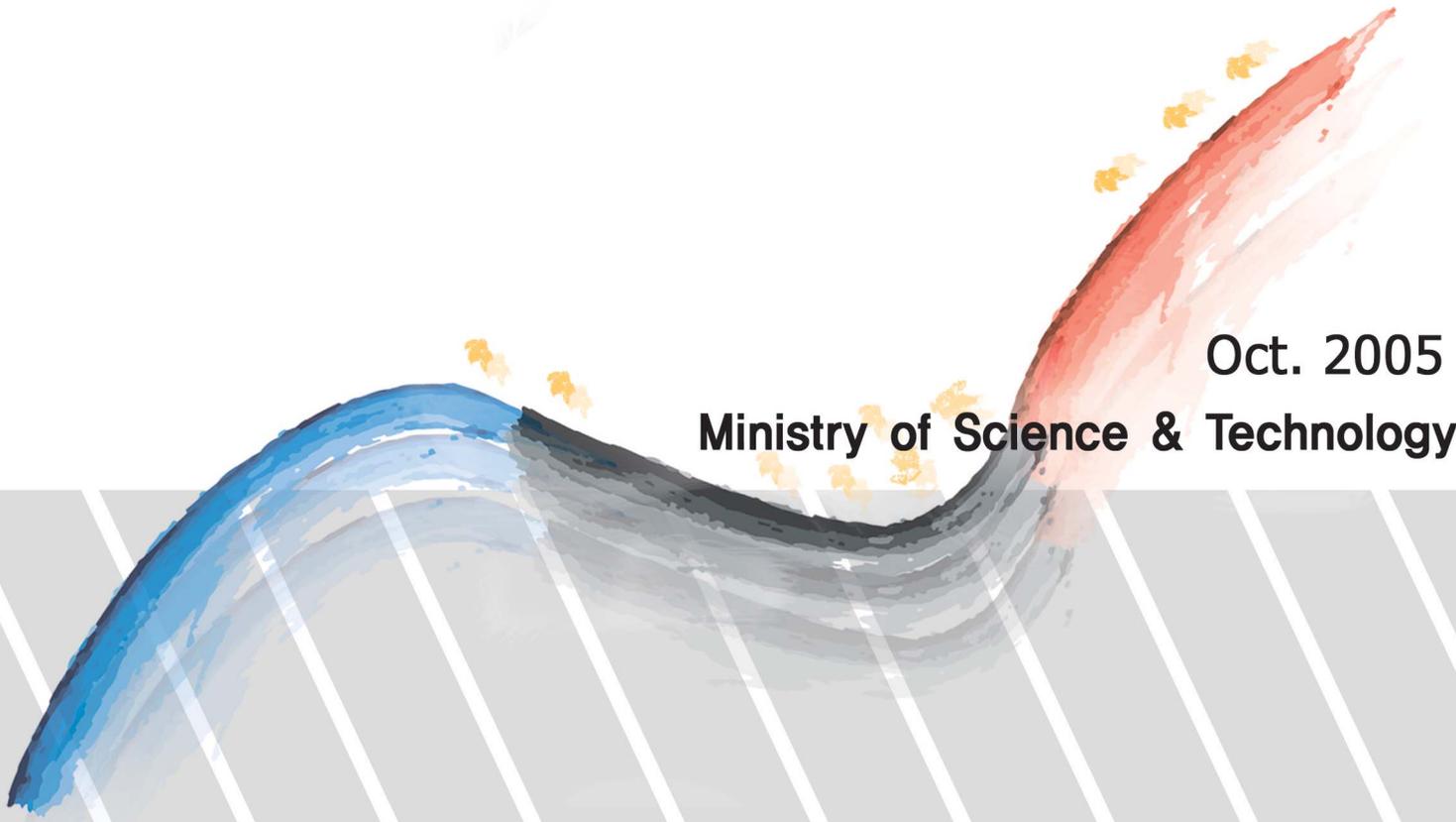




Korean second national report under the Joint Convention on the safety of spent fuel management and on the safety of radioactive waste management

Korean implementation of the obligations of the Joint Convention
Second Review Meeting, 15-26 May 2006



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Ministry of Science & Technology



The Republic of Korea

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FOREWORD

The government of the Republic of Korea, as a contracting party to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (hereinafter referred to as 'Joint Convention') which entered into force on June 18, 2001, and deposited the ratification of on September 16, 2002, described the state of implementing the contracting party's obligations in the Second National Report, pursuant to Article 32 ("Reporting") of the Joint Convention.

This National Report was prepared in accordance with the "Guidelines Regarding the Form and Structure of National Reports" under the Joint Convention reflecting the observations given in the Summary Report of the First Review Meetings. Revised and added parts as compared with the First National Report are highlighted in bold and italics. This Report maintains the structure of article-by-article approach based on every implementation of obligations contained within the topical arrangement of the Joint Convention. The cutoff date of this national report preparation was December 31, 2004, otherwise specified in the report.

Facilities covered in this National Report are the civilian facilities and its land, buildings and equipment in which spent fuel and radioactive waste were handled, processed, treated, stored or disposed of on such a scale that consideration of safety is required under the jurisdiction of the Republic of Korea as defined in Article 2 and 3 of the Joint Convention.

This National Report was drafted by the "Working Group for the Implementation of the Joint Convention" organized by the Ministry of Science and Technology and Korea Institute of Nuclear Safety. This Report was reviewed by relevant governmental and industrial organizations, and deliberated over by Radiation Protection Sub-Committee of the Nuclear Safety Commission.

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List of Abbreviations

AEA	Atomic Energy Act
AEB	Atomic Energy Bureau
AEC	Atomic Energy Commission
ADU	Ammonium Di-Uranate
AFR	Away From Reactor
AR	At Reactor
AUC	Ammonium Uranyl Carbonate
ALARA	As Low As is Reasonably Achievable
CANDU	Canadian Deuterium
DAW	Dry Active Waste
DECOMIS	Decommissioning Information System
EBA	Electricity Business Act
ECL	Effluent Control Limit
EOC	Emergency Operation Center
HANARO	High Advanced Neutron Application Reactor
HLW	High-Level Radioactive Waste
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
IMEF	Irradiated Material Examination Facility
INES	International Nuclear Event Scale
KAERI	Korea Atomic Energy Research Institute
KEPCO	Korea Electric Power Corporation
KHNP	Korea Hydro & Nuclear Power Co., Ltd.
KINS	Korea Institute of Nuclear Safety
KISOE	Korea Information System on Occupational Exposure
KIRAMS	Korea Institute of Radiological & Medical Science
KNFC	Korea Nuclear Fuel Co., Ltd.
KOPEC	Korea Power Engineering Co., Inc.
KPS	Korea Plant Service & Engineering Co., Ltd.
KRIA	Korea Radioisotopes Association
KRR	Korea Research Reactor

LEMC	Local Emergency Management Center
LILW	Low and Intermediate Level Radioactive Waste
LWR	Light Water Reactor
MES	Radioactive Waste Management System
MOCIE	Ministry of Commerce, Industry and Energy
MOCT	Ministry of Construction and Transportation
MOE	Ministry of Environment
MOGAHA	Ministry of Government Administration and Home Affairs
MOL	Ministry of Labor
MOST	Ministry of Science and Technology
NEMC	National Emergency Management Committee
NETEC	Nuclear Environment Technology Institute
NPP	Nuclear Power Plant
NSC	Nuclear Safety Commission
OEMC	Off-site Emergency Management Center
PWR	Pressurized Water Reactor
PHWR	Pressurized Heavy Water Reactor
PIEF	Post-Irradiation Examination Facility
PNSC	Plant Nuclear Safety Committee
PSR	Periodic Safety Review
PWR	Pressurized Water Reactor
RI	Radioisotope
RIPF	Radioisotope Production Facility
RAWMIS	Radioactive Waste Management Information System
SFSP	Spent Fuel Storage Pool
SITES	Site Information & Total Environmental Database Management System
SSC	Site Selection Committee
URT	Underground Research Tunnel
WACID	Waste Comprehensive Information Database

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A. Introduction

The Korean government has maintained a consistent national policy for stable energy supply by fostering nuclear power industries under the insufficient energy resources in the country. Nuclear power reached approximately 40 % of total domestic electricity generation.

Since the commencement of the first commercial operation of Kori Unit 1 in April 1978, 20 units of NPPs are commercially operating as of October 2005. Four units out of the 20 operating NPPs are Pressurized Heavy Water Reactors (PHWRs) at Wolsong. The 16 units located in Kori, Yonggwang, and Ulchin are Pressurized Light Water Reactors (PWRs). The spent fuels generated from these NPPs are stored in spent fuel storage pools at the reactors or an on-site dry storage facility. The low and intermediate level radioactive wastes (LILW) generated from the NPPs are stored at the on-site radioactive waste storage facilities.

Only one research reactor is now in operation: the HANARO reactor at the Korea Atomic Energy Research Institute (KAERI) located in Daejeon. Its operations commenced in 1995 and it has thermal power of 30 MW. The two research reactors, KRR-1 & 2, located at the former KAERI site in Seoul, were shut down and the reactors and the auxiliary facilities have been decommissioned since 1997.

All fuels for the domestic NPPs are being fabricated at Korea Nuclear Fuel Co., Ltd. (KNFC) in Daejeon. The radioactive wastes generated in the course of conversion and fabrications are stored at the on-site radioactive waste storage facilities. Also, the number of facilities utilizing radioactive materials in medicine, research work and industry has increased steadily to reach about 2500 as many. These facilities are located wide spread throughout the country and generate various types of radioactive waste. The radioisotope (RI) - contaminated wastes from these facilities are stored in the RI storage facility at Nuclear Environment Technology Institute (NETEC) of Korea Hydro & Nuclear Power Co., Ltd. (KHNP), in Daejeon.

The Korean government has striven to secure the disposal site for safe management of radioactive waste since early 1980s. The 249th meeting of Atomic Energy Commission (AEC) held in September 1998, developed “National Radioactive Waste Management Policy” aiming to construct and operate a LILW disposal facility by 2008 and a centralized spent fuel interim-storage facility by 2016; however the site selection had not been successful yet. Therefore, revision of the policy was made at 253rd meeting of AEC held on December 17, 2004, that the construction and operation of LILW disposal facility would be accomplished by 2008, and but the national policy for spent fuel management including construction of the centralized spent fuel interim-storage facility was to be decided in the view of the domestic and international technology development later on.

The locations and operational status of major radioactive waste generation sources and management facilities in Korea are shown in Figure A.1-1.

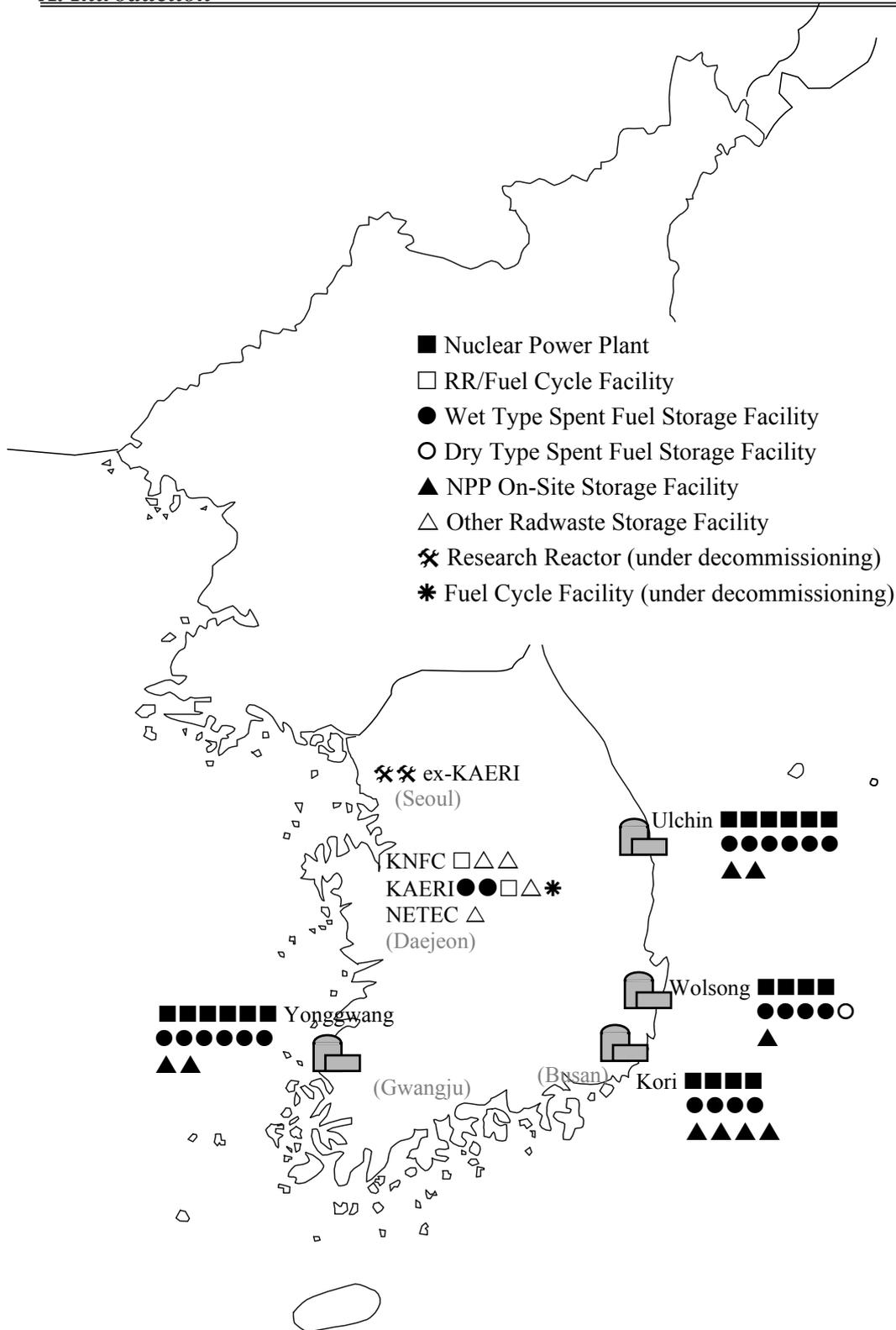


Figure A.1-1 Locations and operational status of major radioactive waste generation sources and management facilities (as of October 2005)

B. Policies and Practices (Article 32, Paragraph 1)

ARTICLE 32. REPORTING

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 National policy and principles

B.1.1 National policy

The Atomic Energy Commission (AEC) of the Korean government developed the “National Radioactive Waste Management Policy” at the 249th meeting held on September 30, 1998. The policy stipulates that the site selection process for radioactive waste repository shall be managed transparently, and the government shall explain to public about its will for securing safety during site selection process. The summary of the national policy statements includes the following;

Direct control by the government

Radioactive waste, which needs long-term safe management, shall be managed under the responsibility of the government.

Top priority under safety

Radioactive waste shall be safely managed in due consideration of biological and environmental impact so as to protect the individuals, society and the environment from the harmful effects of radiation and to observe international norms on the safety of radioactive waste management.

Minimization of radioactive waste generation

Radioactive waste generation shall be minimized.

B. Policies & Practices

“Polluter pays” principle

The expenses related to radioactive waste management shall be levied on the radioactive waste generator at the point of radioactive waste generation, without imposing undue burden on future generations.

Transparency of site selection process

Radioactive waste shall be managed transparently and openly, and the radioactive waste management project shall be promoted with regard to harmony with the local community, and to community development.

B.1.2 Fundamental principles

The 253rd meeting of AEC held on December 17, 2004, changed the “National Radioactive Waste Management Policy” regarding the disposal facility. The construction and operation of the LILW disposal facility shall be initiated first to secure the LILW disposal facility at the appropriate time. It will include the democratic and transparent site selection process and the enactment of the local community support. The summaries of the new policy are as follows

- The LILW should be stored at the existing radioactive waste storage facilities on NPP sites or at the RI storage facilities at first, and then shall be disposed of in either near surface repository or rock cavern repository. The construction and operation of one or two radioactive waste disposal facilities shall be accomplished by 2008.*
- The national policy for spent fuel management will be decided at a later date, with consideration given to the domestic and international technology development.*

B.1.3 Implementation plans

Organizations in charge

As a pertinent ministry for the safe and effective management of radioactive waste, the Ministry of Commerce, Industry and Energy (MOCIE) has the responsibility of establishing basic policies and project implementation plans for the storage, treatment and disposal of radioactive waste. These policies and plans shall be implemented by MOCIE under the review and approval of AEC.

The minister of MOCIE shall appoint either NPP operator or nuclear related organization established by special law, to perform the storage, treatment, and disposal activities for the radioactive wastes which are above the clearance level from generators of radioactive waste.

Regulations, codes of practice, and standards

The Ministry of Science and Technology (MOST) together with the Korea Institute of Nuclear Safety (KINS) develops regulations and codes of practice needed for the safe management of spent fuel and radioactive waste. Specific guidelines may be formulated by the operating organization, the KHNP. Domestic regulations and codes shall be consistent with international norms including relevant Safety Fundamentals, Safety Principles, and Safety Guides provided by the IAEA.

Interim storage for spent fuel

Spent fuel generated in NPPs has been stored within each plant by expanding the storage capacity. With the consideration of the sufficiency of spent fuel storage capacity beyond 2016, the national policy for spent fuel management including the construction of the interim storage facility for spent fuel shall be decided in a timely manner through national consensus by public consultation among stakeholders.

Radioactive waste repository

The LILW generated from NPPs have been stored in the temporary storage facilities within the site of plants until the permanent disposal facility is constructed. The RI wastes from industries, research facilities, medical industries etc., have been stored in the NETEC storage facility. A near surface repository (including rock cavern type) for the LILW shall be constructed by the year of 2008. Initially, the facility will be constructed with a capacity of 100,000 drums on the basis of 200L drum, and an expansion will be considered based on demand (total estimated capacity: 800,000 drums).

Radioactive waste management fund

In accordance with the Electricity Business Act, the NPP operators should bear the cost to dispose radioactive waste generated from its facilities and non-NPP operators should pay for their radioactive waste when they deliver the waste to the Nuclear Waste Management Business Operator. In this regard, the NPP operators should appropriate the post-NPP disposal reserve and non-NPP operators are recommended to accumulate disposal expenses as well.

Stakeholders' involvement

To promote residents' acceptance, the Korean government has promulgated a "Special Act on Supporting the Local County Around LILW Disposal Facility" on March 31, 2005. As for clear and fair process of site selection, Site Selection Committee (SSC), consisting of 17 members, shall manage the overall site selection process. Every aspect of the site selection plan, site investigation result, and site selection process shall be carried out in an openly manner. Finally, site selection shall be done by a local referendum after plenty of explanation to the public and discussion among stakeholders.

B.2 Spent fuel management practices

B.2.1 Nuclear power plants

Spent fuel generated from NPPs is stored in the spent fuel storage facility in each unit. The storage capacity for spent fuel has been expanded as a consequence of the delayed schedule for construction of the Away-From-Reactor (AFR) interim storage in accordance with the 249th meeting and the 253rd meeting of AEC. For PWR reactor, Kori unit 3 and Ulchin units 1 and 2 have already expanded their storage capacity by adopting high-density storage racks. Kori unit 4 and Yonggwang units 1, 3 and 4 will also expand their storage capacity by adopting high-density storage racks. As Kori units 1 and 2 encountered a shortage of the spent fuel storage capacity, spent fuel which was in excess of the SFP storage capacity was transshipped to the excess spent fuel pools of neighboring Kori units 3 and 4. For the PHWRs at the Wolsong site, an on-site dry storage facility has been constructed and additional expansion will be the scheduled to resolve the shortage of capacity of the spent fuel pools of Wolsong units 1, 2, 3 and 4.

B.2.2 Research facilities

Korea research reactor (KRR-1 & 2)

All of the 299 spent fuel rods from the KRR-1 & 2 in storage were sent back to the USA in June 1998, as decommissioning projects of the research reactors were undertaken.

HANARO research reactor

HANARO research reactor is equipped with a spent fuel pool capable of storing spent fuels from 20 years operation of HANARO. The spent fuel pool in HANARO can store spent fuels from HANARO operation and test fuels which have been irradiated at HANARO and have taken post-irradiation examinations.

Post-irradiation examination facility (PIEF)

In the post-irradiation examination facility (PIEF), a water pool is equipped for storing up to 20 PWR spent fuel assemblies. The spent fuels transported from the NPPs for post-irradiation examination are stored in the fuel storage pool of PIEF. The examination is carried out in the PIEF hot cells and the remaining parts of the fuel after post-examination are packed in a rod cut container and stored in the pool.

B.3 Radioactive waste management practices

B.3.1 Nuclear power plants

Gaseous radioactive waste management

Gaseous radioactive waste is mainly generated from the degassing of the primary system and ventilation systems for the radiation controlled area in NPPs. The gaseous waste from the primary system shall be treated by gas decay tank or charcoal delay bed to reduce radioactivity and released into the atmosphere through a radiation monitor. Gaseous waste from the building ventilation system is also to be exhausted through a high-efficiency particulate filter and charcoal filter under continuous monitoring into the environment.

The Notice of the MOST addresses the maximum radioactivity concentration limits (i.e. ECL) for gaseous effluent being released into the atmosphere on the restricted area boundary. The licensee shall conduct a periodic evaluation for the expected off-site dose due to gaseous effluent released into the environment, and routinely report results to the regulatory body. The off-site dose limit related to the release of gaseous waste is specified in Subsection F.4.3.

Liquid radioactive waste management

Liquid radioactive waste is mainly generated from the cleanup and maintenance process of reactor coolant and related systems containing radioactivity. In general, liquid radioactive waste is treated with evaporators, demineralizers, and/or filters. The effluent is either reused in the plant systems or released to the sea after monitoring. The Korean Standard Nuclear Power Plant is furnished with a selective ion exchange system instead of an evaporator to increase efficiency in the treatment of liquid radioactive waste.

The Notice of the MOST prescribes the maximum radioactivity concentration limits (i.e. ECL) for liquid effluent being discharged into the environment on the restricted area boundary. The operators shall conduct periodic assessments for the expected off-site dose due to the liquid effluent discharged into the environment, and routinely report results to the regulatory body. The off-site dose limit related to the discharge of liquid effluents is also specified in Subsection F.4.3.

Solid radioactive waste management

Most solid radioactive waste consists of dry active waste (DAW) and secondary process waste. The DAW is generated during maintenance and repair of contaminated systems and includes items such as used parts, papers, used clothes, gloves, shoes, etc. Secondary waste is generated from the liquid and gaseous radioactive waste treatment system and included concentrated wastes from evaporators, spent resin from demineralizers, and spent filters from liquid purification systems.

The DAW is compressed by a conventional compactor (capacity: 10 tonne) into drums. Additional volume reduction of the DAW can be achieved with a super-compactor (capacity: 2000 tonne). Solidification by cement, which was commonly applied in the past, is not used any longer. Instead, the concentrated waste is now dried and stabilized by paraffin in drums and spent resin is kept in a high-integrated or equivalent container, after drying in the spent resin drying facility. Spent filters are stored in a shielding container.

B.3.2 Research facilities

The KAERI has several facilities where radioactive materials are handled, such as HANARO research reactor, PIEF, radioisotope production facility (RIPF), irradiated material examination facility (IMEF), nuclear fuel fabrication facility for research reactor, and other laboratories. Additionally, it operates a radioactive waste treatment facility for the treatment and a storage facility of radioactive waste.

Gaseous radioactive waste management

In every facility, a ventilation system is equipped with filters to treat off-gas before its release to the atmosphere. The stacks of such facilities, that is, the final outlets, have a continuous air monitor. When the radioactivity concentration in off-gas exceeds the internal guidelines, the operation of the ventilation system should be stopped to keep the public dose rate lower than the target limits.

Liquid radioactive waste management

The liquid waste generated from each facility of the KAERI is transferred through an underground pipeline to a collection tank of the radioactive waste treatment facility, and all the waste is evaporated and the resulted condensate is processed in a solar evaporation facility. No liquid waste is directly discharged to the environment.

Solid radioactive waste management

The solid radioactive waste, generated from each facility at KAERI, except the spent fuels, is transferred to the radioactive waste treatment and storage facilities. Solid radioactive waste with a higher radiation dose rate than the internal guidelines is packed in 50L stainless steel drums, and kept in a concrete monolith with adequate shielding capacity. Solid radioactive waste with a radiation dose rate below the internal guidelines is packed in 200L steel drums with compaction of the waste, and kept in the storage facility.

B.3.3 Nuclear fuel fabrication facility

Gaseous radioactive waste management

Any radioactive materials from gaseous radioactive effluent shall be treated through a filter in the ventilation system before its release through the stack to the outside environment. As usual, gaseous radioactive waste is properly controlled so that the resulting off-site exposure dose may not exceed the regulatory limits by the blockage of release if there is any excess of the preset limits, under continuous monitoring of radioactivity within gaseous effluent.

Liquid radioactive waste management

Liquid waste is separated into two kinds of waste; one is PWR type waste from the PWR fuel fabrication facility and the other is PHWR type waste from the PHWR fuel fabrication facility. They are treated by several treatment systems such as lime precipitation, polymer coagulation, and/or centrifugation in accordance with their characteristics. The treated liquid waste below release limits is allowed to batch-wise discharge. Data such as discharge volume, and release amounts of radioactivity are recorded and maintained.

Solid radioactive waste management

Most solid waste from the fuel fabrication facility consists of protective articles such as clothes, gloves, metals generated during facility repair, and lime deposits. They are classified into miscellaneous wastes, metals, synthetics, lime deposits, wood, glass, etc., and packed in 200L steel drums. The drums are stored in the waste storage facility, after measuring radioactivity, weight, surface contamination level, and radiation dose rate for each package.

B.3.4 Radioisotope waste storage facility

Radioisotopes are used in two forms; sealed source and open source. Open source waste is classified into combustibles, incombustibles, non-compactable, spent filters, animal carcasses, organic liquids waste, and inorganic liquids waste. Of all waste generated by RI users, open source waste is collected and delivered to the NETEC of the KHNP by the Korea Radioisotopes Association (KRIA), while the disused sealed source waste is directly delivered by RI users, or through an consignment agency, to the NETEC. The NETEC stores and safely manages the RI waste in the RI waste storage facility.

In order to improve the storage efficiency of the RI waste storage facility, part of the RI waste in storage is treated for volume reduction. The incombustible wastes like glass are compacted. The very low-level, combustible waste and organic liquid waste are incinerated. *For the safe and efficient storage, some disused sealed sources are stored in a special container after separating the source part from the source canister.*

B.4 Definition and classification of radioactive waste

The Atomic Energy Act (AEA) defines “Radioactive Waste” as radioactive materials or materials contaminated with radioactive materials which are the object of disposal, including spent fuel. The Enforcement Decree of the AEA defines high-level radioactive waste (HLW) as radioactive waste with radioactivity and heat generation over the limit value specified by the MOST. In strict, others than HLW belong to the LILW in accordance with the AEA. The limit value on radioactivity and heat generation is specified in the MOST Notice (Criteria for Radiation Protection, etc.) as follows:

- Radioactivity : $\geq 4,000$ Bq/g for emitting nuclide having a half life longer than 20 years
- Heat Generation : ≥ 2 kW/m³

Until 1998, waste classification based on IAEA Technical Report Series No. 101 (1970) had been applied. In August 1998, the criteria for radioactive waste classification was amended with a view to emphasizing radioactive waste disposal safety as above, in due regard to the IAEA revised classification system of IAEA Safety Series No.111-G-1.1 (1994).

The AEA also defines the clearance level adopted from the “exempt waste” concept of the IAEA radioactive waste classification. The clearance levels in Korea such that annual individual dose shall be below 10 μ Sv/y, and the total collective dose be below 1 person-Sv/y concurrently. These are identical to the levels specified in IAEA Safety Series No. 115 (1996).

C. Scope of Application (Article 3)

ARTICLE 3. SCOPE OF APPLICATION

1. This Convention shall apply to the safety of spent fuel management when the spent fuel results from the operation of civilian nuclear reactors. Spent fuel held at reprocessing facilities as part of a reprocessing activity is not covered in the scope of this Convention unless the Contracting Party declares reprocessing to be part of spent fuel management.
2. This Convention shall also apply to the safety of radioactive waste management when the radioactive waste results from civilian applications. However, this Convention shall not apply to waste that contains only naturally occurring radioactive materials and that does not originate from the nuclear fuel cycle, unless it constitutes a disused sealed source or it is declared as radioactive waste for the purposes of this Convention by the Contracting Party.
3. This Convention shall not apply to the safety of management of spent fuel or radioactive waste within military or defense programmes, unless declared as spent fuel or radioactive waste for the purposes of this Convention by the Contracting Party. However, this Convention shall apply to the safety of management of spent fuel and radioactive waste from military or defense programmes if and when such materials are transferred permanently to and managed within exclusively civilian programmes.
4. This Convention shall also apply to discharges as provided for in Articles 4, 7, 11, 14, 24 and 26.

C.1 Application of Joint Convention

Under the application of the Joint Convention, the radioactive waste applied in this national report is defined in accordance with the AEA and its related technical standards. The spent fuels and radioactive wastes generated from commercial nuclear power plants, the research reactor facilities, the nuclear fuel cycle facility, and the RI users are covered in the National Report.

The definition and classification of radioactive waste is specified in Section B.4.

C.2 Reprocessing of Spent Fuel

The national policy for the spent fuel management will be decided later in consideration of the domestic and international technology development. Therefore,

C. Scope of Application

under Article 3.1 of the Joint Convention, reprocessing activities of spent fuel are not described in the National Report, because those activities have not been conducted in Korea.

C.3 Naturally Occurring Radioactive Materials

Under Article 3.2 of the Joint Convention, the National Report includes the naturally occurring radioactive materials (NORMs) originating from the nuclear fuel cycle, but does not apply to the NORMs originating outside the nuclear fuel cycle.

C.4 Radioactive Wastes within Military or Defense Programs

Pursuant to Articles 3.2 and 3.3 of the Joint Convention, radioactive waste within military or defense programs are not declared as radioactive waste for the purpose of the Joint Convention. But the RI wastes transferred to the RI storage facility from the military use are incorporated in the inventory of the National Report.

D. Inventories and Lists (Article 32, Paragraph 2)

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 Spent fuel management

D.1.1 Nuclear power plants

Spent fuel discharged from reactors is stored in the spent fuel pool in each reactor unit for a certain period, and the on-site storage capacity is expanded. Annex A-1 represents the location and characteristics of spent fuel storage facilities in each plant.

As of December 2004, spent fuel inventories for PWRs and PHWRs are 3397 MTU and 3889 MTU, respectively. The inventories, initial enrichment of fuel and types of spent fuel in storage are as given in Table D.1-1.

D.1.2 Research facilities

HANARO research reactor

The HANARO is a multi-purpose research reactor with the main object of its use for

Table D.1-1 Inventory of spent fuels stored in NPPs (as of December 2004)

NPP	Type	Volume stored (MTU)	Initial enrichment (w/o)	Fuel type
<i>Kori Site</i>	<i>wet</i>	<i>1415</i>	<i>3.4 4.2</i>	<i>PWR</i>
<i>Yonggwang Site</i>	<i>wet</i>	<i>1140</i>	<i>3.8 4.4</i>	<i>PWR</i>
<i>Ulchin Site</i>	<i>wet</i>	<i>842</i>	<i>3.8 4.4</i>	<i>PWR</i>
<i>Wolsong Site</i>	<i>wet and dry</i>	<i>3889</i>	<i>natural uranium</i>	<i>CANDU</i>

fuel performance testing, material irradiation testing, RI production, basic science and applications study, and is currently in use for various research and development activities.

The spent fuel storage pool of HANARO is a heavy concrete structure, of which the inside is lined with stainless steel plate. The vault comprises three storage lattices. The vault has enough capacity for temporarily storing new fuel as well as spent fuel to be generated during normal operation of HANARO for 20 years. Annex A-2 represents the location and characteristics of the spent fuel storage pool at HANARO.

The inventories and types of spent fuel stored at HANARO are as given in Table D.1-2.

Post-irradiation examination facility (PIEF)

The PIEF was constructed for the purpose of performance testing and evaluation for fuels irradiated in NPPs. It is equipped with pool and hot cell facilities to examine irradiated PWR fuel assemblies and fuel rods. Examinations for other types of nuclear fuels including PHWR fuel can be conducted in hot cell and pool test facilities whenever deemed to be necessary.

The PIEF consists of 3 pools, 4 concrete hot cells, 2 lead hot cells, and supporting installations. *Annex A-3 represents the location and characteristics of the spent fuel storage pool at the PIEF.*

As of December 2004, spent fuels from NPP are stored in the PIEF as form of assemblies, spent fuel rods and specimen in order to carry out the post-irradiation examination. Table D.1-2 represents the detailed status of storage and amounts of fissile materials remaining within fuel elements.

**Table D.1-2 Inventory of spent fuels in the storage pool of research facilities
(as of December 2004)**

Category of spent fuel		No. of assemblies	U-235 remained (kg U)
HANARO	36 rod element	156	41.8
	18 rod element	81	11.7
PIEF (Post-Irradiation Examination Facility)	PWR assemblies	9	3192.7
	PWR fuel rods	24	

D.2 Radioactive waste management

D.2.1 Nuclear power plants

Nuclear power plants currently in operation are furnished with gaseous, liquid, and solid waste treatment facilities and on-site storage facilities to ensure the safe management of radioactive waste generated in the process of operation. The gaseous waste treatment system comprises gas decay tanks and/or charcoal delay beds. The liquid waste treatment system is equipped with either liquid waste evaporators or selective ion exchangers. The solid waste treatment facility has spent resin drying systems, spent filter processing and packaging systems, concentrated waste drying systems, and super compactors.

The on-site solid radioactive waste storage facility is a concrete slab-type building with separate storage for wastes according to radioactivity level, and is equipped with a radiation monitoring system. The location and characteristics of these facilities are listed in Annexes B-1 and B-2.

As of December 2004, about 62000 drums of radioactive waste generated from NPPs are stored at the on-site storage facilities. The disposal of radioactive waste has not been implemented yet. Table D.2-1 shows the inventory status of radioactive waste stored at

D. Inventories & Lists

the on-site storage facility.

