Radioactive Waste Management in Korea

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1. Introduction

Since the commencement of first commercial nuclear power plant(NPP) Kori Unit 1 in 1978, 10 PWRs and 2 CANDU reactors have been operated in Korea. From these NPPs, about 48,000 drums of low level radioactive waste(LLW) and 2,800 tons of spent fuel(SF) have been generated and stored at each NPP site. In addition, 2,070 drums of radioisotope(RI) wastes collected from RI users (hospitals and industries) have been stored at Daeduk site of KEPCO-NETEC. In order to meet the increase of radioactive waste generation due to this nation's active nuclear power program (RI wastes is comparatively less than that from NPPs), national radioactive waste management program aiming at securing a centralized site for permanent LLW disposal as well as SF interim storage was initiated by the Korean Government in mid 1980's. Early in 1995, a small Island, Guleopdo, off the mid-west coast of Korean peninsula was designated as the repository site for radioactive waste. However, the Guleopdo Project was cancelled in late 1995 due to the existence of active fault zones nearby the Guleopdo during site characteristic investigation.

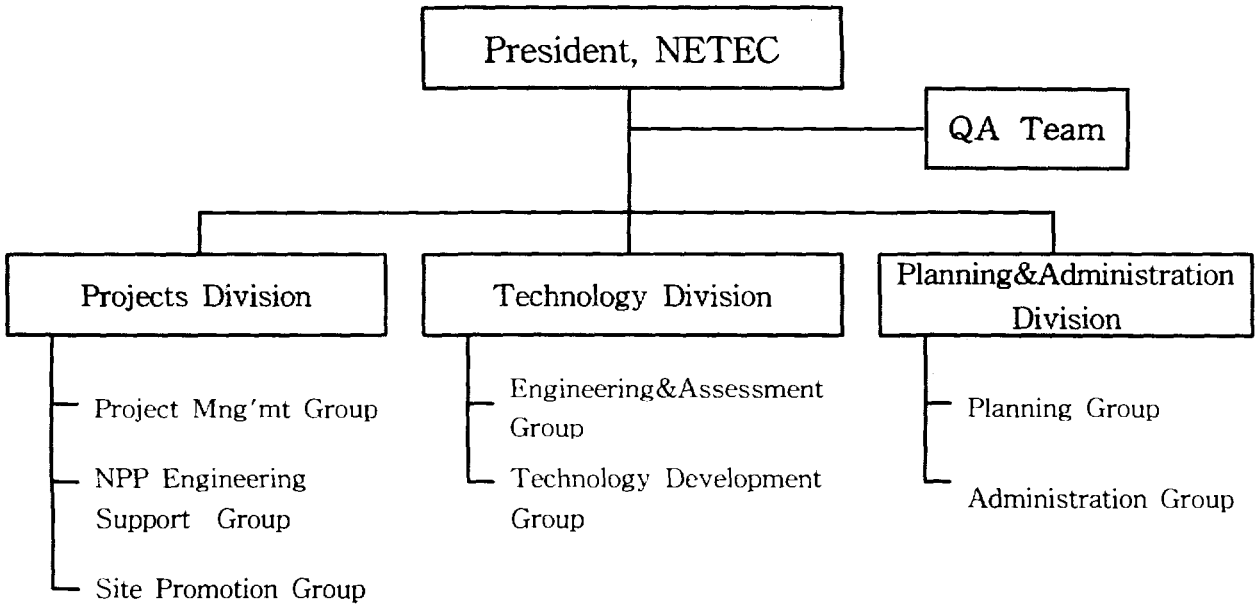
2. Task Transfer on National Radioactive Waste Management

After through review and evaluation of the past performance of the national radioactive waste management program, the Korean Government decided early in 1996 the amendment of the national radioactive waste management program and reorganization of the

project management structure. With the respect of the Government's new policy of national nuclear waste management program, the radioactive waste management which had been carried out by the Nuclear Environment Management Center(NEMAC) affiliated to Korea Atomic Energy Research Institute(KAERI) was transferred to the Korea Electric Power Corporation(KEPCO) in January 1997. And the KEPCO established the Nuclear Environment Technology Institute(NETEC) as a special division of KEPCO to carry out the national nuclear waste management program.

Therefore, the NETEC has the responsibility on the national nuclear waste management and the Ministry of Science and Technology still have the responsibility for the control of the nuclear safety and licensing.

The infrastructure of the NETEC consists of three division and seven groups as shown below.



In order to finalize the task transfer on national radioactive waste management, the associated laws and policies have been revised.

Revision of Laws

- ○ The provisions for the radioactive waste management project were removed from "the Atomic Energy Laws" and inserted in "the Electricity Enterprise Laws".
- ○ "The Act for Promoting the Radioactive Wastes Management Project and Financial Support for Local Community" was abolished, but the provisions for the local community support were added to "the Support Laws for Communities Surrounding Power Plants".
- ○ The provisions for repository siting were inserted in "the Special Act Relating to Development of Electric Power Resources".

