

9-1 Nuclear Facility Decommissioning and Radioactive Waste Management

1. Introduction

JAEA is the only organization established by the government for comprehensive R&D on atomic energy, and it now owns more than 200 nuclear facilities: Research Reactors, Reprocessing Plants, Accelerators, etc. In the future, these facilities will be decommissioned after completing their missions. In the 1st Midterm Plan, more than 30 facilities which should be decommissioned now or in the near future are identified.

In addition, low level radioactive wastes have been generated through a variety of JAEA's research activities, and approximately 340 thousand in 200 liter drum are stored in JAEA's site (FY2005).

Nuclear facility decommissioning and radioactive waste management are collectively known as "Nuclear Cycle Backend". It is considered to be a duty of nuclear institution installer or the radioactive waste generator to carry out the tasks of Nuclear Cycle Backend.

Long-term operations and large amounts of fund are needed to carry out Nuclear Cycle Backend. We have

estimated that the total cost will be 2 trillion yen over the next 80 years. Therefore, we are carrying out the following R&D aimed at reducing the cost.

2. Development of Decommissioning Technology (Fig.9-1)

The fundamental decommissioning technology has been established based on the experience in dismantling gained during the JPDR decommissioning project etc. When applying the technology to other facilities, it is necessary to improve the technology in consideration of their specific features. Specifically, we are developing dismantling technologies for the "FUGEN" Nuclear Power Station (advanced thermal reactor that is heavy water moderated, light water cooled, and of the pressure tube type), the Uranium Enrichment Plant and the Conversion Facility in Ningyotoge, and the JAERI Reprocessing Test Facility which are suited to the features of these facilities, based on the existing technologies.

A lot of data on dismantling technology and related information have been accumulated through the dismantling activities of the facilities. In order to efficiently carry out the

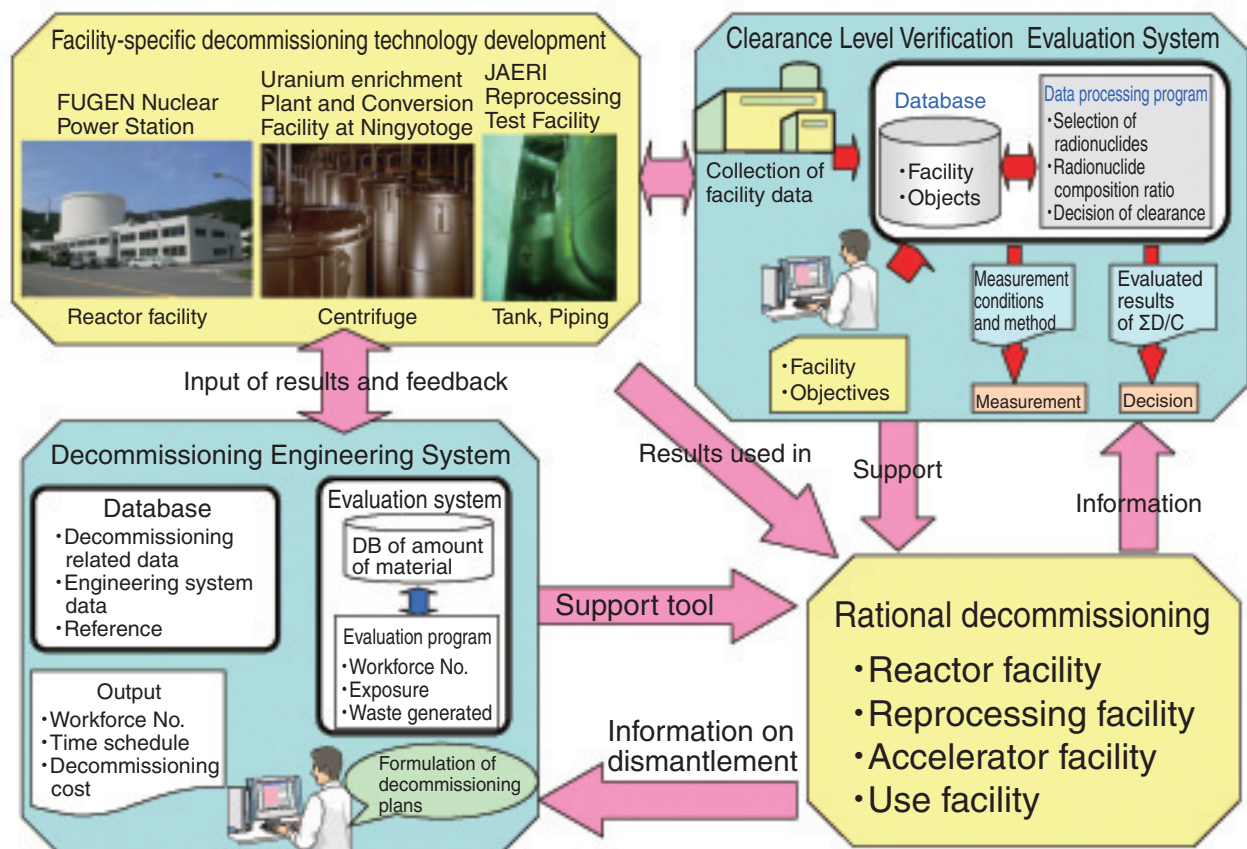


Fig.9-1 Development of Nuclear Facilities Decommissioning Technology

decommissioning of JAEA's facilities in the future, we are developing a computerized decommissioning engineering system which consists of databases including the above decommissioning-related data and evaluation systems such as a system for calculating residual radioactive contamination in the facility.