Table D.2-1 Inventory of radioactive wastes stored in NPPs (as of December 2004)

Facility	Volume [200L drum]	Major radionuclides	Total activity [TBq]
Kori Site	32699	Co-60, Cs-137	4.21E+02
Wolsong Site	4683	Co-60, Cs-137	8.14E+01
Yonggwang Site	12826	Co-60, Cs-137	1.13E+02
Ulchin Site	12260	Co-60, Cs-137	3.10E+02

D.2.2 Research facilities

The KAERI operates a radioactive waste treatment and storage facility for the safe management of liquid and solid radioactive waste generated from research facilities. In Annexes B-3 and B-4, the location and characteristics of the radioactive waste management facilities in KAERI are listed.

All liquid radioactive waste from the KAERI is processed through an evaporation process followed by additional solar evaporation. The liquid concentrate is solidified by bituminization process, and stored in the storage facility. Solid waste is treated for volume reduction with a compactor before storage in the storage facility. This facility is divided into 2 storage units for LILW.

The radioactive wastes generated from KRR-1 and 2 in the former site of the KAERI in Gongneung-Dong, Seoul were solidified in cement and packaged in 200L drums. They were moved to the KAERI in Daejeon in 1985. Since then, these drums have been stored at the radioactive waste storage facility. Table D.2-2 represents the inventory status of radioactive waste in storage together with major radionuclides as of December 2004.

**Table D.2-2 Inventory of radioactive waste stored in the KAERI
(as of December 2004)**

Facility	Volume [drum]		Major radionuclides	Total activity [TBq]
	200L	50L		
<i>Radwaste Storage Building</i>	200L	10973	Mn-54, Co-60, U-238, Cs-137, I-131, etc.	1.2
	50L	115		

D.2.3 Nuclear fuel fabrication facility

Two nuclear fuel fabrication facilities are now in operation; the 1st plant was constructed in 1988 for PWR fuels and the 2nd plant for PHWR/PWR fuels started its commercial operation in 1998. The solid waste treatment and storage concept for the 1st and the 2nd plant are almost the same; the details for storage facility are listed in Annex B-5. However, the liquid waste treatment process for the PWR fuel fabrication facility is different from that of the PHWR fuel fabrication facility as listed in Annex B-6.

As of December 2004, the amount of waste generated from the nuclear fuel fabrication facilities is up to 5310 drums. All of them are stored and managed safely at the on-site waste storage facility. Table D.2-3 shows the inventory of radioactive waste stored at the on-site storage facilities.

**Table D.2-3 Inventory of radioactive waste stored at the KNFC facility
(as of December 2004)**

Facility	Volume [200L drum]	Major Radionuclides	Total Activity [TBq]
<i>Radwaste Storage Building</i>	5310	U-234, U-235, U-238	2.8 E -01

D.2.4 Radioisotope waste storage

The RI waste generated from domestic RI users is collected and stored at the RI waste storage facility. This facility stores 5155 drums of RI wastes as of December 2004 and operates incinerator to treat combustible waste. Annex B-7 lists the location and main characteristics of the RI waste storage facility. Annex B-8 lists the main characteristics of the RI waste storage facility.

Table D.2-4 shows the inventory status of RI waste stored in the RI waste storage facility, as of December 2004.

**Table D.2-4 Inventory of RI wastes in the RI waste storage facility
(as of December 2004)**

Facility	Volume [200L drum]	Major radionuclides	Total activity [TBq]
RI waste storage facility	4963 (unsealed source waste)	I-125, Tc-99m, etc.	1.7E+02
	192 (disused sealed source waste)	Co-60, Cs-137, Am-241, etc.	

D.3 Decommissioning

D.3.1 KRR-1 and 2

Radioactive waste from the decommissioning of KRR-1 and 2 are safely stored in the on-site interim storage area, classifying with its characteristics and radioactivity level. Minimization of waste generation has been an important principle for the whole stage of decommissioning. Therefore, new technologies for decontamination have been employed with wider application for decontamination activities of equipments.

The inventory of radioactive waste generated from KRR-1 and 2 decommissioning activities are given in Table D.3-1. In general, most of wastes are contaminated with Co-60 and Cs-137, except for the small volume of waste activated by neutrons. Annex C shows the list of nuclear facilities in the process of decommissioning and the estimated waste arising.

Table D.3-1 Inventory of radioactive waste stored at the KRR-1 and 2 decommissioning activities

(as of December 2004)

Facility	Volume [200L drum]	Major Radionuclides	Total Activity [MBq]
<i>KRR-1,2 Interim Storage Building</i>	40	Co-60, Cs-137, etc.	1.4 E +02

D.3.2. Uranium conversion facility

The estimated volume of waste from the decommissioning of the uranium conversion facility is 380 m³. All equipments in the facility were contaminated by natural uranium. Also most of waste will be likely to be below clearance level after the decontamination.

As of December 2004, there has been no inventory of radioactive waste produced since actual decontamination and decommissioning work started from the late 2004. The details of nuclear fuel cycle facility in the process of decommissioning and the expected waste arising are as given in Annex C.

D.4 Record keeping and reporting

The nuclear licensee has been maintaining the relevant record on radioactive waste utilizing their own record-keeping system. In accordance with reporting provisions of the AEA, the licensee shall report related radioactive waste-related information as volume and/or amount of both radioactive waste and spent fuel generated on a quarterly basis together with their total accumulations to the KINS. The supplied data and information reported from the nuclear licensee will be confirmed through the regulatory inspection performed on a regular basis.

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E. Legislative and Regulatory Framework

E.1 Implementing measures (Articles 18)

ARTICLE 18. IMPLEMENTING MEASURES

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

The legislative, regulatory and other measures to fulfill the obligations of the Convention are discussed in relevant sections of this report.

E.2 Legislative and regulatory framework (Articles 19)

ARTICLE 19. LEGISLATIVE AND REGULATORY FRAMEWORK

1. Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of spent fuel and radioactive waste management.
2. This legislative and regulatory framework shall provide for:
 - (i) the establishment of applicable national safety requirements and regulations for radiation safety;
 - (ii) a system of licensing of spent fuel and radioactive waste management activities;
 - (iii) a system of prohibition of the operation of a spent fuel or radioactive waste management facility without a 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.

E.2.1 Legislative framework

E.2.1.1 Nuclear legislative framework

National laws related to the safety of spent fuel management and the safety of radioactive waste management are the Atomic Energy Act (AEA), the Electricity Business Act (EBA), the Environmental Impact Assessment Act and others as shown in Table E.2-1. All the provisions on nuclear safety regulation and radiation protection are entrusted to the AEA. The AEA enacted as the main law concerning safety regulations for spent fuel and radioactive waste.

The laws concerning nuclear regulation, as shown in Figure E.2-1, consist of 4 levels: the AEA, the Enforcement Decree of the AEA, the Enforcement Regulations of the AEA (including regulations concerning technical standards of nuclear facilities, etc., and regulations concerning technical standards of radiation safety management), and the Notices of the MOST.

The AEA provides for basic and fundamental matters concerning the development and utilization of nuclear energy and the safety regulation. It includes provisions on the Atomic Energy Commission (AEC), the Nuclear Safety Commission (NSC), the nuclear energy promotion program, the construction permit and operating license of nuclear facilities, and others as shown in Tables E.2-1 and E.2-2. The Enforcement Decree of

the AEA (the Presidential Decree) provides the particulars entrusted by the AEA, and the administrative particulars including the detailed procedures and methods, etc., necessary for the enforcement of the AEA.

The Enforcement Regulation of the AEA (the MOST Ordinances) provides the particulars including detailed procedures, the format of documents, and technical standards, as entrusted by the same Act and the same Decree. The Enforcement Regulations were divided into namely, the Enforcement Regulation of the Act, the Enforcement Regulation Concerning the Technical Standards of Reactor Facilities, etc., and the Enforcement Regulation Concerning the Technical Standards of Radiation Safety Management, etc. *At Last, the Notices of the MOST prescribe regulatory requirements, technical standards and guidelines, as entrusted by the same Act, the same Decree and the same Regulation.*

Atomic Energy Act

The AEA prescribes basic matters on waste safety to be applied to radioactive waste management facilities, as follows:

- *Provisions on the permit for construction/operation of disposal facilities,*
- *Provisions on step-by-step safety inspections related to installment and operations of radioactive waste management facilities,*
- *Provisions on restrictions regarding disposal practices of radioactive wastes including prohibition of dumping into sea,*
- *Provisions on the safe transport and package of radioactive waste, and*
- *Provisions on the establishment and implementation of a basic policy and management program in order to manage radioactive wastes in a safe and efficient manner.*

Enforcement Decree of the Atomic Energy Act

The Enforcement Decree of the AEA (Presidential Decree) specifies the detailed requirements for implementing basic matters on waste safety, referred to in the AEA, as follows:

- *Detailed provisions on application for the permit for construction /operation of radioactive waste management facilities and their alterations,*
- *Detailed provisions on conditions of material accounting and security on specific nuclear materials in nuclear safeguard system,*

Table E.2-1 Laws concerning nuclear regulation

Title	Major Contents	Competent Authorities	Remarks
Atomic Energy Act	Integrated law on the development and utilization of nuclear power and nuclear regulations	MOST	—
Korea Institute of Nuclear Safety Act	Provides the establishment and operation of the Korea Institute of Nuclear Safety	MOST	—
<i>Physical Protection and Radiological Emergency Act</i>	<i>Establishes effectively domestic system of physical protection of nuclear material and nuclear facilities and provides legal and institutional basis for preventing radiological disaster and preparing countermeasures against radiological emergency</i>	MOST	
Nuclear Damage Compensation Act	Provides the procedures and the extent of compensation for any damages which an individual has suffered from a nuclear accident	MOST	—
Nuclear Damage Compensatory Contract Act	Provides the particulars on a contract between the government and the operator to make up any compensation not covered by insurance	MOST	—
Electricity Business Act	Provides the basic system of electricity business	MOCIE	The AEA is entrusted with the particulars on safety regulations for the installation, maintenance, repairs, operation and security of nuclear facilities
Act on Special Cases Concerning Electric Source Development	Provides special cases relevant to the development of electric sources	MOCIE	Prior designation/notice of nuclear site
Basic Law of Environmental Policy	Mother law of the environmental preservation policy	MOE	The AEA is entrusted with the particulars on measures to prevent radiological contamination
Environmental Impact Assessment Act	Provides the extent and procedures to assess environmental impact according to the Basic Law of Environmental Policy	MOE	Assessment of environmental impacts excluding radiological impacts
Fire Services Act	Provides for general matters on the prevention, precaution and the extinguishment of fires	MOGAHA	The requirements for safety management of inflammables
Basic Law of Civil Defense	Provides for general matters on the civil defense system	MOGAHA	Preparedness against disasters due to nuclear accidents is included in the basic civil defense plan
Disaster Control Act	Provides for general matters on the control of man-made disasters	MOGAHA	It prescribes corrective or complementary measures for violations in the implementation of the basic civil defense plan
Industrial Accident Compensation Insurance Act	Provides insurance to compensate workers in case of an industrial disaster	MOL	—
Industrial Safety and Health Act	Provides for the preservation and enhancement of workers' health and safety	MOL	The AEA is entrusted with the particulars on radiological safety
Building Act	Provides for general matters on construction	MOCT	The AEA is entrusted for the particulars on construction permits for a nuclear facility

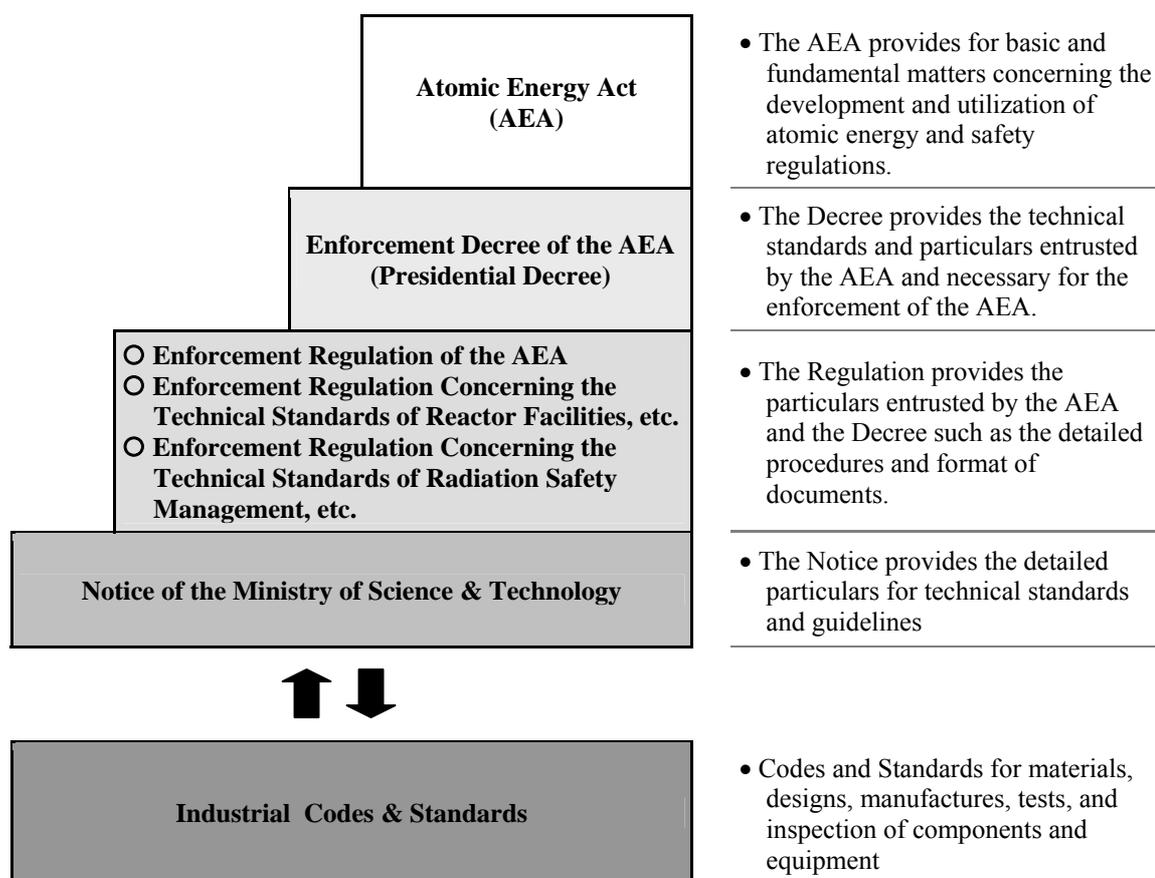


Figure E.2-1 Legal hierarchy of the Atomic Energy Acts

- *Detailed provisions necessary for implementing the regulatory inspections of preoperational inspection, regular inspection, disposal inspection, QA inspection applicable for radioactive management facilities, etc.,*
- *Detailed provisions on the procedures and methods of clearance application of very low level radioactive waste,*
- Detailed provisions necessary for the safe transportation and packaging of radioactive materials, etc.

Ordinance of the Ministry of Science and Technology (MOST)

The MOST Ordinance includes the Enforcement Regulations of the AEA, the Regulation Concerning the Technical Standards of Reactor Facilities, etc., and the

Table E.2-2 Contents of the Atomic Energy Act (AEA)

Title		Major Contents
Chapter 1	General provisions	The purpose of this Act and definitions of the terminology used in this Act
Chapter 2	Atomic Energy Commission and Nuclear Safety Commission	Establishment, functions, and composition of the Atomic Energy Commission and the Nuclear Safety Commission
Chapter 3	Establishment and enforcement of the overall nuclear energy promotion program, research and development, etc., of nuclear energy	Establishment and enforcement of the comprehensive promotion plan for nuclear energy, nuclear energy research and development institution, burden of cost for nuclear energy research and development work
Chapter 3-2	Nuclear energy research and development fund	Establishment, management, and operation of the fund
Chapter 4	Construction and operation of nuclear power reactors and related facilities	Criteria for permits (license), licensing procedures, license application documents to be submitted, regulatory inspection, records and record keeping, appointment (dismissal) and obligation of responsible persons for nuclear reactor operation, notification of suspension or disuse of operation, transfer and inheritance, measures for suspension, and decommissioning
Section 1	Construction of nuclear power reactors and related facilities	
Section 2	Operation of nuclear power reactors and related facilities	
Section 3	Construction and operation of nuclear research reactors, etc.	
Chapter 5	Deleted	Deleted
Chapter 6	Nuclear fuel cycle business and use, etc. of nuclear materials	Criteria for permits (license), licensing procedures, license application documents to be submitted, and regulatory inspection
Section 1	Nuclear fuel cycle business	
Section 2	Use of nuclear materials	
Chapter 7	Radioisotopes and radiation generating devices	Criteria for permits (license), licensing procedures, and regulatory inspection
Chapter 8	Disposal and transport	Permit for construction /operation of radioactive waste management facilities, and regulatory inspections
Chapter 9	Personnel dosimetry service	Approval or permit for personnel dosimetry service and regulatory inspection
Chapter 10	License and examination	License examination and certification of licenses
Chapter 11	Regulation and supervision	Establishment of exclusion area and preventive measures against radiation hazards
Chapter 12	Supplementary provisions	Conditions for permit or designation, approval of report on specific technical subjects, hearing, protection for the individual in charge of safety management, education, and training
Chapter 13	Penal provisions	Penal provisions, fines for negligence, and joint penal provisions
Addenda		Enforcement date, transitional measures, and relations with other laws

Regulation Concerning the Technical Standards of Radiation Safety Management, etc., and prescribes detailed procedures and methods necessary for implementing the AEA and the Enforcement Decree of the AEA, and the detailed technical standards thereof.

- *Detailed provisions on detailed procedures and methods necessary for implementing the AEA and the Enforcement Decree of the AEA, and on the particulars about control and management of radioactive wastes, packaging and transportation of radioactive materials, etc., (Enforcement Regulations)*
- *Detailed provisions on measures related to structure, equipment and performance of radioactive waste processing and storage facilities, etc. for reactor and related facilities, and nuclear fuel cycle facilities, (technical standards of reactors)*
- *Detailed provisions on measures related to radioactive waste management plans in operation for reactor and related facilities, and nuclear fuel cycle facilities, (technical standards of reactors)*
- *Detailed provisions on particulars about facilities, equipments and performance of near surface disposal, geological disposal, spent fuel management facilities, etc. (technical standards of radiation)*
- *Provisions on performance standards for disposal facilities, for example, radiation monitoring, drainage, fire protection, and emergency power systems (technical standards of radiation)*

Notices of the Ministry of Science and Technology

The Notices of the MOST present the detailed technical standards of radioactive waste management specified in the AEA, the Enforcement Decree of the AEA, and the Ordinance of the MOST. Table E.2-3 lists the Notices of the MOST applicable to the safety management of radioactive waste. Among them, the principal notices related to radioactive waste management are listed as follows:

- *Siting Criteria for the Low and Intermediate Level Radioactive Waste Repository*
- *Acceptance Criteria for the Low and Intermediate Level Radioactive Waste Repository*
- *Radiological Protection Criteria for Long-term Safety on the Low and Intermediate Level Radioactive Waste Disposal*
- *Regulation on the Clearance Level of Radioactive Waste, etc.*

E. Legislative & Regulatory Framework

Table E.2-3 Notices of the MOST, applicable to radioactive waste management

<i>Notice No.</i>	<i>Title</i>	<i>Effective date (day/month/year)</i>
90-07	<i>Regulation on the Classification, Collection, and Delivery of Radioisotope Waste</i>	28/08/90
92-17	<i>Quality Assurance Criteria for Radioactive Waste Management Facilities</i>	24/11/92
05-07	<i>Regulation on the Reporting of Events and Accidents of Reactor Facilities</i>	02/05/05
01-19	<i>Regulation on Inspection of Manufacture and Use of Radioactive Material Transport Containers</i>	18/09/01
01-23	<i>Regulation on the Packaging and Transport of Radioactive Materials, etc.</i>	18/09/01
01-30	<i>Regulation on the Clearance Level of Radioactive Waste</i>	28/11/01
01-31	<i>Incineration Criteria of Low and Intermediate level Radioactive Waste</i>	28/11/01
01-33	<i>Acceptance Criteria for Spent Fuel</i>	28/11/01
02-23	<i>Standards on Radiation Protection, etc.</i>	06/01/03
03-09	<i>Siting Criteria for Spent Fuel Interim Storage Facilities</i>	19/07/03
04-17	<i>Regulation on the Environmental Radiation Survey and Impact Analysis in the Vicinity of Nuclear Facilities</i>	13/07/04
04-21	<i>Criteria for Structure and Equipment of Low and Intermediate level Radioactive Waste Repository</i>	09/09/04
04-23	<i>Standard Format and Contents of Site Characteristics Report for Spent Fuel Interim Storage</i>	09/09/04
05-11	<i>Criteria for Structure and Equipment of Low and Intermediate level Radioactive Waste Treatment System</i>	10/06/05
05-12	<i>Technical Requirement for the Operation and Control of Low and Intermediate level Radioactive Waste Repository</i>	10/06/05
05-13	<i>Standard Format and Contents of Safety Analysis Report for Low and Intermediate level Radioactive Waste Repository</i>	10/06/05
05-14	<i>Regulation on Inspection of Radioactive Waste Disposal</i>	10/06/05
05-15	<i>Standard Format and Contents of Site Characteristics Report for Low and Intermediate level Radioactive Waste Repository</i>	10/06/05
05-16	<i>Siting criteria for Low and Intermediate level Radioactive Waste Repository</i>	10/06/05
05-17	<i>Radiological Protection Criteria for Long-term Safety on Low and Intermediate level Radioactive Waste Disposal</i>	10/06/05
05-18	<i>Acceptance Criteria for Low and Intermediate level Radioactive Waste</i>	10/06/05
05-19	<i>Regulation on Preparation, etc. of Radiological Environmental Report of Nuclear Power Utilization Facilities</i>	10/06/05

E.2.1.2 Electricity business legislative framework

The Electricity Business Act (EBA) establishes a basic system regarding electricity business and stipulates basic information for the promotion of electricity business. The Enforcement Decree of the EBA, the Enforcement Regulations of the EBA, and the Ministry of Commerce, Industry and Energy (MOCIE) Notices provide necessary information for the implementation of standards and procedures entrusted by higher laws.

As in Figure E.2-2, the EBA system consists of 4 levels; the EBA, the Enforcement Decree of the EBA, the Enforcement Regulations of the EBA, and the MOCIE Notice.

Electricity Business Act

The EBA stipulates basic matters related to electricity business in general. Major regulations related to radioactive waste management include the following:

- Provisions on the Nuclear Waste Management Business Operator*
- Provisions on the radioactive waste management and cost defrayment*
- Provisions on the establishment and implementation of radioactive waste management plans*
- Provisions concerning the implementation plan of the Nuclear Waste Management Business*
- Provisions on the cost of decommissioning NPPs and disposal of radioactive waste*

Enforcement Decree of the EBA

The Decree stipulates detailed provisions regarding the implementation of basic matters stipulated in the EBA. Major provisions related to radioactive waste management are as follows:

- Provisions concerning the objects of the Nuclear Waste Management Business and standards on the selection of the Nuclear Waste Management Business Operator*
- Detailed provisions on the scope of the Nuclear Waste Management Business*
- Detailed provisions on delivery and management costs of radioactive waste generated by parties other than the Nuclear Waste Management Business Operator*

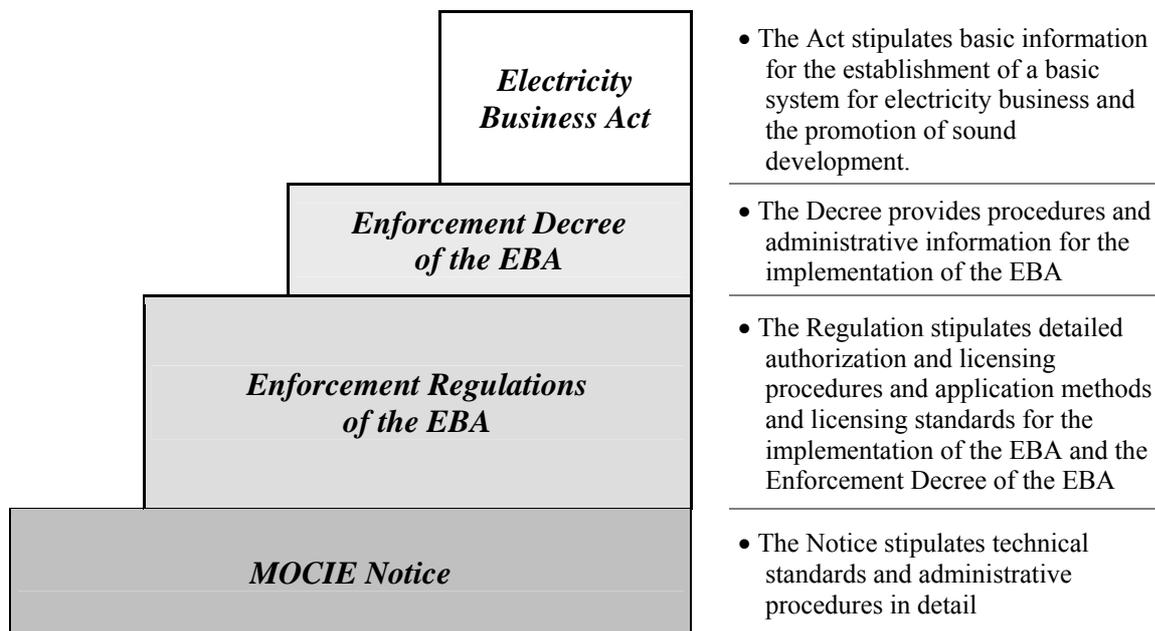


Figure E.2-2 Legal hierarchy of the EBA System

- *Detailed provisions on the request for data on and the revision of radioactive waste management plans*
- *Detailed provisions on the scope of for post-NPP disposal reserve funds*

Enforcement Regulations of the EBA

These regulations stipulate detailed procedures, methods, and technical standards for the implementation of the EBA and the Enforcement Decree of the EBA. Major requirements related to radioactive waste control are as follows:

- *Detailed regulations on the assessment criteria for post-NPP disposal reserve funds*
- *Details on the application for approval of and the reporting of revisions on implementation plans of the Nuclear Waste Management Business*

MOCIE Notices

The MOCIE Notices provide detailed technical standards on the regulations in the EBA, Enforcement Decree of the EBA, and Enforcement Regulations of the EBA. As for MOCIE Notices related to radioactive waste, the Regulations on the Delivery and Cost of Radioactive Waste stipulate general requirements to deliver radioactive waste generated by non NPP operators to the Nuclear Waste Management Business Operator.

E.2.2 Nuclear regulatory framework

The governmental organizations concerned with nuclear activities, as shown in Figure E.2-3, are mainly formed of administrative authorities; the MOCIE supervises the nuclear power program, the Ministry of environment (MOE) is responsible for regulating issues on the general environment excluding the radiological environment, and the MOST is responsible for nuclear safety regulations including the licensing of nuclear facilities.

There is also the AEC under the jurisdiction of the Prime Minister, as the supreme organization for decision-making on national nuclear policies. Its responsibility is to deliberate and decide on important matters concerning the development and utilization of nuclear energy. And lastly, the NSC, under the jurisdiction of the MOST is responsible for the deliberation and decision on important matters concerning the safety of nuclear facilities and radioactive waste management.

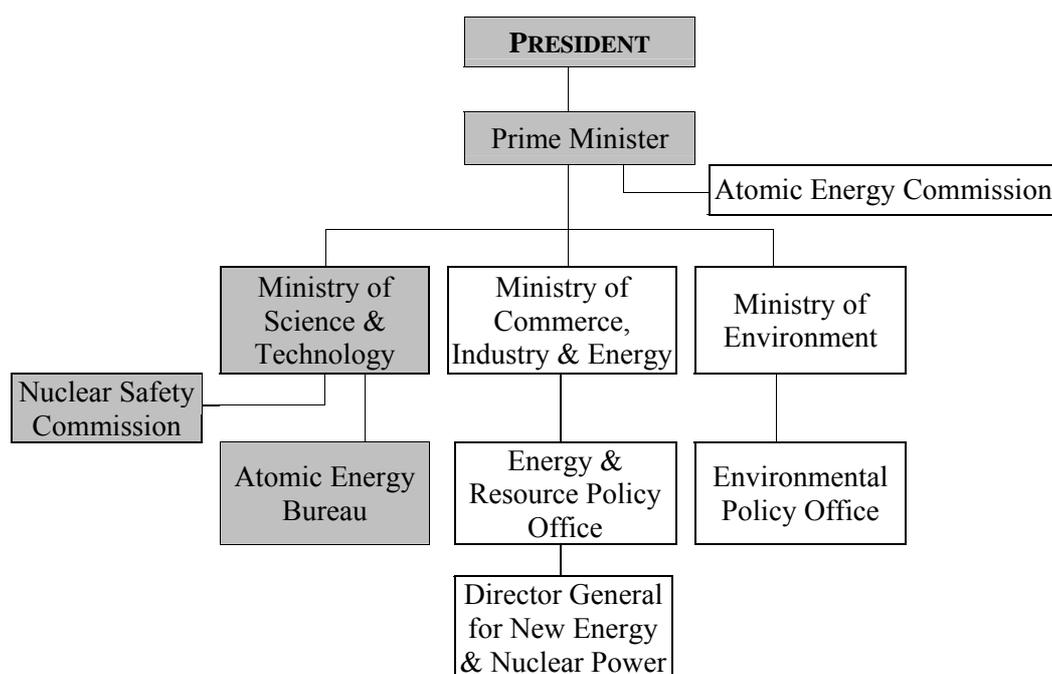


Figure E.2-3 Governmental organizations related to radioactive waste management

E. Legislative & Regulatory Framework

Nuclear safety regulatory organizations are mainly composed of the MOST and the NSC as safety regulatory authorities, and the KINS as an expert organization of nuclear safety regulation as shown in Figure E.2-4. ***The MOST established the nuclear emergency division in the Atomic Energy Bureau (AEB) in 2001, and the Off-site Emergency Management Center was founded to direct nuclear emergency cases of nuclear sites, especially NPP.***

The safety regulations of radioactive waste are in charge of the Radiation Safety Division of the AEB. On the commencement of radioactive waste disposal, the disposal activity shall be regulated by Office of Residence Inspectors at the disposal facility.

The details of regulatory organizations are described in Section E.3.

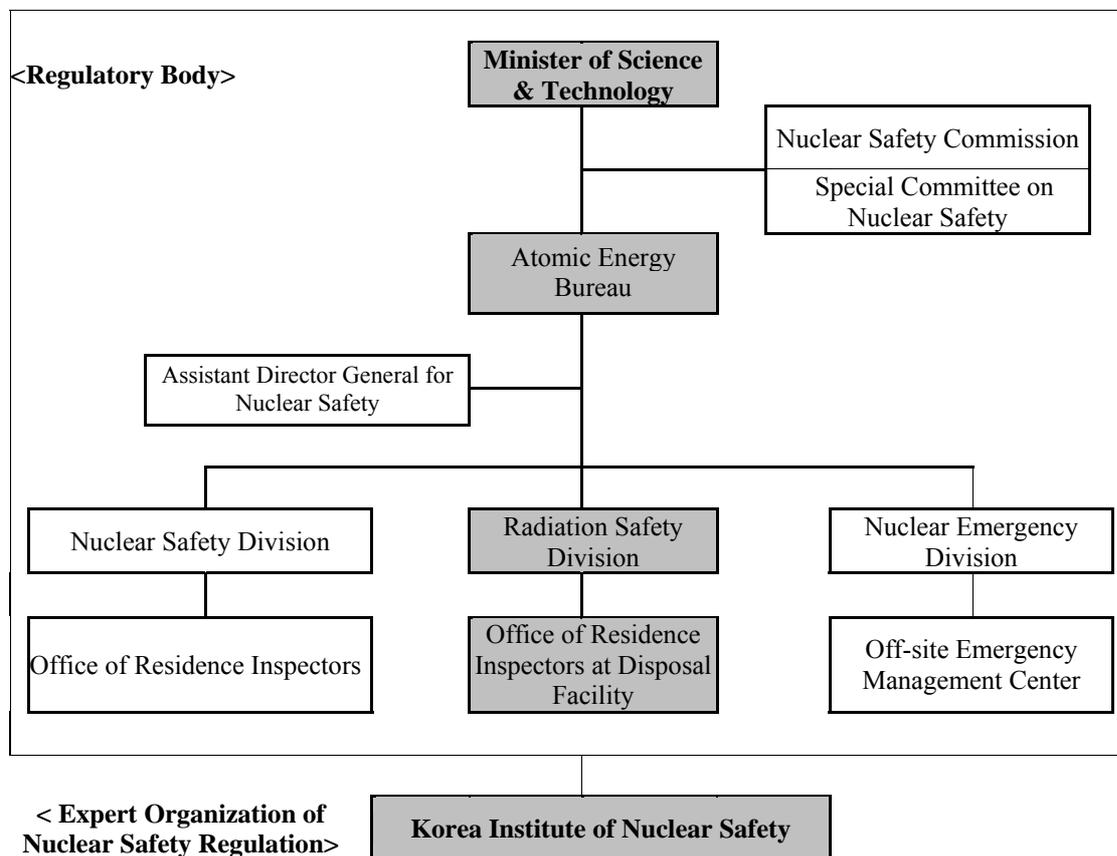


Figure E.2-4 Nuclear safety regulatory framework

E.2.3 Licensing system and safety evaluation

The licensing procedure of spent fuel management facilities and radioactive waste management facilities is done as a one step process that combines the construction/operating permit, pursuant to the AEA as shown in Figure E.2-5.

Early site approval

In order to begin limited construction work on a proposed site before a construction/operation permit is issued, the applicant for early site approval shall submit an application for approval accompanied by a site survey report and a radiological environmental impact assessment report to the MOST. Based on the results of the safety review by the KINS of the application for early site approval, the Minister will grant official approval. The objective of the safety review is to evaluate the adequacy of a site for radioactive management facilities and radiological impacts on the environment adjacent to the site. The MOE is in charge of reviewing non-radiological environmental impacts.

