I. BACKGROUND

Reliability of nuclear fuel plays a key role in ensuring safety, competitiveness and public acceptance of nuclear power. The Fukushima accident has especially demonstrated the necessity for detailed analysis of all aspects of fuel design and performance related to both normal and accident conditions, including severe beyond-design-basis accidents with durable loss of active fuel cooling. The behaviour of in-core materials, especially of fuel cladding, in extreme high temperature and corrosive environments is among the primary factors that define accident evolution. Currently used Zirconium alloy claddings are particularly susceptible to high temperature exothermic reaction with steam that leads to massive oxidation of the cladding and generation of large amount of hydrogen. This runaway reaction significantly exacerbates the course of accident progression at high temperatures (>1200ºC) and complicates mitigation of accident consequences.

The basis for consideration of alternative fuel materials and design concepts in a number of countries is enhanced safety margins under severe accidents. These efforts were particularly intensified after the events at Fukushima with the goal of developing a so-called Accident Tolerant Fuel (ATF). Unlike the conventional Light Water Reactor UO₂-Zircaloy fuel, ATF should withstand beyond-design-basis LOCA's for much longer periods, and similarly tolerate a loss of in-pool cooling during long-term storage of irradiated fuel. At the same time, it is necessary that ATF concepts should either reasonably compare with or improve upon standard UO₂-Zr alloy clad fuel in terms of normal operation characteristics, economics, reliability, and spent fuel management.
A variety of possible approaches for ATF development are now being examined in international research efforts including: modifications and advancement of Zr-based claddings such as use of coatings, replacement of Zr alloys by alternative high-performance materials (e.g. Advanced Fe-based alloys, refractory materials, or SiC-based materials), and replacement of UO$_2$ by other fuel concepts and compositions with enhanced thermal, chemical, fission product retention, and other advantageous operational properties. Given the complexity and cost of these long-term R&D activities, many corresponding projects have been initiated at both national and international (e.g. IAEA, NEA/OECD, WNA) levels. Accordingly, an adequate level of coordination among these efforts is required to avoid duplications, enhance productivity, and to assure complementarity wherever possible.

II. OBJECTIVES

The purpose of the meeting is to provide an international forum for the presentation and discussion of the current status and perspectives on Accident Tolerant Fuel concepts and development for their use in Light Water Reactors. This venue will provide the key opportunity for meaningful collaboration in this important area.

This activity was recommended by the IAEA Technical Working Group on Fuel Performance and Technology as a part the Nuclear Safety Action Plan approved by the Member States after Fukushima accident, and is in line with the recommendation to initiate a Research Coordinated Project “Analysis of Options and Experimental Examination of Accident Tolerant Fuels for Water Cooled Reactors” (ACTOF) to be implemented in 2015-2018.

III. TOPICS TO BE COVERED

Papers are invited on all aspects of development of LWR Accident Tolerant Fuels, their properties, structure, characteristics, technological, economical aspects, and safety issues. Particular topics include but are not limited to:

1. Materials, design, technology, and safety requirements for ATF with regard to possible reactor operation parameters at normal, transient, design basis, and severe accident conditions;
2. R&D on ATF, including:
   a. Zr alloys modification and advancements
   b. Alternative cladding concepts
c. Alternative fuel concepts

3. Modelling ATF behavior, including reactor physics aspects, severe accident analysis and codes verification and experimental coupling;

4. Economic aspects of ATF implementation;

5. Experience and lessons learned from Fukushima and other accidents, relevant to ATF development.

A new IAEA Coordinated Research Project on Analysis of Options and Experimental Examination of Accident Tolerant Fuels for Water Cooled Reactors” (ACTOF), which is planned to start in 2015, will be outlined at a special round-table discussion.

There will be a technical tour organized to the ORNL facilities involved in ATF R&D. These facilities include the High Flux Isotope Reactor, and the Irradiated Fuels Examination Laboratory.

As usually practiced at this type of meetings, the programme will include a final session to permit participants to contribute to session summaries.

IV. ORGANIZATION

Meeting Chairman: Dr Alan Icenhour
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Meeting Coordinator: Dr Kurt Terrani
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V. DEADLINE FOR PAPERS AND PARTICIPATION IN THE MEETING

The meeting may be attended only upon official nomination, and papers are required from all international participants. Applicants should complete the attached Form A and B and send them, together with an abstract of approximately 300 words to the appropriate national authority (Ministry of Foreign Affairs or National Atomic Energy Authority) for subsequent transmission to the IAEA, not later than 24 July 2014, with copies to the IAEA Scientific Secretary Mr Victor Inozemtsev, and to the local Meeting Coordinator Mr Kurt Terrani.

The abstracts should summarize the content and principal conclusions of the papers. Officially nominated authors, whose abstracts have been selected, will be notified directly about acceptance of their applications, and a preliminary programme will be issued by 1 September 2014.

On arrival at the meeting, the authors are requested to bring in electronic form (on a CD or a memory stick) their full papers in MS Word format and their presentations in Power Point or PDF format. They should be formatted by authors before submission according to the standard IAEA rules, available on the meeting website (under preparation), and will be afterwards published as the IAEA TECDOC.

VI. VENUE AND ACCOMMODATION

The meeting will be held in Oak Ridge National Laboratory. Further details regarding travel arrangements and other recommended hotels can be found here: http://www.ornl.gov/ornl/visiting-ornl.

Designated participants who require a visa to enter the USA should submit necessary application forms in due time to the nearest diplomatic or consular representative of the USA. The visitors need to ensure and check with their home country embassy to obtain the correct
visa. In most cases a B-1 (business) visa or VW-B (if from a Visa Waiver Country) is what is used to enter the US. Of great importance is that the foreign national makes sure they enter the US for business purposes and not tourist purposes. Once your visa has been issued, you should contact the meeting coordinator to arrange for your access to the ORNL site. After you contact the coordinator, you will receive an email with instructions to provide the necessary information for your access request.

VII. EXPENDITURES

In accordance with the established rules, Governments or other national authorities are expected to bear the travel and other costs of designated participants in the Technical Meeting. Limited funds are, however, available to help cover the cost of participants from Member States eligible to receive technical assistance under the IAEA’s Technical Cooperation Programme. Such assistance can be offered, upon specific request, to one participant per country provided that, in the IAEA’s view, this participant will make an important contribution to the meeting. The application for financial support should be made at the time of designation of the participant.

The Secretariat wishes to state that compensation is not payable by the IAEA for any damage to or loss of the experts’ personal property. However, for the period of their engagement with the NPIC, including travel between their residence and the duty station, the designated experts will be covered under the IAEA’s insurance policy for permanent total disablement or death resulting from services-incurred accidents or illness up to a maximum of $100,000, for permanent partial disablement resulting from service-incurred accidents or illness up to a maximum of $100,000 and for medical expenses up to a maximum of $20,000 plus $10,000 for supplementary travel and accommodation expenses in case of illness or injury resulting from service-incurred accidents or illness, in accordance with the terms of the IAEA’s relevant insurance policy. This insurance coverage only covers accidents and illnesses insofar as they clearly result from attendance at an IAEA meeting. The IAEA recommends that the expert also make arrangements for private insurance coverage on an individual basis.

VIII. WORKING LANGUAGE

The working language of the meeting will be English. All communications, abstracts, and papers must be sent in English.