651-T1-TM-35292

INTERNATIONAL ATOMIC ENERGY AGENCY

TECHNICAL MEETING ON 'ADVANCED FUEL PELLET MATERIALS AND FUEL ROD DESIGNS FOR WATER COOLED REACTORS'

23-26 November 2009
PSI, Villigen, Switzerland

INFORMATION SHEET

I. BACKGROUND

The economics of current nuclear power plants is improved through increasing fuel burnups and fuel cycles, i.e. the effective time that fuel remains in the reactor core and the amount of energy it generates. Increasing the consumption of fissile material in the fuel element before it is discharged from the reactor means that less fuel is required over the reactor's life cycle, which results in lower amounts of fresh fuel, lower spent fuel storage costs, and less waste for ultimate disposal. There has been a continuous historical increase in fuel burnup from 20–25 GWd/tU in Generation I reactors to 50–60 GWd/tU in today's light water reactors, and this tendency continues as soon as technological and operational improvements make it possible. In parallel, higher enrichments are discussed, leading to a higher energy yield. For heavy water reactors slight enrichment of fuels and correspondingly growing burnups in CANDU / PHWR are driven by the same economical incentives.

Higher burnups and better utilization of fissile nuclear materials (including use of MOX fuel and burnable neutron absorbers), as well as more flexible power manoeuvring, place challenging operational demands on materials used in reactor components, and fist of all - on fuel and cladding materials. It defines a need for increased attention to measures ensuring compliance to safety criteria related to fission gas release (to limit the internal rod pressure), pellet-cladding interaction (to avoid clad cracking combined stress and aggressive chemical environment) and pellet-cladding mechanical interaction (to avoid clad mechanical fracture). These measures that secure desired in-pile fuel performance parameters include adequate improvements in fuel material properties and fuel rod designs.

That is why the subject Technical Meeting was recommended to the IAEA in 2007 by the Technical Working Group on Fuel Performance and Technology (TWGFPT), and the recommendation was supported by the TWG on Light and Heavy Water-Cooled Reactors (TWGLWR and TWGHWR) with a proposal to hold it at the Paul Scherrer Institute, Switzerland.

II. OBJECTIVES

The purpose of the meeting is to provide an overview on the status and perspective of fuel pellet materials development and recent improvements in fuel rod designs for light and heavy water cooled power reactors.
The meeting will cover both light and heavy water reactor fuels with the following main objectives:

- Consideration of modern technological and design tools enabling reliable performance of fuels and rod columns in current and planned operational environments;
- Analysis of high burnup fuel structure and properties, including RIM effects, thermal behaviour, fission gas release, PCI and PCMI;
- Discussion on specific features of MOX fuel, as well as perspectives on advanced fuels like Vibro-pack, Thorium fuel and others.

III. TOPICS TO BE COVERED

Papers are invited on all aspects of fuel pellet technology, fuel rod design and performance analysis relative to current and planned operations, characterised by high burnup, power ramps and optimized fuel cycles for both light and heavy water reactors. Both experimental and theoretical/modelling works are welcome.

In the conclusions of earlier subject TM ('Advanced Fuel Pellet Materials and Designs for Water Cooled Reactors, 20-24 October 2003, Brussels, Belgium', IAEA-TECDOC-1416, 2004) and related meetings, the following topics have been identified as being of particular interest:

1. Issues in Fuel Fabrication Technologies (Quality Issues, Optimization, Additives and Dopants, Controlled Sintering Atmosphere, Clad Coating, etc.)
2. High Burnup Issues (Evolution of Structure and Properties of UO_2 and MOX Fuel Pellets, Initial Pellet Structure and Chemical Composition, RIM, FGR, etc)
3. PCI/PCMI and Related Issues (Transient Behaviour, Plastification, Clad Bonding, etc)
4. High Performance Fuel Designs (Enhanced Thermal Properties, Enhanced Structural Properties, Enhanced Chemical Properties, etc)
5. Advanced and Innovative Fuels for Water Cooled Reactors (CERMET, CERCER, METMET, Vibro-pack, Sphere-pack, Thorium, MA fuels, etc)
6. Issues Related to the 5% Enrichment Limit (Criticality, Isotopic Composition, etc)