Permission for the construction/operation of a radioactive waste management facility

In order to obtain permission for the construction/operation of a radioactive waste management facility, the applicant shall submit an application for permission accompanied by a radiological environmental impact assessment report, a safety analysis report, safety management regulations, specifications of design and work process, and QA program for construction and operation to the MOST. Based on the result of the safety review by the KINS of the application for the construction/operation permit, the Minister of the MOST will issue a permit for construction/operation after deliberation by the NSC.

The safety review of the application for the permit is conducted to confirm that the site and the design of radioactive waste management facility are in conformity with the relevant regulatory requirements and technical guidelines. It includes safety reviews of the principles and concepts of facility design, the implementation of regulatory criteria in due course, the assessment of environmental effects resulting from the construction and operation of the facility, and a proposal for minimizing those effects. The radiological environmental impact assessment report to be submitted together with the application for permission as well as for early site approval should contain the public's opinion from the area surrounding the site; a public hearing can be held, if necessary.

E.2.4 Regulatory inspections

Regulatory inspections for radioactive waste management facilities under construction or in operation include the preoperational inspection for the construction and performance of facility, radioactive waste disposal inspection, periodic inspections, QA audit, and daily inspection by resident inspectors. General procedures for each inspection are schematically described in Figure E.2-4.

Preoperational inspection for the construction and performance of a radioactive waste management facility

The preoperational inspection is conducted to verify whether the radioactive waste management facility is properly constructed in conformity with the conditions of the construction permit, and whether the constructed facility may be operated safely throughout its lifetime. It is conducted for the construction and the performance of facility by means of field inspection, as well as document inspection.

Radioactive waste disposal inspection

The radioactive waste disposal inspection is conducted to verify whether radioactive waste is properly disposed of in conformity with all the related technical standards provided in the AEA, before disposal and by means of document inspection and field inspection.

Periodic inspection for in-service radioactive waste management facilities

The regular inspection of in-service radioactive waste management facilities is conducted to verify whether the facility is properly operating in conformity with the conditions of the operating license; whether the facility can still withstand the pressure, radiation and other stresses of the operating environment; and whether the performance of the facility maintains its license-based conditions. It is performed by means of document inspection and field inspection.

Quality assurance audit

The QA audit is conducted to verify whether all activities affecting quality at every stage of the design, construction and operation of a radioactive waste management facility are being performed in conformity with the QA program approved by the regulatory body. It is conducted periodically for in-service management facilities.

Daily inspection by resident inspectors

The main purpose of the daily inspection by resident inspectors is to check daily the radioactive waste management facility under construction or in operation. It includes field inspection of surveillance tests, investigation of the measures taken when the facility reaches an abnormal state, and the verification of adequacy of the operator's radiation safety control activities.

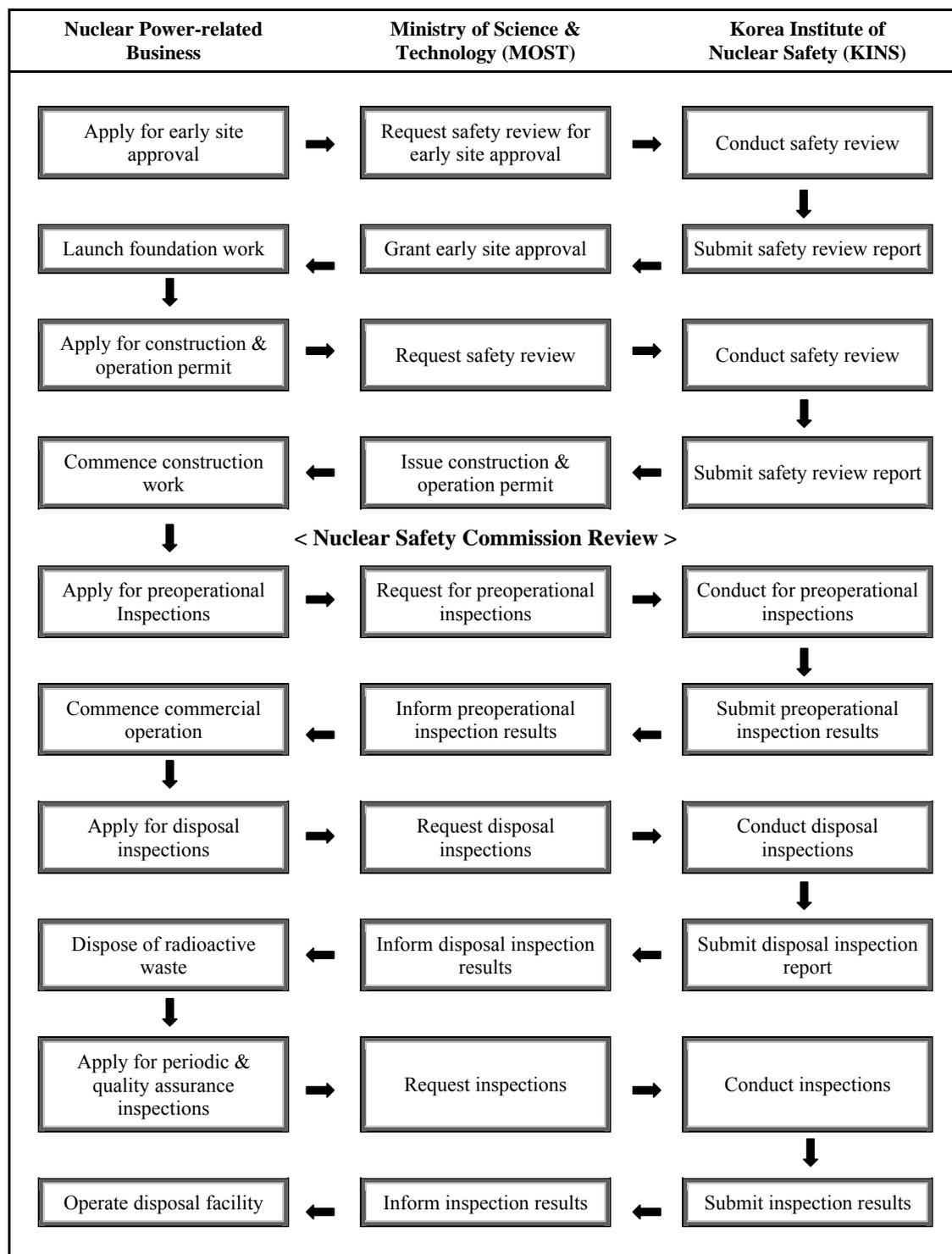


Figure E.2-5 Licensing procedures for radioactive waste management facilities

E.2.5 Enforcement

In case that the results of a safety review for a license application meet the relevant requirements, the MOST will issue a license. The Minister of the MOST may impose minimum conditions therein, if judged necessary to secure safety. If any violation is found as a result of regulatory inspection, the Minister may order the license holder to take corrective or complementary measures in accordance with the AEA.

If it is deemed necessary for the enforcement of the regulations, the MOST is authorized to order the nuclear-related licensee to submit necessary documents on their business and to complement any submitted documents. The Minister may also conduct regulatory inspections to verify that the documents are in conformity with field conditions, and order the operator to take corrective or complementary measures, if any, in accordance with the inspection results.

The Minister of the MOST may order revocation of a license or suspension of business within one year, if the operator of a radioactive waste management facility falls under one of the following cases:

- the operator has modified any matter subject to the permit without approval,
- the operator has failed to meet the criteria for licensing,
- the operator has violated an order of the MOST to take corrective or complementary measures as the result of regulatory inspections for the construction or operation of a radioactive waste management facility, and
- the operator has violated any of the licensing conditions or regulations on safety measures in the operation of a radioactive waste management facility.

It is prescribed in the AEA that any violation of the relevant provisions specified in the same Act shall cause a penalty and/or a fine according to its extent.

E.2.6 Allocation of responsibility

The AEA and the EBA prescribe definitely where responsibility lies for each stage of spent fuel and radioactive waste management.

Under the AEA, the MOST is responsible for construction/operation permit and the safety-related regulations of spent fuel and radioactive waste management facilities. As technical supporting organization for the MOST, the KINS performs safety-related regulatory activities as entrusted by the MOST.

With regard to the LILW management, the MOCIE has the responsibility for formulating basic policies regarding radioactive waste management including the projection of radioactive waste generation and repository construction plan, and has the responsibility to designate a Nuclear Waste Management Business Operator.

Since 1997, the KHNP, as a sole NPP operator in Korea, has been designated as the Nuclear Waste Management Business Operator by the MOCIE, and is now is carrying out the site selection procedures for the LILW disposal facility.

E.2.7 Clearance

The clearance of the radioactive waste, as shown in Section B.4, is described in the AEA of Korea. The clearance level of the AEA is identical to the levels specified in IAEA Safety Series No. 115 (1996).

E.3 Regulatory body (Article 20)

ARTICLE 20. REGULATORY BODY

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

E.3.1 Authority and responsibility of the regulatory body

The authority of the MOST, which is specified in the AEA and the Enforcement Decree of the National Government Organization Act, is as follows:

- to issue, amend and revoke licenses for the construction and operation of nuclear facilities, and to take necessary enforcement actions, where a violation of regulatory requirements has taken place,
- to conclude agreements with other domestic governmental or non- governmental bodies, and to delegate tasks to other organizations, where such delegation is directly essential to the performance of the body's regulatory responsibilities,
- to obtain such documents and opinions from public or private organizations or persons as may be both necessary and appropriate,
- to maintain contact with foreign regulatory bodies and relevant international organizations, and
- to enter, at any time, the premises of any nuclear facility licensed or under review.

The MOST assumes responsibility to develop the licensing criteria for the construction and operation of radioactive waste disposal facilities, to develop technical standards for operational safety measures, and to secure radioactive waste safety management at every stage of the site selection, design, construction, operation, closure, and post-closure of radioactive waste disposal facilities.

E.3.2 Structure and resources of the regulatory body and supporting organizations

E.3.2.1 Ministry of Science and Technology (MOST/AEB)

As shown in Figure E.3-1, the NSC, under the jurisdiction of the MOST, is responsible for deliberating and making decision on important matters concerning nuclear safety. The Vice Minister and the Director General in charge of the Atomic Energy Bureau (AEB) are in a vertical arrangement under the Minister.

The AEB consists of 5 divisions: the Atomic Energy Policy Division, the Atomic Energy Cooperation Division, the Nuclear Safety Division, the Radiation Safety Division, and the Nuclear Emergency Division. The Assistant Director General for Nuclear Safety assists and advises the Director General of the AEB in matters of nuclear safety regulation. *Of the 63 staff participating in the nuclear activities, 39 staff members are responsible for safety regulation. The finance of the MOST is totally funded by government budget for the regulatory independence.*

The functions of each division in the AEB are as follows:

Atomic Energy Policy Division

- *establishing and coordinating the mid- and long-term comprehensive plans for R&D of atomic energy*
- *restructuring and supplementing laws and systems in relation to atomic energy*
- *directing, coordinating, and managing the R&D for atomic energy policies*
- *supporting the operation of Atomic Energy Commission (AEC)*

Atomic Energy Cooperation Division

- *establishing, synthesizing, and coordinating the international cooperation policies of atomic energy*
- *agreement and amendment for the cooperation with countries utilizing atomic energy*
- *cooperation with IAEA*
- *cooperation with OECD/NEA*
- *establishing policy, compiling and coordinating, and cooperating in terms of nuclear non-proliferation system*
- *planning, compiling and coordinating, and cooperating in terms of international nuclear safeguards*

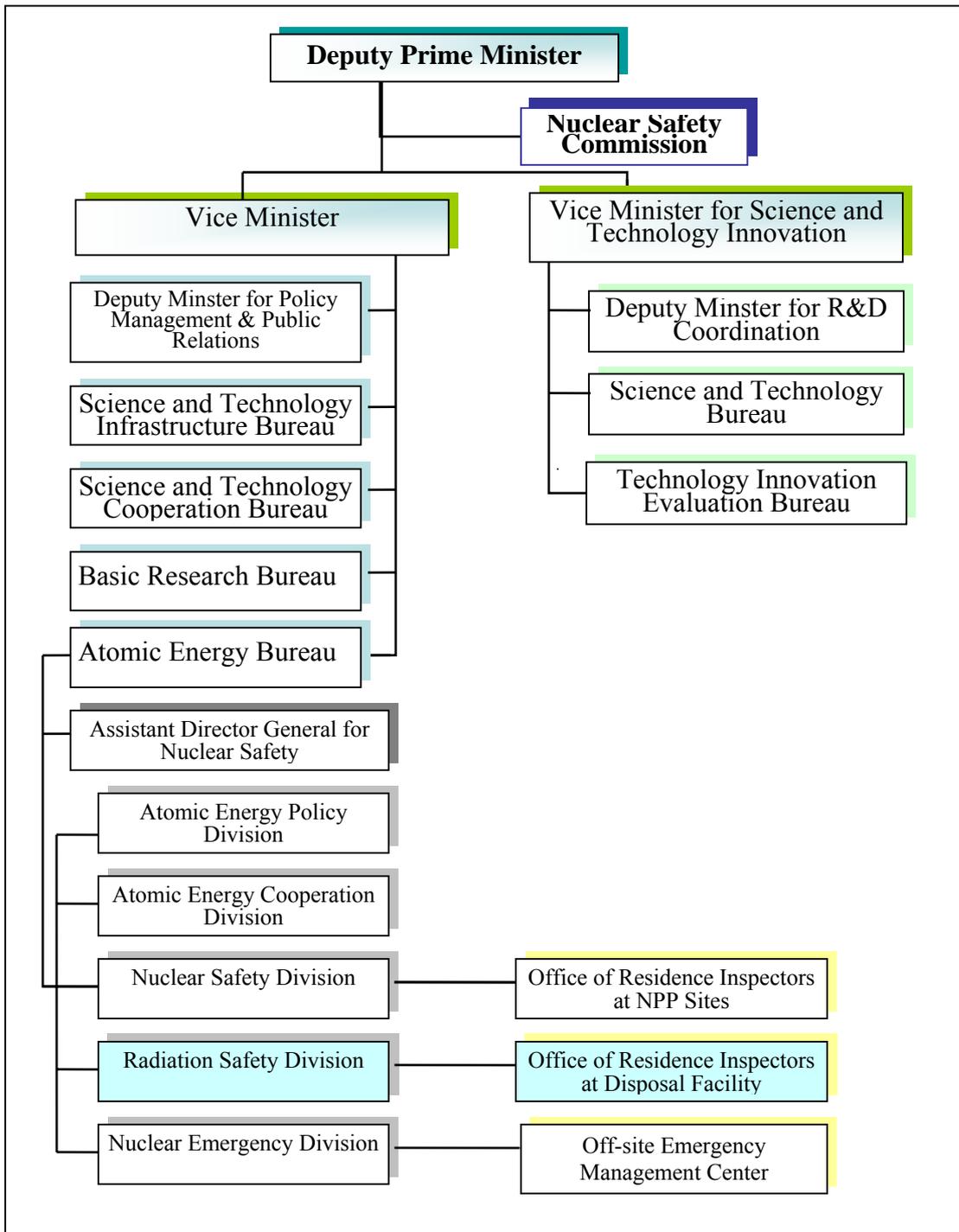


Figure E.3-1 Organization chart of the MOST

Nuclear Safety Division

- establishing and coordinating basic policies on nuclear safety regulation
- compiling, coordinating, and managing nuclear safety regulation activities
- *supporting the operation of Nuclear Safety Commission (NSC)*
- *licensing and implementing the safety regulation to nuclear facilities including reactor and nuclear fuel cycle*
- spreading nuclear safety culture
- formulating and general supervising the plans for the technical standards of nuclear safety
- *implementing affairs of the Nuclear Safety Conventions*
- operating the office of residence inspectors

Radiation Safety Division

- *development of technical standards of radiation safety*
- *licensing and supervising the production, sale, use, and transport of radioisotopes and radiation generating devices*
- *licensing and supervising the use of nuclear materials*
- *issuing the construction/operation permit of radioactive waste disposal facilities including centralized spent fuel interim-storage facility*
- *implementing affairs of the Joint Convention*
- *formulating and coordinating the safety management measures of radiation sources, and managing the license to RI users*
- *safety regulation to closure and decommissioning of nuclear facilities*
- supervise occupational exposure of the workers employed in the field of handling radioactive materials

Nuclear Emergency Division

- formulating and coordinating plans for radiological emergency preparedness
- general supervising and evaluating the radiological emergency exercises
- directing and supervising the evaluation of radiological environmental impacts around nuclear facilities
- monitoring and evaluating the national environmental radiation
- overall management of the radiological disaster circumstance
- *developing laws related to physical protection and radiological emergency of nuclear facilities*

E. Legislative & Regulatory Framework

- *establishing physical protection system for nuclear facilities*
- *operating Off-site Emergency Management Center*

E.3.2.2 Nuclear Safety Commission (NSC)

The NSC is established under the jurisdiction of the MOST in order to deliberate and decide on important matters concerning nuclear safety, pursuant to the AEA. The Commission deliberates and decides on the following:

- synthesis and coordination of matters concerning nuclear safety management
- matters concerning the regulation of nuclear materials and reactors
- matters concerning protection against hazards due to radiation exposure
- matters concerning plans for the estimation and allocation of expenditures for nuclear safety management
- matters concerning the formulation of tests and research for nuclear safety management
- matters concerning the fostering and training of researchers and engineers in the area of nuclear safety management
- matters concerning the safety of radioactive waste management
- matters concerning measures against radiological emergency
- other matters deemed important by the Chairman

The NSC, which is chaired by the MOST, consists of 9 members including 8 members appointed or commissioned by the Minister. In order to strengthen nuclear regulatory independence, the MOST stipulates that any person who is engaged in the operation of nuclear facilities should not be commissioned to be a member of the Commission.

The NSC organized the Special Committee on Nuclear Safety to technically investigate and deliberate matters under its jurisdiction. This Committee is composed of 25 experts or less, and for its effective operation, it is divided into 5 Sub-committees, as shown in Figure E.2-2, of the Reactor System Subcommittee, the Radiation Protection Subcommittee, the Nuclear Emergency and Environment Subcommittee, the Site and Structure Subcommittee, and the Regulatory Policy Subcommittee. The NSC may also organize and operate the Special Investigation Committee if any nuclear and/or radiation accidents occur.

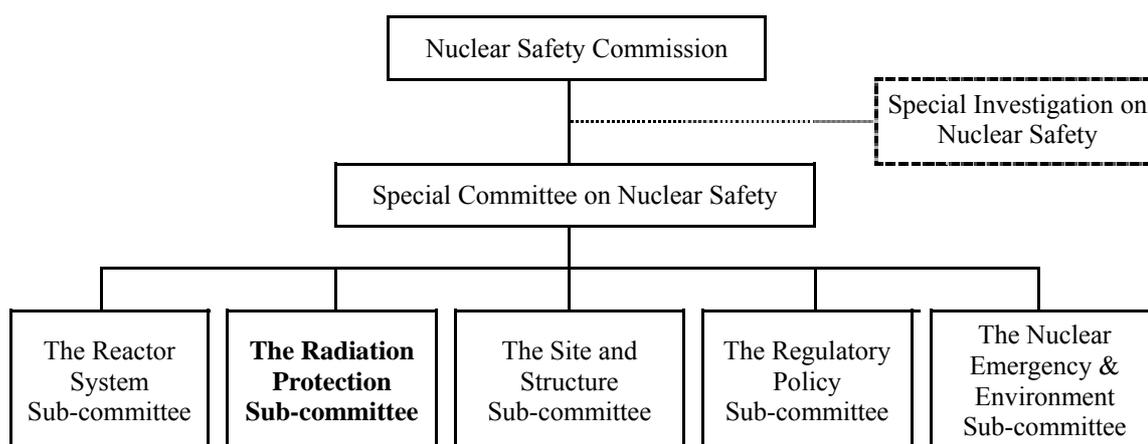


Figure E.3-2 Organization chart of the NSC

E.3.2.3 Korea Institute of Nuclear Safety (KINS)

The KINS was established in December 1981, and initially operated under the name of the “Nuclear Safety Center” as an internal organization of the KAERI. It started functioning as an independent expert organization in February 1990, according to the “Korea Institute of Nuclear Safety Act,” and conducts matters on nuclear safety regulation as entrusted by the MOST in accordance with the Atomic Energy Laws.

Its major functions relevant to nuclear safety regulation are as follows:

- to conduct safety reviews in relation to the licensing and approval of nuclear facilities,
- to conduct regulatory inspections during the manufacturing, construction and operation of nuclear facilities,
- to perform research and development of technical standards of safety regulations for nuclear facilities,
- to conduct license examinations for the handling of nuclear materials and radioisotopes, and the operation of nuclear facilities,
- to receive and process notifications relevant to licensing formalities, and
- to conduct the QA examination and inspection.

The KINS also takes responsibility of activities such as the development of nuclear safety regulation technology, technical support to the MOST for policy development and radiation protection, information management on safety regulations, and the monitoring and evaluation of environmental radioactivity.

E. Legislative & Regulatory Framework

The KINS consists of 6 divisions, 32 sections, and 1 project division, as shown in Figure E.3-3, and operates the Advisory Committee on Nuclear Safety, a consultative body for technical matters on safety regulations, which is composed of experts from the KINS and other external organizations. As of December 31, 2004, the KINS staffs are composed of total 328, of which 274 members are technical experts.

The safety regulation of radioactive waste management facilities is in charge of Radioactive Waste Regulation Dept. in the KINS. The finance of the KINS, expert organization of nuclear safety regulation, is mainly funded by government budget and partially appropriated by regulation fee from licensee.

The KINS has concluded agreements with China, Germany, France, Japan, Romania, Spain, Sweden, UK, and USA (in alphabetic order) for bilateral cooperation in radiological emergency preparedness as well as strengthening techniques and knowledge of nuclear safety regulation through international collaboration with regulatory agencies in the cited countries.

E.3.3 Regulatory independence

The MOST, the regulatory body for nuclear and radioactive waste safety, implements safety regulation. Its authority of the MOST is completely independent from the MOCIE by law. Under the AEA, the MOST has complete responsibility and authority for the safety regulation including construction/operating licenses of spent fuel and radioactive waste management facilities. The KINS has responsibility for development of safety-related regulations on this area, as entrusted by the MOST.

The NSC and the Special Committee on Nuclear Safety are established under the jurisdiction of the MOST to deliberate and decide on important matters concerning nuclear safety. Both commission and committee members comprise civilian experts to enhance the objectivity and fairness in the safety regulation.

In accordance with the EBA, the MOCIE has the responsibility for formulating basic policies regarding radioactive waste management including the projection of radioactive waste generation and repository construction plan.

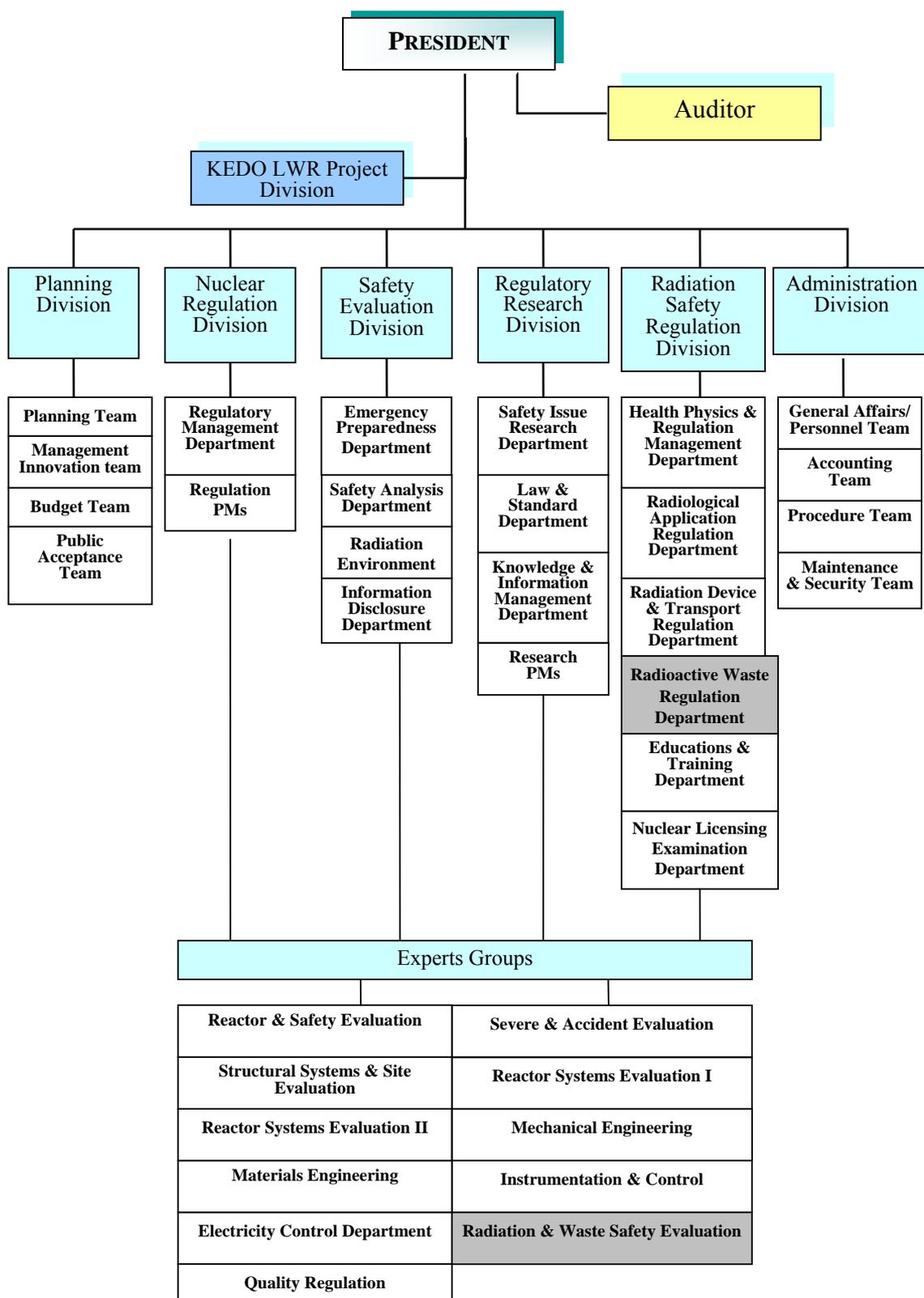


Figure E.3-3 Organization chart of KINS

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F. Other General Safety Provisions

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

ARTICLE 21. RESPONSIBILITY OF THE LICENCE HOLDER

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

F.1.1 Mechanism for the regulatory body to ensure that the license holder will meet its primary responsibility for safety

To verify compliance with the requirements in permit or license conditions by the AEA, during the construction and lifetime of the nuclear facility for the installer or operator of nuclear facilities, the MOST carries out the regulatory inspections described in Subsection E.2.4. If violations occur, the Minister of the MOST immediately orders the installer or operator of nuclear facilities to take corrective and complementary measures so as to secure the safety of the nuclear facilities.

The Nuclear Safety Policy Statement as shown in Annex E, promulgated in September 1994, states that the nuclear facility operator holds ultimate safety responsibility for the licensed nuclear facility and the responsibility cannot be lessened by respective activities of the facility designers, suppliers, constructors, and regulatory body.

The operator of the nuclear facility holds the responsibility for the safe management of generated spent fuel and radioactive wastes in compliance with related activities before these materials are transferred to the licensee of the treating, storage, or disposal facility.

The operator of the radioactive waste management facility should accept, treat, store, and dispose of the radioactive waste from the nuclear industries.

F.1.2 Ultimate responsibility

According to the 249th meeting of the AEC, the Korean government adopted the

F. Other General Safety Provisions

State's ultimate responsibility of radioactive waste management in the light of the importance that these wastes are needed and required long-term safe management. Based upon this principle, the MOCIE carries out the management policies regarding to radioactive waste treatment, storage, and disposal, which are prepared by the MOCIE in consultation with the MOST and deliberated by the AEC.

F.2 Human and financial resources (Article 22)

ARTICLE 22. HUMAN AND FINANCIAL RESOURCES

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

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

F.2.1 Nuclear power plants

The KHNP, a proprietor of nuclear power plants, has 4 divisions at the headquarters and 4 nuclear power sites, Radioactive Waste Office, Nuclear Environment Technology Center (NETEC), 6 special institutes, and hydropower department in local, as shown in Figure 2-1.

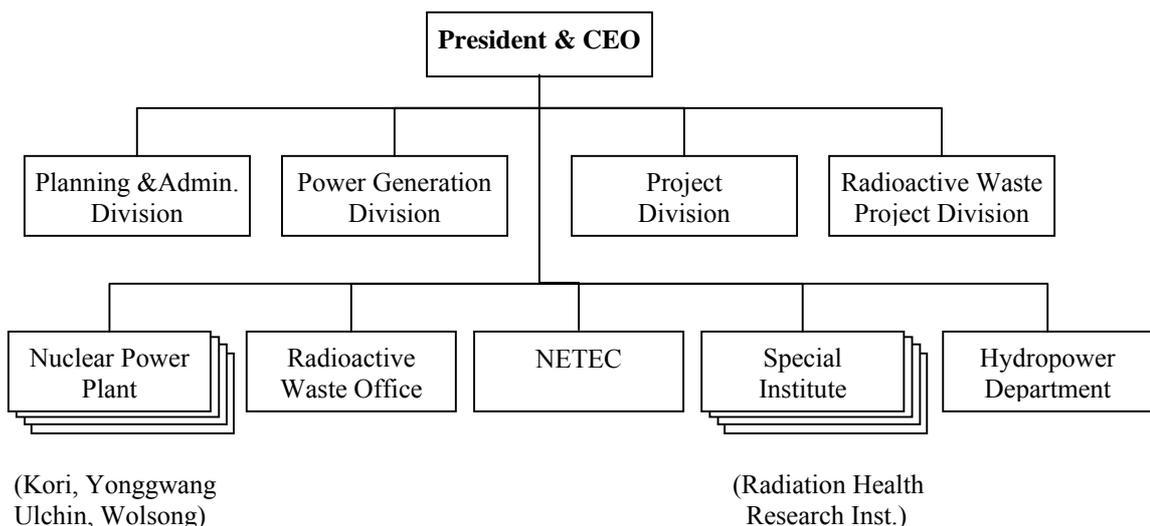


Figure F.2-1 Organization of KHNP

F. Other General Safety Provisions

Organization and Human resources

The Safety & Technology Department at the KHNP headquarters operates the Radiation Safety Office, as a subordinate organization, consisting of 17 personnel, It is in charge of the safe treatment of radioactive waste and radiation protection.

Each NPP has a Radiation Safety Dept. with 21 engineers tasked for the radiation protection of local employees and to treat radioactive waste generated from its nuclear facility. There are usually 5 staff members among them that treat and manage radioactive waste. As a collaborative company, Korea Plant Service & Engineering Co., Ltd. (KPS) supports the maintenance of radioactive waste treatment facilities. In addition, some radiation safety management service companies provide technical support of the radiation safety related activities. Figure F.2-2 shows the NPP operational structure.

For the nuclear safety review and decision, the KHNP has the KHNP Nuclear Review Board (KNRB) at its the headquarters and a Plant Nuclear Safety Committee (PNSC) at each nuclear plant.

The Radioactive Waste Project Division in the KHNP headquarters is in charge of overall radioactive waste management projects. In addition, the Radioactive Waste Office has undertaken the preparatory works for construction of the LILW disposal facility, publicity for selection of LILW disposal site, and site investigation of the LILW disposal facility.

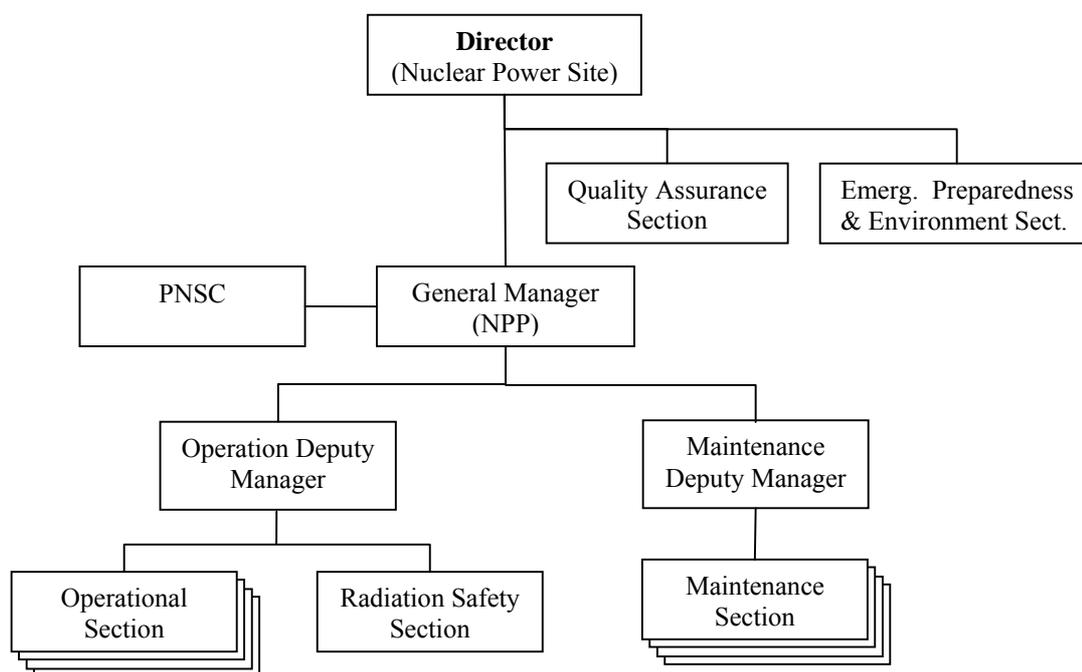


Figure F.2-2 Organization chart for operation of NPP

Financial resources

The decommissioning cost of NPP is inevitable for the nuclear electricity business. Due to the uncertainties about the future cash flow and management methods, the cost should be reliably estimated based on reasonable and supportable assumptions.

