

## FOREWORD

Twelve fast breeder reactors (FBRs) are in operation in seven countries which are different in scale from small test reactors with thermal capacity of 10-60 MW to semi-commercial reactors with capacity of 1500-3000 MW(th). Five FBRs are under construction (SNR-300-FRG, PEC-Italy, Monju-Japan and two BN-800-USSR) and three more are firmly planned (Joint European project, PFBR-India and BN-1600 USSR). These statistics show that industrial-scale implementation of FBRs is rather limited and does not look as optimistic as it did 5 - 10 years ago. There are many reasons explaining this fact and among them: current uranium oversupply and low prices, reduction of prices for organic fuels, higher construction cost for FBRs than for LWRs, reduction in electricity demand and others. However taking into account that Pu production will be increased when large-scale reprocessing plants are commissioned (totaling approx 1000 tons of Pu by the year 2000) and it could be optimally used only in FBRs, one could suggest the revival of industrial interest in FBRs.

The present design for FBR fuel rods includes usually MOX fuel pellets clad into stainless steel tubes, together with  $UO_2$  axial blanket and stainless steel hexagonal wrappers. Mixed carbide, nitride and metallic fuels have been tested as alternative fuels in test reactors. India's 42,5 MW(th) fast breeder test reactor (FBTR) commissioned in October 1985, uses (70% Pu-30% U) C as the driver fuel.

Among others, the objectives to develop these alternative fuels are to gain a high breeding ratio, short doubling time and high linear ratings. Fuel rod and assembly designers are now concentrating on finding the combination of optimized fuel, cladding and wrapper materials which could result in improvement of fuel operational reliability under high burnups and load-follow mode of operation.

Some of these aspects were discussed at the Agency's Advisory Group on Advanced Fuel Technology and Performance (Würenlingen, Switzerland, 4-6 December 1984) including fabrication technology, irradiation properties and feasibility of reprocessing of mixed carbide and nitride

FBR fuels. The Advisory Group recommended to hold the meeting on Advanced LMFBR Fuels Technology and Properties in 1987. In spite of some oversupply of uranium, mentioned above, and the general stagnation in the nuclear industry, the Agency feels that it is necessary to continue an effort aimed at the improvement of FBR fuel technology, reliability, and economics in order to be ready to meet near future requirements of nuclear power development. Taking this into account, as well as the recommendation of the Advisory Group on Advanced Fuel Technology and Performance the Agency decided to hold this meeting. The meeting was conducted jointly by Division of Nuclear Fuel Cycle and Division of Nuclear Power in co-ordination with the IWG on FBRs.

The purpose of the meeting was to review the experience of advanced FBR fuel fabrication technology, its properties before, under and after irradiation, peculiarities of the back-end of the nuclear fuel cycle, and to outline future trends. As a result of the panel discussion, the recommendations on future Agency activities in the area of advanced FBR fuels were developed.

The Agency wishes to thank all those who participated in the panel discussion. Special thanks are due to the Session Chairmen, Messrs H. Blank, and C. Prunier and Co-Chairmen, Messrs. A. Mayorshin and M. Handa. The officers of the IAEA responsible for the preparation of the document are Mr. V. Onufriev, Division of Nuclear Fuel Cycle, and V. Arkhipov, Division of Nuclear Power.

### *EDITORIAL NOTE*

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