



TRAINING MEETING/WORKSHOP ON BURNUP CREDIT CRITICALITY CALCULATION METHODS AND APPLICATIONS

25-28 October 2011, Beijing, China

INFORMATION SHEET

I. INTRODUCTION

The objective of the workshop is to provide the information about the fundamentals of burnup credit (BUC) criticality analyses, as well as to present and discuss recent developments in BUC methodologies and applications. The workshop will focus on safety-related, operational and regulatory aspects. It is also intended to foster the exchange of international experience in licensing and implementation of burnup credit (BUC) applications.

In the last 20 years, burnup credit (BUC) was more frequently applied in criticality safety analysis of spent nuclear fuel systems instead of the "fresh fuel assumption" usually made in the past. With the steady development of calculation methods, it became possible to take credit for the reactivity reduction associated with the fuel burnup process, hence reducing the analysis conservatism associated with the "fresh fuel assumption" while maintaining an adequate criticality safety margin. Therefore, more and more countries are interested in applying BUC, in particular those countries developing nuclear energy programmes.

Spent fuel management is a common and costly activity for all operators of nuclear power plants, which involves different operational safety risks. An accepted possibility to achieve a reduction in fuel cycle costs while maintaining enough safety margins associated to the different processes is to implement burnup credit in spent fuel management systems. In fact, in many countries, burnup credit is already applied to transport systems, wet and dry storage facilities, and components of reprocessing plants. For spent fuel disposal as well as reprocessing of some advanced fuel designs, burnup credit is considered to be important in demonstrating viable approaches.

In 1997, the IAEA initiated a task to monitor the implementation of burnup credit in spent fuel management systems, to provide a forum to exchange information, to discuss the matter and to gather and disseminate information on the status of national

practices of burnup credit (BUC) implementation in the Member States. The IAEA started this active programme with an advisory meeting in 1997, followed by major meetings on BUC held in Vienna in 2000, Madrid in 2002, and London in 2005, as well as an international workshop in Spain in 2009. Moreover, the Agency has contributed to the organization of BUC training courses held in different countries.

The 2011 Workshop on Burnup Credit Criticality Calculation Methods and Applications will take place on 25-28 October 2011 in Beijing, China. This workshop will be organized by the International Atomic Energy Agency (IAEA), hosted by China Atomic Energy Authority (CAEA) and China National Nuclear Corporation (CNNC), sponsored by the China Nuclear Power Engineering Co., Ltd.

II. TOPICS TO BE COVERED

II.1 Topics of the workshop

II.1.1 Depletion Calculations and validation codes

- Depletion parameters
- Depletion codes and nuclear data
- Available data for validation
- Validation methodologies and uncertainty analysis

II.1.2 Criticality calculations and validation

- Criticality calculation Codes and nuclear data
- Selection of benchmarks for validation
- Reactivity effects of non-uniform burnup distributions
- 2.4 Validation methodologies and uncertainty analysis

II.1.3 Implementation of BUC

- Verification of burnup
- Accident conditions. Prevention of misloading events
- Demonstrations of compliance

II.1.4 BUC regulations

- IAEA guidelines
- National regulations

II.1.5 Applications

- SF Storage (wet and dry)
- SF Transportation
- SF Reprocessing

- SF Disposal

II.2 Provisional agenda

- Session 1. International and national reports
 - Opening address-CAEA, CNNC, CNPE, IAEA
 - IAEA presentation on SFM activities on BUC applications
 - Overview of the BUC activities performed by OECD/NEA
 - Overview of the status of exemplary national programmes for BUC applications (applications from the attending countries representatives)
- Session 2. Depletion Calculations and validation
 - Experts' overview of depletion calculations and validation basics
 - Presentations by participants
 - Depletion calculations for different nuclear fuel types
 - Recent developments in codes and nuclear data
 - Assay data availability and validation methodologies
 - Uncertainty analysis methodologies
- Session 3. Criticality calculations and validation
 - Experts' overview of Criticality calculations and validation basics
 - Presentations by participants
 - Experimental data for validation
 - Validation methods -new developments
 - Methods for generating bounding burnup distributions
 - Uncertainty analysis methodologies
- Session 4. Implementations
 - Experts' overview of implementation issues
 - Presentations by participants
 - Verification of fuel burnup, reactor records, out-of-core measurement methods
 - Prevention of misloading events and the double contingency principle
 - Boron credit for normal and accident conditions
 - Methods to demonstrate compliance with the regulations
- Session 5. BUC regulations
 - Experts' overview of the different regulations
 - Presentation by participants

- Session 6. BUC applications
 - Presentations by participants
 - Spent fuel storage (wet and dry)
 - Spent fuel transportation
 - Spent fuel reprocessing
 - Spent fuel disposal

II.3 Panel Discussions

Panel discussions will be organized to facilitate the exchanges of views among the participants and experts attending the workshop. Tentative topics of panels are:

