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Organisation de Coopération et de Développement Economiques
Organisation for Economic Co-operation and Development **16-Sep-2004**

English - Or. English

NUCLEAR ENERGY AGENCY
NUCLEAR SCIENCE COMMITTEE

NEA/SEN/NSC/WPNCS(2004)2
For Official Use

Working Party on Nuclear Criticality Safety (WPNCS)

SUMMARY RECORD OF THE EIGHTH MEETING

September 3, 2004
Prague, Czech Republic

English - Or. English

JT00169269

Summary Record of the Eighth Meeting of the

NEA Nuclear Science Committee

Working Party on Nuclear Criticality Safety (WPNCS)

Friday, September 3, 2004
Prague, Czech Republic

Welcome and Administrative Items

1. The WPNCS chairman, B. Briggs, opened the meeting and welcomed the delegates. He expressed the Working Parties sincere thanks to L. Markova and her team for their efforts to make the WPNCS expert group meetings such a success. R. Mach, the Czech representative in the NEA Nuclear Science Committee, presented a welcome address to the delegates.

2. Thirty-one delegates attended the meeting (see the list of participants in Annex 1).

Review of Actions from the previous meeting

3. The actions from the last WPNCS meeting were reviewed and were discussed in more detail under the relevant points of the agenda.

Approval of the Summary Record of the previous meeting

4. The Summary Record of the last meeting (NEA/SEN/NSC/WPNCS(2003)2) was approved without modifications.

Feedback from the Nuclear Science Committee

5. B. Briggs informed the Working Party that the NEA Nuclear Science Committee (NSC) approved the proposed WPNCS mandate at its meeting in June 2004. The new mandate covers three years.

Nuclear Criticality Safety National Programmes

6. The chairman reminded the delegates of their obligation to send to the NEA secretariat their country reports (one per country) in advance of the meeting. He also stressed the need for short and concise presentations of maximum 15 minutes per country.

Belgium

7. P. Baeten presented an overview of the REBUS experimental programme. The objective of the programme is to validate criticality and depletion computer codes with implementation of burn-up credit. The program started in 2003 and fuel characterisation will be completed in 2004. Reactivity measurements and fuel sample radiochemical analyses will be preformed in 2005.

Czech Republic

8. L. Markova informed the Working Party that the Czech Republic joined the ICSBEP project in 2004 and would submit one evaluation each year over the period 2005-2009. A one-year cooperative project between Ukraine and a NRI daughter company, focusing on BUC/PBC implementation, was

completed in spring 2004. The lack of VVER PIEs is one of the main global issues in the VVER community and it was agreed to further discuss this issue under point 10 on the agenda.

France

9. P. Cousinou presented an overview of the recent criticality-safety developments in France. Extensions to fuel cycle facilities included a project to build a new enrichment plant based on the centrifugation technology and a new license for the La Hague reprocessing plant for high burnup light water reactor fuels. The MOX fabrication plant in Cadarache will be stopped after delivering four MOX assemblies for the US MOX project. Several other facilities are being decommissioned. A review of experimental programs performed at Valduc was presented. A. Santamarina reported on the coupling of DARWIN and CRISTAL codes enabling an automatic handling of burnup credit in criticality-safety calculations. Experimental programs related to burnup credit included PIE experiments on MOX spent fuels and the extension of the validation of UOX spent fuel up to 70 GWd/t.

Germany

10. W. Weber informed the participants of the main developments in Germany. Twelve on-site interim storage facilities had been licensed with a total capacity of about 14 000 tonnes of heavy metal. The research reactor FRM-II reached its first criticality in March 2004. The maximum enrichment will be increased to 6% in the URENCO enrichment plant. Plans to establish a DIN standard on BUC for final deposit are being drafted.

Japan

11. Y. Miyoshi first presented a brief history of the STACY and TRACY experimental facilities. New experiments planned in these facilities include critical experiments with 6% enrichment solutions and heterogeneous configurations with fission products and transient experiments with water reflected cores. He then presented an overview of code developments which include the transient codes AGNES and DOCTRINE, the spent fuel inventory SWAT-2 and the simulation of the mixing process in the Japanese MOX plant. Finally, he informed the participants that the second version of the Japanese Criticality Handbook is scheduled for publication in 2004.