Research and Development(R&D) Fund

- ○ The radioactive waste management fund provided from 1986 by the Law was abolished and a new nuclear R&D fund was established.
- ○ The nuclear R&D fund is provided by KEPCO with the yearly ceiling of 1.2 won/kWh of nuclear power generation.
- ○ Radioactive waste generators (KEPCO, RI users, research institutes and etc.) are to bear the cost required for radioactive waste management.

NETEC'S Responsibilities

The scope of radioactive waste management includes :

- ○ Treatment, transportation and disposal of low-level radioactive waste from the operating nuclear power plants
- ○ Treatment, storage and disposal of RI waste from industries, hospitals, and research institutions
- ○ Treatment, transportation and disposal of waste from the decommissioning of nuclear power plants
- ○ Transportation, away-from-reactor storage and treatment of spent fuel
- ○ R&D related to radioactive waste management projects

3. Prospects

Based on the new national policy of radioactive waste management, the Korean Government will set up a new plan for the national radioactive waste management and R&D programs in accordance with the revised laws, new policies and responsibilities. KEPCO-NETEC is preparing a long term plan for overall radioactive waste management and will report to the Government for approval by the end of this year.

From 1986, regional survey for repository site was initiated to identify suitable areas. Since then, five separate attempts of survey had been carried out along the east and west coast of Korea. However, most of these attempts were stopped due to local opposition and anti-nuclear groups. At this point, the attempt to investigate new repository site will be started again based on our passed experience.

- **LLW management at NPPs**

  At present, about 48,000 drums of LLW/ILW are stored at 4 NPP sites and the cumulative amount of wastes will gradually increase by the addition of NPPs in the future. However, according to recent statistics of arising waste drums, the yearly generation rate of drums of radioactive waste per NPP indicates significant reduction in 509 drums/NPP-year in 1990 to 236 drums/NPP-year in 1996.

  This reduction was achieved mainly by the KEPCO's outstanding efforts for waste volume reduction by continuous implementation of new technologies and by improvement of old and inefficient treatment facilities.

- **Status of spent fuel management**

  At present, about 2,800 tons of spent fuel are stored at NPP sites and the generation rate of spent fuel is constantly increased due to the continuous addition of NPPs. The KEPCO will make efforts to solve such increase of SF by

adapting appropriate measures for each NPP.

The NETEC will play a dominant role to manage these projects.

○ **RI waste management**

Until 1996, KAERI was responsible for managing RI wastes arising from hospitals and industries. At present, this function was transferred to NETEC so that the RI storage facility located at Daeduk site is managed by NETEC. Due to the rapid increase of RI users (at present about 1,000 users), the annual generation rate of this type of waste is also increasing. About 500 drums (based on open sources) of RI wastes are annually collected and stored. The NETEC is planning to increase the storage capacity to solve the space problem of increasing RI wastes.

○ **Public acceptance (PA)**

Even though the necessity of nuclear power generation has been understood by the great part of the general public, overall anti-nuclear movement has been escalated all over the country together with environmental protection groups.

After local government system was established by direct election of residents in 1995, it is more difficult to obtain PA for nuclear applications, and the more criticism about nuclear safety has increased.

Therefore PA programs for radioactive waste management are being extensively carried out and promoted.

○ **Research and development**

The R&Ds NETEC is aiming to are:

- Studies on spent fuel related project management
- Radioactive waste treatment technology (including volume reduction)
- Radioactive waste disposal technology
- Decontamination and restoration technology
- Decommissioning of NPP

- Shipping cask development for spent fuel
- Other R&Ds

The R&D of waste volume reduction is the one as important R&D activities in NETEC.

○ **International cooperation**

NETEC from the time of NEMAC, had made a lot of efforts on international cooperation in the field of radioactive waste management, and will continue to emphasize international cooperation. Especially, NETEC will actively participate in the following cooperation projects and want to keep close relationship with radioactive waste management organizations in other countries.

- OECD/NEA projects
- IAEA projects
- Bilateral and multilateral agreements on technology exchange related to radioactive waste management.

4. Summary

○ In order to meet the increasing energy demand in Korea, continuous promotion of nuclear power program will be inevitable in the future. However, the use of nuclear energy eventually requires effective and reliable radioactive waste management.

○ For the safe and economical management of radioactive waste, first of all, volume reduction is essentially required and hence the development of related technologies continuously be pursued.

○ A site for overall radioactive waste management has to be secured in Korea.
KEPCO-NETEC will improve public understanding by reinforcing PA and will maintain transparency of radioactive waste management.

Korea is ready to smartly overcome all challenges in the radioactive waste management. Also Korea is fully willing to share and learn all experiences in both technologies and public awareness activities with all nations and international bodies such as IAEA.