On the other hand, the Law on nuclear reactor regulations was amended in December 2005, and a clearance system was introduced in the Law. The clearance system is useful for reducing the amount of radioactive waste as well as waste disposal cost. We are developing a computerized clearance level verification evaluation system to easily and efficiently implement clearance.

The above mentioned technologies have been developed or are under development, and will be used for the future decommissioning activities in JAEA.

3. Development of Radioactive Waste Treatment and Disposal Technology (Fig.9-2)

Radioactive Waste is to be treated using a technology appropriate to the radioactivity level and waste characteristics. We are developing the following treatment

technologies aiming to reduce the waste management cost: a calcination pre-treatment prior to volume reduction treatment and a decontamination process for waste contaminated with uranium and TRU nuclides.

The waste package, which is prepared by solidification by cement, melting, etc. for final disposal, has to be measured for radioactivity under the regulatory rules for waste disposal. We are developing an easy and rapid radioactivity measurement method to reduce measurement time and cost.

Waste packages are finally disposed of in a near surface repository (with or without engineered barriers), in a sub-surface disposal or in a deep geological repository, depending on its radioactivity. As safety of disposal is judged based on exposure dose assessment, we have been examining factors affecting migration of radionuclides, creating a database and method for the assessment of disposal of radioactive wastes arising from non-nuclear fuel cycle facilities, TRU bearing wastes and uranium bearing wastes.

And we are developing a waste records management system which manages an integrated set of information on radioactive waste in all phases of management from generation to disposal with good traceability of records.

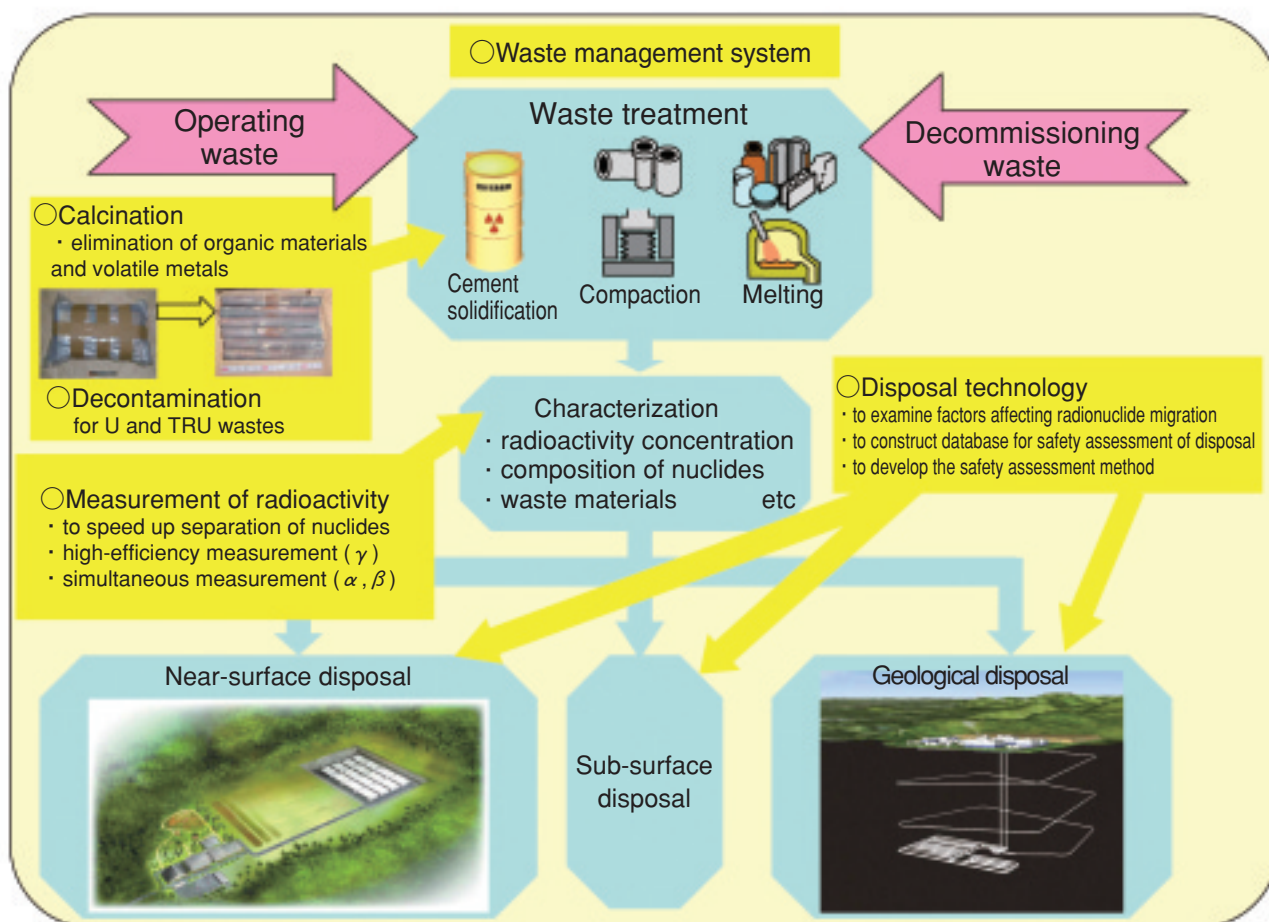


Fig.9-2 Development of Radioactive Waste Management Technology