

In October 1976, the Steering Committee for Nuclear Energy prolonged the mandate of the Co-ordinating Group for two years and at the same time agreed to the participation of the Commission of the European Communities in the Group's future work.

During 1977 the United States have joined the Co-ordinating Group on Gas-Cooled Fast Reactor Development, which is now supported by ten countries and two international bodies (Austria, Belgium, the Federal Republic of Germany, France, Japan, Sweden, Switzerland, the Netherlands, United Kingdom, United States, CEC and GBRA).

The participation of the U.S. increased considerably the wealth of information available to the participating countries in many areas of GCFR development. The total effort spent in the past on GCFR relevant work is of a comparable magnitude in the U.S. (37 million US\$) and in the remaining countries (43 million US\$ together). The work in the U.S. which groups government and industry efforts, is oriented towards the project definition phase of a demonstration plant.

The work during 1977 included research and development on fuels and reactor materials, reactor core and fuel element design as well as GCFR physics studies. In addition, control systems development, safety studies and environmental site studies are under way. The U.S. programme is also supported by Helium Breeder Associates, a grouping of interested utilities.

On the European side, the most significant event was the start-up of the first in-pile test in the helium loop in the BR-2 reactor in Mol with uranium oxide, vented fuel elements. These tests continued into March 1978 and new tests with mixed uranium-plutonium oxide fuel elements were started afterwards. In addition, the work on heat transfer, corrosion phenomena, tribological effects, physics calculation, core design and safety analysis continued in the participating countries.

Increased international co-operation in the high temperature reactor field including the GCFR was established during 1977 between the U.S. and the Federal Republic of Germany in a so-called umbrella agreement, which was also joined by Switzerland and France. The terms of this agreement foresee a closer co-operation between the four respective countries in the HTR and GCFR field.

Concerning future work, the Co-ordinating Group agreed during 1977 to continue the collaborative effort in the near future and to prepare a GCFR status report which would bring out the achievements of the Group and identify the development work necessary to bring the GCFR option closer to realisation, taking into account the changing international environment in the field of advanced reactor types.

REVIEW OF FAST REACTOR ACTIVITIES

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GAS-COOLED FAST REACTORS

Since 1971, when the Co-ordinating Group on Gas-Cooled Fast Reactor Development was set up, the participating countries have maintained an interest in keeping this option as a back-up solution to the sodium-cooled fast reactor. Thus, the set-back for the High Temperature Gas-Cooled Reactor system has not so far substantially affected the gas-cooled fast reactor development work, although the NEA development programme has, in fact, undergone some streamlining.

In the past, two different concepts were investigated, one based on coated particle type fuel elements and the other on pin type fuel elements. The coated particle studies have been brought to an end and resources have been concentrated on the further development of the pin concept.

The work carried out in recent years covered design and safety investigations, heat transfer studies and irradiation experiments in thermal reactors. The design and safety work has brought out the principal features which enabled the development programme requirements to be identified, and encouraging safety discussions to be held. The heat transfer work has shown that the design requirements can be met, and irradiation and compatibility work has clarified the choice of materials and the selection of coolant gas composition.

At its November 1977 meeting, the NEA Committee on the Safety of Nuclear Installations (CSNI) decided to convene a meeting of senior experts to examine the rationale and the objectives of the LMFBR safety R & D programme plans of the OECD Member countries and of the Commission of the European Communities; the meeting was also to advise CSNI on a desirable programme of work in this area.

The meeting of senior experts on LMFBR safety R & D was held on 6th April 1978. There was general agreement that non-concerted LMFBR safety R & D in various countries could lead to incomplete or non-reconcilable technical solutions which in turn could lead to excessive licensing requirements and unjustified cost increases. There was a clear need for a rational international approach to LMFBR safety R & D. It was agreed that CSNI could, in the context of such an approach, provide an adequate mechanism for consensus development and for consolidation of an international understanding on the overall LMFBR rationale and strategy and on how certain problems should be addressed, and for the co-ordination of useful expert groups and specialist meetings.

The meeting of senior experts on LMFBR safety R & D made the following recommendations to CSNI:

- (i) CSNI should establish a Group of Senior Experts on LMFBR Safety Research and Development.
- (ii) The Group of Senior Experts would have the following tasks:
 - recommend to CSNI a rationale for discussing strategies, targets, and priorities in LMFBR safety R & D;
 - recommend areas in which international status of technology reports could be prepared;
 - recommend areas in which specialised activities (e.g. specialist meetings, groups of experts, task forces, etc.) could contribute to the investigation and resolution of specific problems.

It was suggested that participation in the Group of Senior Experts should be limited to organisations sponsoring major research in this field and the CEC.

The meeting of senior experts also recommended to NEA to discontinue the informal Group of Experts on Trends and Options in LMFBR Safety R & D after the creation of the proposed new Group.

A NEA Specialist Meeting on Fuel and Clad Motion Diagnostics for Fast Reactor Safety Test Facilities was held at Los Alamos Scientific Laboratory from 5th to 7th December 1977; the meeting was also sponsored by the U.S. Department of Energy and the U.S. Nuclear Regulatory Commission. A very good technical exchange took place at the meeting, and considerable progress in mutual understanding among those working on different techniques was highly visible. It was felt that it would be appropriate to hold another NEA specialist meeting on fuel and clad motion diagnostics for fast reactor safety test facilities near the end of 1979.

Two meetings of the CSNI Group of Experts on the Science of Fuel-Coolant Interactions and of Vapour Explosions were held during 1977; another meeting will be held in September 1978. The Group is making slow progress in overcoming the more important uncertainties so as to prepare the way for agreement on firmer and more specific conclusions regarding fundamental mechanisms. The fourth CSNI Specialist Meeting on Sodium-Fuel Interactions will be held during 1979 (it is likely that the subject matter of the meeting will be broadened to include fuel-coolant interactions in water reactors). The first issue of the CSNI FCI Newsletter (replacing the CSNI SFI Newsletter) will be published during the summer of 1978.

CSNI has set up a Group of Experts on Nuclear Aerosols in Reactor Safety with the following initial tasks:

- to prepare a state-of-the-art report on nuclear aerosol safety (in fast reactors and in thermal reactors);
- to list important unresolved questions and suggest priorities for related research;
- to advise on the usefulness of a specialist meeting on nuclear aerosols in reactor safety to be held in one or two years time.

The report will be completed by 15th September 1978.

For completeness, mention should be made of NEA's activities in the fields of reactor noise analysis (a CSNI specialist meeting was held in 1977, another one is likely to be held in 1979/1980), of rare events analysis, information exchange (Volume III of the Nuclear Safety Research Index is devoted to fast reactors), of antiseismic design, of steel components, and of fuel cycle safety.