

## **RECENT TOPICS IN THE FIELD OF RADIOACTIVE WASTE MANAGEMENT IN JAPAN**

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### **Abstract**

In Japan, several organisations have carried out R&D of Partitioning and Transmutation (P&T) technology under the OMEGA programme (Options for Making Extra Gains from Actinides and fission products) which was initiated in 1988. In 1999, the Atomic Energy Commission of Japan (AEC) will check and review the outcome of the OMEGA programme up to now to decide how to proceed the P&T technology further.

The AEC established two committees for both technical and socio-economic aspects of geological disposal, and each of them materialised a report. The Advisory Committee on Nuclear Fuel Cycle Backend Policy, AEC, laid down the guidelines until 2000 on future research and development of the disposal of high-level radioactive waste (HLW), and the Special Committee on High-Level Radioactive Waste Disposal, AEC, published a report on the disposal of HLW discussed from social and economical points of view.

## **Status of Partitioning and Transmutation Study in Japan**

P&T technology of long-lived radionuclides could convert HLW into useful resources and reduce the environmental impact associated with its disposal. In Japan, the Japan Atomic Energy Research Institute (JAERI), the Japan Nuclear Cycle Development Institute (JNC; former Power Reactor and Nuclear Fuel Development Corporation (PNC)), and the Central Research Institute of Electric Power Industry (CRIEPI), etc. have carried out the basic research and development activities of P&T technology under the OMEGA programme.

The OMEGA programme was initiated in 1988 in accordance with the national programme “Long-Term Program for Research, Development and Utilisation of Nuclear Energy” defined by AEC, aiming at efficient disposal of radioactive waste, effective use of natural resources and improvement of safety level of geological disposal. The OMEGA programme consists of the research and development subjects as follows:

- Partitioning:
  - Partitioning technology of high activity liquid wastes.
  - Recovery technology of useful metal from insoluble residue.
  - Effective utilisation technology of separated nuclides.
- Transmutation:
  - Transmutation technology by using reactor.
  - Transmutation technology by using accelerator.

In 1999, the AEC will check and review the results of the OMEGA programme, make clear the position of study on P&T technology within the HLW disposal policy at present, and revise the programme.

In addition, international collaboration with France and with Russia, concerning transmutation by using FBR, is now under way.

## **Current Activities for Radioactive Waste Management**

Japanese basic policy regarding disposal of HLW is to solidify it into stabilised form, to store it for 30-50 years to be cooled, and to dispose of it deep to the underground (geological disposal). Japan is planning to set up an implementing entity for geological disposal around the year 2000, and thereafter we are looking to start operation of the repository between 2030 and the mid-2040s at the latest. In order to realise the plan harmoniously, the AEC has been discussing the technical and socio-economical aspects of HLW disposal.

The study of P&T technology is considered to provide the improvement option of geological disposal, not to be the replacement option of geological disposal. The results of the OMEGA programme must be checked and reviewed in accordance with these discussion for the basic policy of HLW disposal.

After the last (4th) International Information Exchange Meeting held in Mito in 1996, intensive discussions have been done concerning HLW disposal, and such efforts materialised two reports. Main recommendations and future plans described in these reports are summarised.

### ***Technical Aspects***

In April 1997, the Advisory Committee on Nuclear Fuel Cycle Backend Policy, AEC, laid down the guidelines on future research and development of the disposal of HLW. The report, entitled “Guidelines on Research and Development relating to Geological Disposal of High-Level Radioactive Waste in Japan”, states the basic technical issues relevant to geological disposal of HLW in Japan, the matters to be discussed in the second progress report, released by JNC, and the technically important issues which have to be covered by the second progress report.

In accordance with the report, JNC will release the report on the outcome of R&D activities to elucidate technological reliability of the geological disposal and to provide technical ground for selecting repository sites and for establishing safety requirement in the form of the second progress report before the year 2000, with the co-operation of related institutions, such as JAERI, CRIEPI, the Geological Survey of Japan (GSJ), the National Research Institute for Earth Science and Disaster Prevention (NIED), and university researchers. The first draft of the second progress report was made known to the public on September 1998, and the second one will follow around next spring, reviewed by experts in Japan. The second draft will be available in English for international reviews, and after that final version of the second progress report will be finalised before the year 2000.

In parallel with the R&D programme, there is also a plan in the national programme that the implementing organisation for HLW disposal will be established around the year 2000 to initiate the siting activities. The programme will then move from the generic into the site-specific phase. Development of site characterisation methodologies will become a more important issue as the national programme progresses.

### ***Socio-economic Aspects***

The Special Committee on High-Level Radioactive Waste Disposal, AEC, has considered various aspects of HLW disposal, including social and economic aspects, with a view to ensuring that such disposal will be accepted by the Japanese people in the coming century. Based on its discussions, the Special Committee released a report on how to implement HLW disposal in May 1998. In this report, the Committee considered the needs for discussing HLW disposal issues and the strategies for making information open to the public for their acceptance. And then, the Committee discussed an institutional arrangement on how to establish a reliable and transparent system for the HLW disposal project funding and the establishment of the entity to implement the disposal project and on how to make sure of the most appropriate siting process for harmonious co-existence between an eventual repository and host communities. So that, the Committee recommended various strategies for agencies concerned to enforce in particular. The Committee would like strongly to request those agencies concerned to take urgent steps to resolve the following four policy issues; (1) to secure HLW disposal project funds; (2) to set up the HLW disposal project-implementing entity; (3) to develop deep underground research laboratories; and (4) to prepare and establish the safety criteria and the guidelines on safety assessment of HLW disposal.

The report, entitled “Basic Approach to the Disposal of High-Level Radioactive Waste”, consists of two parts. Part 1 discusses general considerations relating to the implementation of HLW disposal. Part 2 highlights four specific issues essential to further implement disposal of HLW: 1) how to promote public understanding of HLW disposal, 2) how to build public confidence in disposal technology and construct a financial and social supporting system for implementation, 3) how to coexist harmoniously with local communities at the disposal site and 4) how to proceed with site selection.

For the construction of the institutional system, to collect fund for disposal and the establishment of the implementing entity, Steering Committee on High-Level-Radioactive-Waste Project (SHP: the committee established by the Japanese government, JNC and the Federation of Electric Power Companies for preparing the establishment of implementing entity) is continuously investigating.

For the development of deep underground research laboratories, JNC has already started to the research programme in deep underground research laboratory at Mizunami city, Tono area, Gifu prefecture, in the central part of Japan as a crystalline rock site. JNC is also planning another deep underground research laboratory at Horonobe town, Hokkaido prefecture, in the north of Japan as a sedimentary rock site.

The report also states that “At present, the geological disposal of HLW is technically the most practical. The research on the volume reduction of HLW and utilisation of HLW as resources (P&T, etc.), aiming at safer and more efficient geological disposal, should be reviewed periodically, and the disposal system should be flexible to adopt outstanding progresses in these technologies, if any.”