VIET NAM

(based onJC national report)

a) National framework for management of spent fuel and radioactive waste

There are approximately 1.800 radioactive sources in use (4% in health care, 66,8% in industry and 29,2% in other applications) and approximately 1.400 radioactive sources in storage. There is one research reactor - Triga Mark II, 500 kW in Da Lat. In 2011 full core low enriched uranium conversion was performed and in 2013 spent high enriched uranium was sent to Russia. So there is no spent fuel in Viet Nam, only disused radioactive sources.

In 2011 Master plan of National Electricity Development from 2011-2030 was approved by Prime Minister and this plan foresees the first nuclear power plant unit with capacity of 1000 MW by 2020. By 2025 the NPPs total capacity should be 8000 MW and by 2030 10700 MW. The site for first two NPPs is in Ninh Thuan. It is also foreseen to build a new research reactor to replace the current research reactor in Da Lat.

The legislation does specify the following:

- RW shall be minimised;
- RW shall be separated from conventional waste;
- Short half-life RW shall be stored for clearance by decay;
- RW shall be appropriately treated.

Classification of RW

- 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;
- 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;
- 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 10^4TBq/m^3;
- High level waste (HLW) – Radioactive waste contains radionuclides with activity concentration higher than 10^4TBq/m^3.

b) National legal and regulatory framework

June 3rd, 2008: the National Assembly passed the Law on Atomic Energy and it came into force on Jan 1st, 2009. The law promotes the atomic energy uses; regulates the safety, security, and safeguards; etc. Atomic Energy Law also specifies the responsibilities of different Ministries and Agencies:

- Ministry of Science and Technology responsible for state management on activities in the field of atomic energy, including safety
- Ministry of Health for regulations on health check for radiation workers, dose control for patients
- Ministry of Labor and Social Affairs responsible for regulations on wages, working hours for workers and employees working in radiation hazard environment
- Vietnam Agency for Radiation and Nuclear Safety (VARANS) responsible for drafting regulations on safety, conducting verification on safety, emergency response

It also stated that licensees have prime responsibility for safety and security.

Nuclear Safety Council established 07 April 2010

Vietnam Agency for Radiation and Nuclear Safety (VARANS) is Regulatory Body on Safety, Security and Safeguards. VARANS was established in 2003 and it has the responsibility to assists the Minister of Science&Technology. The functions and responsibilities of VARANS include:

- Drafting legal and regulatory documents
- Licensing radiation practices, including waste management
- Performing safety assessment of research and power nuclear reactors
- Performing inspection and enforcement

c) Radioactive waste management, decommissioning and spent fuel strategy

There is radioactive waste from operation of research reactor and research on uranium ore processing (146 m3 LILW-LL at ITRRE; 60 m3 LILW-SL at NRI). Government constructs a national RW storage facility.

Final decision of SF management is not done yet. Viet Nam is considering options for long-term SF management policy such as overseas reprocessing and final disposal inside or outside the country. SF will be stored in wet and dry storage at the reactor site for 30 –50 years.

Table 1 Radioactive Waste In Storage (including spent fuel that is considered waste)

Route Waste Class	Processed (type)/Un processed	Total Current Volume (m3)	Estimated Disposal Volume (m3)	Distribution (%)							Planned Disposal Route (if known)
				RO	FFE	RP	NA	DF	DC/ RE	ND	
All Classes		206		100							
LILW-LL		146		100							
LILW/ SL		60		100							

NEWMDB waste origin type codes:
RO – reactor operations
FFE – fuel fabrication & enrichment
RP – fuel reprocessing
NA – nuclear applications
DF - defence
DC/RE - decommissioning & remediation
ND - Not Determined

Table 2 Radioactive Waste Disposed (as disposed volume)

Waste Class	Processed (not)	Total Volume (m3)	Distribution (%)							Disposal Route Used
			RO	FFE	RP	NA	DF	DC/RE	ND	
All Classes		0								

Table 3 Spent fuel in Storage (MTHM)

Type	Current Amount (NPP)	Current Amount (Research Reactors)
Total Spent Fuel Storage	0	0
Wet storage (AR)	0	0
Wet storage (AFR)	0	0
Dry storage (AR)	0	0
Dry storage (AFR)	0	0
Total spent fuel held in storage for other countries (amounts also included above)	0	0

Table 4 Spent fuel sent for reprocessing (in the country or sent to another country) (MTHM)

Type	Current Amount (NPP)	Current Amount (Research Reactors)
Total amount Spent Fuel sent to	0	0

Reprocessing (in your country)		
Total amount Spent Fuel sent to Reprocessing (in another country)	0	0
Total amount of Spent Fuel received from another country for reprocessing and recycling	0	0
Total amount of Spent Fuel (MTHM) or radioactive waste (cubic metres) returned to country of origin for storage/disposal	0	0

Table 5 Example of a translation matrix (from NEWMDB) that can be used for transition from a national classification system to IAEA classification

National Waste Classification Name	**VLLW**	**LILW**	**ILW**	**HLW**

Table 6 Waste management facilities

Type	**Planned**	**Construct.**	**Commiss.**	**In Operation**	**Shutdown**	**Decomm.**	**Other**	**Total**
Spent Fuel Storage	0	0	0	0	0	0	0	
Spent Fuel Reprocessing and Recycling	0	0	0	0	0	0	0	
Spent Fuel Conditioning	0	0	0	0	0	0	0	
Spent Fuel disposal	0	0	0	0	0	0	0	
Waste processing	0	0	0	0	0	0	0	
Waste storage	0	0	0	2	0	0	0	
Waste disposal	0	0	0	0	0	0	0	

Table 7 Summary of major sources of waste

Type	Planned	Construct	Commiss.	In Operation	Shutdown	Decomm.	Other	Total
Research reactors	1	0	0	1	0	0	0	0
Nuclear Power reactors	6	2	0	0	0	0	0	0
Spent Fuel Reprocessing and Recycling	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0

Table 8 Future prospects

Type	Current amount	Estimated Current amount when prepared for disposal	Current Disposal Capacity	Total forecast at 2030	Disposal Capacity 2030	Total forecast at 2050	Disposal Capacity 2050
Spent Fuel Storage							
Wet storage (AR)							
Wet storage (AFR)							
Dry storage (AR)							
Dry storage (AFR)							
Total amount Spent fuel sent to Reprocessing and Recycling							
Total amount Spent fuel disposed							
Waste in storage							
Waste disposal							