Slovakia

12. V. Chrapčiak presented the nuclear energy programme in Slovakia. He highlighted the characteristics of the different plants and described the spent fuel management policy as well as the interim spent fuel storage facility.

Sweden

13. A short informal report was given by D. Mennerdahl. However, neither presentation materials nor a written summary report was provided within the allotted time.

Switzerland

14. Reactivity worths of 13 spent fuel samples (7 UO2 and 4 MOX samples from a PWR, 2 UO2 samples from a BWR) were measured in the LWR-PROTEUS Phase II project at the Paul Scherrer Institute (PSI) in Switzerland. The reactivity worth measurements were completed at the end of 2003. The chemical assays are on-going and the final calculation analysis is starting. PSI has also decided to use Monte Carlo methods for future criticality safety calculations and to establish a wider validation base than previously available. For this purpose, a validation effort for MCNP and cross-section libraries based on JEF-2.2 and JENDL-3.3 nuclear data against a large number of configurations from the ICSBEP handbook is in progress.

UK

15. G. O'Connor presented a report written by J. Gulliford. The UK activities in criticality safety are co-ordinated through the UK Working Party on Criticality (WPC). The group includes representation from all the main licensees of nuclear sites and from the main regulatory bodies. Items of current interest are the development of national consensus on waste methodology, national professional development workshops, criticality emergency planning, development of an electronic handbook and advice to fire-fighters. Code developments are mainly in the area of MONK, which is developed by Serco Assurance in co-operation with BNFL. Among the international activities were mentioned the participations in the ANS and ISO Standards Groups, in the OECD-NEA WPNCS and associated Experts Groups and in the IAEA BUC Technical Meetings.

USA

16. M. Westfall presented an overview of US/DOE criticality-safety program. This included activities on data for burnup credit validation of selected fission product nuclides, space reactor NCS issues, weapons plutonium disposition, application of burnup credit for transport packages, the development of the SCALE code and work on the ANS and ISO standards in the field of nuclear criticality safety. The Working Party was also informed of a topical meeting that will be held in Knoxville on September 19-22, 2005. M. Westfall asked WPNCS members to stimulate participation to this meeting from their countries.

17. C. Withee provided information about activities related to licensing and regulation issues. It was noted that the criticality part of the construction permit for a MOX Fabrication facility has been approved and that the US NRC is reviewing revised safety plans that implement the Integrated Safety Analysis (ISA). The major issues in the area of BUC concern benchmarking of fission products, measurements to confirm burnup of fuel and the use of reactor critical state points for benchmarking.

Report from other International Activities

ISO Standards

18. C. Hopper gave an overview of the status of ISO nuclear criticality safety standards. He reviewed recent development of these standards and highlighted existing, developing and possible future standards in this field. He emphasized the need for cooperation and welcomed especially the collaboration with international organizations, such as the OECD/NEA and the IAEA, while stressing that more interactions and communications were needed to advance the standards. C. Hopper agreed to send the latest versions of the MOX and burnup credit draft standards to the corresponding WPNCS groups for comments and feedback.

19. The next meeting of the ISO TC85/SC5 will be held on 5-7 April, 2005 at Oak Ridge National Laboratory in US.

IAEA

20. W. Danker presented the IAEA activities in Spent Fuel Management. He reviewed the relevant IAEA meetings that had been held since the last WPNCS meeting and presented recently published TECDOCs. The proceedings of the IAEA Conference on "Storage of Spent Fuel from Power Reactors" had also been published and the recommendations from the conference were highlighted.

21. It is proposed to organize an IAEA Technical Meeting on "Advances in applications of burn-up credit to enhance spent fuel transportation, storage, reprocessing, and disposition" in UK in September 2005. The exact date and place of the meeting have to be confirmed.

