

FOREWORD

High-level radioactive waste disposal is an issue of great importance in the discussion of the sustainability of nuclear power generation. The main contributors to the high radioactivity are the fission products and the minor actinides. The long-lived fission products and minor actinides set severe demands on the arrangements for safe waste disposal.

Fast reactors and Accelerator Driven Systems (ADS) are under development in Member States to reduce the long-term hazard of spent fuel and radioactive waste, taking advantage of their incineration and transmutation capability. Important R&D programmes are being undertaken in many Member States to substantiate this option and advance the basic knowledge in this innovative area of nuclear energy development.

The conceptual design of the lead cooled fast reactor concept BREST-OD-300, as well as various other conceptual designs of lead/lead-bismuth cooled fast reactors have been developed to meet enhanced safety and non-proliferation requirements, aiming at both energy production and transmutation of nuclear waste. Some R&D studies indicate that the use of lead and lead-bismuth coolant has some advantages in comparison with existing sodium cooled fast reactor systems, e.g.: simplified design of fast reactor core and BOP, enhanced inherent safety, and easier radwaste management in related fuel cycles. Moreover, various ADS conceptual designs with lead and lead-bismuth as target material and coolant also have been pursued. The results to date are encouraging, indicating that the ADS has the potential to offer an option for meeting the challenges of the backend fuel cycle.

During the last decade, there have been substantial advances in several countries with their own R&D programme in the fields of lead/lead-bismuth cooled critical and sub-critical concepts, coolant technology, and experimental validation. In this context, international exchange of information and experience, as well as international collaborative R&D programmes are becoming of increasing importance. It is with this focus that the IAEA convened the Advisory Group Meeting (AGM) on “Design and Performance of Reactor and Sub-critical Blanket Systems with Lead and Lead-Bismuth as Coolant and/or Target Material,” in cooperation with RDIPE, IPPE and Minatom in the Russian Federation.

This meeting, which assembled sixteen participants from eight countries, drew upon the vast experience of a group of international experts in order to review and discuss the recent R&D developments in critical and sub-critical concepts, coolant properties, and experimental and analytical validation work, as well as to exchange information on the experience accumulated, and to discuss the issues requiring further R&D. A total of twenty-four presentations and/or statements were made by the participants.

The IAEA expresses its appreciation to all the participants of the Advisory Group Meeting for their valuable contributions and also to the Member States that have made available experts to assist and participate in this meeting. The IAEA officer responsible for this publication was Y. I. Kim of the Division of Nuclear Power.

EDITORIAL NOTE

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