

NRC Foreign Travel: Quick Look Report

Subject: The 12th Meeting of the Organization for Economic Co-operation and Development (OECD) Nuclear Energy Agency (NEA) Integrated Group for the Safety Case (IGSC), 19–21 October 2010

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Travel Dates: 19–21 October 2010

Location: OECD NEA, 12, Boulevard des Îles, 92130 Issy les Moulineaux, France

Organization/Committee: OECD/NEA/IGSC

Desired Outcome: Full representation of USNRC interests in the IGSC programs. This will be accomplished by providing input to the IGSC with respect to development of international programs and development of consensus reports. Also, specific activities for potential participation as part of the Integrated Spent Nuclear Fuel Regulatory (ISFR) Activities will be identified.

Results Achieved: The USNRC interests were fully represented in discussions leading to the future work program of the IGSC. Recommendations for further participation are provided at the end of the report. After further discussions with USNRC staff and management, specific activities to participate will be selected.

Summary of the Trip: The following summarizes significant information from this meeting.

- European Commission (EC) Developments: (i) A new EC sponsored study has created an European Pilot Group (EPS) consisting of regulators from Belgium, France, Finland, Italy, Germany, Spain, Sweden, and Switzerland, together with representation from the NEA and the International Atomic Energy Agency (IAEA), to develop a common set of expectations for the contents of the safety case for a geologic repository. A preliminary finding of this study is that regulator involvement is needed for success of major decisions whether it is formally required or not. The final study report accompanied by a companion report on waste confidence will be discussed in a workshop that is being planned for 2012 in Luxemburg. (ii) Two important Framework–7 projects currently ongoing are Fate of Repository Gases (FORGE) and Strategies and Technologies for Repository Monitoring (MoDeRn). Both projects began in 2009 and would conclude in 2013 with international symposia. FORGE deals with gas generation and migration while MoDeRn is focused on studying state-of-the-art technologies for monitoring repository systems. (iii) To enhance confidence in and accelerate geologic disposal, the EC plans to focus its future research program under Framework–8 on in-situ demonstration of repository concepts and technologies.

Finland, Sweden, France, and Germany are engaged in developing joint pilot in-situ research and development projects; the EC expects that in Europe, a functioning repository will be in place by 2025. (iv) Final report on the EC PAMINA project that investigated performance assessment approaches in several countries will be available by the end of 2010.

- IAEA Developments: (i) Twenty organizations plus EC and the NEA are participating in the GEOSAF project with the objective of developing safety guides such as DS-354, Requirements for Waste Disposal and DS-355, Guide on the Safety Case and Assessment of Disposal to ensure that IAEA safety guidelines can be effectively applied; and (ii) A major IAEA conference on broader approaches to managing spent nuclear fuel was held in Vienna in June 2010.
- Benefits and Impact of Partitioning and Transmutation: A task force created by the NEA Nuclear Science Committee is charged with examining the potential benefits and impacts of advanced fuel cycles with partitioning and transmutation (P&T). The task force will compare the results of various studies conducted at the NEA, EC, U.S., Japan, and the French Atomic Energy Commission (CEA) and draw common conclusions regarding P&T. A 4-chapter report is being developed that will discuss the use of reprocessing and fast reactors and their impact on efficiency of uranium utilization, waste reduction, economic factors, safety issues, and proliferation risks. A preliminary conclusion indicates that with a 50–60 year cooling of waste resulting from P&T, the repository foot print can be 1/9th of the one from once-through fuel cycle. A commercial fast reactor is expected to become available by 2040.
- Thermodynamic Database Project: The four-year Phase 4 of the Thermodynamic Database project was started in February 2008 with a budget of 430,000 Euros per year. This project provides internally consistent, quality assured, and internationally recognized thermodynamic data on selected elements. Phase 4 will include data on inorganic species and compounds of iron and molybdenum and also update data on elements previously published earlier in 10 volumes. Data on tin and iron will be published in early 2011. National programs for speciation and sorption models use the thermodynamic data collected by this project. A workshop on “From Thermodynamics to the Safety Case” was held 17–19 May 2010, in Karlsruhe, Germany; 75 participants from 26 countries participated.
- Clay Club: The Clay Club focuses its studies on properties of and processes in argillaceous media important to a safety case. It is organizing an international workshop on “Microscopic Observations and Imaging Techniques” in Nantes, France, on 6–8 September 2011. Earlier in 2010, the Clay Club had sponsored the 4th international meeting on clay in Toronto with a special session on natural tracers in clay stones. The existence of anomalous pressures in low-permeability media was also discussed in this session. A report on self-sealing properties of clay will be published by the end of 2010. The Clay Club requests its members to contribute from 3 to 6 thousand Euros per year for common expenses.
- Country Reports: The NEA continues to gather information and maintain country reports annually. Those reports should be consulted for details. Briefly in this meeting, Canada indicated that a repository for low and intermediate level waste will be constructed in sedimentary rock in Bruce at 680 m depth. A safety report will be produced next year; construction will begin in 2013 and operation in 2018.

