NUCLEAR ENERGY AGENCY
COMMITTEE ON THE SAFETY OF NUCLEAR INSTALLATIONS

Working Group on Integrity and Ageing of Components and Structures (IAGE WG)

NEA/IAGE Workshop on "IRIS 2010 Benchmark on Improving Robustness Assessment Methodologies for Structures Impacted by Missiles"

13-15 December 2010
NEA Headquarters, France

JT03294213
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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NUCLEAR ENERGY AGENCY

The OECD Nuclear Energy Agency (NEA) was established on 1st February 1958 under the name of the OEEC European Nuclear Energy Agency. It received its present designation on 20th April 1972, when Japan became its first non-European full member. NEA membership today consists of 28 OECD member countries: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, Norway, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The European Commission also takes part in the work of the Agency.

The mission of the NEA is:

- to assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally friendly and economical use of nuclear energy for peaceful purposes, as well as
- to provide authoritative assessments and to forge common understandings on key issues, as input to government decisions on nuclear energy policy and to broader OECD policy analyses in areas such as energy and sustainable development.

Specific areas of competence of the NEA include safety and regulation of nuclear activities, radioactive waste management, radiological protection, nuclear science, economic and technical analyses of the nuclear fuel cycle, nuclear law and liability, and public information.

The NEA Data Bank provides nuclear data and computer program services for participating countries. In these and related tasks, the NEA works in close collaboration with the International Atomic Energy Agency in Vienna, with which it has a Co-operation Agreement, as well as with other international organisations in the nuclear field.

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COMMITTEE ON THE SAFETY OF NUCLEAR INSTALLATIONS
Within the OECD framework, the NEA Committee on the Safety of Nuclear Installations (CSNI) is an international committee made of senior scientists and engineers, with broad responsibilities for safety technology and research programmes, as well as representatives from regulatory authorities. It was set up in 1973 to develop and co-ordinate the activities of the NEA concerning the technical aspects of the design, construction and operation of nuclear installations insofar as they affect the safety of such installations.

The committee’s purpose is to foster international co-operation in nuclear safety amongst the NEA member countries. The CSNI’s main tasks are to exchange technical information and to promote collaboration between research, development, engineering and regulatory organisations; to review operating experience and the state of knowledge on selected topics of nuclear safety technology and safety assessment; to initiate and conduct programmes to overcome discrepancies, develop improvements and research consensus on technical issues; and to promote the co-ordination of work that serves to maintain competence in nuclear safety matters, including the establishment of joint undertakings.

The clear priority of the committee is on the safety of nuclear installations and the design and construction of new reactors and installations. For advanced reactor designs the committee provides a forum for improving safety related knowledge and a vehicle for joint research.

In implementing its programme, the CSNI establishes co-operate mechanisms with the NEA’s Committee on Nuclear Regulatory Activities (CNRA) which is responsible for the programme of the Agency concerning the regulation, licensing and inspection of nuclear installations with regard to safety. It also co-operates with the other NEA’s Standing Committees as well as with key international organizations (e.g., the IAEA) on matters of common interest.
OECD/NEA IAGE Workshop on

“IRIS 2010 Benchmark on Improving Robustness Assessment Methodologies for Structures Impacted by Missiles”

ORGANISATION AND HOST

The NEA/CSNI-IAGE Workshop on "IRIS 2010 Benchmark on Improving Robustness Assessment Methodologies for Structures Impacted by Missiles" will be held from 13th to 15th December 2010 in the NEA Headquarters, Paris, France.

OBJECTIVES OF THE WORKSHOP

The CSNI/IAGE initiated a benchmark study as a means of validating the evaluation techniques used in the assessment of the integrity of structures impacted by missiles. In the proposed IRIS 2010 round robin study, the different computer codes, modelling approaches methods and results are to be compared to data and other codes used to determine effective means of analyzing the structural effects of a postulated missiles impact on civil structures.

Three different types of tests are benchmarked in the framework of IRIS_2010 Project. One simulation is related to one Meppen test (II-4) performed in Germany in 80’, and the two other simulations are related to two different types of tests performed in VTT facility in Espoo: flexural and punching. For flexural test two repeated tests were performed and for punching test, three repeated tests were conducted. Twenty eight organisations participated in the IRIS 2010 benchmark.

The objective of the workshop is to present and discuss the results of the participating organisations in the workshop, to compare the simulated results with the experimental ones, to discuss the assumptions and methodology used by the different benchmark participants and to develop recommendations for future guidance.

The expected conclusions of the workshop should give better understanding of the current analysis methods and practices and their effects on the integrity assessment of civil structures impacted by missiles.

RECALL OF THE BENCHMARK MILESTONES

As previously notified, the outputs of the benchmark studies are sent to the organizing committee by the participating organisations according to the following schedule:

- 20th September: Results of the Numerical Simulations
- 23rd October: Numerical Simulation Report
Besides, by 3rd November 2010, the organizing committee will send to the participating organisations the output data of the tests carried out by VTT and the results of the numerical simulations provided by the participating organisations.