According to the EBA, the NPP operator should determine the cost of plant decommissioning, disposal of LILW and spent fuel generated in the process of operation every year. The KHNP has accumulated these costs as an in-house liability since 1983.

Recently, the statement of financial accounting standard was revised to recognize a liability for asset retirement as a present value of decommissioning costs. The EBA adapted the same methodology; thus decommissioning and disposal cost should be recognized as a present value and an annual interest added up every year from 2005.

The Notice of MOCIE stated various parameters such as assumption cost, inflation rate, interest rate and etc. to estimate discounted cash flow in accordance with the revised EBA. The KHNP has recognized the post-NPP disposal reserve to abide by the regulation with auditing by an independent auditor.

F.2.2 Research facilities

F. Other General Safety Provisions

In the KAERI, there are several facilities related to the spent fuels and radioactive waste such as the HANARO facility, post-irradiation examination facility, radioisotope production facility, irradiated material examination facility, nuclear fuel fabrication facility for research reactor, radioactive waste treatment and storage facilities, and other laboratories. Figure F.2-3 represents the organization for spent fuel and radioactive waste management at the KAERI.

Human resources

1) HANARO research reactor

With 56 staff members of the HANARO Management Division, HANARO Application Research Center operates the research reactor and carries out the maintenance work. Radioactive waste generated from the HANARO has been transferred to the radioactive waste treatment facility, and stored at the storage facility. The spent fuels generated from the reactor are managed by the HANARO Management Division.

2) Post-irradiation examination facility

The Nuclear Fuel Cycle Examination Division of the Nuclear Fuel Cycle Development Center in the KAERI operates the PIEF. This facility is operated and maintained by 12 operating and examining/managing staff members whose work scopes are divided by their specialties and backgrounds. The operating staff members are responsible for the operation of the utility and supporting equipment, internal and external inspections including nuclear material accountancy and licensing, while the examining/managing staff are in charge of post-irradiation examination for spent fuel, with the management of the relevant examination facility. Additionally, they conduct radiation safety management, environmental radioactivity control, water supply control, nuclear material safeguards and management in cooperation with the related expert departments within the KAERI.

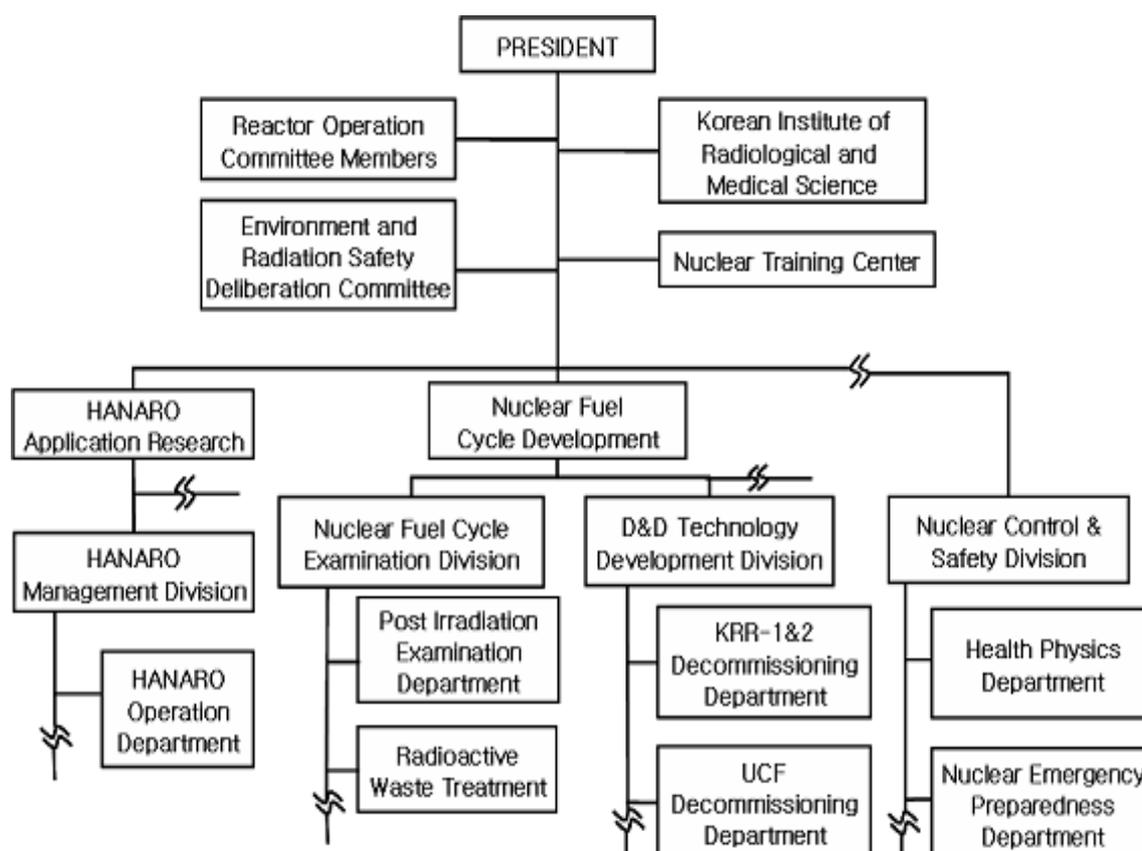


Figure F.2-3 Organization Chart of KAERI

3) Radioactive waste treatment and storage facility

A total of 11 staff members of the Nuclear Fuel Cycle Examination Division, Nuclear Fuel Cycle Development Center KAERI, operate the radioactive waste treatment facility and the storage facility. They operate the equipment related to evaporation, bituminization, solar evaporation, and compaction (only for solid waste), cementation, decontamination, and ventilation. The storage facility has 2 buildings for LILW. The radiation safety management, and environmental radioactivity management and quality assurance are performed with the support of related expert departments in the KAERI.

Financial resources

The radioactive waste treatment and storage facilities in the KAERI are in operation with the organizational project fund provided by the government budget.

F.2.3 Nuclear fuel fabrication facility

Human resources

F. Other General Safety Provisions

The KNFC has the Radiation and Environment Management Department for the radiation safety, radioactive waste and nuclear material management under the Fuel Production & Technology Division. The Radiation and Environment Management Dept. consist of the Radiation & Environment Safety Section and the Safeguards Section.

The Radiation & Environment Safety Section consists of 20 staff members responsible for radiation management and the treatment, storage of waste generated from the nuclear fuel fabrication facility. This includes health physics, personal dose management, environmental radiation/radioactivity measurement and radioactive material transport.

In addition, the Safeguards Section has 6 staff members responsible for nuclear material accountancy and safeguards. The operation and maintenance of radioactive waste treatment facilities is made with the support of 16 experts belonging to a subsidiary company as shown in Figure F.2-4.

Financial resources

Under the EBA, the radioactive waste generator at the point of delivering radioactive waste into the disposal site shall pay expenses related to radioactive waste management. In order to lessen the economic burden imposed by the increase of waste management funds with one lot in waste delivery, KNFC has been reserving expenses for waste management each quarter according to the quantity of waste generated.

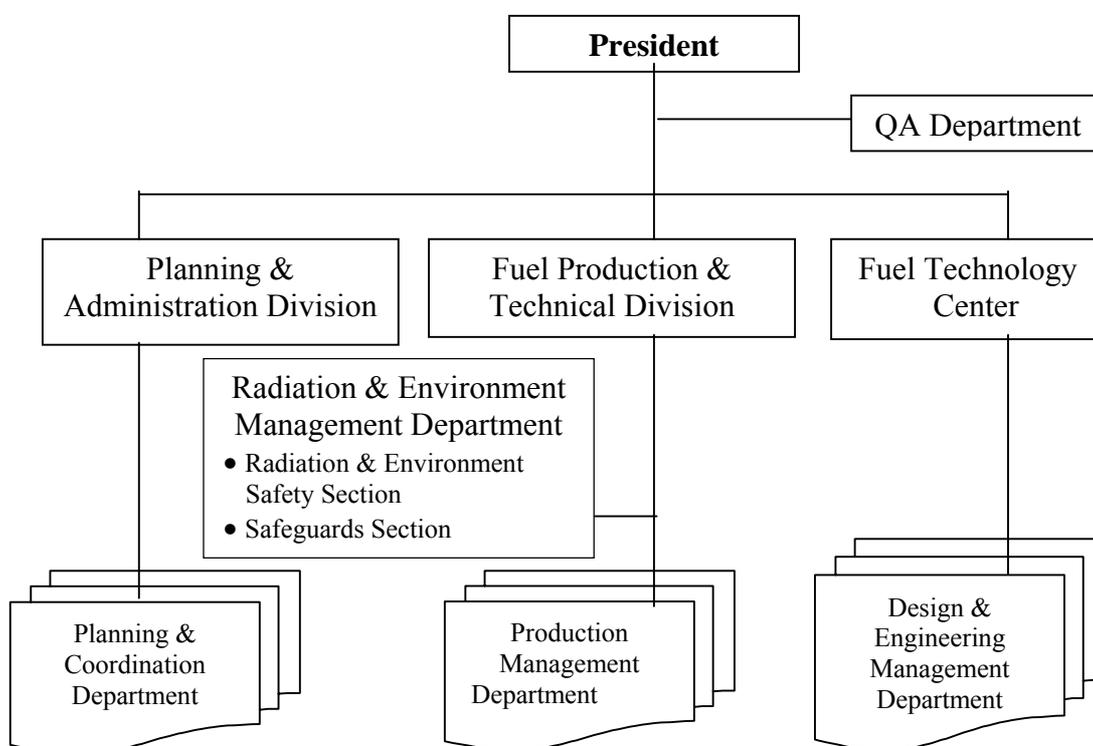


Figure F.2-4 Organization chart of KNFC

F.2.4 Radioisotope waste storage facility

Human resources

The NETEC, an affiliate of the KHNP, consists of 3 offices, 1 center, and 17 departments/groups, as shown in Figure F.2-5. There are about 200 employees at NETEC, including 12 persons engaged in duties related to the operation of the RI waste storage facility.

The RI Technology Group, who operates and manages a RI waste storage facility, is in charge of safely storing and managing all RI wastes with the cooperation of other sections.

Financial resources

The EBA requests that the RI waste generator bear incurring management expenses related to waste treatment and disposal at the point of delivering waste to the disposal licensee, the KHNP.

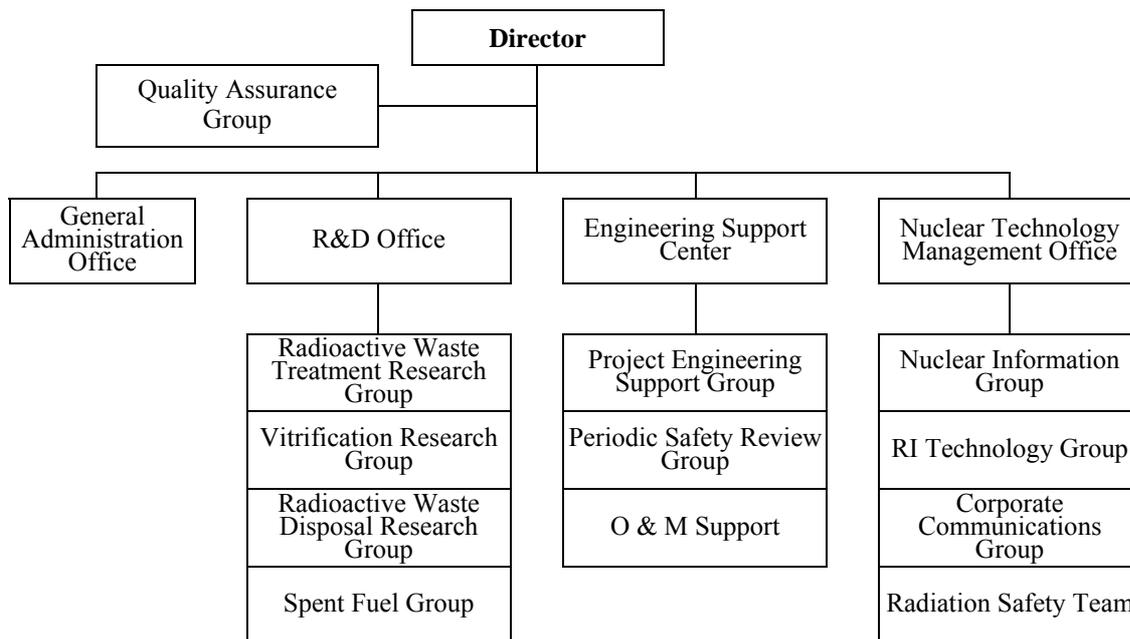


Figure F.2-5 Organization chart of NETEC

F.2.5 Securing of financial resources for management after the closure of a radioactive waste disposal facility

The long-term management for the post-closure of radioactive waste disposal facility is essential and the cost for the post-closure of repository must be assured. In this regard, the Enforcement Decree for the EBA demands that the scope of the Nuclear Waste Management Business include the post-closure management and mandates cost be assured.

F.3 Quality assurance (Article 23)

ARTICLE 23. QUALITY ASSURANCE

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

F.3.1 Quality assurance policies

The AEA stipulates that a licensee of radioactive waste treatment, storage, and disposal facilities and auxiliary facilities shall establish and implement a QA program concerning construction and operation, to ensure planned and systematic activities in the stages of design, procurement, manufacturing, construction, commissioning, operation, maintenance, and closure of facilities.

It is specified that, in establishing QA programs of disposal facilities, the provisions from Article 68 (Organization) to Article 85 (Audit) of the Enforcement Regulation Concerning the Technical Standards of Reactor Facilities (Quality Assurance Criteria for the Construction and Operation of Reactor Facilities) shall be applied mutatis mutandis. The QA concerning the design and manufacturing for packages used in transport of radioactive waste should also follow this regulation.

The MOST Notice (Quality Assurance Criteria for Radioactive Waste Management Facilities) shall be applied to establish a QA system of the LILW disposal facilities. Another MOST Notice (Technical Requirement for the Operation and Control of the LILW Repository) also specifies overall QA requirements to be observed by the licensee for the operation and management of the LILW disposal facilities.

According to this provision, the applicants of the construction/operation permit of disposal facilities shall submit a QA program for the construction and operation of radioactive waste disposal facilities for approval to the MOST. The applicant has the ultimate responsibility to comply with the QA program during the construction and operation of each facility.

F.3.2 Framework of quality assurance programs

As for the framework of the QA programs applicable to radioactive waste disposal facilities, the Enforcement Regulation Concerning the Technical Standards of Reactor Facilities and the MOST Notice (Quality Assurance Criteria for Radioactive Waste Management Facility) stipulate 18 criteria including from the Organization to the Audit.

F.3.3 Implementation and assessment of quality assurance programs

The licensee (KHNP), a constructor and operator of radioactive waste disposal facilities and all contractors participating in the site characterization, design, construction, operation and closure of those facilities are required to prepare and implement a QA program pursuant to the AEA. The licensee is responsible for establishing an integrated system for all participants to implement the QA program.

All contractors involved in radioactive waste disposal projects, including the design, manufacturing, construction, maintenance, etc., are required to perform quality activities in accordance with the regulatory requirements.

The evaluation for the implementation and effectiveness of the QA program is periodically conducted by the licensee to verify whether QA activities are properly implemented by the licensee itself, as well as by the contractors and sub-contractors, in accordance with the approved QA program. The method to assess the implementation of a QA program includes quality control inspection, QA audit, QA trend analysis, and effectiveness evaluation of the QA program.

The responsible person of the QA organization should take proper measures in a timely manner by reporting to the top management the important issues resulting from the evaluation of the implementation and effectiveness of the QA program. Further efforts should be made to maintain the QA program as a valid document by revising the corresponding QA program, if necessary, after in-depth evaluation of effectiveness.

F.3.4 Regulatory activities

The regulatory activities concerning QA of radioactive waste disposal are conducted through safety reviews and regulatory inspections by the KINS, as entrusted by the Government. The main objectives of regulatory activities for radioactive waste disposal project are to verify whether each organization participating in the design, manufacturing, construction, and operation of related facilities has performed quality activities in accordance with the QA program, and whether the program has effectively been implemented so as to ensure the safety and reliability of related facilities. These activities are performed based on the AEA, the safety review guidelines on the safety analysis report (SAR) of radioactive waste disposal and the QA guidelines prepared by the KINS for nuclear facilities.

The safety review of quality activities is conducted to verify whether the QA system of the licensee and major contractors is adequate to implement the QA program in accordance with the AEA and the safety review guidelines. It also verifies whether the QA procedures for the implementation of the QA program are properly established and practicable. Recently, the KINS has performed the safety review of the QA program in accordance with the Enforcement Regulation Concerning the Technical

Standards of Reactor Facilities (Quality Assurance Criteria for the Construction and Operation of Reactor Facility) for the design and manufacturing of the transport cask for transshipment of spent fuel between NPPs.

In order to encourage voluntary performance-based QA activities from the licensees, the KINS has developed and utilized the inspection guidelines for verifying the adequacy of licensee's QA program and the appraisal instructions for assessing the appropriateness of licensee's QA activities. Under the "Quality Assurance Auditor Qualification Program" for regulatory personnel which was established by the KINS, qualified auditors who have completed the specified educational and training courses, conduct the QA inspections.

The KINS has performed the periodic inspections to confirm the adequacy of implementation of the QA program of radioactive waste treatment, storage, and disposal facilities in the NPP and the radioactive waste management facilities in the research reactor facility or in the fuel fabrication facility. In addition, the KINS performed the regulatory inspection to verify the adequacy of implementation of the QA program for the design and manufacturing of the transport cask for transshipment of spent fuels between NPPs. In the same manner, equivalent regulations will be conducted to LILW disposal facilities to be constructed.

In addition, based on IAEA-TECDOC-1090, "Quality Assurance within Regulatory Bodies," the KINS established the QA program for regulatory bodies to improve public acceptance and transparency of regulatory activities, and is developing the QA guidelines for regulatory activities necessary.

F.4 Operational radiation protection (Article 24)

ARTICLE 24. OPERATIONAL RADIATION PROTECTION

1. Each Contracting Party shall take the appropriate steps to ensure that during the operating lifetime of a spent fuel or radioactive waste management facility:
 - (i) the radiation exposure of the workers and the public caused by the facility shall be kept as low as reasonably achievable, economic and social factors being taken into account;
 - (ii) no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection; 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.

F.4.1 Regulations and requirements

The regulations and requirements related to radiation protection applicable to nuclear facilities which generate spent fuel and radioactive waste are specified in the AEA, the Enforcement Decree of the AEA, the Ordinance of the MOST and the Notices of the MOST. These Regulations and requirements meet IAEA standards and are summarized as follows:

Atomic Energy Act

The AEA prescribes basic matters on radiation protection to be applied to nuclear facilities, as follows:

- provisions on protective measures against radiation hazards that maintain radioactive material release and occupational radiation exposure as low as is reasonably achievable (ALARA),
- provisions on safety measures related to operations stipulating the necessary actions to be taken for protecting human body, materials, and the public from radiation hazards which may accompany the operation of nuclear facilities,
- provisions on the designation of exclusion areas to protect human body, materials, and the public from possible radiation hazards, in establishing nuclear facilities,
- criteria for the registration of businesses related to personnel dosimetry services for any person who is employed or who has access to NPP, and
- requirements for the education and training of the human resource involving radiation exposure.

Enforcement Decree of the Atomic Energy Act

The Enforcement Decree of the AEA specifies the detailed requirements for implementing basic matters on radiation protection referred to in the same Act, as follows:

- radiation dose limits related to radiation protection (The dose limits defined are as shown in Table F.4-1)
- detailed provisions on safety measures related to operation, stipulating the necessary action to be taken for protecting human body, materials, and the public from radiation hazards, which may accompany the operation of nuclear facilities,
- provisions to minimize the exposure of workers employed in nuclear facilities, persons who have frequent access to the said installations, and the public living in nearby regions,
- physical examination and exposure control for people who have access to nuclear facilities,
- provisions on the measurement of radiation dose and contamination levels for any place, which is in a radiation hazard area within nuclear facilities, and the functional testing of dosimetry service providers,
- detailed provisions necessary for implementing protective measures against radiation hazards, such as actions to be taken for any person suffering from radiation hazards, relevant reports, etc., and
- detailed provisions on the education and training of persons engaged in radiation work or who have access to controlled areas.

Table F.4-1 Dose limits

(Items)	Radiation Worker	Frequent Access Personnel /Worker for Transport	Public ²⁾
Effective dose limit	100 mSv for five consecutive years ¹⁾ and not exceeding 50 mSv/y	12 mSv/y	1 mSv/y
Equivalent dose limit – lens of the eye – skin, feet & hands	150 mSv/y 500 mSv/y	15 mSv/y 50 mSv/y	15 mSv/y 50 mSv/y

1) “Five consecutive years” means the 5-year period from any given year (for example, 1998 – 2002). This calculation is not applicable to any period before 1998.

2) As for the general public, the value of over 1 mSv in a single year is acceptable within the limit of not exceeding 1 mSv per year for the average of values for five consecutive years.

Concerning a person who is proven to be pregnant among radiation workers and persons who restrictively or temporarily use any radioactive isotope among the public, it is necessary to comply with the standards prescribed and notified by the MOST.

Ordinance of the Ministry of Science and Technology (MOST)

The MOST Ordinance includes the Enforcement Regulations of the AEA, the Regulation Concerning the Technical Standards of Reactor Facilities, etc., and the Regulation Concerning the Technical Standards of Radiation Safety Management, etc., and prescribes detailed procedures and methods necessary for implementing the AEA and the Enforcement Decree of the AEA, and the detailed technical standards thereof.

- detailed provisions on radiation protection equipment for protection against radiation exposure in the reactor and related facilities, and nuclear fuel cycle facilities, (technical standards of reactors)
- detailed provisions on the particulars about and the actions taken for controlled areas within nuclear facilities, (technical standards of reactors; technical standards of radiation)
- detailed provisions on radiation protection for persons who are engaged in radiation work, and persons who have frequent access to nuclear facilities, (technical standards of reactors)
- detailed provisions on measures related to radiation protection plans for reactor and related facilities, and nuclear fuel cycle facilities, (technical standards of reactors)

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- detailed provisions on the assessment and control of radiation dose for persons who are engaged in radiation work, and persons who have frequent access to nuclear facilities, (Enforcement Regulations)
- detailed provisions on the place and personnel for measuring radiation dose and contamination level, (Enforcement Regulations)
- provisions on technical capabilities for personal dosimetry, (Enforcement Regulations)
- detailed provisions on the substance and duration of education and training for persons who are engaged in radiation work, and persons who have access to controlled areas, (Enforcement Regulations)
- details of physical examination for persons who have access to nuclear facilities. (Enforcement Regulations).

Notices of the Ministry of Science and Technology

Notices of the MOST present the detailed technical standards of radiation protection specified in the AEA, the Enforcement Decree of the AEA, and the Ordinance of the MOST, and the principal Notices related to radiation protection as follows:

- Standards on Radiation Protection, etc.
- *Notice on Materials exempted from Radioisotopes, etc.*
- *Notice on Uses and Capacity exempted from Radiation Generating Devices*
- Regulation on Assessment and Management of Personnel Dose
- Regulation on Registration Standard and Inspection of Dosimeter Reading Service Provider
- Regulation on the Education and Training for Radiation Safety Management, etc.

The standards on radiation protection, etc. concretely define not only the constraints and limits in radiation protection such as the allowable surface contamination level, release control standards, annual limit on intake (ALI), derived air concentration (DAC), and design dose standards of shields, but also the details of the method to apply dose limits and the dose limitation and working procedures in emergency radiation work. Additionally, in order to prevent any environmental hazard, the criteria applicable to the design of corresponding facilities are specified.

F.4.2 Radiation protection framework by stages of nuclear facility management

ALARA activities for workers and the public

The KHNP incorporates the following radiation protection principles in the design and construction of nuclear facilities, for assuring ALARA and maintaining the radiation doses to workers and the general public within the applicable limits:

- radioactive equipment to be installed separately in a shielded room with a partition,
- installation of shields to fully attenuate radiation from pipes and equipment containing large amounts of radioactivity,
- use of remote controlled equipment and automatic equipment,
- installation of ventilation facilities in areas of potential air contamination,
- installation of a continuously operating radiation monitoring system in nuclear facilities, and
- appropriate zone classification and access control.

1) Radiation protection training

The Procedure prescribes that radiation workers and the personnel having frequent access to nuclear facilities should take appropriate radiation protection training courses in both the theoretical and practical aspects to acquire radiation-handling skills needed for radiation work, or for access to controlled areas. The curriculum is classified into the following courses:

- a course for radiation workers (first 20 hours),
- a course for personnel of frequent access (first 4 hours), and
- a refresher course (Radiation workers: 6 hours, Personnel of frequent access: 4 hours respectively).

The training duration is different for each course in consideration of the specialty of each course. Educational subjects include fundamentals of radiation protection, health effects of radiation, access procedures to controlled areas, and emergency preparedness. Additional subjects include radiation exposure control, contamination control, waste management, and the use of instruments and protective equipment. Personnel who have taken the training courses shall be evaluated by proper means including a written examination. If the results of the evaluation are above the pre-established level, personnel will be qualified.

2) Radiation work management

It is provided that any person who intends to have access to controlled areas and to perform radiation work should obtain approval in advance in the form of a radiation

work permit. This is prepared separately in consideration of the radiation work type, the radiation level, and the working area conditions. For the issuance of a radiation work permit, the radiation safety control personnel evaluates the expected dose in consideration of the working environment and conditions if there is no problem in the result of checking the work applicant's records of radiation dose, protection training, and physical examination. In addition, the radiation safety control personnel can further impose special conditions on the work applicant if necessary, giving work permission. *Mock-up training is conducted for specified radiation work in which high radiation exposures are expected.*

3) Dose reduction

The KHNP establishes and operates target values for reducing occupational radiation exposure according to classified categories, such as annual collective dose, collective dose during the planned preventive maintenance period, and job-specific collective dose. It is provided that any radiation work should be conducted following the plan, as established before undertaking the work, and causal analysis for excesses over the expected dose, if any, should be performed through ALARA post-examination after the work is completed, so that its result can be applied to any similar work in the future.

Individual dose control

1) Personnel dose control

The KHNP established a target dose limit for radiation workers at 80 % of the legal limit, and controls radiation doses to maintain the target dose limit. It is prescribed in the procedures that any person whose annual dose reaches the target value shall not perform any more radiation work during which said worker is expected to be additionally exposed above the target value, unless the approval of the person responsible for the operation of the facility is given or proper measures are taken.

2) Personnel dosimetry service and performance testing

All persons engaged in personnel dosimetry services, including the KHNP, transacts dosimetry services with approval of the MOST, and monthly or quarterly distribution, collection, and reading of thermo-luminescence dosimeters (TLDs). The results should be given to the individuals in question and reported to the government on a quarterly basis, and the calibration and performance verification for TLD reader are conducted every 6 months. TLD periodically undergoes a standardized performance inspection and a periodic inspection that meets the international criteria in order to secure objectivity and reliability in personnel dosimetry.

3) Operation of the national safety management center for radiation workers

As the number of radiation workers continuously increases with the expansion of nuclear facilities and radiation related industries in Korea, it has become

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necessary to systematically control occupational exposures with the ALARA principle. Thus, KINS established the National Safety Management Center for Radiation Workers, on November 27, 2002, with support of the MOST.

The center operates the Korea Information System on Occupational Exposure (KISOE), which is an internet-based expert system that enables analysis and evaluation of occupational exposures and lifetime tracking of individual worker dose. The main functions of the KISOE are as follows:

- Production of basic data on optimization of occupational exposure by analysis of the individual exposure dose*
- Feedback of matrix information on radiation dose into regulatory activities*
- Derivation of quantitative indicators for radiation safety management according to the type of radiation usage*
- Establishment of an information network system related with international databases such as ICRP, the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), and Information System on Occupational Exposure (ISOE) of OECD/NEA.*

Preventive measures for unplanned /uncontrolled release

1) Legal requirements

The MOST stipulate that direct or indirect measuring equipment that can monitor the concentration of radioactive materials, shall be installed in the drainage and air vents of nuclear reactor, related facilities and nuclear fuel cycle facilities. When the concentration of the radioactive materials released exceeds the established set points, alarm devices must automatically trigger, thus making appropriate countermeasures possible. Regarding radioactive effluent controls, airborne or liquid radioactivity concentration at site boundary must be equal to or less than the legal limits such as the ECL and radioactive waste must not be released in restricted areas other than air vents or drainage.

2) Measures in the design stage

In the design stage for the implementation of legal requirements to prevent any unplanned/uncontrolled release, it is necessary to classify each system as a radioactive system, non-radioactive system, or potential radioactive system, and to install a process radiation monitor for checking radioactivity levels or leakage by systems. The effluent radiation monitor and sampling equipment shall be furnished in the main release path, if any, and the environmental release of effluents that hold radioactivity exceeding the legal limit shall be controlled through the securing of an interlock function to automatically suspend release in alarming. Additionally, in the design stage, there is a need to check every effluent release path and spot, and to create a design that permits the prevention of possible effluent release in any other path and spot than that intended, during the operation of a nuclear facility.

3) Measures in the operation stage

Before starting operation of a nuclear facility, the operator formulates an effluent management plan, with due regard to the characteristics of the facility, which includes detailed procedures of effluent monitoring and management, sampling planning, etc. Nuclear facilities must release all liquid and gaseous effluents according to the pre-arranged plan.

According to the MOST Notice, when radioactive materials are released under unplanned and uncontrolled conditions due to equipment malfunction or human error, operators must report the incident to the regulatory body within 4 hours and submit detailed reports to regulatory body within 30 days. When radioactivity released into the environment from the facilities concerned exceeds the ECL, operators likewise must report the incident to the regulatory body within 8 hours and submit reports to regulatory body within 30 days. Information on such unplanned/uncontrolled release must also be included in regular quarterly reports submitted to the regulatory body.

F.4.3 Release restriction system for nuclear facilities

The AEA prescribes that the permission for construction and operation of nuclear facilities should be given on condition that the prevention of radioactive hazards to the public health and the environment is ensured. According to this, the Enforcement Decree of the AEA provides that the concentration of radioactive materials released from nuclear facilities should meet not only the limits defined by the MOST but also the limits defined by the said Ministry for other radioactive hazard prevention. In the Ordinances of the MOST, it is provided that the volume of radioactive material released should be minimized with the formulation of the radioactive waste management plan, and environmental impacts should be controlled to remain as low as is reasonably achievable.

Accordingly, the Enforcement Decree of the AEA stipulates that the concentration of radioactive materials released from nuclear facilities should meet not only the limits defined by the MOST but also the limits defined by the said Ministry for other radioactive hazard prevention. In the Ordinances of the MOST, it is stipulated that the volume of radioactive material released should be minimized with the formulation of the radioactive waste management plan, and environmental impacts should be controlled to maintain as low as is reasonably achievable.

The Enforcement Decree of the AEA and the MOST Notice (Standards on Radiation Protection, etc.) prescribe discharge limits of gaseous and liquid radioactive effluents to be released from nuclear facilities into the environment, along with annual dose constraints of the population living around nuclear facilities.

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- **Annual dose constraints for gaseous effluents on the restricted area boundary by a unit of nuclear facilities are as follows:**
 - air absorbed dose by gamma rays: 0.1 mGy/y
 - air absorbed dose by beta rays: 0.2 mGy/y
 - effective dose from external exposure: 0.05 mSv/y
 - skin equivalent dose from external exposure: 0.15 mSv/y
 - organ equivalent dose from internal exposure to particulate radioactive substances, etc.: 0.15 mSv/y

- **Annual dose constraints for liquid effluents on the restricted area boundary by a unit of nuclear facilities are as follows:**
 - effective dose: 0.03 mSv/y
 - organ equivalent dose from internal exposure: 0.1 mSv/y

- **Annual dose constraints on the restricted area boundary per site where multiple units are operating are as follows:**
 - effective dose: 0.25 mSv/y
 - Thyroid equivalent dose : 0.75 mSv/y

In practice, nuclear facilities operate with targets which are more restrictive than the discharge limits. In addition, some facilities also apply the derived release limits based on a small fraction of the dose limits in consideration of convenience in a field application. Whether related limits are met is verified with periodic inspection or the examination of regular reports submitted to the regulatory body. Tables F.4-2 and F.4-3 represent the annual release of gaseous and liquid effluents recently generated from nuclear plants and fuel fabrication facilities, and their off-site dose estimations, respectively.

The radiation dose and its effect on the individual around nuclear facilities are assessed monthly by using the Off-site Dose Calculation Manual (ODCM). The assessments are based on the radioactivity of released liquid and gaseous effluents, atmospheric conditions, metabolism, and social data including agricultural and marine products of the local community within a radius of 80 km.

F.4.4 System of implementing complementary measures against unplanned/ uncontrolled release from nuclear facilities

Monitoring plan

Radioactive effluents from nuclear facilities undergo monitoring to keep a release within the limits specified by the Enforcement Decree of the AEA (concerning the general public's dose limit) and the Notices of the MOST (concerning the prevention of hazards to the environment), through sampling, sample analysis, and environmental impact assessment before its release.

Action plan

The radioactive waste management facility in nuclear installation, which is furnished with a proper radiation monitoring system in the expected release path of radioactive material, is subject to formulate and implement various programs to take appropriate measures suitable in the event that an uncontrolled release of radioactive materials occurs. The facility shall make reports under the incidents reporting scheme, if any unplanned/uncontrolled release from facilities occurs, and take proper action with the support of the facility operator and the emergency response organization. Subsequently, necessary actions shall be taken after assessments for individuals/public dose and released amount of radioactive effluents according to radiological data from the process radiation monitoring and environment radiation monitoring system, and a reasonable scenario. The existing action procedures must be complemented through analysis of the path and cause of the uncontrolled/unplanned radioactive material release.