Posiva, Oy, in Finland, is planning to submit a license application in 2012 for its repository in granite at Onkalo Island. A 4.5 km long tunnel reaching a depth of 425 m (approximately the repository depth) has been completed. Finland is investigating the KBS3-H version that includes horizontal emplacement in tunnels (compared to KBS3-V with emplacement in vertical boreholes). The KBS3-H will include a perforated stainless steel 'super container,' which is not needed in the KBS3-V concept. Germany issued its safety requirements on disposal of heat generating wastes in 2009 and site investigation is continuing on the Gorleben site for which a preliminary safety assessment is expected to be produced in 2012. In a formal comparison of salt and clay sites (such comparison is required in German safety requirements); salt sites were found to be preferable. Hungary is planning to extend the life of its four nuclear power plants and add 2,000 MW to its power output. In the U.K., two communities close to Sellafield in Cambria have expressed interest in conducting feasibility studies. Site selection is also proceeding in France with a preferred location (30 sq. km—twice the size needed for a repository) which has been decided in consultation with stakeholders; a license application is expected to be produced in 2015. Swedish Nuclear Fuel and Waste Management Company (SKB) in Sweden plans to submit its license application on 16 March 2011; the Swedish Nuclear Safety Authority (SSM) is planning to assemble a team of international experts to help it conduct the safety review. The Swiss government is planning to choose a geological setting for a repository in November 2010.

- Update of Features, Events, and Processes (FEP) Database: The IGSC is considering updating its FEP database by including additional information and by making it more user-friendly. A questionnaire will be sent to IGSC members to gather information. The questionnaire may also be sent to parties other than the IGSC members to make the database more broad based.
- Summary of Radioactive Waste Management Committee (RWMC) Activities: The RWMC in its 43rd meeting noted that the current U.S. policy debate on Yucca Mountain will have wide implications around the world. It also supported a NEA peer review requested by the SSM, of the safety case to be submitted by the SKB in March 2011. A peer review of the safety case for the Gorleben site in Germany is also planned in 2012. The 43rd meeting also included a topical session on Interpreting Radiological Protection principles & Criteria for Geological Disposal chaired by Ms. Catherine Haney, USNRC Director of Office of Nuclear Material Safety & Safeguards. A general conclusion of this topical session was that the future long-term calculated effective doses under assumed conditions were only a measure of potential effects and not a direct indicator of direct health effects. Based on a second topical session on Long Term Memory, the RWMC decided to initiate a project on this topic in 2010 with the initial step of literature survey. Sweden, Switzerland, France, Finland, U.K., Spain, Czech Republic, and the IAEA expressed an interest in joining this project. Initial findings of this project will be discussed in a conference at the NEA on 23–25 February 2011 and a collective statement on the state-of-the-art on preserving information, knowledge, and memory will be developed. The RWMC plans to organize an international conference to take stock of worldwide progress in implementation of geologic disposal. This conference will be held in Yokohama, Japan, on 2–5 October 2011.
- The Sorption Project: The Sorption Forum in its Phase 3 project is developing a guidebook on use of thermodynamic sorption models in performance assessment.

The guidebook will describe methods for determining the fundamental model parameters, including up-scaling of laboratory measurements. The guidebook is expected to be published in early 2011. The USNRC is a participant through the Office of Research.