**SCOPE, CONTENT AND OUTLINE OF THE WORKSHOP**

The workshop will include an introductory session, technical sessions devoted to technical presentations by the benchmark participants on the main results and conclusions of the simulations performed and a final session. The final session will summarize the discussions and develop conclusions and recommendations for possible further actions by the CSNI. All participants are expected to take part in the discussion and in the formulation of conclusions in the final session.

**Organizing Committee**

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<tr>
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FINAL WORKSHOP PROGRAMME

Monday, 13 December 2010

08:30 – 09:00  Registration and Welcome Coffee

09:00 – 12:10  Opening session
Chair: Alejandro Huerta (OECD/NEA), Organizing Committee members

Welcome address
J. Repussard, Director General (IRSN) and Chair CSNI

NEA Hazards Activities and Objectives of the Workshop (10 min.)
A. Huerta (OECD/NEA)

Overall view of the benchmark (55 min.)
I. Objectives and implementation  J.-M. Rambach (IRSN) (10 min.)
II. Meppen Test data & simulations  F. Benboudjema (ENS-Cachan) (15 min.)
III. Punching Tests data & simulations  N. Orbovic (CNSC) (15 min.)
IV. Flexural tests data & simulations  F. Tarallo (IRSN) (15 min.)

10:25 – 10:50 Coffee Break

Lectures:
“A perspective - one more simulation of the VTT tests” by J. Arros (20 min.)
“About simulations” by F. Stangenberg (20 min.)
“A review of various constitutive models” by R.K. Singh (20 min.)
“Impact simulation: what can be done to reduce uncertainty and increase reliability?” by L. Schwer (20 min.)

12:10 – 13:10  Lunch break

13:10 – 17:15  Afternoon session
8 presentations by the simulation teams (15 min. presentation + 10 min. discussion per participant)

Team #1 – AECL:  A. Saudy
Team #2 – AREVA:  A. Fäcke
Team #6 – CNSC-I:  L. Schwer
Team #8 – COB:  G. Hervé

14:50 – 15:20 Coffee Break

Team #12 – GRS:  C. Heckötter
Team #17 – ITER:  D. Combescure
Team #18 – JNES:  I. Hiroto
Team #13 – IRSN-LMT:  F. Gatuingt

17:00 – 17:15 Panel Discussion
17:15 – 18:00 Joint Organizing Committee – Scientific Committee Meeting Summary of the day

**Tuesday, 14 December 2010**

**09:00 – 12:00 Morning Session**  
*Chair: Organizing Committee*

6 presentations by the simulation teams (15 min. presentation + 10 min. discussion per participant)

Team #4 – CEA-Gramat: C. Pontiroli  
Team #14 – IRSN-AS+: C. Lapoujade  
Team #19 – JRC: O. Martin

10:15 – 10:45 Coffee Break

Team #20 – KINS: Y.S. Chung  
Team #21 – NRC-I: J. Petti  
Team #26 – VTT-I: K. Calonius

12:00 – 13:00 Lunch break

**13:00 – 17:20 Afternoon session**

8 presentations by the simulation teams (15 min. presentation + 10 min. discussion per participant)

Team #3 – BARC: R.K. Singh  
Team #5 – CEA-Saclay: D. Guilbaud  
Team #10 – ENSI-B&H: J. Moore  
Team #11 – FORTUM: J.T. Kahkönen + M. Vuorinen

14:40 – 15:10 Coffee Break

Team #22 – NRC-II: J. Petti  
Team #24 – SPI: M. Borgerhoff  
Team #27 – VTT-II: M. Tuomala  
Team #28 – VTT-III: A. Saarenheimoo

16:50 – 17:20 Panel Discussion

**17:20 – 18:00 Joint Organizing Committee – Scientific Committee Meeting Summary of the day**
Wednesday, 15 December 2010

09:00 – 12:00 Morning Session
Chair: Organizing Committee

4 presentations by the simulation teams (15 min presentation + 10 min discussion per participant)

Team #7 – CNSC-II: G. Sagals
Team #9 – EDF: D. Markovic
Team #16 – IRSN-BAGCS: B. Cirée
Team #15 – UJF + IRSN-UJF L. Daudeville + X.D. Vu

10:40 – 11:10 Coffee Break

Synthesis (Organizing Committee) (50min.)

I: Meppen test simulations J.-B. Colliat (12min.)
II: Punching test simulations N. Orbovic (12min.)
III: Flexural test simulations F. Tarallo (12min.)
IV: All simulations Y. Berthaud (14min.)

12:00 – 13:00 Lunch break

13:00 – 16:00 Closing Session

13:00 – 14:45 Panel Discussion (1h45)

14:45 – 15:15 Coffee Break

15:15 – 16:00 Workshop Conclusions and Recommendations (45min.)

End of Workshop

16:00 – 17:00 Joint Organizing Committee – Scientific Committee Meeting Summary of the Workshop Proposals and discussion on future benchmark
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