- Panel 1: BUC practices and regulatory issues
- Panel 2: Sensitivity/uncertainty analysis, verification and validation
- Panel 3: BUC applications and future needs

III. ORGANIZATION

Meeting Chairs:

Mr. Jens Christian Neuber

AREVA NP GmbH
Mechanical Analyses PEEA8-G
Criticality Safety and Statistical Analysis
Kaiserleistrasse 29
63005 Offenbach am Main
Phone: +49 69 2557-31385
Fax: +49 69 2557-31876
E-mail: Jens-Christian.Neuber@areva.com

Mr. José M. Conde

Consejo de Seguridad Nuclear
Tel.: +34-913460253
Fax: +34-913460588
E-mail: jmcl@csn.es

Local Coordinators:

Ms. Yuan, Kun
China Nuclear Power Engineering Co.Ltd (CNPE)
P.O.Box: 840, No.117, Xisanhuanbeilu, Haidian District,
Beijing, 100840, China
Phone: +86 10 88022896
Fax: +86 10 68474263
E-mail: yuankun@cnpe.cc

Mr. Huo, Xiaodong
China Nuclear Power Engineering Co.Ltd (CNPE)
P.O.Box: 840, No.117, Xisanhuanbeilu, Haidian District,
Beijing, 100840, China
Phone: +86 10 88023186
E-mail: huoxd@cnpe.cc

Scientific Secretaries:

Mr. Xuxin Zou
International Atomic Energy Agency
Wagramer Strasse 5
P.O. Box 100
A-1400 Vienna, Austria
Phone: +431 2600 25808
Fax: +431 2600 725808
E-mail: X.Zou@iaea.org

Mr. Arturo Bevilacqua
International Atomic Energy Agency
Wagramer Strasse 5
P.O. Box 100
A-1400 Vienna, Austria
Phone: +431 2600 22767
Fax: +431 2600 722767
E-mail: A.Bevilacqua@iaea.org

Secretary:

Ms. Valentina Prohaska
International Atomic Energy Agency
Wagramer Strasse 5
P.O. Box 100
A-1400 Vienna, Austria
Phone: +431 2600 22761
Fax: +431 2600 722761
E-mail: V.Prohaska@iaea.org

IV. PARTICIPATION IN THE MEETING

The workshop is directed to a broad range of criticality safety practitioners and experts working on the different disciplines involved in the implementation of BUC techniques, as well as operators, governmental officials and experts from regulatory bodies, industry and research institutes. No registration fee will be charged to the participants.

Persons wishing to participate in the workshop should complete the Registration Form enclosed and send it electronically to X.Zou@iaea.org and A.Bevilacqua@iaea.org.

The registration **Form A, Form B** can be downloaded from the web page <http://www-pub.iaea.org/MTCD/Meetings/Meetings2011.asp>. Registration **Form A, Form B** and **abstract** of paper should be sent to the Scientific Secretaries (X.Zou@iaea.org, A.Bevilacqua@iaea.org) by email before **20 May 2011**.

V. PAPERS AND PRESENTATIONS

An abstract not exceeding 400 words should be included as an attachment to the email. The abstract should be prepared using MS-WORD. Times New Roman font 11 should be used for the text file, avoiding the use of local fonts.

Authors will be notified of the acceptance of their paper, including suggested changes or modifications, by **1 July 2011**. The final version of the paper should be sent to X.Zou@iaea.org and A.Bevilacqua@iaea.org before **16 September 2011**, together with the completed Copyright Form. The slides to be used at the meeting should be sent to the same address before **10 October 2011**.

VI. VENUE

The International Workshop will take place on 25-28 October 2011 in the city of Beijing, China. The workshop will be held at the

Beijing International Convention Centre (BICC)

No.8 Beichen Dong Road, Chaoyang District, Beijing 100101, China

Website: <http://www.bicc.com.cn/English/huiyi/qyjs.html>

Detail information about Beijing and about the hotels nearby, as well as some additional travel information, can be found at

<http://www.bcghotel.com/English/jiudian/index.asp>;

<http://www.huiyuangongyu.com.cn/en/main.html>.

VII. VISA ARRANGEMENTS

Participants who require a visa to enter China should submit the necessary application to the nearest diplomatic or consular representative of China as soon as possible. Please note that this process could take up to about one month.

VIII. EXPENDITURES

In accordance with the established rules, Governments, national authorities, private companies or individual sources are expected to bear the travel and other costs of designated participants in the 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 the designation of the participant.

To apply for a grant, please send the **IAEA Grant Application Form** (attached) through the competent national authority (Ministry of Foreign Affairs or national atomic energy authority) to reach the IAEA not later than **15 September 2011**. The grants awarded will be in the form of a lump sum, usually covering part of the cost of attendance. Incomplete or late applications will not be considered.

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.

IX. WORKING LANGUAGE

The working language of the workshop will be English. All communications, abstracts, papers and presentations sent to the IAEA must therefore be in English.