



PL0300473

DEPARTMENT OF NUCLEAR ENERGY

The activities of Department was engaged in the selected topics in nuclear fission reactor science and engineering. Present and future industry competitiveness, economic prosperity and living standards within the world are strongly dependent on maintaining the availability of energy at reasonable prices and with security of supply. Also, protection of man and the environment from the harmful effects of all uses of energy is an important element of the quality of life especially in Europe. It is unrealistic to assume that the technology for renewables (hydro, wind, solar and biomass) available within a 20-30 year perspective could provide the production capacity to replace present use of nuclear power and at the same time substantially reduce the use of fossil fuels, especially when considering that energy demand in industrialized countries can be expected to continue to increase even within a framework of overall energy conservation and continued improvement of efficiency in energy usage.

In the area of nuclear fission, we continue support to maintain and develop the competence needed to ensure the safety of existing and future reactors and other nuclear installations. In addition support is given to explore the potential for improving present fission technology from a sustainable development point of view. The focus on advanced modelling of improved reactor and fuel cycle concepts, including supporting experimental research, with a view to improving the utilisation of the inherent energy content of uranium and other nuclear fuels, whilst at the same time reducing the amount of long-lived radioactive waste produced. A common scientific understanding of the frequently used concept of "reasonable assurance of safety" for the long-term, post-closure phase of repositories for spent fuel and high-level waste developed in order to ensure

reasonably equivalent legal interpretations in environmental impact assessment and licensing procedures. Also, research is carried out on characterising and assessing the impact of disposal on the environment as such with a view to propose standards for protection.

Therefore, the following domain are subject of investigation:

- Analysis of new concepts of nuclear reactors with improving utilisation of nuclear fuel and reducing the amount of long-lived waste, with higher efficiency in electricity production and energy supplying for chemical processes.
- Problems of spent fuel management: technical and safety problems of spent fuel storage, inspection of spent fuel state after long time storage in water pool, environmental impact of spent fuel storage and disposal and economy of spent fuel management.
- Analysis of safety properties and characteristic of nuclear power plants with WWER reactors operating in the neighbour countries.
- Analysis of the interaction of high energy hadrons with nucleus especially looking for reaction with positive energy balance.
- Investigation of the nuclear processes applied for transmutation of transuranium isotopes and fission product. These work are done with the collaboration with Joint Institute of Nuclear Research.
- Investigation of PWR fuel behaviour with high burn up and high temperature.