IV. ORGANIZATION

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V. DEADLINE FOR PAPERS AND PARTICIPATION IN THE MEETING

The meeting may be attended only upon official designation. Participants should complete the attached Form A and B (if applicable) 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 **1 September 2009**, with copies to the IAEA Scientific Secretaries, Mr Victor Inozemtsev, Ms Sama Bilbao y León and to the Meeting Coordinator, Mr Johannes Bertsch. The abstracts should summarize the content and principal conclusions of the paper the author intends to present during the technical meeting.

Prospective participants whose nominations have been received by the IAEA will be notified directly. Also the authors will be notified about the acceptance of their paper(s) and the preliminary programme will be issued by **1 October 2009**. As usually practiced in this type of meetings, the programme will include a panel session to permit participants to contribute to the summary and highlights of the meeting and to make recommendations to the IAEA on future work in this field.

On arrival to the meeting, the authors are requested to bring in electronic form (on a CD or a memory stick) their papers in MS Office Word format and their presentations in Power Point format.

VI. VENUE AND ACCOMMODATION

The meeting will be held at the Paul Scherrer Institut, Villigen, Switzerland.

Delegates should arrange their accommodation directly with hotels (a list of recommended options will be provided by the meeting organizers).

One day of the meeting will be set aside for a technical visit of the nuclear research installations at the Paul Scherrer Institut.

Further details regarding travel arrangements and social events will be provided to participants at the meeting website:

(http://www-pub.iaea.org/MTCD/Meetings/Announcements.asp?ConfID=35292)

Designated participants who require a visa to enter Switzerland should submit the necessary application form in due time to the nearest diplomatic or consular representative of Switzerland.

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 Stated 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 IAEA, 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 service-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.

FORM A
651-T1-TM-35292

INTERNATIONAL ATOMIC ENERGY AGENCY

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on
'Advanced Fuel Pellet Materials and Fuel Rod Designs for Water Cooled Reactors'
23-26 November 2009
Villigen, Switzerland

To be sent to competent official authority (Ministry of Foreign Affairs, National Atomic Energy Authority) for transmission to the International Atomic Energy Agency, Vienna International Centre, Wagramer Strasse 5, P.O. Box 100, A-1400 Vienna, Austria

PARTICIPATION FORM

DEADLINE FOR APPLICATION: 1 September 2009

<table>
<tr><td>Family name:</td><td>All initials of given name:</td><td>Mr.
Ms.</td></tr>
<tr><td rowspan="2">Institution:</td><td colspan="2">Full address:</td></tr>
<tr><td colspan="2">For urgent communications please indicate:
Phone No.:
Telefax No.:
E-mail:</td></tr>
<tr><td>Nationality:</td><td colspan="2">Designating government or organization:</td></tr>
<tr><td colspan="3">Mailing address (if different from address of institution):</td></tr>
</table>

Do you intend to present a paper? YES ☐ NO ☐

Title of Paper .....

.....

An abstract of my paper is attached? YES ☐ NO ☐

FORM B
651-T1-TM-35292

INTERNATIONAL ATOMIC ENERGY AGENCY

Technical Meeting
on
'Advanced Fuel Pellet Materials and Fuel Rod Designs for Water Cooled Reactors'
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FORM FOR SUBMISSION OF A PAPER

DEADLINE FOR APPLICATION: 1 September 2009

TITLE OF THE PAPER		
AUTHOR(S) INITIAL(S) AND FAMILY NAME(S)	SCIENTIFIC ESTABLISHMENT(S) IN WHICH WORK HAS BEEN CARRIED OUT	TOWN/COUNTRY
1.		
3.		
3.		

AUTHOR WHO WILL PRESENT THE PAPER	Mailing Address:
Mr./Ms.	
Initial(s):	
Family Name:	For urgent communications please indicate: Telefax No.: E-Mail: Telex No.:

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