Table F.4-2 Annual radioactivity of the released liquid and gaseous radioactive waste from NPPs and off-site dose

(Unit: TBq)

<i>Type of Effluents</i> \ <i>Year</i>		<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2004</i>
<i>Kori site</i>	<i>Liquid</i>	<i>1.45E-05</i>	<i>1.96E-05</i>	<i>3.63E-05</i>	<i>1.03E-04</i>	<i>3.35E-05</i>
	<i>Gaseous</i>	<i>1.75E+00</i>	<i>7.38E+00</i>	<i>9.86E+00</i>	<i>1.06E+01</i>	<i>6.02E+00</i>
	<i>off-site dose (mSv)</i>	<i>3.61E-03</i>	<i>6.41E-03</i>	<i>2.70E-03</i>	<i>2.08E-03</i>	<i>5.22E-03</i>
<i>Yonggwang site</i>	<i>Liquid</i>	<i>1.96E-05</i>	<i>1.39E-05</i>	<i>8.51E-04</i>	<i>3.92E-03</i>	<i>2.55E-02</i>
	<i>Gaseous</i>	<i>3.43E+00</i>	<i>8.79E-02</i>	<i>9.53E+00</i>	<i>1.55E+01</i>	<i>5.19E-01</i>
	<i>off-site dose (mSv)</i>	<i>2.65E-03</i>	<i>1.59E-03</i>	<i>6.85E-03</i>	<i>5.98E-03</i>	<i>5.77E-03</i>
<i>Ulchin site</i>	<i>Liquid</i>	<i>2.99E-05</i>	<i>2.67E-05</i>	<i>1.31E-04</i>	<i>2.07E-05</i>	<i>1.89E-04</i>
	<i>Gaseous</i>	<i>3.30E+00</i>	<i>1.06E+01</i>	<i>4.02E+01</i>	<i>1.71E+00</i>	<i>2.68E+00</i>
	<i>off-site dose (mSv)</i>	<i>1.03E-03</i>	<i>3.31E-03</i>	<i>2.36E-02</i>	<i>3.37E-03</i>	<i>2.42E-03</i>
<i>Wolsong site</i>	<i>Liquid</i>	<i>2.89E-04</i>	<i>3.69E-04</i>	<i>4.58E-04</i>	<i>4.88E-04</i>	<i>5.29E-04</i>
	<i>Gaseous</i>	<i>5.29E+01</i>	<i>1.31E+02</i>	<i>1.52E+02</i>	<i>4.36E+01</i>	<i>3.38E+01</i>
	<i>off-site dose (mSv)</i>	<i>3.50E-03</i>	<i>4.43E-03</i>	<i>1.10E-03</i>	<i>5.32E-04</i>	<i>4.61E-03</i>

* Annual released radioactivity data do not include tritium release

* Off-site dose calculation includes tritium effect

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Table F.4-3 Annual radioactivity of the released liquid and gaseous radioactive waste from the nuclear fuel fabrication facility and off-site dose
(Unit: MBq)

<i>Year</i>		<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2004</i>
<i>Annual released effluents</i>	<i>Liquid</i>	<i>2.25E+01</i>	<i>1.98E+01</i>	<i>1.25E+01</i>	<i>2.25E+01</i>	<i>2.25E+01</i>
	<i>Gaseous</i>	<i>3.87E-01</i>	<i>7.84E-01</i>	<i>6.62E-01</i>	<i>10.01E-01</i>	<i>4.71E-01</i>
<i>off-site dose (mSv)</i>		<i>4.23E-04</i>	<i>5.50E-03</i>	<i>5.43E-03</i>	<i>5.66E-03</i>	<i>4.16E-03</i>

F.5 Emergency preparedness (Article 25)

ARTICLE 25. EMERGENCY PREPAREDNESS

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

F.5.1 Regulations and requirements

Radiological emergency preparedness is based on the ‘Physical Protection and Radiological Emergency Act’ and the ‘Basic Law for Disaster and Safety Management’ which stipulates a national preparation against radiological accidents. Under the above law, the MOST is responsible for formulating a master plan every 5 years and a yearly implementation plan based on the master plan. The local governments and agencies concerned make detailed implementation plan of their own, according to the master plan and the yearly implementation plan.

The emergency plan for facilities related to spent fuel and radioactive waste is made based upon the emergency plan devised by the operator of the nuclear facility as above.

F.5.2 National radiological emergency response system

The radiological emergency response scheme is composed of the National Emergency Management Committee (NEMC) which is chaired by the Minister of MOST, Off-site Emergency Management Center (OEMC), the Local Emergency Management Center (LEMC), the KINS-Radiological Emergency Technical Advisory Center, Korea Institute of Radiological and Medical Science (KIRAMS)-Radiological Emergency Medical Center, and the KHNP-Emergency Operation Center. This is shown in Figure F.5-1.

The central government has the responsibility to control and coordinate the countermeasures against radiological disaster. Especially, the OEMC, which consists of experts dispatched from the central government, local governments and designated administrative organizations, has responsibility to perform coordination of management of radiological disaster and decision-making on public protective

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actions (sheltering, evacuation and food restriction, etc.). The OEMC consists of 7 actual groups including Joint Public Information Center, which is in charge of providing accurate and unified information about radiological disasters and the OEMC Advisory Committee for the director of the OEMC.

The LEMC, established by the local governments concerned, implements the OEMC's decisions concerning public protective actions.

When an accident occurs, KHNP, an operator of nuclear installation, is responsible for organizing an Emergency Operation Center and for taking measures to mitigate the consequences of the accident, to restore the affected installations, and to protect the on-site personnel.

In addition, the central government establishes the national radiological emergency medical system for coordination and control of radiological medical services. It consists of the Nation Radiological Emergency Medical Service Center and the primary and secondary radiological emergency medical hospitals designated by the region. The KIRAMS established the Radiological Emergency Medical Center and administers national radiological emergency medical system in radiological disasters.

If any accident occurs in the nuclear facilities, the operator shall immediately report the emergency situation to the MOST and the local government, in accordance with the MOST Notice (Regulation for Establishment, etc. of the Radiological Emergency Plan for the Nuclear Related Enterprises).

The operator is also responsible for providing the local government with advice and information on protective measures for the public in radiological emergencies. The operator maintains contracts with designated hospitals near the site of the nuclear facility to provide systematic emergency medical services to the staff and the population of the vicinity region.

The KHNP Radiation Health Research Institute performs research in radiation and health physics, along with the physical examination of persons engaged in a nuclear facility and the local people of the nearby region of plants, and provides a specialized radiation emergency medical service in radiological emergencies.

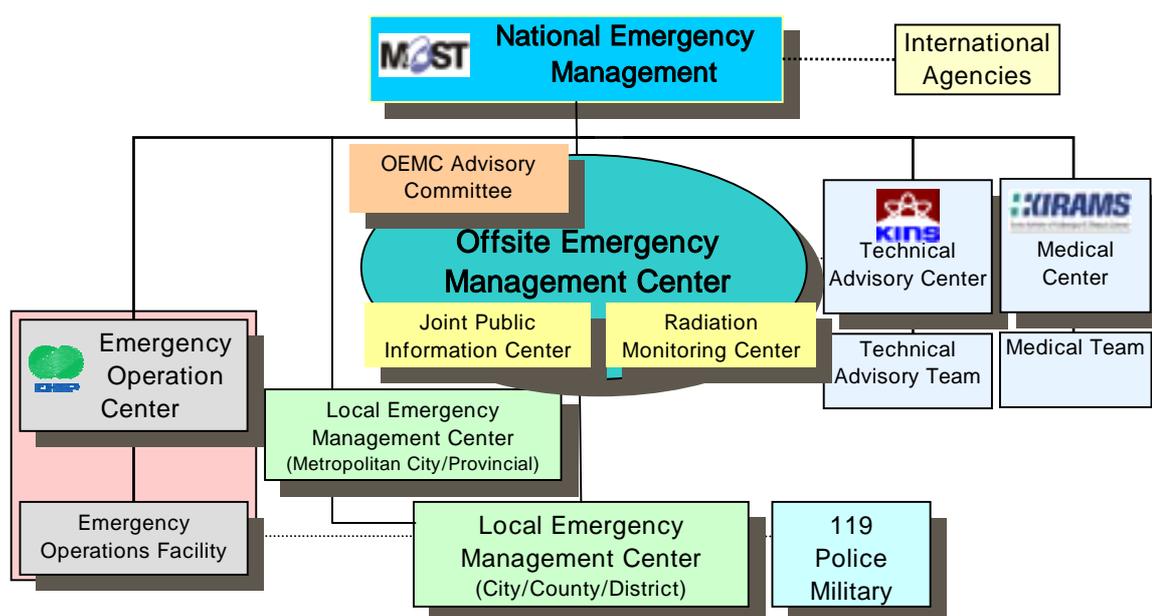


Figure F.5-1 National Radiological Emergency Response Scheme

F.5.3 Training and exercises

The operator of nuclear installations shall periodically conduct training and exercises for the emergency personnel to qualify them by providing thorough knowledge of emergency duties. The Nuclear Training Center of the KAERI and the Nuclear Education Institute of the KHNP operate training courses on emergency preparedness for personnel involved in an emergency response. The head of the local government formulates and implements an independent training program, considering the specialty of radiological accidents, to the personnel engaged in an emergency response.

In accordance with the Physical Protection and Radiological Emergency Act that came into effect in February 2004, the central government manages the radiological emergency training.

Emergency exercises, in which on-site and off-site emergency preparedness organizations must participate, are held as follows:

- *Partial drills must be conducted for two plants at least once each quarter with the participation of emergency organizations in nuclear reactor facilities.*
- *United drills must be conducted for two plants at least once each year with the participation of all emergency organizations in nuclear reactor facilities.*
- *Initial joint drills must be conducted for new nuclear reactor facilities*

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constructed on the same sites as nuclear reactor facilities currently in operation to verify emergency response ability before initial rated thermal power of 5 %.

- Joint drills must be conducted once every 4 years with the participation of all emergency organizations in nuclear facilities, the MOST, local governments, and all radioactive disaster prevention-related organizations.*
- Combined drills must be conducted once every 5 years with the participation of all domestic radioactive disaster prevention-related response organizations including central administrative organizations.*

During drills, the appropriateness of the emergency plans and their procedures, emergency equipment and networks, resident notification systems, emergency personnel's expertise in the tasks and emergency response ability, practicability of emergency plans, and a cooperative system among the related organizations are reviewed. During united, joint, and combined drills, drill scenarios that hypothesize accidents requiring evacuation and the evacuation of residents in emergency areas are established and radioactive disaster preparedness drills are performed.

F.5.4 International arrangements

The notification of an accident and the request of assistance from international organizations and nations concerned, are made in accordance with the procedures specified in the “Convention on the Early Notification of Nuclear Accidents” and the “Convention on the Support in Nuclear Accidents or Radiological Emergencies”.

The MOST and the USNRC maintain a radiological emergency cooperation scheme, by mutual consent, pursuant to the “Arrangement between USNRC and MOST for the Exchange of Technical Information and Cooperation in Regulatory and Safety Research Matters”.

Between the MOST and the Ministry of Economics, Trade and Industry, and the Ministry of Education, Culture, Sports, Science and Technology of Japan, there are inter-governmental agreements to maintain an early notification network to provide prompt notification when a nuclear accident occurs.

In December 2002, the KINS and Radiation Monitoring Technical Center (RMTC) of China concluded a Memorandum of Understanding (MOU) to exchange experts and information on environmental radiation monitoring, etc.

F.6 Decommissioning (Article 26)

ARTICLE 26. DECOMMISSIONING

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

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

The facilities, which are being decommissioned as of December 31, 2004, are the Korean Research Reactor units 1 and 2 (KRR-1 and 2) and the Uranium Conversion Facility. The research reactors are located in Seoul and the uranium conversion facility in Daejeon. Their characteristics are shown in Annex C.

The first research reactor KRR-1 reached its first criticality in March 1962 and shut down in January 1995. The operation of the KRR-2 started in May 1972 and it had been operated for 55226 hours through December 1995 with a total thermal output of 68740 MWth. A project for the decommissioning of KRR-1 and 2 was launched from January 1997, with the goal of the completion of the decommissioning at the end of 2008.

The uranium conversion facility was constructed in 1982 for the development of the fuel fabrication technologies for the PHWR and its capacity was 100 tons of uranium oxide per year. A decommissioning plan was submitted to the MOST and approved in July 2004. It is planned to complete the decommissioning by end of 2007.

F.6.1 Regulations and requirements

In the AEA and the Enforcement Regulations of the AEA, it is clearly defined that the decommissioning of a nuclear facility is the responsibility of the operator of the facility. The operator, with the intention of decommissioning a nuclear facility, shall submit a decommissioning plan and obtain approval of decommissioning from the MOST.

A decommissioning plan shall include the following:

- methods of decommissioning the nuclear facilities, and work schedule
- methods of removing radioactive materials and methods of decontamination
- radioactive waste treatment and disposal methods

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- necessary measures against radioactive hazards
- assessment of environmental impact and measures for its minimization
- QA program with regard to decommissioning
- others, as specified by the MOST

F.6.2 Human and financial resources

Nuclear power plants

1) Human resources

There is no power reactor yet that requires decommissioning and therefore no specific organization for the decommissioning of NPP exists in Korea. The NPP operators plan to make use of an organization, consisting of operating plant staff members for future decommissioning of plants.

2) Financial resources

In order to secure stable resources for decommissioning, the NPP operators have now been accumulating expenses for every stage of decommissioning and the safe management of decommissioned waste, in accordance with the EBA.

KRR-1 & 2 and uranium conversion facility

1) Human resources

For the decommissioning of KRR-1 & 2 and the uranium conversion facility, the KAERI as the operator of the research reactors carries out a project for the decommissioning of the reactors and at same time the relevant R&D of the decommissioning technologies and their demonstration. For this, the KAERI organizes a division of “Decontamination and Decommissioning Technology Development.”

There are a total of 25 workers in this division, including the project manager. Additionally 3 external researchers, retirees from the KAERI with experience in reactor operation, are entrusted with the safe dismantling of the reactor.

2) Financial resources

The KRR-1 and 2 were constructed and had been operated by the KAERI, and funded by the Korean government. As such, the government provides all financial resources for the decommissioning of these reactors. The KAERI reported a master plan for the decommissioning of these reactors to the MOST in 1996 and started the project for decommissioning these reactors in 1997 with the financial support of the government.

The uranium conversion facility was also operated by the KAERI, and funded by the Korean Government. The project for the decommissioning of this facility is

under way with the government's financial support.

F.6.3 Radiation protection

In the decommissioning of the KRR-1 and -2 and uranium conversion facility, the same regulations for the operation of the corresponding facilities, described in Article 24 of the Joint convention, are applied for the radiation protection and safety. In the decommissioning plan of the facilities, the status of facilities, radiological conditions, and anticipated waste are considered. Required human resource are described and dose rate of workers at normal and abnormal conditions, and radiation protection measures were evaluated in accordance with the MOST radiation safety regulations. At the actual worksite where the decommissioning works take place, the radiation protection is controlled according to the detailed plan specific to working conditions.

The regulations applied to the decommissioning site are Notices on the Standards for Radiation Protection, etc., the Regulation on the Packaging and Transport of Radioactive Materials, etc., the Regulations on Preparation, etc. of Radiological Environmental Report of Nuclear Utilization Facilities, and the Regulations on the Environmental Radiation Survey and Impact Analysis in the Vicinity of Nuclear Facilities.

F.6.4 Emergency response

In the decommissioning of the KRR-1 & 2 and uranium conversion facility, the exposure rate for workers was estimated for several scenarios of plausible accidents and the highest exposure rate was expected in the case of a drop of equipment, which was highly radioactive because of the activation by neutrons during reactor operation. But even in this case, it was evaluated that the exposure rate could be minimized with securing sufficient times enough to take a shelter.

In the guideline for coping with such radiation accidents, it is defined that all work should be suspended and all workers should be evacuated from the working area without a delay. Further, the radiation safety control personnel must control access to the working area and take necessary measures for preventing radioactive materials from spreading.

All decommissioning work is conducted within the building, and indoor air is released through a filter set as part of the building ventilation system even in the case of radiation accident, to eliminate spreading of radioactive materials outside the reactor building. Thus it is not necessary for the public around the KRR-1 and 2 and uranium conversion facility to evacuate when such an accident occurs.

However, for preparedness against general industrial safety accidents as well as radiation accidents, an emergency network for communication was made with the

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Korea Institute of Radiological & Medical Sciences (KIRAMS), which is located in the vicinity of the research reactors, for the emergency evacuation of injured workers.

F.6.5 Record keeping

Under the Enforcement Regulation of the AEA, the records on the operation of the nuclear facilities should be kept till the decommissioning of the facilities for the application of the records for planning and implementing the decommissioning. The records include the documents on the reactor design and construction, data on radiation protection, abnormal operation conditions and their remedy works, etc.

In the division of Decontamination and Decommissioning Technology Development, which is an organization of the KAERI responsible for the decommissioning of both the research reactors and the uranium conversion facility, the database system named DECOMIS was developed. The final goal of the database system is to gather all information on the decommissioning waste, such as generation, decontamination and packing, manage them in a systematic way and report to the WACID system of the KINS, a national DB for radioactive waste management.

All information related to the decommissioning of the research reactors is preserved. The information includes data about the condition and radiological state of the facilities, duration of each activity, input of workforce and equipment for each work involved, radiation dose of each worker, radioactive waste generation and radioactivity of the waste, the volume of released radioactive effluent, the amount of treated liquid waste, and so on.

G. Safety of Spent Fuel Management

G.1 General safety requirements (Article 4)

ARTICLE 4. GENERAL SAFETY REQUIREMENTS

1. 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.

G.1.1 Design criteria and requirements

In accordance with the AEA, a comprehensive and systematic safety evaluation shall be performed before the commencement of construction, which provides reasonable assurance that the public health and the environment will be protected against radiation hazard due to the construction and operation of a spent fuel management facility. The evaluation results shall be reported to the MOST as a safety analysis report and radiological environmental impact assessment report. Principal design criteria and requirements to be considered to ensure the safety of the facility are as follows:

The major design criteria and requirements to enhance the safety of the facility are defined in the Notice of the MOST (the Siting Criteria for Spent Fuel Interim Storage

G. Safety of Spent Fuel Management

Facilities, the Standard Format and Contents of Site Characteristics Report for Spent Fuel Interim Storage Facilities, the Acceptance Criteria for Spent Fuel, the Regulation on Preparation, etc. of Radiological Environmental Report of Nuclear Power Utilization Facilities, and Standards on Radiation Protection, etc). The major design criteria and requirements are as follows:

Site suitability

The location of the spent fuel management facility shall be determined in accordance with consideration of meteorological conditions, hydro-geologic features, earthquakes, ecological characteristics, and the availability of existing water resources.

Safety evaluation

The spent fuel management facility shall be designed so that the leakage of radioactive materials into the environment is restricted by ALARA under the conditions of normal operation and abnormal situations, and that radiation exposure due to accidents including natural disasters can be efficiently mitigated.

Fire and explosion

The spent fuel management facility shall be designed to efficiently maintain its safety function even in fire and explosion accidents.

Prevention of heavy objects from falling

Spent fuel or vault shall be kept safe from detriment due to the falling of any heavy objects such as a shipping cask.

Nuclear criticality safety

All equipment of the spent fuel management facility shall be designed to maintain a sub-critical state under any circumstances.

Test and inspection

The spent fuel management facility shall be designed and constructed to permit periodic testing and inspection to check the reliability of its use with a safety margin.

G.1.2 Additional requirements to be considered

Minimization of spent fuel generation

The generation of spent fuel is decreasing due to long-term operation accompanied with the utilization of more highly enriched fuel (4.2 – 4.5 w/o).

Means to and requirements for protection from radiation/radioactivity hazards

In accordance with the AEA, the spent fuel management facility shall maintain radiation-shielding capacity to sufficiently protect against dose rate due to the handling and storage of spent fuel. The facility shall also prevent the stored fuel from any severe damage, such as criticality.

Biological, chemical, and other hazards

In accordance with the AEA, the spent fuel management facility shall have enough capability to prevent itself from any impact of fire or explosion, etc.

Requirements for restricting the effects on future generations

The potential risk of radiation exposure, to future generations, in the spent fuel management facility shall be restricted within the radiation protection level of current application, in accordance with international technical standards.

Abatement of undue burden on future generations

The spent fuel shall be safely managed so that future generations may not be hazarded at a higher level of risk than those imposed upon the present generation, and the waste generators reserve funds for the payment of expenses incurred at the point of generating waste in order not to impose any financial burdens on future generations.

G.2 Existing facilities (Article 5)

ARTICLE 5. EXISTING FACILITIES

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

The independent storage facility for spent fuel does not exist in Korea as of today. The spent fuel storage facilities in the nuclear power and research reactor (AR storage) are licensed and inspected for the safety management, as a part of the nuclear facilities.

The spent fuel storage facilities in the reactor sites can be constructed and operated after the safety review in accordance with the AEA. The design performance of these facilities is also confirmed through the regulatory inspection. The alteration of the licensed matters of significance and the minor changes of the operating facilities shall follow the same licensing procedure of the AEA.

The status, operating history, major events, any maintenance records, etc. of the operating spent fuel storage facilities in Korea at the time the Convention enters into force were reviewed thoroughly; no abnormal safety cases were identified.

Safety evaluation

As a result of safety evaluation of facilities, the SAR shall be submitted to the regulatory body, and an appropriate examination and verification as to whether such results fulfil the related regulations and design criteria should be performed.

Safety improvement

The spent fuel management facility shall be subject to a comprehensive evaluation for its safety and performance through regulatory inspections by the MOST, and proper action shall be taken within a specified time according to the procedure, if there is any abnormality in safety and performance as a result of the safety evaluation.

G.3 Siting of proposed facilities (Article 6)

ARTICLE 6. SITING OF PROPOSED FACILITIES

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

The siting of the spent fuel management facility shall be made in accordance with the Notice of the MOST (Siting Criteria for the Spent Fuel Interim-Storage Facilities), and technical standards of the site in which the facility is located, including various conditions such as demographic, geological and seismological characteristics, the hazard of man-made events induced by flying objects, industry, military activities and dangerous objects. It should also include data on atmospheric diffusion and dilution, natural phenomena such as rainfall, snowfall, lightning, tidal waves and typhoons, river flooding, and other hydrologic characteristics.

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

ARTICLE 7. DESIGN AND CONSTRUCTION OF FACILITIES

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

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

Prevention of the release and uncontrolled effluent

In order to ensure the safety of spent fuel management facilities, a multi-barrier concept based on the defense-in-depth principle is applied to the design of such facilities. Several basic concepts, particularly, of securing sufficient design margins, the interlock concept, and the multiple barriers concept are being considered to back-up the defense-in-depth principle.

The spent fuel management facility shall be designed to have a capability of properly controlling gaseous and liquid radioactive materials generated in normal operation including the anticipated operational transients, and inhibiting the release thereof, and to restrict the effects to the external environment with the limitation of gaseous and liquid effluent releases to the effluent control limits.

Application of decommissioning concept

The spent fuel management facility shall be designed to secure safety in decommissioning.

Application of proven technologies

The spent fuel management facility shall be designed and constructed on the basic principle that technologies incorporated in a design shall be duly proven by experience or qualified by testing or analysis.

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

ARTICLE 8. ASSESSMENT OF SAFETY OF FACILITIES

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

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

Safety and environmental impact assessment for facilities

It is necessary to prepare a SAR and a radiological environmental impact assessment report after evaluating safety and radiological environmental impacts for the period of operation for the spent fuel management facility. The safety analysis report contains the results of a comprehensive safety evaluation for the said facility, particularly, the design features of structures, systems and equipment in the facility, radiation protection, and site characteristics.

The radiological environmental impact assessment report contains the effects of radiation or the release of radioactive materials from the spent fuel management facility on the population and the environment.

Supplementation of safety evaluation

The examination and verification as to whether the safety evaluation and environmental impact assessments conform to regulatory requirements and technical standards, etc. should be performed and matters needing amendment, if any, should be properly modified before the start of operation. The results should be reported to the regulatory body.

G.6 Operation of facilities (Article 9)

ARTICLE 9. OPERATION OF FACILITIES

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) programs 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.

G.6.1 Technical requirements

The criteria for operating license for a spent fuel management facilities are specified in the AEA as follows:

- Technical and economical capabilities necessary for the construction and operation of the facilities, etc. shall be secured.
- The location, structure, equipment and performance of the facilities shall conform to technical requirements, as prescribed by the Ordinance of the MOST, in such a way that there may not be any impediment to the protection of human body, materials, and the public against radiation hazards caused by radioactive materials.
- There shall be no impediment to the protection of the public health and the environment against danger and harm due to radioactive materials, which may accompany the construction and operation of the facilities, etc.
- The equipment and manpower prescribed by the Presidential Decree shall be secured.

The spent fuel management facility shall be operated with the verification of its conformity to the design requirements through a startup operation, in accordance with license conditions.

The technical requirements newly amended during the operation of spent fuel management facilities shall come to be reflected in the operation of those facilities.

G.6.2 Determination of operation limiting conditions

The determination of operation limiting conditions for spent fuel management facilities shall be described in the operational technical specifications, in accordance with the related laws and regulations.

G.6.3 Operating procedures

The operation, maintenance, monitoring, inspection and testing of facilities shall be made after an operating procedure is prepared on the basis of the operational technical specifications.

G.6.4 Engineering and technical support

The operator of a spent fuel management facility will cooperate with several organizations, which administer engineering and technical support according to facility features in all safety-related fields during its operational lifetime. The KHNP, which is responsible for the construction and operation of the spent fuel management facility, receives support in engineering, maintenance, and facility operation from the KOPEC, the KPS and Samchang Enterprise Co., Ltd., and a radiation safety management service company, respectively.

G.6.5 Incident report and document control

The AEA stipulates that nuclear-related organizations shall immediately take all necessary safety measures and report such measures to the MOST for the following cases:

- if radiation hazards occur,
- if any failure occurs in nuclear facilities,
- if there is any danger to nuclear facilities or radioactive materials due to earthquakes, fires or other disasters,
- if radiation generating devices and radioactive materials in possession are stolen,

G. Safety of Spent Fuel Management

lost, or destroyed by fire or any other incident, or

- if radioactive materials in transportation or packaging leak or are destroyed by fire or any other incident.

The Notice of the MOST (Regulation on the Reporting of Events and Accidents of Nuclear Facilities) stipulates in detail the incident reporting system. It includes the objects, means and procedures of reporting, and the classification of incidents and accidents, which is based on the International Nuclear Event Scale (INES) of IAEA. The expected scenarios to be reported in spent fuel management facility are as follows:

- *when the surface contaminations at the outside of the radiation area are over the limit due to the release of the radioactive materials*
- *when the local radiation level is increased abnormally*
- *when unplanned or uncontrolled radioactive materials are released to the environment*
- *when the radioactive materials over the release limits are discharged*

G.6.6 Procedures of decommissioning plan formulation, supplementation, and review by regulatory body

In accordance with the AEA, any person who intends to decommission a spent fuel management facility must prepare a decommissioning plan, and submit it to the MOST for approval. The decommissioning plan is to be prepared on grounds of necessary measures against radiation hazards, the data obtained during the operation of the facility and data obtained by facility survey at the point of ending operations.

The operators of all the NPPs and related facilities including spent fuel storage facilities should report the discontinuation of the business to the MOST after the completion of necessary activities for the radiation hazard protection such as transfer, keeping, discharge, treatment, disposal, and decontamination of the radioactive materials. The MOST can order the collection of the used radioactive materials and the decommissioning of the contaminated facilities, if necessary.

G.6.7 Emergency plan

The operator of spent fuel management facility shall prepare an emergency plan, and secure and operate emergency response organizations and facilities based upon the plan.

G.7 Disposal of spent fuel (Article 10)

ARTICLE 10. DISPOSAL OF SPENT FUEL

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

The spent fuel management program in Korea keeps the long-term perspective strategy that it progresses the program in consideration of the national policy and worldwide radioactive waste disposal technology development.

The disposal technology development related to the high-level waste (HLW) including spent nuclear fuels has begun in 1997 in accordance with “The Comprehensive Promotion Plan for Nuclear Energy” stipulated in the AEA. Over the years, a comprehensive program for the HLW disposal system development, system performance and safety assessment, validation of performance of the HLW disposal system, and geo-environmental assessment have been carried out as a national 10 year research program to propose the Korean Reference Disposal System.

The preliminary results of the HLW disposal technology development were peer-reviewed by IAEA WATRP (Waste Management Assessment and Technical Review Programme) in October 2002. It turned out that the current research had been on the reasonable direction, but it was recommended that QA system and performance assessment system may need complement. The WATRP report is listed in reference.

Since May 2005, an underground research tunnel (URT) has been constructed at the site of the KAERI in Daejeon, Korea. It is expected that more systematic research for the HLW disposal will be conducted after completion of the URT at the end of 2006.

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H. Safety of Radioactive Waste Management

ARTICLE 11. GENERAL SAFETY REQUIREMENTS

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

In so doing, each Contracting Party shall take the appropriate steps to:

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

H.1 General safety requirements (Article 11)

H.1.1 Design criteria and requirements

According to the AEA, radioactive waste management facilities shall be designed to provide reasonable assurance that the public health and the environment be protected against radiation hazard due to the construction, operation, closure, and institutional control. In order to ensure satisfying the above criteria, the license applicant shall perform a comprehensive and systematic safety analysis. And then analysis results shall be reported to the MOST as a safety analysis report and a radiological environmental impact assessment report. Principal design criteria and requirements to be considered to ensure the safety of the facility are as follows:

Site selection

The location of radioactive waste management facility shall be determined in due consideration of meteorological conditions, hydro-geologic features, earthquakes, ecological characteristics, and the usage of existing water resources. Engineering barriers shall be applied to complement natural barriers, if necessary.

H. Safety of Radioactive Waste Management

Safety evaluation

The radioactive waste management facility shall be designed to maintain the radiological impact on workers, the population and the environment, due to the release of radioactive materials, as low as is reasonably achievable (ALARA), within acceptable limits, in the design, construction, operation, closure and institutional control stages, and to sufficiently decrease any radiation exposure caused by accidents including natural disasters.

Radiation protection

Every zone where radioactive materials are handled and managed shall be designed according to the requirement that radiation exposure be maintained as low as is reasonably achievable (ALARA).

Fire and explosion

The radioactive waste management facility shall be designed to prevent the release of radioactive materials outside the facility, in the occurrence of fire or explosion accidents.

Criticality Safety and Thermal Stability

Radioactive waste management facilities must be designed such that they can prevent the formation of criticality conditions during operation and withstand the heat generated by decay heat and radiation irradiation. For this, the concentration of fissile materials in radioactive waste must be restricted at the stage of designing the facilities and cooling functions must be secured when there is the possibility of waste being overheated by decay heat.

Prevention of Hazards to Environment

As one of the major licensing standards for radioactive waste management facilities, the said facilities shall prevent radiological hazards to human health and the environment. In accordance with the AEA, the standards for prevention to environmental hazard regarding radioactive waste management facilities are: (1) limits on the radiological concentration in liquid and gaseous radioactive effluents from the facilities; and (2) design objectives of exposure dose for the general public around the facilities.

In particular, with respect to disposal facilities, a radiological protection criteria for long-term safety has been established to maintain the radiological risks of post-closure radioactive waste below permissible level for not only the present but also future generations. In addition, the future anticipated impact on the environment surrounding the disposal facilities must be restricted to a negligible level and the radioactive materials or non-radioactive materials disposed of must not impede future use of natural resources.

Tests and inspection

The radioactive waste management facility shall be designed and constructed to facilitate tests and inspection for ensuring the safety of its continuing operation.

Closure and post-closure management

The radioactive waste management facility shall be designed and constructed to allow its closure when the performance considered in design reaches a limit or when the normal function of the facility can be no longer maintained due to unexpected accident. For the post-closure management of the disposal facility, it is necessary to conduct environmental monitoring of the closed disposal facility and its surroundings that enables inspection and testing to check the safety of the facility for the necessary duration.

H.1.2 Additional requirements to be considered

Minimization of radioactive waste generation

To minimize the amount of radioactive waste generated in the process of operating NPP, the KHNP has improved existing treatment facilities and actively introduced, to newly constructed NPPs, a new waste treatment technology that minimizes the volume of waste generated.

In order to reduce the volume of the DAW, which amounts to 60-70 % of the waste generated in the NPP, the waste used to place in a 200 L cylindrical drum and subject to low-pressure compression at a pressure of 10 tonne. As for newly operating NPPs in Korea, improved facilities with compression of 30 tonne are used.

Because the construction of permanent radioactive waste repositories has been postponed and the construction of additional temporary storages on NPP sites has become unforeseeable in the near future, a super-compactor with compression of 2000 tonne has been used since 1994. Existing low-pressure compressed miscellaneous radioactive solid waste drums have been compressed again using the super-compactor and repacked. However, the super-compactor was not applied for some waste drums containing non-compactable ones including metal, concrete and etc., because no volume reduction was almost attained.

Some plastic wastes tend to generate spring-back phenomena when compressed. To mitigate these unfavorable phenomena, a heating and compressing device that compress waste at a high temperature was developed and has been used in some NPPs in Korea.

Liquid concentrates generated from liquid waste evaporation were solidified using cement. Since the mid-1990s, however, the amount of concentrates waste generated,

H. Safety of Radioactive Waste Management

which amounted to approximately 30 % of the total waste, has considerably been reduced by introducing a technology whereby concentrates throughout the NPP are completely dried and fixed with paraffin. In addition, since the selective ion exchange demineralizer system for liquid waste treatment installed in Yonggwang units 5 and 6 have been operated, liquid concentrates are no longer generated.

As for spent resin used to clean up nuclear reactor coolants, the cement solidification used to employ widely. Since the mid-1990s, however, spent resin has been dried and packed in containers that enable to retain their structural integrity over a long period, even in severe disposal environments, thus reducing the amount of waste generated in comparison with the past.

To fundamentally minimize the generation of radioactive waste, as much as possible, equipments and materials already existing in the radiation controlled areas are used to minimize new items bring into the areas. Besides, in order to recycle used materials, decontamination equipments and temporary storage facilities are installed and operated in radiation-controlled areas. Recycling or clearance is also performed by decontamination of relatively easily decontaminable items such as metals and plastic through the techniques such as grinding and electrolysis.

