Standard TCVN 6561:1999: Radiation protection for medical installations using X-ray machines was enacted in 1999.

- Safety Standard, Safety Requirements, Codes of Practice and Guidelines
 - Radiation dose limits for radiation worker and public TCVN 6866:2001
 - Safe Transport of Radioactive Materials TCVN 6867:2001
 - Safe Management and Treatment of radioactive Wastes- Classification of Radioactive Wastes TCVN 6868:2001
 - Radiation Protection-Medical exposure-General provisions TCVN 6869:2001
 - Exemption of Radiation Sources and Practices from Regulatory Control TCVN 6870:2001

3.9.2.2 Regulatory Framework/Body

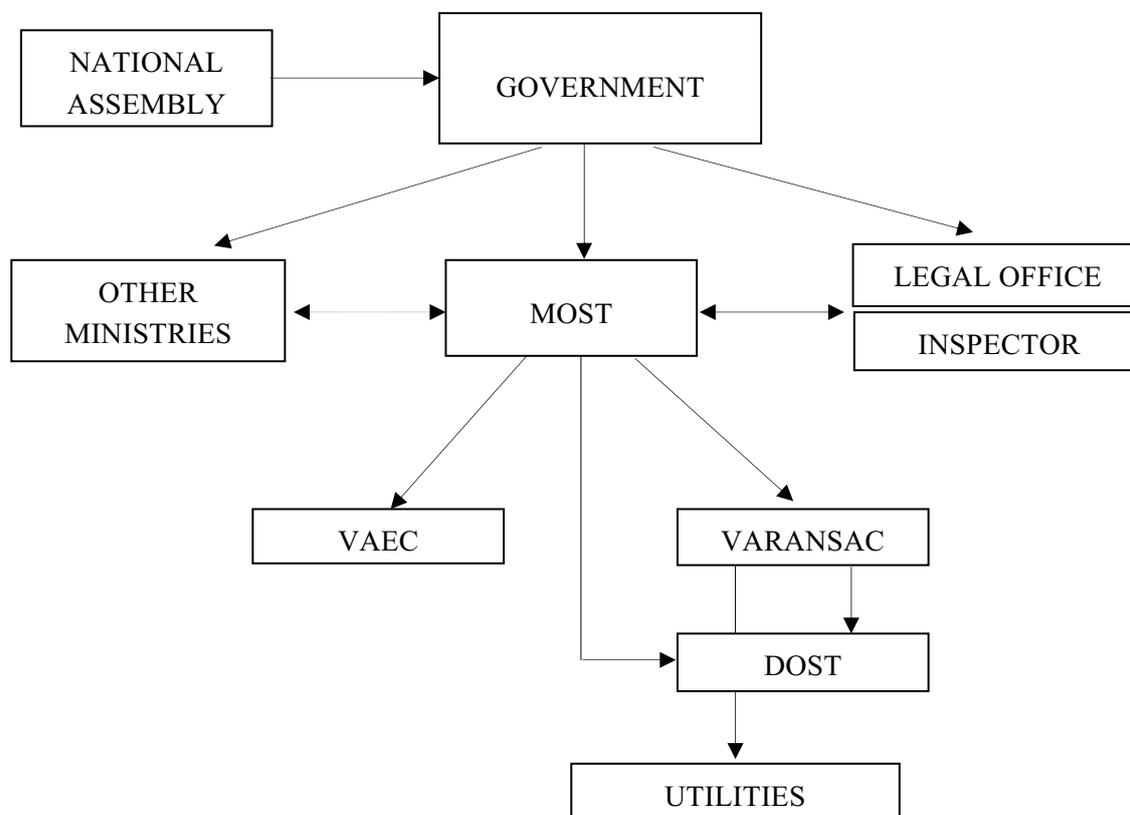


Figure 3.9-1 Diagram of Regulation Authority in Vietnam

3.9.2.3 Responsibility of License Holder

MOST

Under the Article 29 of Ordinance and the Article 34 of Decree 50/CP the MOST was designated as the Regulatory Authority for Radiation safety and control. MOST is a Regulatory Body being responsible to Government for the exercise of unified State management over radiation safety and control throughout the country, responsible for organizing and directing all radiation safety and control activities within the scope its function and duties.

Vietnam Agency for Radiation and Nuclear Safety & Control (VARANSAC)

Under MOST, on 30 July 1994, the Prime Minister signed the Decision numbered 389/TTg on establishment Vietnam Radiation Protection and Nuclear Safety Authority. On 4 March, 1995 the Minister of Science, Technology and Environment

signed the Decision numbered 159/QD-TCCB to assist in State management of Radiation Protection and Nuclear Safety.

In order to strengthen the State management in radiation and nuclear safety, based decision numbered 54/2003/ND-CP dated on 19 May 2003 of Government, Vietnam Agency for Radiation and Nuclear Safety & Control (VARANSAC) was established by the Decision No.1073/2003/QD-BKHCN of Minister of MOST on 20 June, 2003.

Department of Science, Technology (DOST)

According to the article 42 of the Decree 50/CP the DOST's of 64 provinces/cities under direction of MOST are also involved in the provincial management of Radiation Protection in its province such as issuing a license for diagnostic radiology department and reporting regularly to MOST via VARANSAC.

