

Formation of Basis for Nuclear Energy R&D, and Creation of Innovative Nuclear Energy Utilization Technology

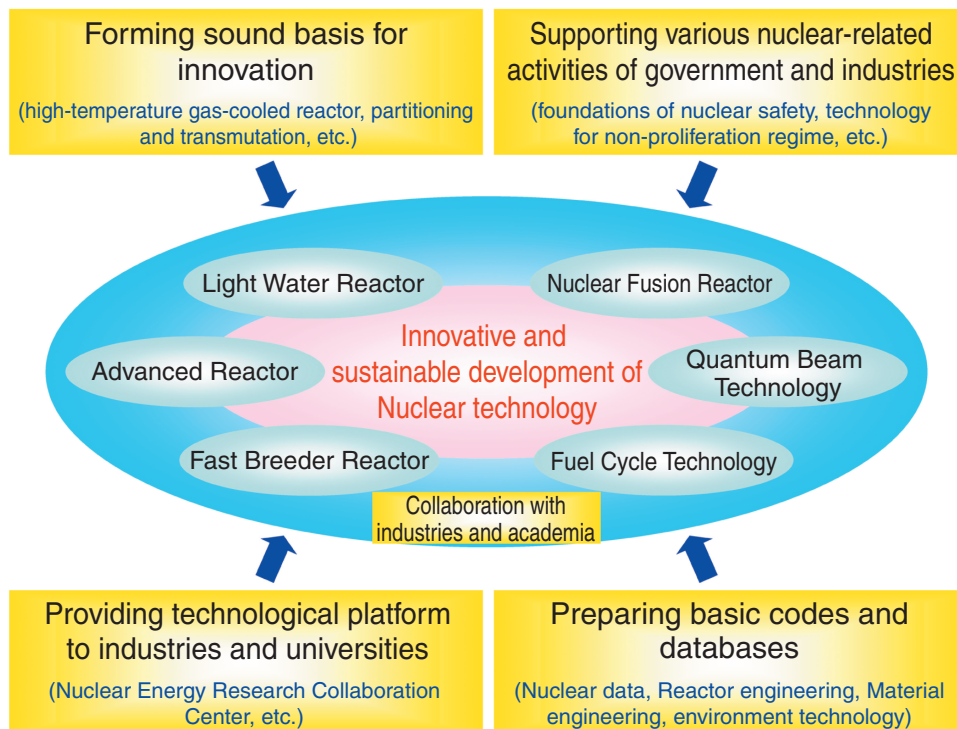


Fig.7-1 Roles of nuclear science and engineering research

The nuclear science and engineering research being conducted at the Japan Atomic Energy Agency has the four roles shown in Fig.7-1. In order to fulfill these roles, research in nuclear data and reactor engineering, fuels and materials engineering, environment and radiation science, and nuclear applied heat technology is being conducted.

Nuclear data and reactor engineering

Various types of research are being performed to investigate the feasibility of advanced nuclear systems and to establish the basic technology for these systems. Topic 7-1 is development of a prediction uncertainty evaluation method of neutronic design without full-scale mock-up critical experiments. Topic 7-2 is development of a high-accuracy measurement method for nuclear data of minor actinides (MA) e.g. Np, Am, Cm, and results obtained thereby.

Fuels and materials engineering

Basic studies on advanced nuclear fuel and cycle technology and the degradation of nuclear power plant materials are being carried out. Topic 7-3 is the publication of "Handbook on Process and Chemistry of Nuclear Fuel Reprocessing Ver. 2", in which data comprising the technical basis for spent nuclear fuel reprocessing are compiled. Topic 7-4 is the corrosion mechanism of stainless steel used in containers for spent fuel reprocessing plants, studied for safety analysis of nuclear materials. Topic 7-5 is the mechanism of thermal property changes in Am-containing oxide fuels, needed for MA recycling technology.

Environment and radiation science

Research on movement of radionuclides in the environment and dose assessment is being carried out. Topic 7-6 is the completed development of WSPEEDI - II to predict atmospheric dispersion of radionuclides accidentally released anywhere in the world (Fig.7-2). Topic 7-7 is analysis of organ doses using Japanese voxel phantoms to evaluate the effects of body posture on dose.

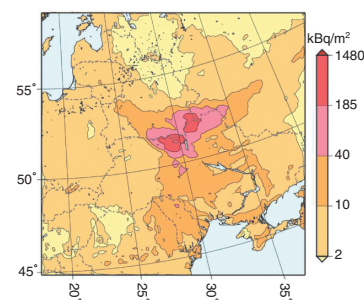


Fig.7-2 Deposition of ^{137}Cs during the Chernobyl accident predicted by WSPEEDI - II

Nuclear applied heat technology

To expand nuclear energy applications to heat utilizing industries, we are continuing extensive R&D for high-temperature gas-cooled reactor (HTGR) technology and for a HTGR-heated hydrogen production system. Topic 7-8 is efficient hydrogen production by a thermochemical IS process. Topic 7-9 is safe hydrogen use in HTGR, specifically to prevent the hydrogen from being contaminated by radioactive material.