Disposal Options for Radioactive Waste

The AEA stipulates radioactive waste disposal methods and related requirements according to the degree of radiological hazard concerned. First, regarding LILW, near-surface disposal requirements have been stipulated; with respect to HLW including spent fuel, requirements for geological disposal have been stipulated. As for waste with negligible radiological risk, clearance application is allowed in the case-by-case manner.

Consideration of disposal safety in predisposal management

As the final stage of management of the LILW, permanent disposal is being considered and the form of the waste to be disposed of is restricted to non-fluid solid waste that is physically and chemically stable. Regarding the LILW, permanent disposal should be taken into consideration even from the pre-disposal stage. For ensuring the disposal safety, radioactive waste management facilities must be equipped with functions whereby radioactive waste can be solidified or stabilized into a form appropriate to disposal or be placed in containers whose long-term safety under disposal environment have already been verified.

Means and requirements for protection against radiological hazards

To dispose of radioactive waste effectively and safely, sites, disposal facilities, and radioactive waste itself must have its integrity and the radioactive waste to be disposed of must satisfy the regulations established in the MOST Notice (Acceptance Criteria for LILW). Consequently, radioactive waste is processed to comply with the provisions established in the acceptance criteria of the LILW.

After the closure of radioactive waste disposal facilities, annual dose caused by

natural phenomena due to radiation risks on the individuals of a critical group should not exceed 0.1 mSv. Annual risk due to unexpected phenomena caused by either natural or artificial factors should be limited to below 10^{-6} as well.

Disposal facilities must be constructed in due consideration of disposal facility performance objectives to protect not only radiation workers and the current general public but also future generations.

Biological, chemical, and other hazards

Explosive, flammable, and pyrophoric materials-containing waste to be disposed of shall be adequately treated so that hazards due to these features can be removed. In addition, the waste shall be controlled not to lower the integrity of the waste package or the performance of disposal facilities by generating gas, vapor, or liquid as a result of radiolysis, or biological or chemical reaction, and it also shall not hinder the safety of the workers.

With regard to waste to be disposed of, that includes corrosive materials, corrosivity must be mitigated and the material must be packed so as to withstand corrosion; waste that includes toxic, perishable, or contagious materials must be processed so as to exclude such hazards. The chelating agent included in waste must be excluded or its content must be restricted according to the acceptance criteria of disposal facility.

Stability of waste package

Waste to be disposed of shall be packed in a nonflammable container, and the packing container should be free from defects as judged by a visual inspection. Furthermore, the package shall be able to maintain its integrity under the circumstances expected in disposal conditions, and even when the internal pressure increases due to the generation of gas within the package.

Protection of future generations

In accordance with the performance objective as defined in the Notice of the MOST No. 2005-17 (Standard for Preventing Radiological Hazards from LILW Disposal Facilities), impact on future generations from radioactive waste disposal facilities shall be restricted to within the level equivalent to the radiation protection criteria permitted for the current generation.

Burdens on future generations

In order to avoid unfairly imposing burden on future generations regarding the safe management of radioactive waste generated by the present generation, construction of facilities that will ensure the safe isolation of LILW from the ecosystem and the development of related technology are under way.

And the waste generators are obliged to reserve funds for the payment of the expenses incurred at the point of generating waste so as not to impose any financial burdens on future generations.

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

ARTICLE 12. EXISTING FACILITIES AND PAST PRACTICES

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.

All the domestic nuclear facilities including radioactive waste management facilities are constructed and operated after adequate safety evaluations and the authorization of licenses according to the AEA. The maintenance of these facilities according to licensed conditions is verified through periodical regular inspections and ad-hoc inspections. In addition, when authorized and licensed conditions at specific facilities require revision, authorization and licensing procedures in pursuant of the AEA such as revision authorization for major alteration cases and revision reporting for minor alteration must be adhered to.

Starting on the effective date of the Joint Convention, the current conditions, past operation history, and major accident and maintenance records of existing radioactive waste management facilities and major radioactive waste-generating facilities in operation in Korea were reviewed. As the result, no abnormality was confirmed.

In addition, past practices such as the control of radioactive effluents released into the environment from existing facilities and records on the clearance application of very low level radioactive waste were reviewed. It were verified that past practices had been performed in a manner appropriate to domestic laws that comply with international safety standards.

Safety Evaluation

The MOST Notice (Technical Requirements on the Operation and Control of LILW Repository) stipulates that safety re-evaluation be performed on LILW disposal facilities before their closure. Safety re-evaluation of disposal facilities must include: information on the facility, site, and surrounding areas during the operation period; total inventory of the waste disposed of; and records on events and accidents that occurred during operation and that may affect the safety of disposal; and possible radiological and non-radiological impacts from disposal on the public and the surrounding environment.

In order to improve the operational safety of NPPs, which are the major sources of radioactive waste, a provision of the periodic safety review (PSR) has been institutionalized since 2002. Every 10 years, all NPP operators must submit to regulatory body the PSR reports including radioactive waste safety control and effluent control and future improvement plans; regulatory body must review, and confirm whether the reports adequately satisfy related laws and design standards. Periodic safety evaluations have been completed for Kori units 1 and 2 and Wolsong unit 1. Currently, periodic safety evaluations for Kori units 3 and 4 are underway.

Safety improvement

Radioactive waste management facilities undergo a comprehensive evaluation for their safety and performance through periodic regulatory inspections by the MOST, and proper actions shall be taken within a specified time according to established procedure if there is any abnormality in safety or performance as the result of safety evaluations. The efforts to improve the safety of radioactive waste such as minimization of radioactive waste generation are already described in Subsection H.1.2.

H.3 Siting of proposed facilities (Article 13)

ARTICLE 13. SITING OF PROPOSED FACILITIES

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.

H.3.1 Siting-related factors

General factors

The siting criteria for radioactive waste management facilities are stipulated in the MOST Notice according to the AEA. The results of the site characteristics investigation are to be described in the site characteristics report, which must be drawn up according to MOST Notice (Standard Format and Contents of Site Characteristics Reports for LILW Repository).

The Notice of the MOST (Siting Criteria for the LILW Repository) provides technical standards of siting with regard to radiation safety in the aspects of both the natural, and human and social environment. Many factors such as meteorological conditions, ground surface conditions, geological conditions, surface water, ground water, earthquakes, ecological characteristics, the use of water resources, other land use for industrial or military purposes, and the supplementary emplacement of engineering barriers are covered in the criteria.

Another MOST Notice (Standard Format and Contents of Site Characteristics Reports for LILW Repository) stipulates the following, all of which must be described

in the site characteristics reports: 1) data on the current status of the site such as its geography, population, military facilities, major environmental conditions, natural resources, and the ecosystem; 2) site safety evaluation data such as the effect of natural disasters and human-induced external events, and design input data; and 3) site monitoring and surveillance programs including pre-operational, operational, and post-closure site monitoring and surveillance plans.

Safety analysis factors

Safety evaluation for the site of radioactive waste repository is categorized into the environmental impact assessment applicable to the non-radiological aspects under the Environmental Impact Assessment Act enforced by MOE, radiological environmental impact assessment and the safety analysis applicable under the AEA enforced by the MOST.

Such safety analysis shall be performed for the “Approval of Electric Source Development Project Plans” and the “Approval of Radioactive Waste Management Project Plans, as well as for the “Construction/Operation Permit of Radioactive Disposal Facilities.”

Radiological environmental impact assessment

Under the AEA, the radiological environmental impact assessment shall be conducted to evaluate the impact of radiation or radioactive materials caused by the operation of a radioactive waste disposal facility on the surrounding environment, as one of the fundamental requisites to obtain the construction permit and operating license for the radioactive waste disposal facility.

The radiological environmental impact assessment report contains facility information, the environmental status of neighboring regions, the predicted radiological impact due to the operation of the facility on the surroundings thereof, the environmental radiation monitoring program to be implemented during construction and operation of the facility, the radiological impact on the environment resulting from operational accidents/incidents, and the public opinions collected.

Non-radiological environmental impact assessment

Aside from the radiological environmental impact assessment, the environmental impact assessment checks and evaluates non-radiological impacts induced during the construction and operation of a LILW repository on the surrounding environment, in compliance with the provisions of the Environmental Impact Assessment Act. The licensee shall submit the Environmental Impact Assessment Report when applying for an approval of an electric source development project plan, and an environmental impact assessment to apply for approval of a radioactive waste management project plan.

The environmental impact assessment shall be performed for 23 items related to 3 fields of the natural environment, living environment, and social and economic environment, while the opinions of the local residents living in the corresponding region shall be

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collected through a presentation meeting or public hearing before the preparation of an assessment, and be included in the assessment. The assessment submitted is to be approved by the MOCIE upon deliberation with the MOE.

Safety Analysis

Under the AEA, the licensee shall prepare a SAR and submit it to the MOST in order to ensure safety in every stage of construction and operation of a radioactive waste disposal facility, and this report is one of the core requirements to obtain the construction/operating permit for the radioactive waste disposal facility.

The Enforcement Regulation of the AEA specifies the items to be included in the SAR, which covers safety-related matters, particularly, the outline and description of the facility, site characteristics, the design, construction, operation and maintenance of the facility, site closure and institutional control, safety evaluation and accident analysis, radiation protection, technical guidelines, etc.

In particular, the MOST Notice (Standard Format and Contents of Site Characteristics Reports for LILW Repository) requires, as a part of the site safety evaluation, a description of an impact assessment in reference to natural phenomena, and disasters and external human-made events, as well as construction and design input data.

In particular, the SAR must describe evaluation results and analysis methods regarding the meteorological, hydrological, geological, seismological, geochemical, and geotechnical characteristics needed to conduct a safety evaluation of the disposal facility site for the assessment of the impact of natural phenomena and disasters. To conduct an impact assessment of external events, an impact assessment of anticipated human-induced external events concerning major industrial facilities, transportation facilities, and military facilities surrounding the disposal facilities concerned likewise must be presented.

Disclosure of information

The Korean government maintains consistently a principle for securing transparency in the entire stage of selection process of the LILW repository site.

The Act on Special Cases Concerning Electric Source Development prescribes to open the details of the project to local residents for a certain period before notice of the designation of the final site and the approval of the Electric Source Development Project Plan. The AEA and the Environment Transportation Disaster Impact Assessment Act of the MOE also specify that public opinions should be collected through public hearings before the preparation of an environmental impact assessment report.

The Special Act on Supporting the Local County Around the Low and Intermediate Level Radioactive Waste Disposal Facility prescribes that the MOCIE shall open the site selection plan and process as well as the results of site surveys and

the LILW disposal facility construction plan to the public, while holding explanatory meetings or forums for the local residents. The MOCIE also has been operating the “Site Selection Committee” since March 11, 2005, consisting of 17 members, comprised of professors, journalists, NGO representatives and lawyer.

In addition, the Private Environment Monitoring Organization which consists of local residents and NGO representatives will be organized and operated during the LILW Disposal Facility operation period.

Consultation with neighboring countries

The Korean Government has not concluded any specific international agreements with foreign countries on site selection, since the Korean peninsula surrounded by sea on three sides, is isolated from neighboring countries.

However, the Korean Government maintains close cooperative relations with international organizations and neighboring countries on radioactive waste and radiation emergency preparedness. Additionally, Korea preserves the cooperative system for the peaceful use and development of nuclear power under nuclear cooperation agreements made with 18 countries including neighboring countries such as China, Japan, etc.

H.3.2 Permit for radioactive waste management facilities

The permit/approval required for siting, construction, and operation of radioactive waste management facilities are the “Approval of Electric Source Development Plan” provided in the “Act on Special Cases concerning Electric Source Development,” and the “Approval of Radioactive Waste Management Plan” provided in the EBA. Meanwhile, the Construction/Operation Permit for Disposal Facilities, etc.” prescribed in the AEA is to make the final decision on the selected site as the radioactive waste repository site.

Approval of electric source development plan

The radioactive waste management project organization shall prepare an electric source development plan including information on the outline of the facility, the location and boundary of the facility, the project duration, necessary funds and fundraising, and the installation of public facilities and cost sharing plan, as well as an environmental impact assessment report, and submit an application for approval of the plan to the MOCIE. Then, the Minister of MOCIE gives official approval to the licensee through consultation with the relevant Ministers of the central government and deliberations at the Electric Source Development Promotion Commission, after consulting with the head of the relevant local government.

Approval of radioactive waste management plan

The radioactive waste management project organization shall submit an application for approval including facility location map, layout of main facilities, environmental impact assessment report, operation plan after construction, construction schedule, estimated

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funds and fundraising, etc. to the MOCIE. Then, the MOCIE reviews the implementation plan, and gives official approval to the licensee after consulting with the relevant Ministers of the central government.

Permit of construction/operation for the radioactive waste management facility

The radioactive waste management project organization shall submit an application for the construction permit and operating license of a radioactive waste management facility including a radiological environmental impact assessment report, SAR, the implementation plan for safety management, documents on design and construction methods, a QA program for construction and operation, documents related to the types of radioactive waste to be stored, treated and disposed of and the method of storage, treatment and disposal, a fundraising plan, specifications of technical capabilities for construction and operation, etc. to the MOST. The MOST gives official approval to the licensee, if the application submitted meets the licensing criteria prescribed in the AEA.

H.3.3 Efforts in site selection of the radioactive waste disposal facility

After establishment of the legal basis of project promotion by the amendment of the AEA in 1986, the Korean government has striven to secure a site for the national radioactive waste repository, as summarized in Table H.3-1.

In 2004, the Korean government strived to secure a site through petition by local residents, voluntary application by the local government, and local referendum, according to the procedure publicly notified on February 5, 2004.

The KHNP, the organization is responsible for the national radioactive waste repository project, made a great deal of effort to enhance local residents' acceptance on the repository through various ways; publicity campaign, inviting local residents to visit nuclear related facilities at home and abroad, providing information on the internet, advertisements, explanatory meetings, forums, symposiums, etc.

As a result of these efforts, there were petitions by some residents in 10 local communities, which all failed in site selection due to the lack of application from the local governments, which is a prerequisite for site selection.

Thereafter, the government promulgated the Special Act on Supporting the Local County Around the LILW Disposal Facility on March 31, 2005. The Special Act prescribes the financial aid to the hosting region, democratic and transparent procedure of site selection, as well as the site selection process with active participation of local residents.

On June 16, 2005, the government gave a Public Notice, the Site Selection for LILW Disposal Facility, which specified the site selection criteria, process, and aid to the hosting region. Based on the Notice, the site selection for the LILW disposal facility is in progress. The detail process for the site selection is described in Annex F.

Table H.3-1 History of radioactive waste repository site selection

Stage	Site Location	Background & Results
1st (’86~’89)	East coast (Ulchin, Yongduk, Yong-II)	- Candidate sites were selected, but site investigation was halted due to opposition by local residents
2nd (’90)	Anmyun-Island in Chungnam Province	- Selected as the 2nd site of the KAERI - Cancelled after demonstration on Anmyun Island (Nov. 1990)
3rd (’91~’93)	Anmyun-Island in Chungnam Province, Chunggha in Kyungbuk Province	- 6 candidate sites were recommended based on a contracted study (Kosung & Yangyang in Kangwon Province, Ulchin & Yong-II in Kyungbuk Province, Tae-An in Chungnam Province)
4th (’93~’94)	Jang-An in Kyungnam Province, Kisung in Kyungbuk Province	- Volunteered by local residents (Financial support program was introduced.) - Violent opposition
5th (’94~’95)	Gulup-Island in Incheon City	- Nominated based on 「 Act for promoting the radioactive waste management project and financial support for local community 」 (Feb.’95) - The Government organized a task force team - Cancelled after the discovery of active faults (Dec.’95)
6th (’00~’01)	7 regions including Younggwang in Jeonnam Province	- <i>Site subscription campaign (’00.6.28~’01.2.28)</i> - <i>Failed due to local governments’ rejection despite 7 petitions by local residents : Younggwang/Jindo /Wando/Gangjin in Jeonnam, Gochang in Jeonbuk, Ulchin in Kyungbuk, Boryoung in Chungnam</i>
7th (’03~’04)	11 regions including Buan in Jeonbuk Province	- <i>Site subscription linked with the Proton Accelerator Project (May ’03)</i> - <i>Submitted an application by the chief of Buan Gun in Jeonbuk and the SSC nominated Wido-island in Buan-Gun as a candidate site (July ’03)</i> - <i>Altered the siting process (mandating referendum, etc) due to the violent opposition and site re-subscription (Feb.’04)</i> - <i>Failed due to local governments’ rejection despite petitions from 10 regions by local community residents (Nov.’04): (Soryong-Dong / Ocdoo-Myun Gunsan-City in Jeonbuk, Hongnong-Eup Younggwang-Gun / Saengil-Myun Wando-Gun / Yongsan-Myun Jangheung-Gun in Jeonnam, Geunnam-Myun / Giseong-Myun / Buk-Myun Ulchin-Gun in Kyungbuk, Seodo-Myun Gangwhado in Incheon)</i>

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

ARTICLE 14. DESIGN AND CONSTRUCTION OF FACILITIES

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.

H.4.1 Design-related factors

Design-related factors to be considered for the LILW disposal facilities are provided in the MOST Notices (Criteria for the Structure and Equipment of the LILW Repository and Standard Format and Contents of Safety Analysis Report for the LILW Repository).

General considerations

Disposal facilities must be designed to maintain their structural and functional integrity during not only normal but also abnormal operation. The design and construction of disposal facilities, therefore, must be based on proven engineering practices. In addition, equipments and components installed at disposal facilities must be designed such that they may be regularly tested and inspected to confirm that they can continue to be used safely.

Design criteria

In order to ensure the safety of disposal facilities during normal and abnormal operations, the above-mentioned MOST Notice (Criteria for the Structure and Equipment of the LILW Repository) addresses detailed design criteria for the following aspects: 1) seismic design, 2) natural phenomena including earthquake, 3) drainage systems, 4) accidents induced by human activities, 5) fire and explosion, 6) ventilation system, 7) complex facilities, 8) radiation monitoring, 9) instrumentation and control, and 10) arrangement of disposal facilities, etc.

Especially, the Notice of the MOST requests that the disposal facilities must be arranged in consideration of the zone arrangement according to waste types,

radioactivity concentration, and packaging methods; environmental characteristics of the disposal site, locations of the safety-related equipments, so as to minimize the effect of radiation on radiation workers and members of the general public during normal operation or accidents.

Considerations for closure

The LILW disposal facilities must be designed such that they can be closed when the disposal capacity taken into consideration at the design stage or the total radioactivity of the waste disposed of exceeds allowable limits or when normal functions of the facilities can no longer be maintained due to unexpected accidents. Accordingly, the SAR must include closure of disposal facility and stabilization plans for the long-term isolation of radioactive wastes and ensuing design characteristics.

Considerations for decommissioning

All radioactive waste management facilities, except for the radioactive waste disposal facility, shall be designed in consideration of decommissioning.

Radioactive effluent control and considerations for preventing uncontrolled release

In accordance with the Notice of the MOST, radiation monitoring systems shall be installed and a distinction must be made between radiation monitoring systems to monitor the radiation levels of radioactive materials in the liquid and gaseous effluents and area radiation monitoring systems to monitor the radiation levels of specific areas in disposal facilities. When radiation levels exceed set points or there are abnormalities in the facilities, the systems shall have functions to activate the alarm and automatically terminate the release.

With regard to radioactive waste treatment facilities, it shall be possible to control gaseous or liquid radioactive effluent appropriately during normal and abnormal operation and such effluents must not be released into the environment from locations other than air vents or drainages established in obtaining license for construction and operation. In addition, so as to monitor the operation conditions of and radioactivity released from waste treatment facilities, appropriate sampling devices and monitoring equipment must be installed. Furthermore, possibility of contamination due to the backflow of radioactive materials must be fundamentally minimized by separation of radioactive waste treatment facilities from ones to handle non- radioactive materials.

H.4.2 Construction-related factors

The Notice of the MOST provides construction-related factors for the LILW disposal facilities in detail.

General considerations

The construction of disposal facilities must be based on proven engineering practices. When new construction methods are applied, their safety must be proved with valid evidence.

Construction criteria

Detailed construction-related factors for the LILW disposal facilities are provided in the Notice of the MOST (Criteria for the Structure and Equipment of the LILW Repository) as:

- Construction of disposal facilities must adhere to the QA requirements;
- Disposal facilities must be constructed so as to minimize damage to the functions of natural barriers;
- Regarding the characteristics of natural barriers assumed at the design stage, their validity must be confirmed through comparison with on-site measurements obtained during construction; and
- When construction and operation stages overlap, construction must be conducted so as not to affect the operation safety of disposal facilities negatively.

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

ARTICLE 15. ASSESSMENT OF SAFETY OF FACILITIES

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).

H.5.1 Safety analysis and environmental impact assessment

Any licensee who wishes to construct and to operate radioactive waste management facilities must submit a license application to the MOST beforehand according to the AEA. They must attach the SAR that includes a separate chapter “Safety Evaluation and Accident Analysis” and the radiological environmental impact assessment report. In other words, a safety evaluation of radioactive waste management facilities is conducted by license applicants before construction of facilities and regulatory body independently in order to determine whether to issue a license after reviewing thoroughly and verifying the appropriateness of the safety evaluation performed.

Analysis through safety analysis report

The SAR on radioactive waste disposal facilities mainly includes results of safety evaluation and accident analysis on events anticipated during the design, construction, operation, closure and post-closure institutional control of disposal facilities and auxiliary facilities. The main contents of the safety evaluation and accident analysis are as follows:

- *Identification of the form, types, and amount of waste: Information on waste generated during operation and closure*
- *Infiltration water: Analysis during the design, safety analysis, operation, post-closure control period, and afterward*
- *Radionuclide leakage: Under normal and abnormal conditions and during accidents*
- *Pathways through which radionuclides eventually reach the human body*

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– *Impact assessment and its compliance with regulatory standards*

Long-term radiological safety criteria for radioactive waste disposal facilities are presented separately for periods of operation and after post-closure. During the operation of radioactive waste disposal facilities, as with other nuclear facilities in operation, the standards for prevention of hazards to environment as described in Subsection F.4.3 (Release Restriction System in Nuclear Facilities) as well as dose limits for the general public are to be applied.

Performance objectives for the post-closure period of disposal facilities are set up as radiological risks on individuals of critical groups in future. Annual dose due to normal natural phenomena must not exceed 0.1 mSv as the dose limit. In addition, annual risk due to unpredictable phenomena caused by natural or artificial factors must be restricted to 10^{-6} or less as the risk limit.

The evaluation period for post-closure is expected to be about 1000 years. However, when the predicted risk does not reach a maximum value within the period above, verification that the leakage of radioactive materials into the surrounding environment may not increase drastically after the period above and acute radiation risk will not occur to individuals must be duly presented.

For major scenarios that are deemed to affect dose evaluation results considerably as a result of the safety evaluation of disposal facilities, an uncertainty analysis must be conducted. In order to increase the reliability of safety assessment results, the QA principles and related detailed procedures for all stages of the safety evaluation including the collection and application of input variables, modeling, detailed calculations, and a comprehensive evaluation must be prepared and applied.

Assessment through environmental impact assessment report

The radiological environmental impact assessment reports on radioactive waste disposal facilities must address the effects of the construction, operation, closure, and post-closure of facilities on areas within 10 km from the site concerned. In particular, the closure impact assessment must describe analysis of the predicted migration pathways of radionuclides that can leak from the disposal facilities, an evaluation of predicted doses for local residents per exposure pathways due to potential radionuclide leakage, and an evaluation of predicted radionuclide concentration in groundwater release points located downstream of the site.

H.5.2 Renewal of safety analysis and reassessment of safety

Renewal of Safety Analysis

The MOST Notice (Criteria for the Structure and Equipment of the LILW Repository) stipulates that when there are natural disasters such as earthquakes and floods, or human-induced incidents that can affect integrity of disposal facilities, the safety of the facilities concerned must be re-evaluated and related authorization and

licensing documents must be revised based on the latest data. In addition, conditions related to the safety of the disposal facilities must be constantly reevaluated and supplemented, if needed, based on the experience and data obtained from operating disposal facilities and the results of safety evaluations.

Reassessment of safety

In addition, the same MOST Notice (Criteria for the Structure and Equipment of the LILW Repository) addresses that the following must be re-evaluated to verify the safety of radioactive waste disposal facilities before closure:

- Information and data on the facilities, site, and surrounding areas for the period that the performance evaluation concerns.*
- Total inventory of radioactive waste disposed of, records on accidents that have occurred during operation and that can affect disposal safety, and radiological and non-radiological impacts on public and the surrounding environment*

H.6 Operation of facilities (Article 16)

ARTICLE 16. OPERATION OF FACILITIES

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 analyse 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.

H.6.1 Criteria for Permit

The criteria for operating license for radioactive waste management facilities are specified in the AEA as follows:

- Technical and economical capabilities necessary for the construction and operation of a radioactive waste management facility shall be secured.
- The location, structure, equipment and performance of a radioactive waste management facility shall conform to technical requirements, as prescribed by the Ordinances of the MOST, in such a way that there may not be any impediment to the protection of human body, materials, and the public against

radiological hazards.

- No impediment to the protection of the public health and the environment against radiological hazards that may accompany the construction and operation of a radioactive waste management facility.
- The equipment and manpower prescribed by the Presidential Decree shall be secured.

The radioactive waste management facility shall be through the preoperational inspection to start operation after completion of the facility construction. When the preoperational inspections on the structure, equipment, and performance of the facility meet the criteria for operating license and the standards of the corresponding MOST Notices, the operation of facility shall be allowed. In other words the constructed facility will be confirmed through the preoperational inspection before the operation whether it meets the related criteria and safety standards.

The radioactive waste management facility shall be operated with the verification of its conformity to the design requirements through a startup operation, under operating license.

Technical standards newly introduced or amended during operation of radioactive waste management facilities shall undergo continuous review, and have to be reflected in the operation of those facilities.

H.6.2 Determination of limiting conditions for operation

The essential limiting conditions for operation of the disposal facilities shall be documented in the operational technical specifications and safety control regulations, according to the AEA, subsidiary regulations of the AEA and the MOST Notices. The followings are major items to be established as limiting conditions for operation:

- *Restrictions on radioactive waste to be disposed of*
 - *Type, volume, radionuclide concentration and amount of waste per disposal unit*
 - *Total radioactive waste inventory of the disposal facility concerned*
- *Acceptance criteria to be applied after verifying the disposal suitability of the radioactive waste delivered from the waste generator*
- *Radiation protection of radiation workers during operation*
- *Physical protection*
- *Measures to be taken in case of radiological leakage from the disposal facilities concerned*
- *Periodic updates of the safety evaluation*

H.6.3 Operation procedures

The Notice of the MOST (Technical Requirement for the Operation and Control of

H. Safety of Radioactive Waste Management

the LILW Repository) defines detailed technical standards regarding the operation of disposal facilities in order to operate the facilities safely and to prevent any harm due to disposal facilities, and to protect the environment.

The operator of disposal facilities shall adequately present an implementation plan conforming to the above standards in appropriate parts of the related license application documents for permission, such as Radiological Environmental Impact Assessment Report, SAR, Safety Control Regulations, Quality Assurance Plan, etc. In addition, the operator shall establish detailed operation procedures for implementing the standards, and then, the procedures shall be reviewed and approved, before implementation, by the regulatory body, through preoperational inspection, disposal inspection, and periodic inspection of the disposal facility.

Other detailed operation procedures are drawn up and approved of as documented procedures under QA programs of the operator and their appropriateness is verified through various regulatory inspections.

H.6.4 Engineering and technical support

As stated in the previous Subsection H.6.1, the AEA stipulates, as a part of licensing standards for radioactive waste management facilities, the technological capability and appropriate equipment and human resource necessary for the construction and operation of such facilities be secured. Consequently, during the process of conducting safety reviews of radioactive waste management facilities, the appropriateness of the technological capability and human resource for the safe operation of the facilities is reviewed.

In the future, radioactive waste disposal facility operators are expected to establish organizations that provide engineering and technical support in accordance with the characteristics of facilities across all safety-related fields during the operating lifetime or to receive external support from any service companies by contracts basis.

H.6.5 Procedure for the characterization and categorization of radioactive waste

In order to deliver radioactive waste package to the operator of disposal facilities, the generator shall submit to the operator an “Application Form of Consigning the Receipt of Radioactive Waste,” attached with a series of characterization data for the waste to be delivered. Major characterization data to be requested for the application of consignment are as follows:

- Physical, chemical, biological features, and evaluation methods of the features;*
- Total radioactivity and radionuclide-specific concentrations;*
- Maximum surface dose; and*

- *Main safety features of waste package and evaluation method, etc.*

The Notice of the MOST (Acceptance Criteria for the LILW) limits radioactivity concentrations in each waste disposal package for the following radionuclides: H-3, C-14, Co-60, Ni-59, Ni-63, Sr-90, Nb-94, Tc-99, I-129, Cs-137, and gross alpha.

H.6.6 Incident reporting and record control

The AEA prescribes that operators of nuclear facilities should immediately take all necessary safety measures and report such measures to the MOST in the following cases:

- If radiological hazards occur,
- If any failure occurs in nuclear facilities,
- If there is any danger or possibility of danger to nuclear facilities or radioactive materials due to earthquake, fire or other disasters, etc.

The Notice of the MOST (Regulation on the Reporting of Events and Accidents of Nuclear Facilities) stipulates in detail the incident reporting system. It includes the objects, means and procedures of reporting, and the classification of events and accidents. Especially, major objects for reporting anticipated at radioactive waste management facilities are as follows:

- Surface contamination of areas other than the facilities' radiation areas exceeding limit-values due to the leakage of radioactive materials
- Abnormal increase in the local radiation level
- Unplanned and uncontrolled release of radioactive materials into the environment
- Release of radioactive materials exceeding effluent control limits

The classification of incidents and accidents is based on the International Nuclear Event Scale (INES) of the IAEA.

H.6.7 Preparation and revision of decommissioning plans and regulatory review process

Operators of nuclear facilities including radioactive waste disposal facilities, before permanently terminating their license, shall take the necessary measures for protection against radiation hazards including transfer, safe-keeping, discharge, storage, processing, disposal, decontamination and make a report to the MOST. The MOST may take necessary measures including collection of radioactive materials, dismantlement of any contaminated facilities, and so forth.

As established in the MOST Notice (Technical Requirement for the Operation and Control of the LILW Repository), when major systems and equipment are removed

H. Safety of Radioactive Waste Management

from radioactive waste management facilities, the safety of disposal facilities currently in operation must not be affected and there must be plans for the safe management of radioactive waste generated during decommissioning.

H.6.8 Preparation and revision of closure plans and regulatory review process

The MOST Notice (Technical Requirement for the Operation and Control of the LILW Repository) stipulates requirements regarding the closure of radioactive waste disposal facilities. The closure of radioactive waste disposal facilities must be conducted according to pre-approved closure plans and in a manner that facilitates follow-up institutional access control, minimizes the need for continued maintenance, and facilitates follow-up environmental monitoring and surveillance.

Before the actual closure of disposal facilities, various authorization and license documents including a safety analysis of the facilities must reflect the latest revisions. Also, the total amount of waste disposed of, records on abnormal events that have occurred during operation and that can affect the safety of disposal, and radiological and non-radiological impacts of disposal on the public and the surrounding environment must be considered.

In addition, operators must finally confirm predicted performance throughout the period stipulated in the SAR at the completion of closure.

H.6.9 Process for operational experience analysis and feedback

On the basis of the experience gained through the process of managing and controlling disposal facilities and the results of safety evaluations, the operator of disposal facilities shall frequently re-evaluate the conditions regarding the safety of facilities and supplement them, if necessary. Details on this issue are described in Subsection H.5.2 (Renewal of safety analysis and reassessment of safety).

H.7 Institutional measures after closure (Article 17)

ARTICLE 17. INSTITUTIONAL MEASURES AFTER CLOSURE

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.

H.7.1 Record keeping

Pursuant to the AEA, radiological data related to radioactive waste disposal shall be permanently preserved. *Accordingly, the development of a national radioactive waste inventory management program is under way.* The related records, particularly, the location and design documents of the disposal facility are to be preserved in accordance with the QA program.

With respect to requirements regarding the keeping and preservation of records on radioactive waste management facilities, the items to be recorded, time at which the records must be drawn up, and preservation period are stipulated in detail in the Enforcement Regulations of the AEA and the MOST Notice (Technical Requirement for the Operation and Control of the LILW Repository). The major information to be recorded is as follows:

- *Radioactive waste-related records: manifest information, amount and type of the waste concerned, and disposal locations*
- *Radiation safety control-related records: radiation level of facilities and radiation workers' exposure dose*
- *Facility inspection records: pre-operational inspection, regular inspection, and disposal inspection records*
- *Operation and maintenance records: results of the inspection, surveillance, and maintenance of the major equipments*
- *Facility incident records*

With regard to radioactive waste disposal facilities, the following records must be maintained on annual basis: 1) site characteristics investigation documents; 2) facility design and construction-related data; 3) waste reception requirements and procedures; 4) Safety Analysis Report; 5) radiological environment impact assessment; 6) data on the characteristics of the waste disposed of; 7) disposal facility

H. Safety of Radioactive Waste Management

and waste locations; 8) other data on the characteristics of the repository; 9) environmental monitoring records; 10) records on unintentional accidents during operation and after closure; 11) closure-related documents; 12) the QA documents; and 13) institutional control plans and results.

To preserve the records above, facility licensees must establish organizations, responsibility, and locations for the maintenance of records and must maintain and store records to provide a complete and objective description of the activities included in all stages of disposal. In addition, to ensure the use and maintenance of appropriate information after the closure stage, records must be updated and maintained such that they are easily accessible and usable.

H.7.2 Institutional control

Operators of radioactive waste disposal facility must establish institutional control plans and submit them to the MOST by one year before the commencement of institutional control. In case they wish to revise control plans, operators must submit a statement of the reasons for revision and revised control plans to the MOST by June of the corresponding year before that in which the revision is to take place. Institutional control plans must include the following:

- Control period*
- Control organization and responsibility*
- Characteristics of the waste disposed of, disposal facilities, and site concerned*
- Control methods (control items, control method per item)*
- QA Program regarding institutional control*

The institutional control period must be established in consideration of the characteristics of the waste, engineering design, site characteristics of the disposal facilities, predicted social activities related to the disposal facilities concerned, records, and historical experience regarding maintenance. After the control period, further control activities must be unnecessary and the risk or dose calculated according to appropriate methods must satisfy performance objectives for the disposal facilities concerned.