VAEC

Under direction of the MOST, and due to a lacking of qualified staff of VARANSAC, the staff from the VAEC was mobilized to assist the VARANSAC on technical aspects.

3.9.3 Criteria Used to Define and Categorize Radioactive Waste

In Vietnam, the radioactive wastes are arising from activities of research reactor operation, radioisotope production, industrial application, nuclear medicine, uranium/monazite processing. These wastes are classified into: Low level radioactive waste, intermediate level radioactive waste and high-level radioactive waste. Criteria used to define and define categorize radioactive wastes bases on classification system as recommended by the IAEA.

3.9.4 RWM Facilities

There are two RWM facilities in Vietnam.

- The system for RWM at the DNRI (Dalat Nuclear Research Institute) consists of two main parts:
 - The radioactive liquid waste treatment station: The radioactive liquid waste treatment station collects radioactive wastes from reactor operation, radioisotope production and other laboratories.
 - The disposal facilities: Dry and wet solid radioactive wastes are collected, treated and stored in disposal facilities. In these facilities, eight concrete pits have been constructed for disposal and solidification of radioactive waste.

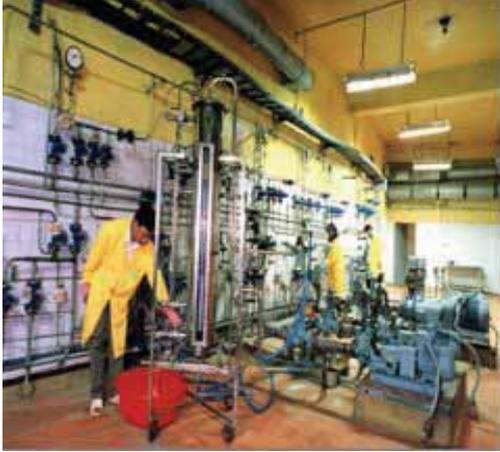


Figure 3.9-2
Equipment for processing
rad-waste in Dalat

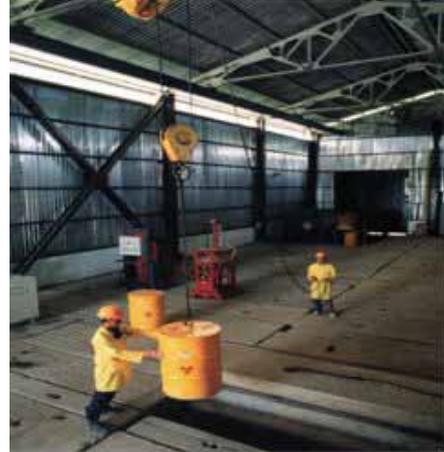


Figure 3.9-3
Transportation of rad-waste



Figure 3.9-4 Temporary storage for rad-waste in NRI Dalat

- The radioactive waste facilities at Phung, Hatay Province: In these facilities, all radioactive wastes from ITRRE (Institute for Technology of Radioactive and Rare Elements) and other Institute in the North of Vietnam are collected, classified, treated and stored in temporary storage for rad-waste.

The experiments for treatment of radioactive waste have been conducted in the laboratory for determination of suitable technological flow-sheet. Procedures have been applied for treatment of rad-wastes is cementation technique.

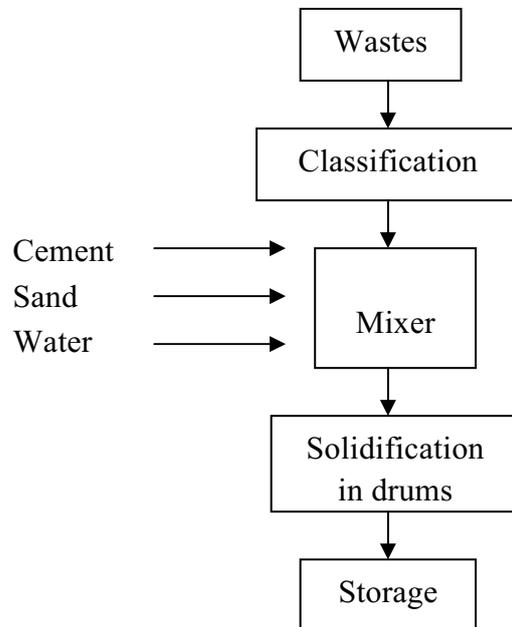


Figure 3.9-5 Flow-sheet of cement solidification



Figure 3.9-6 The temporary storage for rad-waste in ITRRE (Phung-Hatay)

3.9.5 Inventory of Radioactive Waste (RW)

In general, the amount of radioactive wastes in Vietnam are small, they mainly are arising from radioisotope applications, the laboratories of uranium processing and the operation of research reactor.

Table 3.9-1 Inventory of Radioactive Waste Accumulated in Viet Nam

Local/Categories	Radionuclides	Volume (m ³ /y)	Total (m ³)
In storage at DNRI			
Solid waste	Cs-134, Co-60, Eu-152, Eu-154, Zn-65, Sc-46, Mn-54, Fe-59, Ag-110	10	about 200
Liquid waste		120 -240	none
In storage at ITRRE (Phung, Hatay province)			
Solid waste	U, Th, Ra	5	80
Liquid waste	U, Th, Ra	50	none

3.9.6 Nuclear Facilities in the Process of Being Decommissioned and the Status of Decommissioning Activities at those Facilities

None being decommissioned.