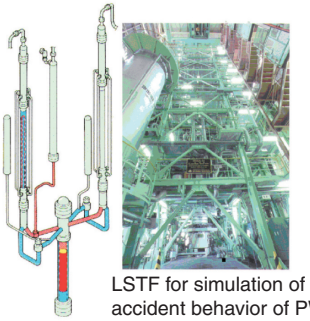
5 Nuclear Safety Research

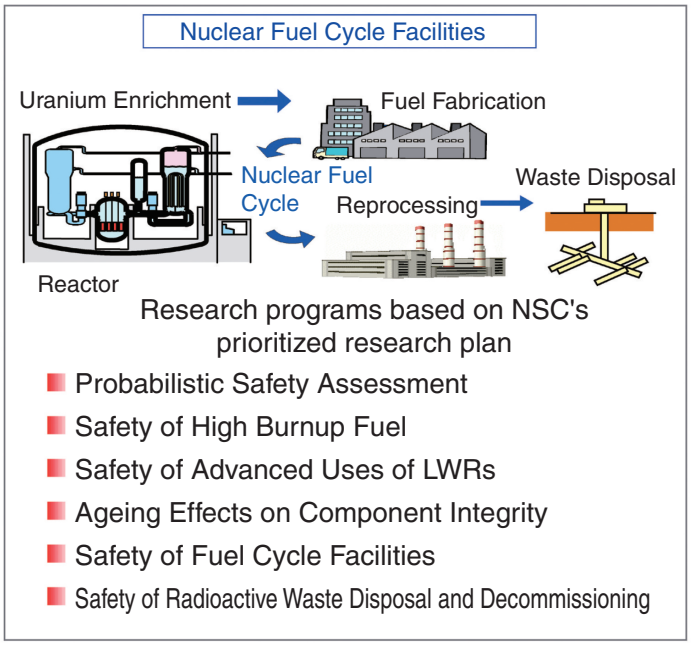
To Support Safety Regulations and to Ensure Nuclear Safety and Confidence

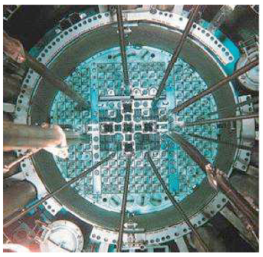
NSRR for studies on reactivity accidents

RFEF for post irradiation examination of nuclear fuel



LSTF for simulation of accident behavior of PWR





JMTR for testing material and fuel behavior

NUCEF for safety research for fuel cycle facilities

Fig.5-1 Major subjects of safety research and research facilities
In order to develop safety assessment technologies for nuclear facilities, analytical models must be developed and validated on the basis of the underlying mechanisms which come to be understood from tests that simulate phenomena in normal and accident conditions. Various large scale test facilities of JAEA are providing important data and contributing to nuclear safety in the international community.

To assure the safety of nuclear facilities, the regulatory authorities of the government perform safety examinations and inspections of the safety design and management by utilities. Safety research is essential for providing a scientific and technical knowledge base for developing guidelines and standards for regulatory decision making.

Safety research at JAEA is conducted according to the "Prioritized Plan for Nuclear Safety Research" made by the Nuclear Safety Commission (NSC), which sets priorities for safety research to be carried out based on future trends in regulation. The major subjects for us to study are shown in Fig.5-1.

Furthermore, we are supporting the regulatory body the Nuclear and Industrial Safety Agency (NISA) and its supporting organization Japan Nuclear Safety Organization (JNES) by conducting research on various technical issues in safety regulation which they have contracted us to do.

The results of nuclear safety research contribute to the maintenance and improvement of safety of the nuclear facilities and also to fostering public confidence in nuclear safety.

The following paragraphs briefly describe new results from the programs shown in Fig.5-1.

In the program on probabilistic safety assessment (PSA), a computer code for accident consequence analysis was validated by field data obtained in the area affected by the Chernobyl accident. (Topic 5-1).

For the study of high burnup fuel safety, a series of tests were conducted to measure the oxidation rate of fuel cladding which had been used for a long time when there are loss-of-coolant accident conditions (Topic 5-2). Furthermore, a study provided understanding of mechanisms behind change in the microstructure of fuel pellets due to long use of the fuel (Topic 5-3).

In the study of safety assessment of advanced uses of light water reactors, an experimental study on the heat transfer at the fuel surface under post-boiling transition conditions provided a new model for safety assessment with higher accuracy (Topic 5-4).

For the structural integrity assessment of reactor components, a detailed analysis was done of the effect of seismic loading on the crack growth in a reactor which was assumed to have stress corrosion cracking in the piping or internal structure (Topic 5-5).

In the research on safety evaluation of nuclear fuel cycle facilities, a rapid dose evaluation method was developed for use in a criticality accident in a nuclear facility (Topic 5-6).

For the safety assessment of radioactive waste disposal, a new analytical model was developed for prediction of the performance of the bentonite clay material that covers the steel container of high level radioactive waste in geological disposal (Topic 5-7). Furthermore, for the development of methods to analyze migration of radionuclides in groundwater, analysis of ground water system observations on a regional scale were performed for validation of a conceptual representation of a flow system (Topic 5-8).