Status on the activity on Minimal Critical Values

22. The new chairman of the group, D. Mennerdahl, presented the time-schedule for finalising the report on minimal critical values. The report would be ready for peer-review by Christmas 2004 and be published before July 2005.

23. The final report would apart from being a state-of-the-art report, also identify further needs in the area of minimal critical values. These needs would then be reviewed by the WPNCS, at it's meeting in 2005, before deciding on any follow-up actions.

Reports from the other Expert Groups

Burn-up Credit

24. M. Brady-Raap outlined the main tasks of the Expert Group on Burn-up Credit. The report from the Phase II-C Benchmark, prepared by J.C. Neuber, was presented in a final draft form and with only a few editorial matters to be resolved before it could be sent for publication. A first analysis of the results of benchmark phase II-D had been performed by A. Barreau. The final report of this benchmark was scheduled for publication in autumn 2005. A report, summarising the lessons learned from all benchmark activities within the expert group, is still under preparation. The deadline for contributions was set as Christmas 2004, with the goal of publishing the report in 2005.

25. A proposal for a limited follow-up activity to the II-D benchmark, to study axial effects, was presented by J.C. Neuber. The proposal was accepted, under the condition that the study would be completed within the present mandate period. Another proposal, to establish a group to review VVER PIE data, was presented by L. Markova. This proposal was referred to point 10 on the agenda.

Source Convergence

26. R. Blomquist informed the Working Party that the benchmark report, covering analysis reports from the four benchmark cases, was about to be published. Since the only missing parts were the introduction and the conclusion sections, it was planned to publish the report before the end of 2004. It was also noted that a final version of an annotated bibliography, containing more than 60 references, is ready to be posted on the NEA Website.

27. The following papers, related to the implementation of new algorithms in computer programs, were presented: Y. Richet on automated suppression of the initial transient, J. Kyncl on "Biases in Approximate Solution to the Criticality Problem and Alternative Monte Carlo Method", Y. Naito on an update on the application of the sandwich method to source convergence benchmarks, and finally Y. Miyoshi on the use of the Wielandt's method to accelerate source convergence.

28. Among the proposals for new activities included a proposal for a workshop to discuss the development of new powering algorithms and convergence diagnostic methods. A possible occasion could be the ANS topical meeting in September 2005 in Knoxville, US.

Criticality Excursions

29. A. Nouri filled in for the absent chairman and presented the outcome of the expert group meeting on criticality excursions. The first three code identification sheets had been presented and would be posted of the Expert Groups Webpage on the NEA web server. Code developers were encouraged to fill in such sheets and send them to the NEA Secretariat.

30. Four presentations of results from the on-going step reactivity benchmarks based on experiments performed at SILENE and TRACY were given. A schedule for the publication of the results of these benchmarks by May 2005 was established. Two additional benchmark studies were presented. These were based on SILENE and TRACY data and concerned slow reactivity insertions.

31. The link with the ISO standards group was discussed and it was noted that the expert group had started to compile information about available experimental data and analytical tools. However, some older US data were missing and information on those would be provided by T. McLaughlin. Finally, H. Okuno made a presentation describing the development of a simplified evaluation model at JAERI for assessing criticality accidents.

Status of the ICSBEP Project

32. B. Briggs described the activities of the International Criticality Safety Benchmark Evaluation Project (ICSBEP). The September 2004 issue of the handbook contains evaluations of 379 experimental series, covering more than 3300 critical and sub-critical configurations. A draft criticality-alarm/shielding benchmark will also be included. It is planned to add for the 2005 edition about 200-300 new configurations, three criticality alarm benchmarks, a pilot fundamental physics benchmark, spectra data for all configurations in the 2004 edition of the handbook and additional sensitivity coefficient data.

Experimental Needs

MOX Experimental Needs

33. B. Briggs gave an animated presentation of the need for integral critical experiments with low-moderated MOX fuels. A workshop was held in Paris, France in April 2004, where the needs for such experiments were confirmed. The NEA Nuclear Science Committee (NSC) was informed of the situation in June 2004 and asked the WPNCS to develop criteria to guide the selection of relevant experiments. A small group was established to write the final recommendations to the NSC bureau meeting at the end of November 2004. In parallel, the NSC agreed to investigate the possibility of releasing unpublished experimental data, specifically the ERASME/S and BFS-49 data. This initiative was strongly supported by Belgium, Japan and USA.