Institutional control methods must be able to prove that radiation protection requirements are met by reasonably verifying the closure performance of the disposal facilities. Institutional control consists of radiological environment investigation, non-radiological environment investigation, maintenance, site monitoring, access restriction, safety evaluation, and record-keeping. However, detailed control methods may be adjusted according to the results of the systematic safety evaluation of the disposal facilities or the characteristics of the disposal facilities and site. Site monitoring must meet post-closure site monitoring plans regarding the disposal facilities in site characteristics reports or the SAR.

H.7.3 Intervention in the case of unplanned release

With regard to radioactive waste management facilities, the concentration of radioactive materials during ventilation and drainage must be monitored so that the concentration of radioactive materials released from the restricted areas on the site does not exceed the effluent control limits. As for ventilation and drainage monitoring equipment, alarms and the automatic blockage of relief valves must trigger when set points have been exceeded. In addition, when radioactive materials in a liquid or gas state are released into the environment from areas other than drainages and air vents or under unplanned and uncontrolled conditions, operators must make oral reports within 4 hours and submit a detailed report within 30 days to the MOST.

During the institutional control of radioactive waste disposal facilities, the unplanned release of radioactive materials into the environment must be prevented or monitored through radiation environment investigation, maintenance, and site monitoring activities.

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I. Trans-boundary Movement (Article 27)

ARTICLE 27. TRANSBOUNDARY MOVEMENT

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 licence 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.

I.1 Domestic transport regulations

Regulations for the transport of radioactive materials are described in the AEA, the Enforcement Decree of the AEA, the Enforcement Regulations of the AEA, the Regulation concerning the Technical Standards of Radiation Safety Management, etc., and the Notice of the MOST entitled ‘Regulation on the Packaging and Transport of Radioactive Materials, etc.’

The domestic regulations for the transport of radioactive materials are based on the ‘Regulations for the safe transport of radioactive materials’ of the IAEA, and the reflection of the 1996 IAEA Regulations for the Safe Transport of Radioactive Materials (ST-1) on the AEA were enacted between 1999 and 2001. At present, the 1996 IAEA Regulations for the transport of radioactive materials are being reflected to domestic regulations for the transport of radioactive materials on the AEA.

Especially, Article 90 of the AEA, Articles 235 through 239 of the Enforcement Decree of the AEA, Articles 90 through 99 of the Enforcement Regulations of the AEA, Articles 83 through 122 of the Technical Standards of Radiation Safety Management provide the notification of transporting radioactive materials, the report of transportation by foreign ship, the inspection of packing and transportation, and the design approval, and inspection for shipping cask.

The detailed technical regulations for safe transportation on radioactive materials are described in the Notices of the MOST (Regulation on the Packaging and Transport of Radioactive Materials and Regulation on Inspection of Manufacture and Use of Radioactive Material Transport Containers), respectively.

I.2 Safety requirements

I.2.1 General requirements

The general safety requirements for the transport of radioactive materials specify radiation exposure and contamination controls for persons engaged in radioactive material transportation work, education and training, quality assurance, and measures, etc. in case of accidents.

I.2.2 Transport containers

The safety requirements for transport containers provide the safety requirements by type

of transport container corresponding to each A-type package, B-type package, and packages containing fissile materials, while separating such requirements into general requirements and test requirements. General requirements and test requirements for transport containers conform to the requirements specified in the IAEA Regulations (ST-1).

I.2.3 Transport

The safety requirements for transport include requirements such as the packaging limits by type of load, for example, A-type package, B-type package and package containing fissile materials as well as the surface dose rate, surface contamination limit of loads, and requirements such as the load limit by transport means such as vehicles, airplanes, ships, isolation, and the radiation dose rate at the surface of transport means. These safety requirements for transport conform to the requirements specified in the said IAEA Regulations (ST-1).

The Enforcement Regulations of the AEA specify that the radioactive materials, which undergo trans-boundary movement, should meet the regulation of packing and transportation of the countries of transit and/or destination.

I.3 Approval and administrative action

I.3.1 Design approval

The approval prescribed in the AEA includes design approval for special radioactive material and low-dispersive radioactive material, and design approval for shipping casks specified in par. 801 IAEA ST-1, design approval for shipping casks, and the special arrangements specified in par.312 IAEA ST-1. The MOST issues a design approval for radioactive material or shipping cask that an application for design approval is made by model. It is a rule to check the integrity of shipping casks through source surveillance in making a cask for which design approval is given. Meanwhile, the manufactured cask in use requires integrity-related inspections at the interval of every 5 years from the manufactured date in order to secure safety in continued utilization.

I.3.2 Approval for transport containers

As for B-type packages, C-type packages, and packages containing fissile materials, it is provided that the details of transport including radioactive contents, the type of load, a written transport procedures and an accident response procedure should be notified to the MOST in advance of the transport day, and the MOST should review said details, and give order to rectify factors apt to impair safety, if any, before transportation. As for loads declared, transport surveillance or periodic inspections are conducted to check the possibility of violating transport regulations.

I.3.3 Special arrangements

A person who intends to have a ship or airplane loaded with radioactive materials arriving in any port or airport in Korea, or passing through Korean territorial waters or aerial routes shall notify the MOST of such fact not later than 7 days before the day planned to start operations after the loading of radioactive materials.

I.3.4 Trans-boundary movement cases

There has been no trans-boundary movement of LILW to or from Korea until now. In June 1998, all of the 299 spent fuel rods stored in the research reactor were sent back to the originating countries as soon as initiating the decommissioning of the KRR-1 and 2.

J. Disused Sealed Sources (Article 28)

ARTICLE 28. DISUSED SEALED SOURCES

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.

J.1 Legal system

The radioisotope (RI) waste management business for the safe treatment and storage of the RI wastes was established in October 1989. After the construction of RI waste storage facility at KAERI, the RI waste was collected from August 1990 and had operated the RI waste storage facility until the end of 1996. The responsibility of the RI waste management was transferred from the MOST to the MOCIE in 1996. Since January 1997, the KHNP has the responsibility for the management and operation of the RI waste storage facility according to the AEA and the EBA.

In accordance with the Article 52 of Enforcement Decree of the EBA, the RI waste management includes storage, treatment and disposal of the RI waste which are not included in the radioactive waste generated from the NPP. The MOCIE is responsible for the administrative management and supervision on the RI wastes. The KINS entrusted by the MOST, implements licensing, safety review, and regulatory inspections for the RI waste management facility.

Disused sealed RI sources have to be collected and delivered to the NETEC of the KHNP by respective RI users directly, or through the Korea Radioisotopes Association (KRIA) or consignment agencies.

J.2 Management of disused sealed sources

J.2.1 Requirements for facilities and handling

Disused sealed sources generated from RI users are temporarily managed by the owner of a storage facility which passed facility inspections by the KINS. It is compulsory to specify matters on safety such as shielding, etc. in the radiation safety report with due regard to the storage capacity of the storage facility, and to keep them safely.

J. Disused Sealed Sources

Currently, the KHNP stores and safely manages RI waste in accordance with the AEA in the RI waste storage facility of the NETEC located in Daejeon. The facility is annually inspected by the regulatory body.

J.2.2 Management

Procedures of waste management by RI users

In accordance with the AEA (License for the Use, etc. of Radioisotopes and Radiation Generating Devices), all RI users or organizations shall have RI utilization license issued by Minister of the MOST to import or purchase the radioisotopes or the radiation generating devices. The organizations of the RI utilization to import or purchase the RI or the radiation generating devices from abroad are required to meet the importation provisions of the KRIA. All the RI users or organizations to purchase the domestic radioisotopes or the radiation generating devices shall only have the RI utilization license issued by the MOST.

Disused sources are stored in the storage or in the disposal container at licensed storage facility. The domestic RI users generating RI wastes as provided in the Notices of the MOST (Regulation on the Packaging and Transport of Radioactive Materials and Regulation that has to be observed by Radioisotope Seller) can entrust the collection of the RI waste to the RI sellers. The collected RI wastes shall be transferred to the sole Nuclear Waste Management Business Operator (KHNP) who is operating the RI waste storage facility at NETEC, after paying the fees as provided in the EBA (Control of Nuclear Wastes Bearing of Expenses, Etc).

Procedures of the operation & management for the RI waste storage facility by the NETEC

The KHNP/NETEC takes over unusable sources of decayed radioactivity from RI users under the Enforcement Decree of the EBA (Radioactive Waste Delivery). In accordance with the Notice of the MOCIE (Regulation for the Consigning of Radioactive Waste and Its Cost), currently the KHNP/NETEC operates the RI waste storage facility and safely stores and manages RI waste accepted from about 2,500 domestic RI users. The RI waste management system is as follows:

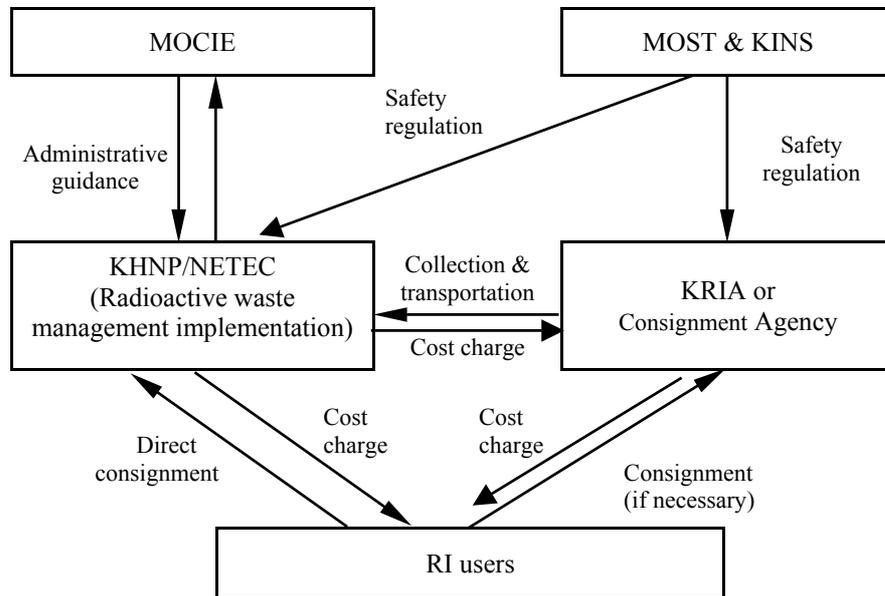


Figure J.2-1 Radioisotope waste management system

J.2.3 Return

Currently, as provided in the Notice of the MOST (Regulation that has to be observed by Radioisotope Seller), disused sealed sources of radiation equipment imported from a foreign country which need to be changed of new sources are sent back to the foreign manufactures.

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K. Planned Activities to Improve Safety

K.1 Radioactive Waste Information Database System

K.1.1 Waste Comprehensive Information Database System (WACID)

As the generation and accumulation of radioactive waste continues to increase with the domestic use of nuclear energy, the necessity arises for establishing a national level comprehensive database system which applies to the state-of-the-art information technology in order to manage information related to the safety management of various and massive radioactive waste sources in a systematic manner.

Coping with the urgent national demand, a WACID (Waste Comprehensive Information Database system) was developed by KINS from July 2002 to May 2004. The WACID system was tested to confirm the integrity and then, practical operation started January 2005.

The system collects data on the radioactive waste information from domestic nuclear installations through the internet quarterly and verifies the data integrity. After verification of data, the system operator produces a variety of reports to offer information to the public. By using this system, individual waste generators can report waste inventory more efficiently.

The WACID DB system has employed 8-sub modules (solid radioactive waste, liquid effluent, gaseous effluent, spent fuel etc.) so as to maximize data sharing, to minimize data redundancy, to enhance the effectiveness of system in operation, and to avoid unexpected complication of system itself, due to involvement of a variety of data characteristics from numerous waste generators. Figure K.1-1 shows the WACID system structure.

The WACID system will play an important role to direct the radioactive waste policy by Government, to promote R&D activities and to upgrade the domestic level of safe management of radioactive waste. In addition, the developed system will do much for achieving the 5 principles (i.e., independence, openness, clarity, efficiency, reliability) of nuclear safety regulation, by providing essential information to the general public.

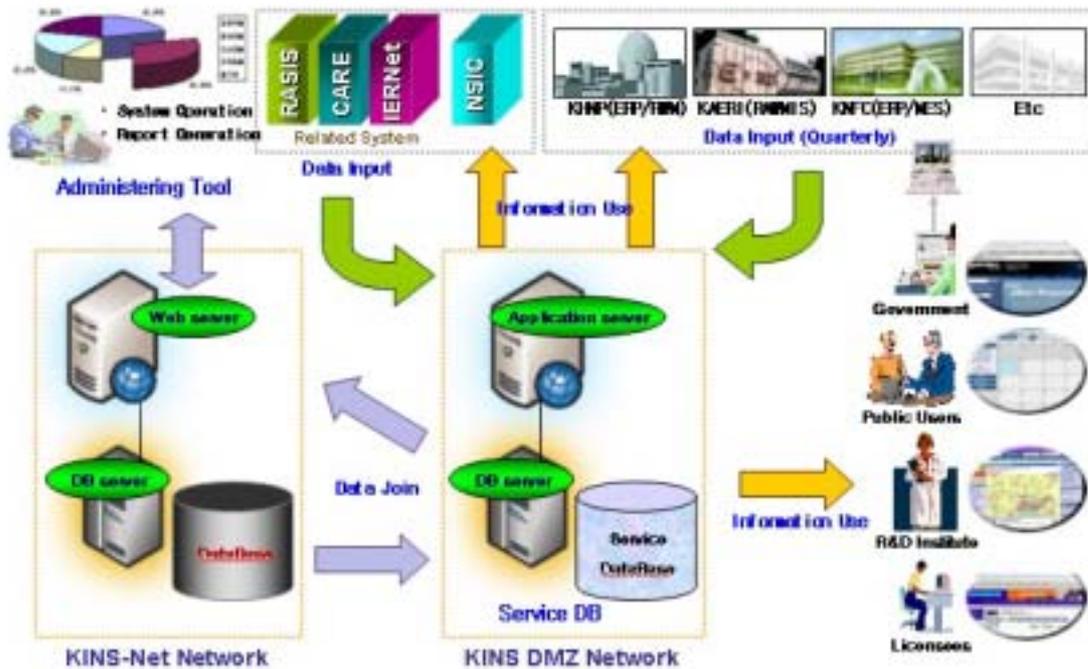


Figure K.1-1 WACID system structure

K.1.2 DREAMS-RWM Database System

The KHNP has developed the integrated Radioactive Waste Management system (DREAMS-RWM) which allows real time management of radioactive waste generation, treatment and disposal. And this system allows interface with national radioactive waste information system (WACID).

The DREAMS-RWM system development project began in April 2002. Through system design and configuration by February 2002, system operation started in May 2002. This system was comprised of gaseous and liquid radioactive waste release managing program, solid radioactive waste managing program, clearance control program and statistical management of radioactive waste.

This system will contribute to allow integrated management of regulatory routine gaseous and liquid radioactive waste release management empowered by an aligned information system. Commodity of rapid data transaction, creating reports, data inquiry of numerous statuses and preparing a database platform to interface with the government information system have been improve in a great deal.

To enable life cycle tracking of solid radioactive waste management; generation, temporary storage and relocation for permanent disposal, the KHNP standardized the

drum serial numbers and input of all related waste information to the DREAMS-RWM system improving the efficiency of information search. The database of clearance wastes which are discarded as industrial wastes through the regulatory approval has been integrated in DREAMS-RWM system as well.

The KHNP has made it possible for the DREAMS-RWM system end users to search, display and report information, using statistics provided by real time computer system. Through this prompt transaction and reference of information, end users can access the major reports such as generating situation of solid radioactive waste in each site, monthly/quarterly reports, and reports about monthly/yearly control situation.

The DREAMS-RWM system has made it enable to provide effective radioactive waste relating information from its computer system to national WACID system.

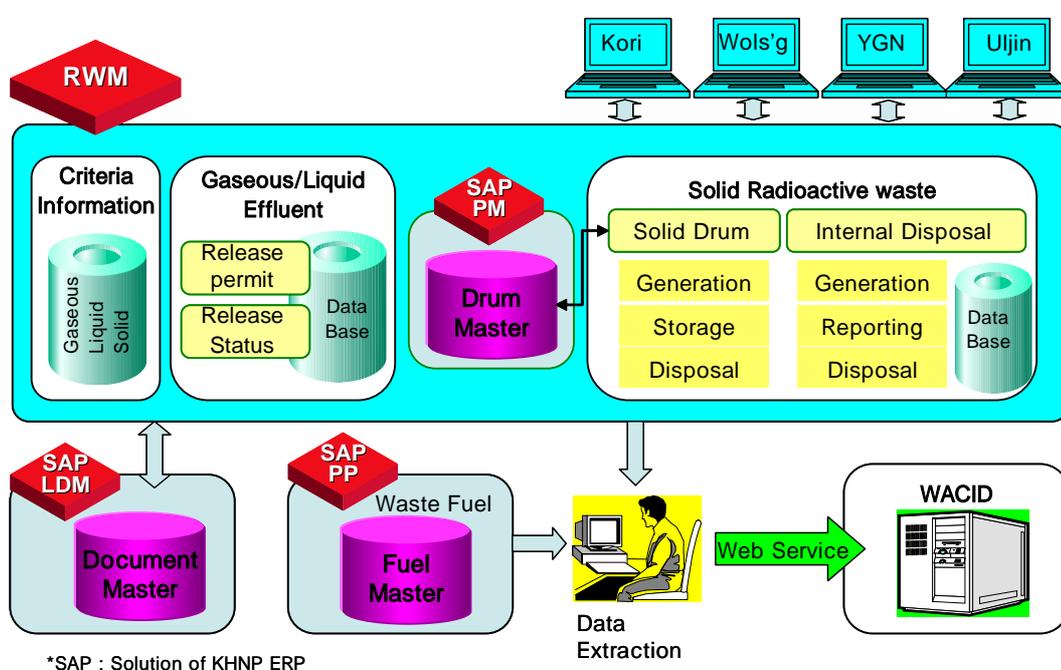


Figure K.1-2 Structure of DREAMS-RWM system

K.1.3 Radioactive Waste Management Integration System (RAWMIS)

In the KAERI, the radioactive waste generation and its kind was increased as the R&D activities and the nuclear fuel cycle facilities were increased. The characteristic of the radioactive waste in the KAERI are the diversity of the waste form, the various radio-nuclides, and non-periodic generation. A synthetic and centralized DB system was required for the improved management of the waste and for the prompt and accurate transfer of information on the waste to the WACID system.

K. Planned Activities to Improve Safety

To meet this requirement, the KAERI developed the RAWMIS (Radioactive Waste Management Integration System) from July 2003 with a financial support from the Korean government. The development of the RAWMIS was finished in May 2004, and its practical operation started from the beginning of 2005.

The RAWMIS aims to improve the synthetic management and the periodical report of the information on the waste. It covers all the information on the management of the radioactive waste including collection, treatment and storage. And also the system gives an improved service to the users, such as a convenient output system and a searching system of the information on site with portable personal terminals. It also has evaluating functions to provide statistical data for reports.

The RAWMIS includes a subsystem for the information transfer to the WACID system. This system extracts the necessary data for the report, and transforms them to the readable format by the WACID system and then, it enable to directly input the data to the WACID system as shown in Figure K.1-3.

The RAWMIS is also utilized in the internal R&D for prompt and exact management of the information on radioactive wastes in the KAERI. And also it provides the essential data to the WACID, which are disclosed to the public, and supports the policy establishment of the government.

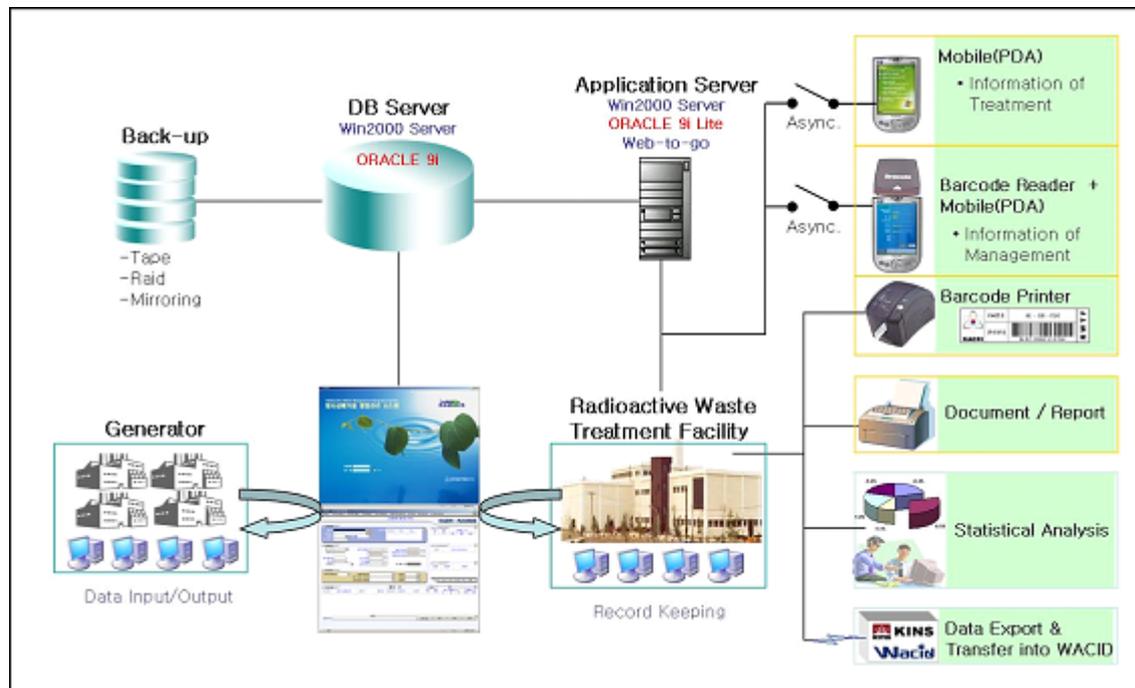


Figure K.1-3 System structure of RAWMIS

K.1.4 Decommissioning Project Managing System (DECOMIS)

The DECOMIS (DECOMmissioning Information System), as one integrated management system of decommissioning project of KAERI was developed through the extension of a simple conventional DB system for the report of the data on the waste to the WACID system. The system was developed in the division of the D and D Technology Development in KAERI responsible for the decommissioning projects. The system enables to maintain the records keeping for future decommissioning projects, the preparation of the source data for the development of the planning technologies including pre-estimation of the decommissioning cost, expected exposure dose during decommissioning, and the data provision to the staff for the more effective management of the projects.

This system consists of 2 parts; decommissioning data input system (DDIS) and data processing system (DDPS). Through DDIS, the data can be directly input at site and the system can play roles of daily reports to minimize the time gap between the dismantling activities and the evaluation of the data. The DDPS provides useful information to the staff for more effective management of the projects and this information includes man-power consumption, radiation dose of workers, waste management results, etc. as shown in Figure K.1-4.

The system includes several information fields, such as project progress management, man power management, waste management, radiation protection, etc. In the waste management part, all information on the waste generation, decontamination,

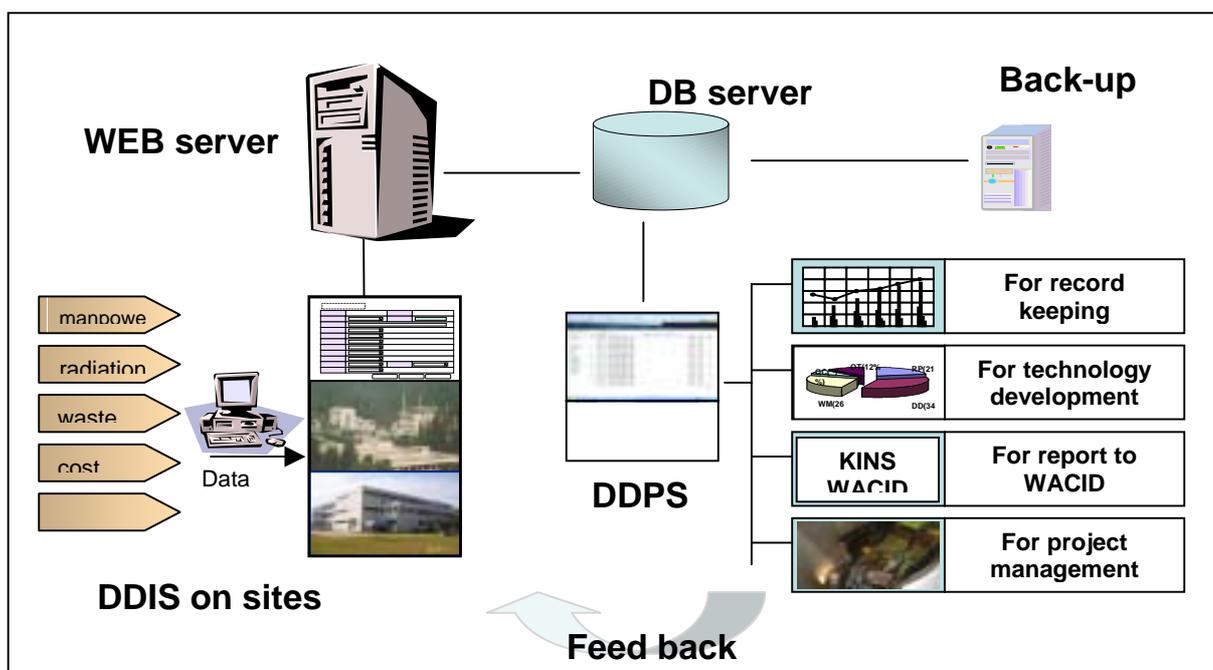


Figure K.1-4 Structure and function of DECOMIS

K. Planned Activities to Improve Safety

classification, final packaging and storage were managed for clearer understanding of the flow of the waste and the evaluation of the waste generation characteristics. This system can extract the data for the report to the WACID and for more effective management of the radioactive waste, such as minimization.

K.1.5 Radioactive Waste Management System in KNFC (MES)

The KNFC had begun to develop the electronic data control system for radioactive waste management since 2003 and started its normal operation in 2004. This system produces the data for recording and control of the history of waste produced from the operation of the KNFC facility, and enables to provide the data which are required by the WACID system.

Radioactive waste management system, as a part of MES (Manufacturing Execution System), manages the data of solid, liquid, gaseous radioactive waste and WACID data. This system enables to search for the radioactive waste data in real time base to raise efficiency and speed of data processing.

This system also enables to input and search the data of solid radioactive waste in real time base while the waste are collected, treated, packaged, and stored in the waste storage. The system offers credibility and convenience of data processing as it regularly prints out daily, monthly, quarterly report, and also enables to search data in each waste storage position.

This system presents the status of waste treatment, approval, release of liquid radioactive waste easily. In particular, this system establishes the approval procedure for liquid waste release, which any liquid radioactive waste will not be allowed to be released without approval of radiation safety staff.

For gaseous radioactive waste, this system offers credibility for such data as discharged volume. Radioactive concentration of gaseous radioactive waste is produced in real time. As shown in Figures K.1-5, the radioactive waste management system is as follows:

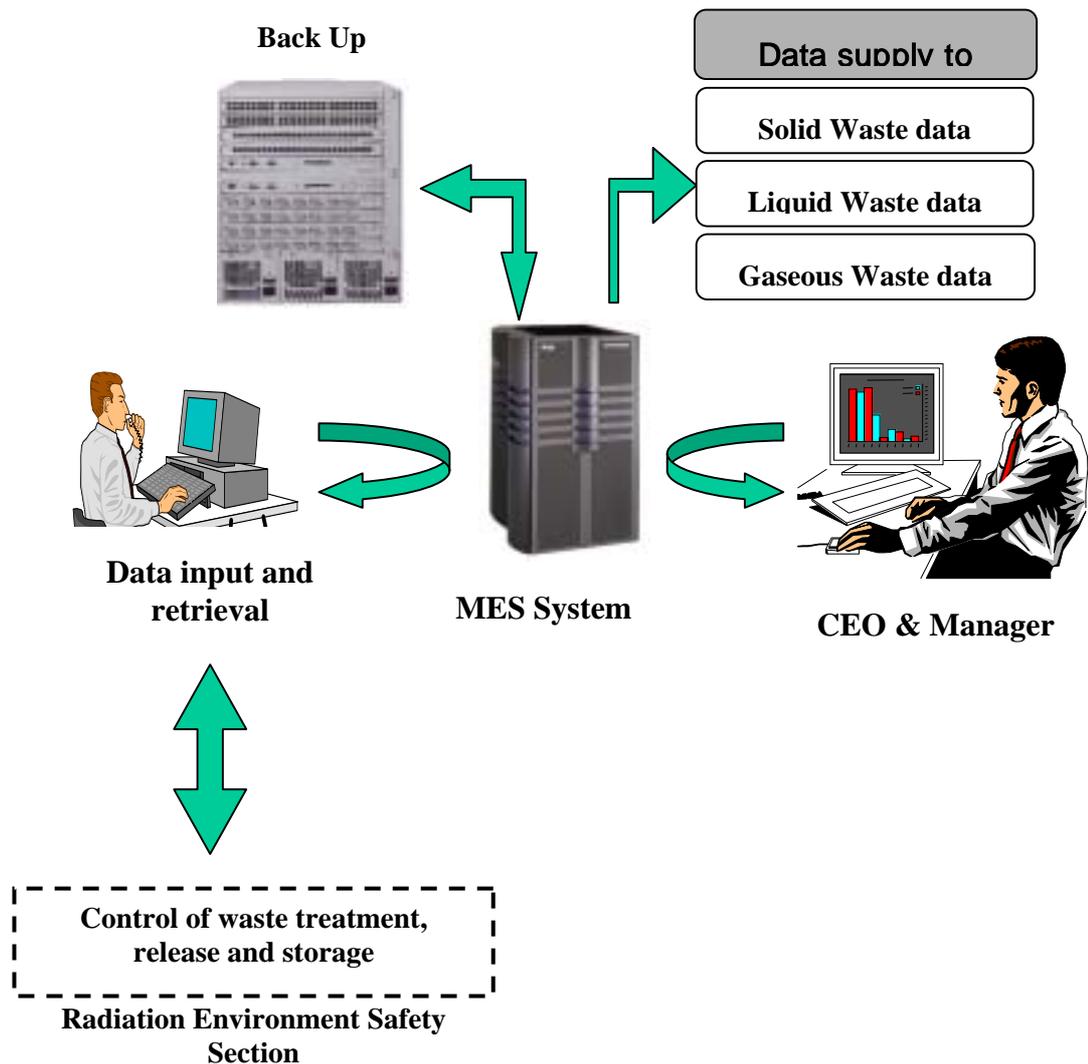


Figure K.1-5 Systematic Diagram of MES

K.2 Development of Site Information & Total Environmental database management System (SITES)

Since June, 2002, Site Information and Total Environmental database management System (SITES) has been developed by Nuclear Environment Technology Institute (NETEC) of KHNP. It includes Databases to store site and environmental data obtained during site characterization and environmental impact assessment of radioactive waste disposal facility. The information in this system will be used for the safety assessment. The SITES is a configured and effective system for the institutional management and periodic safety reassessment of a radioactive waste disposal facility.

K. Planned Activities to Improve Safety

The concept and function of SITES are as shown in Figure K.2-1, and it is composed of the SITES database module (SDM) for site and environmental information management, Safety Assessment System (SAS), and Site & Environmental Monitoring System (SEMS). The SITES DB (SDM) is subdivided into 3 sub-modules such as Site Information Management System (SIMS), ENVironmental Information management System (ENVIS), Radiation ENVironmental Information management System (RENVIS).

The SAS module includes about 20 computer codes for site & environmental data analysis and safety assessment, and it will provide a capability of running a series of the safety assessment codes in one system giving a convenience for the users. In addition, the SEMS module will collect and monitor the site information of safety, meteorology and environmental radiation, groundwater, etc.

It is expected that the SITES will be of more effective and helpful in data search for environmental and site information from the DB, and on the SAS and SEMS functions which contribute to safe management of the facility during operation as well as post-closure by providing the safety assessment and site monitoring information.