- Forum on Stakeholder Confidence (FSC): During the 10 years of its work, the FSC has held seven workshops in seven different countries and has produced several useful reports, which can be accessed at www.nea.fr/fsc. The next workshop will be held in Sweden. The primary FCS conclusion is that stakeholders are greatly interested in safety and improvement of quality of life; they are interested in participation only if they believe that they have real influence in decision making. More information can be obtained from Janet Kotra who represents the USNRC in this group.
- IGSC Outreach Activities: The IGSC “identity flyer” was reviewed and approved for release. This flyer describes the mission and activities of the IGSC. To strengthen its outreach activities, the IGSC will begin developing “fact sheets” on important topics. The first such fact sheet will be on concepts of the safety case. Other subjects for fact sheets are related to geosphere stability and engineered barriers. The IGSC web page will be better organized and information will be updated more frequently. An approach to identify and group IGSC products for easy access will be developed and implemented.
- The Methods for Safety Assessment (MeSa) Project: The second phase of the MeSa has been completed and a synthesis report based on the seven issue papers has been developed. These issue papers assessed the state of the art since the NEA brochure on this subject was issued in 1991. The project team held a workshop in mid-2010 to explore key issues such as treatment of uncertainties, role of regulations, and function indicators. The IGSC approved the proposal to revise the 1991 brochure based on the MeSa synthesis report. One outcome of the MeSa project was development of proposals for future work such as scenarios, uncertainty management, and use of indicator functions as confidence builders. Detailed proposals will be presented in the next IGSC meeting in October 2011.
- Summary of Topical Session: Use of optimization concepts in repository development was the subject of the topical session. The term optimization is being increasingly used in some regulations as well as in some safety cases although it has been interpreted in many different ways and so far doesn't seem to have a unique meaning. The classical definition of optimization as a minimization of a loss function or maximization of a gain function under specified constraints does not apply especially for long-term (hundreds of thousands of years) under rather large technical uncertainties. In view of this, the term is being employed to mean balancing of preclosure safety with long-term safety, developing qualitative rationale of decisions at various stages of the repository development (for example comparison of salt and argillite sites in Germany), and incorporation of stakeholder input in decisions. Concepts such as the use of best available technology (BAT in Swedish regulations) and as low as reasonably achievable (ALARA) are seen as components of optimization. Requirements such as retrievability and reversibility are seen as constraints.

The topical session included several papers including one on the Waste Isolation Pilot Plant (WIPP) that illustrated continuous improvement in operations based on experience citing that as an example of optimization.

The topical session ended with a general feeling that optimization is a good thing to do but did not provide a formal framework for accomplishing it.

- Potential Future Activities: In addition to topics mentioned above under the MeSa Project, the following topics were proposed as potential future projects: (i) organizational issues and stakeholder confidence, (ii) biosphere modeling, (iii) gas migration—technological aspects of monitoring, (iv) operational safety, (v) long-term information and memory preservation, and (vi) safety case symposium. Proposals on the first four topics will be discussed in the next IGSC meeting. As indicated earlier, a workshop on the 5th topic will be held at the NEA. The safety case symposium will likely be held in 2013 in Paris, France.

Next Steps:

- Tentatively, the 13th annual IGSC meeting will be held at the NEA office in Paris on 18–20 October 2011. The USNRC and CNWRA should continue to participate in this NEA forum. The IGSC mandate has been extended until 2013.
- The USNRC should consider either proposing or joining others in proposing new projects to IGSC to obtain leverage of international cooperation in its integrated spent fuel regulatory activities. Of interest to the NRC staff will be (i) organizational issues and stakeholder conference, (ii) operational safety, (iii) long-term information and memory preservation, and (iv) safety case symposium.
- The USNRC should continue to consider expanding its participation in international activities especially of the NEA, IAEA, and to the extent possible of the EC. The USNRC may also consider participating in the NEA managed peer reviews of other national programs as these will provide an opportunity to get acquainted with diverse geologic media and varied approaches to building safety cases.
- In view of the increased interest in knowledge management, the USNRC should consider participation in the workshop on “information, knowledge, and memory” at the NEA in February 2011.

Were policy issues or other items of Commission interest raised? If yes, how has or will the Commission be informed? None

Note: A detailed trip report will not be produced. Please contact the author (contact information below) if you need more information on any topic.

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