

QUICK LOOK TRIP REPORT

Subject: Foreign Travel Quick Look Report—Nuclear Energy Agency (NEA) Symposium, Safety Cases for the Deep Disposal of Radioactive Waste: Where Do We Stand? held January 23–25, 2007 in Paris, France

Travel Dates: January 22–28, 2007

Location: Organisation for Economic Co-Operation and Development (OECD) Headquarters, Paris, France

Organization/Committee: Nuclear Energy Agency (NEA)

Desired Outcome: The information and insights gained from the participation in the symposium will assist in integrating international perspectives on high-level radioactive waste repository programs and would make NRC/CNWRA activities and decisions more effective, efficient, and realistic.

Results Achieved: The symposium resulted in improved understandings of commonalities of and differences between the approaches of different countries in developing safety cases for the deep geological disposal of high-level radioactive waste. The traveler presented a paper titled Perspectives on Developing Independent Performance Assessment Capability to Support Regulatory Reviews of the Safety Case. The traveler also presented a poster on behalf of an NRC staff member who was unable to attend; the poster title was Preclosure Safety Analysis for Seismically Initiated Event Sequences. Discussions following the presentation topics during the meeting provided valuable exchange of information and feedback as indicated in the items of note in the following Summary of the Trip.

Summary of Trip: The stated aims of the symposium were to provide a venue to (i) share practical experiences on preparing for, developing and documenting a safety case; (ii) share experiences on the regulatory perspective; (iii) highlight the progress made in the last decade, the actual state of the art, and the observed trends; (iv) assess the relevance of international contributions in this field; and (v) receive indications useful to the future working program of the NEA and other international organizations. The symposium included four sessions of oral presentations, one poster session, and a final session to provide a summary report of the meeting. The symposium program listing all sessions and presentations is available from the NEA website at http://www.nea.fr/html/rwm/safety_case/.

The first session of the symposium focused on an overview of the French repository program, which included the following items of note.

- The French program for waste disposal comprises three axes: (i) partitioning and transmutation of fuel to reduce both the quantity and toxicity prior to disposal; (ii) deep geologic disposal; and (iii) development of an integrated system for accepting, handling and storing waste prior to disposal.
- The research report called "Dossier 2005" document is now available in English on the ANDRA website (<http://www.andra.fr>). The report, representing the sum of the last 15 years of investigations, includes two parts: (i) feasibility-assessment report on clay formations, based notably on the work conducted on the site of the Meuse/Haute-Marne Underground Laboratory and in foreign laboratories; and (ii) a report concerning the

advantages of granite rocks based on the available bibliography on French granites and on the investigations carried out by ANDRA under research partnerships with foreign laboratories.

- Based on the results of Dossier 2005, clay has been selected by the French program as the preferred medium for deep geologic disposal.
- The current plans for the French deep geologic disposal program call for public dialog leading to site selection by 2013, an application for construction in the year 2015 and, if approved, accepting waste by the year 2025.

The second session focused on the international evolution of the safety case concept. The first part of this session looked at safety-case related work in four international organizations, the NEA, International Commission on Radiological Protection (ICRP), International Atomic Energy Agency and European Commission. The second part of this session focused on country-specific examples of regulatory criteria, including a presentation on the proposed new standard for Yucca Mountain by the U.S. Environmental Protection Agency. Some items of interest from the second session include the following.

- The first presentation provided a history of activities by the NEA's International Group for the Safety Case (IGSC). During this presentation, an opinion was expressed that performance assessment is an important part of a safety case, but should not be the driver of the safety case. The importance of using performance assessment to examine "what-if" scenarios was emphasized.
- The importance of developing societal trust was emphasized in several presentations.
- A topic of discussion was the variety of regulatory requirements among different national programs. The difficulty in harmonizing these national requirements was recognized, and the reasons for the significant differences in approach were discussed at some length. For example, the U.S. Environmental Protection Agency's proposed 3.5 mSv/yr dose constraint over very long time frames was seen by some as being an outlier in world regulations.
- ICRP Publication 81 (ICRP-81) recommendations for the radiological protection have gained wide international acceptance in geologic disposal programs. ICRP-81 reflects a move toward including expert judgement in establishing protective measures, whereas the earlier ICRP-46 was considered "too theoretical."

The third session focused on recent experiences in developing safety cases, with presentations on programs in France, Belgium, Canada, United Kingdom, Hungary, Japan, Sweden, Finland, Germany, and the United States. The first part of this session focused on examples of different national strategies for achieving safety. The second part of this session focused on the scientific and technical basis for assessing safety, including a presentation by the DOE on making the post-closure safety case for the proposed Yucca Mountain Repository. The third part of the session focused on evaluating and documenting confidence in the safety case and included a presentation of a joint CNWRA/NRC paper on perspectives gained from development of an independent performance assessment model by the regulator. Some noteworthy items highlighted in this session include the following.