Other Needs

34. L. Markova presented the need for VVER PIE experimental data. M. Brady Raap proposed the setting-up of an ad-hoc group, which would develop an authoritative expression of the need for PIE data including those for VVER fuel. The proposal was supported by Hungary, Czech Republic, Slovakia, and Finland. France, Japan, UK and USA might also contribute to this effort. WPNCS members approved the setting-up of this ad-hoc group for a period of one year. A report summarising the findings of this group is to be produced and presented at the forthcoming WPNCS meeting. M. Brady Raap will lead this group.

Co-ordination of Activities and Chairmanship Issues

35. B. Briggs informed the working party that F. Barbry had recently retired and would not be available to chair the expert group on criticality excursions. Considering that France, Japan and UK had shown strong interest in this subject and that the two former chairpersons originated from the UK and France, B. Briggs turned to Japan for a nomination. Y. Miyoshi agreed to be a candidate for the post and he was unanimously voted as the new chairman of the expert group on criticality excursions.

ICNC Conferences

36. T. McLaughlin had prepared and distributed draft guidelines, containing five recommendations, for the preparation of future ICNC conferences. His recommendations were discussed and a small change was made to the first (concerning the criteria for the selection of the host country). Recommendations 2, 3, and 4 were approved, as written. The fifth recommendation was changed to emphasize the need for an international program committee. It was also expanded to include a recommendation that both abstracts

and full papers undergo peer-reviewed by the international program committee before the conference. The proceedings will be made available during the conference and a selection of papers might be submitted for publication in a scientific journal. The chairman agreed to redraft Recommendation 5 and distribute it to the Working Party for approval.

37. A. Tsiboulia informed the participants that a proposal was submitted to the Russian authorities to hold the forthcoming ICNC'2007 conference in Saint Petersburg in June 2007. Official approval for IPPE to proceed with the organization of ICNC 2007 has not yet been received.

Date and Place of the Next Meeting

38. The next meeting of the Working Party is tentatively scheduled to be held on 23 September, 2005, in conjunction with the ANS topical meeting on criticality safety, which will be held in Knoxville, USA from 19 to 22 September 2005.

Annex 1

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Annex 2

NEA/SEN/NSC/WPNCS(2004)1

ORGANISATION FOR ECONOMIC COOPERATION AND DEVELOPMENT

Nuclear Energy Agency

Nuclear Science Committee

Eighth Meeting of the Working Party on Nuclear Criticality Safety
Friday September 3, 2004, starting at 9:00 a.m.

Prague (Czech Republic)

PROPOSED AGENDA

1. Welcome and Administrative Items
2. Review of actions from the previous meetings
3. Approval of the summary records of the previous meeting
4. Feedback from the Nuclear Science Committee meeting
5. Nuclear Criticality Safety National Programmes (Belgium, Czech Republic, France, Germany, Hungary, Japan, Korea, Russia, Slovak Republic, Spain, Sweden, Switzerland, UK, USA).
6. Report from other international activities
   - ISO standards (C. Hopper)
   - IAEA (W. Danker)
7. Status of the activity on minimum critical values
8. Reports from the other Expert Groups
   - Burnup Credit (M. Brady Rapp)
   - Source Convergence (R. Blomquist)
   - Criticality Excursions (F. Barbry)
9. Status of the ICSBEP Project (B. Briggs)
10. Experimental needs
    - MOX experimental needs
    - Other needs
11. Co-ordination of activities and chairmanship issues
12. ICNC conferences
    - Guidelines for the preparation of ICNC conferences (T. McLaughlin)
    - On the feasibility of peer-reviewing ICNC full papers (M. Brady Raap)
    - Report on ICNC'2007 preparation (A. Tsiboulia)
13. Date and place of the next meeting