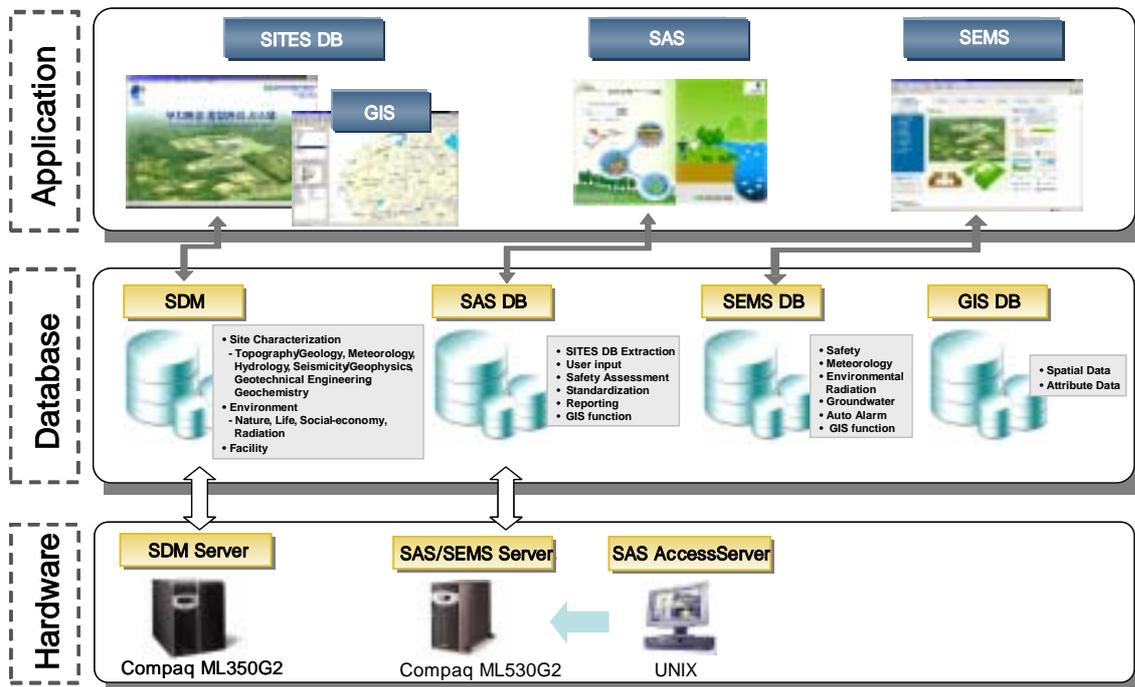


Figure K.2-1 Systematic Diagram of SITES

ANNEXES

- Annex A. List of Spent Fuel Management Facilities
- Annex B. List of Radioactive Waste Management Facilities
- Annex C. List of Nuclear Facilities under Decommissioning
- Annex D. Nuclear Safety Charter
- Annex E. Nuclear Safety Policy Statement
- Annex F. Site Selection Procedure for LILW Disposal Facility
- Annex G. MOST Notices applicable to Radioactive Waste Management
- Annex H. References

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Annex A. List of Spent Fuel Management Facilities

Annex A-1 Spent fuel storage facilities for NPPs (As of Dec 2004)

(Unit: MTU)

Facility	Location	Storage Type	Storage Capacity		
			Volume stored	Extension Method	Total Capacity
Kori # 1	Jangann-Eub, GiJang-Gun, Busan	Wet	116	Transshipment	209
Kori # 2	"	Wet	254	Transshipment	360
Kori # 3	"	Wet	633	Addition	953
				Re-racking	
Kori # 4	"	Wet	412	Addition	485
Yonggwang # 1	HongNong-Eub Yonggwang-Gun Jeonnam Province	Wet	375.3	Addition	485
Yonggwang # 2	"	Wet	331.8	Addition	485
Yonggwang # 3	"	Wet	193.5	-	283
Yonggwang # 4	"	Wet	172.4	-	283
Yonggwang # 5	"	Wet	47	-	292
Yonggwang # 6	"	Wet	20.3		292
Ulchin #1	Buk-Myeon, Ulchin Kyungbuk Province	Wet	319	Re-racking	470
Ulchin #2	"	Wet	297	Re-racking	370
Ulchin #3	"	Wet	127	-	283
Ulchin #4	"	Wet	99	-	283
Ulchin #5	"	Wet	0		292
Ulchin #6	"	Wet	0		292
Wolsong #1	Yangnam-Myeon GyeongJu Kyungbuk Province	Wet	704.4	-	827
		Dry	1316.7	Canister	2041
Wolsong #2	"	Wet	709.6	-	734
Wolsong #3	"	Wet	638.1	-	734
Wolsong #4	"	Wet	520.1	-	734

Including emergency cores reserves and additional dry storage canister extension plan for yrs 04-06 at Wolsong site

**Annex A-2 Characteristics of the spent fuel storage pool in KAERI
research facility (As of Dec. 2004)**

Facility	Location	Storage Type	Storage Capacity	
			Storage Type	Total Capacity of Storage
HANARO Spent Fuel Storage Pool	Deokjin-Dong, Yuseong-Gu, Daejeon	Wet	HANARO 36 Element Fuel Assembly	600
			HANARO 18 Element Fuel Assembly	432
PIEF Spent Fuel Storage Pool	Deokjin-Dong, Yusong-Gu, Daejeon	Wet	Spent PWR Assemblies	20

Annex B. List of Radioactive Waste Management Facilities

Annex B-1 Storage facilities for LILW in Nuclear Power Plants

(As of Dec. 2004)

Facility	Location	Purpose	Operation Year	Volume Stored [Drum]*	Capacity [Drum]*
Kori No.1	GiJang-Gun Busan	Storage from Kori # 1 ~ 4	1978	9226	10000
Kori No.2	"	"	1979	5251	6000
Kori No.3	"	"	1987	8281	11200
Kori No.4	"	"	1993	9941	23000
Wolsong No.1	GyeongJu Kyungbuk Province	Storage from Wolsong # 1 ~ 4	1983	4683	9000
Yonggwang No.1	Hongnong Jeonnam Province	Storage from Yonggwang # 1, 2	1986	9585	13300
Yonggwang No.2	"	Storage from Yonggwang # 1~6	2002	3241	10000
Ulchin No.1	Ulchin-Gun Kyungbuk Province	Storage from Ulchin # 1, 2	1989	6394	7400
Ulchin No.2	"	Storage from Ulchin # 1~ 6	1997	5866	10000

* 200L drum

Annex B-2 Radioactive waste treatment facility for NPPs

Reactor Type	Facility Feature		
	Gaseous	Liquid	Solid
PWR	Treatment by gas decay tank or charcoal delay bed for effluent processing	Treatment by filtering, evaporation or ion exchange method	Treatment by sorting, compacting, drying or solidification method
PHWR	Treatment by charcoal delay bed for effluent processing	Treatment by filtering, or ion exchange method	Treatment by sorting, compacting, or drying method

Radioactive effluent is treated through HEPA and/or charcoal filter of HVAC system

Annex B-3 Storage facilities for radwaste in KAERI (As of Dec. 2004)

Facility	Location	Purpose	Operation year	Capacity [Drum]
Storage	Deokjin-Dong, Yusong-Gu, Daejeon,	LILW	1985	11500* 1134**

* 200L drum, ** 50L drum

Annex B-4 Radioactive waste treatment facility in KAERI

Facility	Location	Purpose	Operation year	Facility Feature	
				Process	Capacity
Radioactive Waste Treatment Facility (RWTF)	Deokjin-Dong, Yusong-Gu, Daejeon	Treatment of radioactive waste generated from research facilities	1991	Bituminization	0.03 m ³ /h
				Evaporation	1 m ³ /h
				Compaction	60 ton
				Solar evaporation	0.6 m ³ /h

Annex B-5 Storage facility for radioactive waste in KNFC

(As of Dec. 2004)

Facility	Location	Purpose	Operation Year	Capacity [Drum]*
Storage No.1	Deokjin-Dong, Yuseong-Gu, Daejeon	Storage of solid waste	1993	4900
Storage No.2	“	“	1998	4000

* 200L drum

Annex B-6 Radioactive waste treatment system in nuclear fuel fabrication facilities in KNFC

(As of Dec. 2004)

Facility	Location	Purpose	Operation Year	Characteristics	
				Capacity	Main Process
PWR liquid waste treatment system in plant 1	Deokjin-Dong, Yuseong-Gu, Daejeon	Liquid waste treatment	1988	187 m ³ /d	Lime precipitation & centrifuge
PWR liquid waste treatment system in plant 2	“	“	1998	“	“
PHWR liquid waste treatment system in plant 2	“	“	1998	“	Flocculation
Solid waste treatment system in plant 1	“	Solid waste treatment	1988	—	Shredding & compaction
Solid waste treatment system in plant 2	“	“	1998	—	Cutting & compaction

Annex B-7 Radioisotope waste storage facility in KHNP/NETEC
(As of Dec. 2004)

Facility	Location	Purpose	Operation Year	Capacity [Drum]*
RI waste storage facility	Deokjin-Dong, Yuseong-Gu, Daejeon	RI waste interim storage	1993	9,277

* 200L drum

Annex B-8 Radioactive waste incinerator in KHNP/NETEC
(As of Dec. 2004)

Facility	Location	Purpose	Operation Year	Treatment Capacity	
				Solid waste	Liquid waste
Radioactive waste incinerator	Deokjin-Dong, Yuseong-Gu, Daejeon	Incineration: - RI waste - Radioactive waste generated from KAERI	2000	Solid waste	15~25 kg/h
				Liquid waste	8 /h

Annex C. List of Nuclear Facilities under Decommissioning

(As of Dec. 2004)

Facility	Location	Organization	Specific	Year		Status	Volume of the Radioactive waste ¹⁾	
				Operation	Shut-down		Volume [m ³]	Total radio-activity [MBq]
KRR-1	Seoul	KAERI	TRIGA Mark-II (250 kWth)	1962	1995	Under de-commissioning	168	3.7E+4
KRR-2	“	“	TRIGA Mark-III (2 MWth)	1972	1995	“	453	1.2E+6
Uranium Conversion Facility	Daejeon	“	ADU ²⁾ AUC ³⁾ (100Ton/y)	1982	1992	“	380	6.5E-1

Remark:

- 1) The values are preliminary estimated.
- 2) ADU: Ammonium Diuranate
- 3) AUC: Ammonium Uranyl Carbonate

Annex D: Nuclear Safety Charter

Recognizing that the peaceful use of nuclear energy contributes to national development and improvement of the quality of the people's life, and confirming that protection of the people and preservation of the environment through safe control of nuclear energy have the first and foremost priority over others, we pledge ourselves:

- 1. To maintain the highest standards of safety in the use of nuclear energy;*
- 2. To release information regarding nuclear safety promptly and transparently;*
- 3. To reflect the public opinion in formulating nuclear safety policies;*
- 4. To assure the independence and fairness in nuclear safety regulation;*
- 5. To strengthen research and development of technologies on nuclear safety;*
- 6. To abide sincerely by national laws and international agreements on nuclear safety;*
- 7. To complement and improve the nuclear safety-related legal system continuously;*
- 8. To promote nuclear safety culture and incorporate it in our workplace.*

September 6, 2001

Annex E. Nuclear Safety Policy Statement

1. Introduction

The following declares the Ministry of Science and Technology's major policies for the assurance of nuclear safety through the settlement of nuclear regulatory goals and principles to meet growing public concern for nuclear safety and the environment. The purpose of this Statement is to improve the consistency, adequacy and rationality of nuclear regulatory activities by notifying the public and concerned people in and out of the nuclear field of the Government's basic policies regarding nuclear safety.

As declared in the report titled, "Directions of Long-term Nuclear Energy Policy through the Year 2030", which was approved at the 234th Atomic Energy Commission in July 1994, Korean nuclear policy is aimed at establishing the safe use of nuclear energy for peaceful purposes and improving public welfare. Therefore, the assurance of nuclear safety should be given first priority in the development of nuclear power, and organizations and individuals engaged in nuclear power activities should adhere to safety principles as top priority.

The Korea public's distrust of nuclear safety has grown significantly due to the Chernobyl nuclear accident. Sometimes we are confronted with a vocal and often powerful anti-nuclear movement, particularly in regions where nuclear facilities will be built. Therefore, people in the nuclear field should have a more pro-active attitude in assuring nuclear safety so that much-needed public's trust and confidence can be obtained, and they should devote more effort to communicating with the public to resolve outstanding issues.

As a matter of course, nuclear safety is not a matter for one country but a worldwide concern. The "Nuclear Safety Convention" signed by IAEA member states during the 38th IAEA General Conference is one example of world-wide efforts to enhance nuclear safety. Its objectives are to establish national measures on nuclear safety and to ensure that each contracting party fulfills its obligations under the said Convention. As a result, each contracting country has an international responsibility for nuclear safety.

The Korean Government will continue to pursue its goal of achieving a high level of nuclear safety through the enhancement of safety technologies and the internationalization and rationalization of the regulatory system, recognizing that the overriding priority should be given to the assurance of nuclear safety before the development of the nuclear industry.

2. Safety Culture

The Government reaffirms that nuclear safety takes top priority in the development of nuclear energy and that it should be of foremost concern to organizations and individuals engaged in nuclear activities. The Government also develops safety culture, which was presented by the IAEA, recognizing that nuclear safety issues are more closely related to human factors rather than to technical ones, as demonstrated by two nuclear accidents of TMI and Chernobyl.

The safety of nuclear facilities can be secured through dedication to common goals for nuclear safety by organizations and individuals at all levels by giving a high priority to safety through sound thought, full knowledge and a proper sense of safety responsibility. The Government recognizes that nuclear safety is achieved not only by safety systems and strict regulations throughout the stages of design, construction, operation and maintenance of nuclear power plants, but also by the spread of safety culture.

In meeting this commitment, the Government strives for strict regulations through the development of clear safety goals and regulatory policies. It will actively encourage safety-related research and technical developments to achieve technical expertise in regulatory activities and will ensure regulatory independence and fairness by minimizing any undue pressure and interference.

Nuclear utilities establish management policies, giving high priority to nuclear safety, and foster a working climate in which attention to safety is a matter of everyday concern. Managers encourage, praise and provide tangible rewards to employees for commendable attitudes and good practices concerning safety matters. On the contrary, when errors are committed, individuals are encouraged to report them without concealment and to correct them to avert future problems. For repeated deficiencies in or negligent attitudes toward nuclear safety, managers take firm measures in such a way to prevent the same errors from occurring again. In this way, safety culture can be achieved through sound safety policies and full understanding of safety culture by senior management and through proper practices and implementation by individuals engaged in the nuclear industry.

3. Regulatory Principles

The ultimate responsibility for safety of nuclear facilities rests with the licensee. This is in no way diluted by the separate activities and responsibilities of designers, suppliers, constructors and regulators.

The Government has an overall responsibility for ensuring the protection of the public health and the environment from radiation hazards that may occur in the development of nuclear energy. It inspects and ensures the appropriateness of the licensee's safety practices through nuclear regulations and establishes a high level of safety assurance in

order to achieve safety goals on a government level. To effectively regulate, the Government sets forth the following five principles to encourage high-safety performance.

A. Independence

The Government establishes the legal framework for the independent regulatory organization responsible for nuclear regulatory activities. It takes proper measures to ensure the independence of the regulatory organization, which is functionally separated from other organizations and systems involved in the development of nuclear energy. It also ensures that the regulatory organization acts on its own objectives and technical judgment without any political interference and influence from external sources.

The regulatory organization should maintain an extensive program of research and sufficient staff resources to review and audit licensee's submittals so that it can independently verify the validity of a licensee's assertions, which are critical to regulatory decisions. The regulators do their work seeking to achieve the highest standards of ethical performance and professionalism. Regulators' decisions and judgments must be based on objective, unbiased assessments, considering possible conflicting interests of those involved, and their work must be documented. Based on safety culture, the regulatory organization should support and guide the licensee in solving its problems, but only to the extent that the regulatory organization's independence is not impeded.

B. Openness

The purpose of nuclear regulations is to protect public safety and to ensure that all activities are legal and public. The Government maintains an open channel with the public for regulatory information so that the public can understand and rely on the regulatory process. The Government is also devoted to establishing a sound social stand on nuclear safety by making an effort to inform the public properly and openly of nuclear activities, including safety matters.

The Government also develops nuclear policies based on public consensus, paying attention to the public's right to know about the regulatory process. To accomplish this, the Government extends an opportunity to the public to participate in regulatory processes and publicizes related information under the principle titled, "Openness and Democratization of Nuclear Administration".

However, restricted information from industries or concerned individuals is protected and kept in confidence, and treated according to the provisions concerned. The Government objectively informs the public of its activities so that it may collect public opinions more soundly and properly, and it strives to get public consensus through constant communication and interaction with regulators, licensees and the public.

C. Clarity

Nuclear regulations should be enforced through clear regulatory policies, which are based on safety goals on a national level. There should be a coherent nexus between regulations and agency goals and objectives. Agency position should be documented to be readily understood and easily applied.

The Government endeavors to ensure that the licensee is fully informed about regulators' policies so that the licensee can prepare for new policies in advance in order to achieve nuclear safety effectively upon implementation. In a case where new or revised regulations are expected, the Government informs the licensee of the regulatory policies and provides guidance in advance and establishes regulatory practices to minimize the licensee's process of trial and error caused by the revision of regulatory requirements.

The licensee should thoroughly observe the AEA, technical standards and regulatory guidance, and if there is a need to revise them or there are any unreasonable acts or technical standards, the licensee should communicate its view with the regulatory organization in order to initiate revisions.

D. Efficiency

The regulatory organization has the responsibility to provide the licensee and the public with the best possible management and administration of regulatory activities. To accomplish this, it must make constant efforts to evaluate and upgrade its regulatory capabilities.

The regulatory organization should possess a sufficient number of staff that is capable in performing regulatory activities, which are closely connected with many technical areas, and regulatory activities must be performed efficiently to contribute to the achievement of the goal of "Nuclear risk reduction".

Regulatory decisions must be made with the best use of all resources invested in the regulatory process to minimize undue impediments.

Before regulatory decisions related to the improvement in nuclear safety are made, the nuclear risk reduction scale and economic benefits that can be gained from the improvement should be reviewed first.

To efficiently perform regulatory activities with limited capabilities and time, appropriate prioritization of regulatory activities must be made based on risks, costs, and other factors. Regulatory alternatives, which minimize cost, are adopted unless they increase the degree of risk, and in all cases resources should be used effectively for the improvement of nuclear safety.

E. Reliability

The regulatory organization endeavors to eliminate public distrust and fear of nuclear activities and to obtain the public's trust and support through fair regulations based on technical and professional judgments. Regulatory decisions must be made promptly and fairly, and reliably based on the best available knowledge from

research and operational experiences.

The Government obtains up-to-date technical information on nuclear safety and applies this information to regulatory activities. When regulatory requirements need to be either newly established or changed, the most suitable option is adopted after the effectiveness of its implementation and technological difficulties resulting from any changes are sufficiently reviewed.

The Government does its best to run its regulatory system efficiently and systematically, and to thoroughly enforce the regulations in order to secure the public's trust on nuclear safety systems.

4. Directions of Nuclear Safety Policy

To quickly realize the establishment of safety culture and a safety assurance system, each organization prepares its "Implementation Program of Safety Culture" and the regulatory body provides a systematic basis to evaluate the results of its implementation.

Nuclear power plants in operation or under construction are supplemented with regulatory requirements consistently and systematically to achieve an international level of nuclear safety, taking into account the possibility of severe accidents.

For newly constructed nuclear power plants, factors which may increase the total risk caused by the construction of an additional nuclear power plant at the same site of existing plants are to be mitigated by improving the safety level at each grade as compared with that of existing nuclear power plants. For nuclear power plants in operation, maintenance, repair, inspection, and monitoring of components are to be strengthened. "Periodic Safety Reevaluation" is established and implemented to reassess and supplement safety deficiencies which may be caused by the aging of facilities and application of old technical standards.

In accordance with regulatory requirement changes in and out of the country, the existing atomic energy law system is to be revised and supplemented, and related technical standards and regulatory guidance are to be maintained in order to efficiently perform regulatory activities.

In consideration of the technical expertise required for nuclear regulatory activities, safety research should be continuously strengthened to meet the growing demand of regulatory requirements due to technical advancements in the nuclear field.

Solutions for unresolved safety issues, including generic safety issues of nuclear power plants, are promptly found and reflected in policy. Operating records and accident and failure data are analyzed to determine factors that affect the safety of nuclear power plants, and efficient safety supplementary measures are also established.

The regulatory organization reviews the introduction of "Optimum Assessment &

Probabilistic Assessment” for safety analyses, and encourages the licensee to introduce new technologies when and if they are considered to be reasonable safety assurance measures, as proven by their application.

An “Overall Safety Assessment” is performed using probabilistic safety assessment and “Nuclear Regulation based on Risk” is done through sound safety regulations in consideration of cost-benefit factors.

Quantitative safety goals and regulatory guidelines for the examination, prevention and mitigation of severe accidents are established and improved to be gradually applied to advanced nuclear power plants as well as to existing facilities. In addition, design and operational safety of nuclear power plants are achieved through these measures in order to minimize human error.

Radiation protection is achieved by the concept, “Radiation exposure should be kept as low as reasonably achievable (ALARA)”, taking into account economic and social circumstances, and for individual exposure dose, the introduction of radiation protection standards based on the new ICRP 60 recommendations are being favorably reviewed.

In response to growing public concern about nuclear safety, nuclear safety-related information and regulatory activities are open to the public through the publication of the “white paper on nuclear safety” and through the periodic release of information about accidents and failures at nuclear power plants.

5. Conclusion

The nuclear community strives for the public’s proper understanding of nuclear energy and the establishment of safety culture by hearing and addressing the public’s concerns with understanding and by using the collected wisdom of those involved to solve any problem together.

Nuclear safety cannot be achieved in a day, but rather it is secured through the licensee’s constant efforts to improve nuclear safety and through the regulator’s thorough enforcement activities. The basic concept of nuclear regulations is to protect the public from radiation hazards and to pursue a “better safety performance” as allowed by circumstances.

To this end, the Government is devoted to developing a higher level of nuclear safety technology and regulatory system, and to achieving an international level of nuclear safety through participation in the “Nuclear Safety Convention.”

In conclusion, the Government reaffirms that the assurance of nuclear safety is the highest duty of the regulatory organization and ensures that such an important role is performed faithfully to secure nuclear safety on behalf of the public.

September 10, 1994

Annex F. Site Selection Procedure of LILW Disposal Facility

The fundamental principal on the site selection of radioactive waste disposal facility is developed by the Radioactive Waste Management Policy, which was settled after establishment by the MOCIE, consultation with the MOST, and consideration and deliberation by the Atomic Energy Commission (AEC). The National Radioactive Waste Management Policy was deliberated upon at the 249th AEC (9/30/98), partly revised at the 252nd AEC (2/4/03), and finalized at the 253rd AEC (12/17/04).

At the 253rd AEC, held on December 17, 2004, it was decided that the construction of single or multiple permanent LILW disposal facilities would first be executed and completed by 2008. The Spent Fuel Management Policy including the construction of spent fuel interim storage facilities is to be proceeded under national consensus through public consultation after adequate long-term discussions in consideration of national policy and relevant technology development at home and abroad.

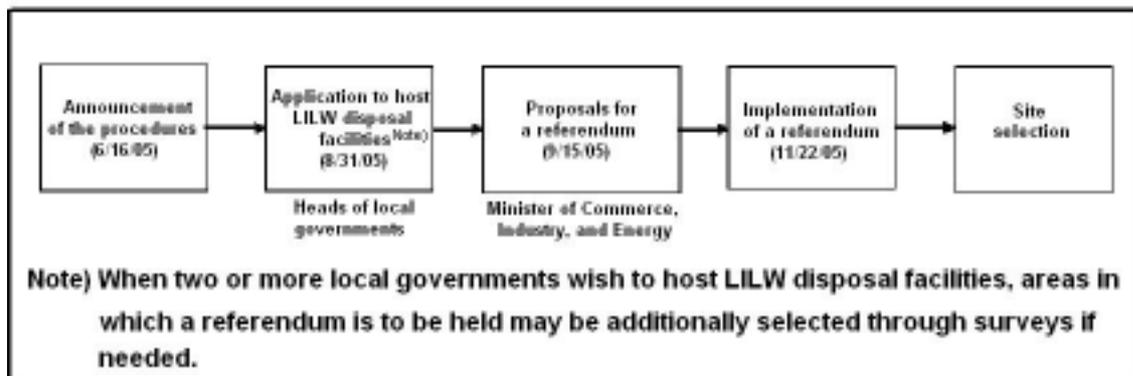
For a transparent and fair site selection, the MOCIE established on March 11, 2005 the Site Selection Committee (SSC), which consists of 17 civilian experts including experts from various fields and civil society organization (CSO) representatives. In operation since then, the SSC controls and monitors overall site selection procedures.

In addition, the government, through the Special Act on Supporting the Local County Around Low and Intermediate Level Radioactive Waste Disposal Facility, enacted and proclaimed on March 31, 2005, has not only stated support for local community hosting LILW disposal facility but also decided to implement the following to ensure fairness and transparency of the selection procedures: (1) hold a local referendum according to the Referendum Act and select host areas; (2) implement selection plans, site investigation results, and selection process openly and transparently; and (3) hold public hearings for the residents of the areas concerned.

On June 16, 2005, through a Public Notice on the selection of possible LILW disposal facility sites, the government announced the site selection method and procedures and support for host areas and initiated the site selection procedures.

Regarding the site selection procedures, the sites are to be selected from among candidate areas whose appropriateness regarding site safety and business conditions have been approved of after a local referendum according to the Referendum Act. The selection procedures will be implemented in the following order: local governments' application to host LILW disposal facilities; proposals for a local referendum; site selection according to the local referendum results. Detailed procedures are as follow:

Annex F



LILW Disposal Facility Site Selection Procedures

Local governments' application to host the LILW disposal facilities must be submitted to the MOCIE by August 31, 2005 through the heads of local governments with the consent of local councils. When 2 or less local governments apply to host the facilities, the areas to hold a local referendum may be added, if needed, by additionally selecting those areas with the greatest percentage of support for the project through surveys. When the MOCIE requests a vote in the areas thus selected according to the Referendum Act, the heads of local governments must present proposals for a local referendum by October 22, 2005 and hold the referendum in the areas concerned by November 22, 2005.

The SSC will evaluate areas that apply to host the LILW disposal facilities based on their site safety, business conditions, and degree of resident support at each stage, and will allow only appropriate areas to proceed to the next stage. The appropriateness of site safety and business conditions will be evaluated before the local referendum and notified to the local government. The local referendum will be held only in areas that are appropriate as sites according to said evaluation. The site will be selected from among areas with the greatest percentage of support for the LILW repository project in the local referendum.

With regard to areas hosting the LILW disposal facility, according to the Special Act enacted and proclaimed on March 31, 2005, they will be provided with special supporting funds amounting to 300 billion won and disposal fees amounting to approximately 8.5 billion won per year and the relocation of the KHNP headquarters. Before the operation of the disposal facility, the special supporting funds will be provided to the local governments, which will be used for local development, tourism promotion, support for the establishment of new markets for agricultural and marine products, higher income, stable livelihood, and improved welfare for local residents. At the facility operation stage, a portion of the disposal fees imposed according to the amount of waste brought in to the disposal facilities will be used by the local government and facility operators to develop host areas and to improve local residents' welfare. In addition, the headquarters of KHNP, the licensee, will be relocated to host areas within 3 years from the date on which the electricity development project plan is approved.

Annex G. MOST Notices applicable to Radioactive Waste Management

Radioactive Waste

Regulation on the Packaging and Transport of Radioactive Materials, etc. (01-23)

The regulation purposes to establish requirements needed for the implementation of Regulations on the Packaging and Transportation of Radioactive Materials in the Enforcement Decree of the AEA.

Regulation on the Classification, Collection, and Delivery of Radioisotope Waste (90-07)

The regulation purposes to define necessary details for segregation, collection and delivery of RI waste, which should be treated and eventually disposed of, produced from various RI users. Especially, this regulation will be applied to technical and administrative matters on for segregation, collection and delivery of RI waste.

Siting criteria for Low and Intermediate level Radioactive Waste Repositories (05-16)

The criteria specify the minimum technical criteria on site conditions of near-surface repository for low and intermediate level radioactive wastes with the provision of the Enforcement Decree of the AEA.

Siting Criteria for Spent Fuel Interim Storage Facilities (03-09)

The regulation aims to specify the minimum technical criteria on site conditions of the Interim Storage Facility for Spent Nuclear Fuel with the provision of the Enforcement Decree of the AEA.

Criteria for Structure and Equipment of Low and Intermediate level Radioactive Waste Repository (04-21)

The criteria stipulate the minimal requirements on structure and equipment that must be considered in relation to the construction and installation of low and intermediate level radioactive waste repository

Acceptance Criteria for Low and Intermediate level Radioactive Waste (05-18)

The criteria purpose to define delivery methods, plan and procedures and other necessary details needed upon consignment of the delivery of disposal of low and intermediate level radioactive waste to operator as well as specific guideline of waste acceptance which should satisfy at the time of disposal of waste.

Quality Assurance Criteria for Radioactive Waste Management Facilities (92-17)

This criteria purpose to define the necessary details on QA program for Low and Intermediate level Radioactive Waste repository and spent fuel interim storage facility. The criteria applies to the site characteristics investigation, design, operation, closure and institutional control for LILW repository and site characteristics investigation, design, construction and operation for spent fuel interim storage facility, respectively.

Radiological Protection Criteria for Long-term Safety on Low and Intermediate level Radioactive Waste Disposal (05-17)

The criteria purpose to define the necessary details for preventing radiological risks to human health or the environment in relation to the disposal facilities of low and intermediate level radioactive waste and to establish performance objectives to secure the long-term safety in the case of the permanent disposal of radioactive waste. The performance objectives will indicate that after the closure of a disposal facility, risks caused by radioactive waste disposal which shall be within the acceptable level both in the present generation and in future generations, and it will also be applied to review and evaluation of radiological safety.

Standard Format and Contents of Site Characteristics Report for Low and Intermediate level Radioactive Waste Repository (05-15)

The regulation defines the matters regarding Site Characteristics Report for Low and Intermediate level Radioactive Waste Repository. This regulation will be applied to near-surface disposal and rock-cavity disposal for Low and Intermediate level Radioactive Waste in the regions of land, seashore, or islands. As these regulations include only minimal technological matters pertaining to each disposal form or method, technological details might be added or excluded in part.

Standard Format and Contents of Site Characteristics Report for Spent Fuel Interim Storage (04-23)

The regulation aims to define the matters regarding Site Characteristics Report for Spent Fuel Interim Storage. This regulation will be applied to wet-type of Spent Fuel Interim Storage on surface of ground.

Acceptance Criteria for Spent Fuel (01-33)

The criteria aim to provide the general requirements for delivering spent fuel as generated from the nuclear power plant to operator of the AFR spent fuel interim storage facility. This criteria purpose to define delivery methods, plan and procedures and other necessary details needed upon consignment of the delivery of spent fuel to operator of the AFR spent fuel interim storage facility.

Regulation on the Clearance Level of Radioactive Waste (01-30)

The regulation purposes to define clearance level for deregulation of very low level radioactive waste and procedures, methods, and other necessary details for deregulation application of very low level radioactive waste below the clearance level in the Enforcement Decree of the AEA.

Incineration Criteria of Low and Intermediate level Radioactive Waste (01-31)

This criteria purpose to provide technical details for incinerator facilities of low and intermediate level radioactive waste in order to secure the operational safety at the time of incineration treatment of radioactive waste

Regulation on Inspection of Manufacture and Use of Radioactive Material Transport Containers (01-19)

The regulation purposes to provide technical details for inspection of Manufacture/Use of Radioactive Material Transport Containers, especially standards in respect of the items, methods for inspection by type of transport containers.

Criteria for Structure and Equipment of Low and Intermediate level Radioactive Waste Treatment System (05-11)

The criteria stipulate the detailed technical requirements on structure and equipment that must be considered in relation to the design and operation of various treatment facilities of low and intermediate level radioactive waste.

Technical Requirement for the Operation and Control of Low and Intermediate level Radioactive Waste Repository (05-12)

The regulation purposes to manage disposal facilities safely, prevent disasters due to disposal facilities, and protect the environment by defining detailed technological standards regarding the management of disposal facilities for Low and Intermediate level Radioactive Waste. This regulation will be applied to the management, closure, and institutional control of disposal facilities of Low and Intermediate level Radioactive Waste and their safety assessment on normal and abnormal events which are likely occurred during the operation, closure, and institutional control of repository

Standard Format and Contents of Safety Analysis Report for Low and Intermediate level Radioactive Waste Repository (05-13)

This guide purposes to define the matters related to the composition of the safety analysis report for Low and Intermediate level Radioactive Waste Repository. This guide will be applied to the safety evaluation and accident analysis for the design, construction, and management of the disposal facilities for Low and Intermediate level Radioactive Waste and of their accompanying facilities, and for problems anticipated during the institutional control period.

Regulation on Inspection of Radioactive Waste Disposal (05-14)

The Regulation aims to establish requirements needed to inspect the disposal of low and intermediate level radioactive waste at waste disposal facilities. Operators who wish to undergo disposal inspection must submit inspection application form for each batch of waste to the MOST before January of the year in which disposal is to be implemented.

Radiation

Standards on Radiation Protection, etc. (02-23)

The purpose of the Standards lies in establishing standards related to radiation protection according to the regulations for radiation protection in the AEA. Especially included are classification of radioactive waste, definition of effluent control limits, and radiological design limits to prevent human and environments from radiation hazards, which applies to the design of the radioactive waste management facilities

Reactor Facilities

Regulation on Preparation, etc. of Radiological Environmental Report of Nuclear Power Utilization Facilities (05-19)

The regulation purposes to describe the necessary matters regarding items of report, its preparation method and others related to the composition of the radiological environmental report for assessment of the radiological impacts that may occur in the environment due to construction and operation of the nuclear facilities as well as of the draft Radiation Environmental Report for public consultation/hearing of residents nearby. This regulation will be applied to the draft Radiological Environmental Report for the nuclear power plant, the LILW disposal facilities and spent fuel interim storage facility, and to the Radiological Environmental Report for research reactor with 100kW thermal, and other waste management facilities and etc.

Regulation on the Environmental Radiation Survey and Impact Analysis in the Vicinity of Nuclear Facilities (04-17)

The regulation purposes to describe the necessary details regarding the implementation of a survey of radiation environment and assessment of the radiological impacts on the surrounding environment of nuclear facilities which should be carried out by their installers and/or operators.

Regulation on the Reporting of Events and Accidents of Nuclear Facilities (05-07)

The regulation purposes to describe the necessary details regarding reporting items, their procedures and impacts assessment on Events and Accidents of Reactor Facilities. Especially this regulation will be applied for items of events and/or accidents which should be reported to the MOST and release the related information to the general public during operation of nuclear facilities.

Annex H. References

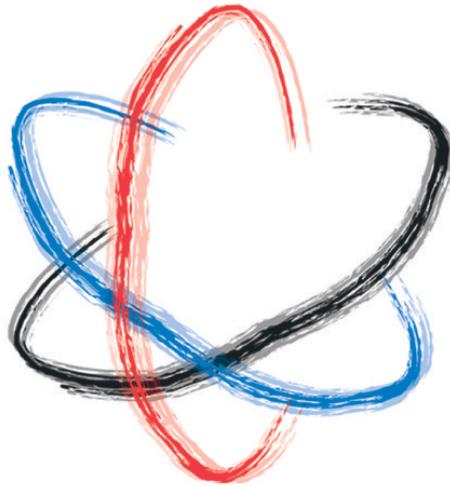
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