- Iterative approaches to developing confidence in postclosure safety are being applied in essentially all deep geologic disposal programs. In general, iterative approaches include data collection, conceptual model development, and quantitative analyses to evaluate performance and identify important site or design features, which, in turn, informs future data collection and refinement of conceptual models. This iterative process also is implemented in most regulatory review process, as highlighted in the CNWRA/NRC paper and other presentations in this session.
- One presentation emphasized the need for improved knowledge management in light of the long time frames for developing repository safety cases. It was suggested that knowledge management systems should be structured in accordance with the safety case information needs. To that end, it was stressed that there is a need to develop practical methods for categorizing safety case information so that current data is not lost to future generations. The importance of developing comprehensive metadata programs for describing and documenting the pedigree of data sets is an essential part of this effort. In this regard, “ontological semantics,” or a comprehensive approach to the treatment of text meaning by computers, is an important concept in knowledge management.
- The need to integrate the safety cases for operational and postclosure phases of a disposal facility was discussed by some, and even though there were program-specific aspects for building a safety case, it became apparent there was much commonality in approaches.
- Institutional components that help provide trust and confidence in a safety case include an effective quality assurance program. Another component is a safety culture that empowers all employees to question safety related decisions and approaches. The U.S. Department of Energy paper made these points, and they were endorsed in the discussion that followed. The U.S. Department of Energy paper also suggested that the license application now being prepared would contain the full safety case for Yucca Mountain.
- A paper that drew a lot of discussion was related to a pilot study by nine national regulatory organizations and two international agencies on the regulatory review of safety cases. A recommendation of this effort is that early and continuing dialogue between regulators and implementers is needed to create common understanding of technical information and regulatory expectations.

The poster session displayed a variety of papers that, in combination with several papers in the second and third sessions, suggest there are several basic universal activities being followed in the developing safety cases. This set of common activities includes site characterization and its data collection, scenario development and modeling, and the search for analog insights and other ancillary sources of potentially supportive information. Posters also included insights into the similarities and potential overlaps between the preclosure and postclosure safety case. A poster by an NRC staff member (presented by the CNWRA traveler) illustrated the methodology for seismic hazard assessment to support operational (preclosure) phase safety assessments and indicated that similar methods can be applied to the postclosure phase.

Session four of the symposium focused on the role of the safety case in societal dialogue and decision making.

- A paper on the Belgium program illustrated a successful six-year effort that involved setting up and working with local partnerships. Partnerships were funded to bring in their own experts to critique implementer reports and to define the topics to be addressed in dialogue opportunities. The outcome was successful in terms of local acceptance of a deep waste disposal facility.
- A presentation by a representative from Nye County, Nevada, highlighted the relationship that exists between the DOE and the host county of the potential Yucca Mountain repository. Health and safety of Nye County residents is the first consideration; long-term economic benefit to the county is also an important consideration.
- A presentation on the Oskarshamn municipality in Sweden described the municipality's planning monopoly, veto authority, and taxing authority. In 2002 this community decided to accept site characterization of a deep geological disposal site with 13 conditions. The final decision whether or not to accept a repository is to be made by community. Optimism was expressed over the ability of the public to understand a safety case.
- A moderated discussion focused on how the safety case becomes embedded into the societal processes of establishing disposal programs. Much of the discussion centered on public perception of time scales and risks. The discussion moderator proposed that three things that may look absurd to the public are: (i) statements about really long time frames; (ii) the no-maintenance assumption that underlies post-closure safety assessments; and (iii) talking about risks in an absolute or numerical manner when lay people see a difference between voluntary and involuntary (imposed) risks.

During the fifth and final closing session of the symposium, a draft summary report was read to by the organizing committee and an opportunity to comment and add to the summary was provided to the meeting participants.

Next Steps: A proceedings document containing a summary of the symposium and a compilation of the full papers for all presentations is yet to be created. Before publication, the symposium summary will go through reviews by the IGSC and the Radioactive Waste Management Committee of the NEA, the European Commission, and International Atomic Energy Agency. No NRC or CNWRA participation is required in this effort. The individual papers will be published as submitted.

A volume of abstracts for all presentations and copies of all presentation slides have been prepared and will be made available by NEA through their website imminently. Based on the anticipated availability of the symposium proceedings, as well as the posting of all abstracts and presentation slides on the NEA website, a full trip report is not planned.

Policy Issues: None

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