Republic of Korea

(based on JC national report and NEWMDB country profiles)

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

Since the commencement of the first commercial operation of Kori Unit 1 in April 1978, 23 units of NPPs are commercially operating. Four units out of the 23 operating NPPs are Pressurized Heavy Water Reactors (PHWRs) at Wolsong site. The remaining units are located at Kori, Yonggwang and Ulchin sites are Pressurized Light Water Reactors (PWRs). Spent fuel generated from NPPs has been stored in spent fuel storage pools at reactors or on-site dry storage facility. The low and intermediate level radioactive waste (LILW) generated from the NPPs has been stored at on-site radioactive waste storage facilities. All fuels for the domestic NPPs are fabricated by the Korea Nuclear Fuel Co., Ltd. (KNF) in Daejeon. The radioactive waste generated from fabrication process is stored at on-site radioactive waste storage facilities. Korea Radioactive Waste Agency (KORAD) is responsible for interim storage and the final disposal of spent fuel.

In addition, the number of user licensees utilizing radioactive materials in medicine, research work and industry has increased steadily to nearly 6,000. These facilities are located throughout the country and generate various types of radioactive waste. Radioisotope (RI) contaminated waste from these facilities is stored at the Radioisotope Waste Facility of Korea Radioactive Waste Agency (KORAD). At the end of 2014, about 3,207 drums (200 liter/drum) of RI waste were stored.

The national policy for radioactive waste management is determined by the Atomic Energy Commission (AEC). The 249th meeting of the AEC, which was held in Sept. 1998, developed a "National Radioactive Waste Management Policy". The summary of the national policy statements on radioactive waste management includes the following:

- Direct control by the government;
- Top priority under safety;
- Minimization of radioactive waste generation;
- "polluter pays" principle;
- Transparency of site selection process.

The Enforcement Decree of the Nuclear Safety Act defines high level radioactive waste (HLW) as the radioactive waste, of which the radioactive concentration and the heat release rate are higher than levels prescribed by the Nuclear Safety and Security Commission (NSSC). LILW means the radioactive waste other than the HLW. LILW is defined to be categorized by its radioactivity in the Enforcement Decree of the NSA and the details regarding LILW sub-categorizations are described in the NSSC Notice. According to this Notice, LILW is classified

into three sub-categorizations: very low level radioactive waste (VLLW), low level radioactive waste (LLW) and intermediate level radioactive waste (ILW).

b) National legal and regulatory framework

National laws related to the safety of spent fuel and radioactive waste management are the Nuclear Safety Act (NSA), the Radioactive Waste Management Act (RWMA), the Environmental Impact Assessment Act and others. More specifically, the nuclear safety and regulatory system of Korea is composed of the NSSC as a regulatory authority, Korea Institute of Nuclear Safety (KINS) as an expert organization for nuclear safety, and Korea Institute of Nuclear Non-proliferation and Control (KINAC) for nuclear control.

c) Radioactive waste management, decommissioning and spent fuel strategy

All spent fuels generated in Korea have been stored in a safe manner and the disposal of spent fuel has not been implemented yet. For decision of spent fuel strategy, the Public Engagement Commission on Spent Nuclear Fuel Management was launched in 2013, a Public Engagement Recommendation Report was submitted by this Commission in 2015. The Korean government is developing a national policy for spent fuel management and according to this Public Engagement Recommendation Report.

In accordance with the principle of laying the financial responsibility on those who have generated radioactive waste, the NPP operator accumulates the cost for radioactive waste management as an in-house liability, and other licensees pay the management cost when transferring radioactive waste to the KORAD.

For permanent disposal of LILW, the Wolsong LILW Disposal Center (WLDC) was operated in 2014 by the KORAD, and capacity of this facility is 100,000 drums. The KORAD also applied license for 2nd stage construction of LILW disposal facility based on the engineered near-surface disposal method, and this facility is being reviewed by the NSSC and KINS.

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	Yes	27331	27331	68	3	0	28	0	1	0	
LLW	Yes	27331	27331	68	3	0	28	0	1	0	

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										
LLW										

Table 3 Spent fuel in Storage (MTHM)

Type	Current Amount (NPP)	Current Amount (Research Reactors)
Total Spent Fuel Storage	13808	4.18
Wet storage (AR)	8900	4.18
Wet storage (AFR)		
Dry storage (AR)	4908	
Dry storage (AFR)		
Total spent fuel held in storage for other countries (amounts also included above)		

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 Reprocessing (in your country)		
Total amount Spent Fuel sent to		

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

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**	**LLW**	**ILW**	**HLW**
HLW	0	0	0	100
LILW	0	90	10	0

Table 6 Waste management facilities

Type	**Planned**	**Construct.**	**Commiss.**	**In Operation**	**Shutdown**	**Decomm.**	**Other**	**Total**
Spent Fuel Storage				24				
Spent Fuel Reprocessing and Recycling				0				
Spent Fuel Conditioning								
Spent Fuel disposal								
Waste processing				1				
Waste storage				20				
Waste disposal				1				

Table 7 Summary of major sources of waste

Type	**Planned**	**Construct**	**Commiss.**	**In Operation**	**Shutdown**	**Decomm.**	**Other**	**Total**
Research reactors		1		1		2		4
Nuclear		6		23				29

Power reactors								
Spent Fuel Reprocessing and Recycling								
Other								

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	13808		19095	26574	0	35907	0
Wet storage (AR)	8900		12858				
Wet storage (AFR)							
Dry storage (AR)	4908		6237				
Dry storage (AFR)							
Total amount Spent fuel sent to Reprocessing and Recycling							
Total amount Spent fuel disposed							
Waste in storage	27331		30315	56000	105000	100000	160000
Waste disposal							