

**CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES**

**TRIP REPORT**

**SUBJECT:** First Meeting of the Integrated Group for the Safety Case (IGSC) of the Nuclear Energy Agency (NEA) of the Organization of Economic Cooperation and Development (OECD) (Charge No. 20.01402.761)

**DATE/PLACE:** June 14-16, 2000, Paris (France)

**AUTHOR:** Budhi Sagar

**DISTRIBUTION:** Dr. Ralph Cady from the Nuclear Regulatory Commission (NRC) Office of Nuclear Regulatory Research; see attachment B for a complete list.

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# **CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES**

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## **TRIP REPORT**

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**DATE/PLACE:** June 14–16, 2000, Paris (France)

**AUTHOR:** Budhi Sagar

**ATTACHMENTS:** Copies of the meeting agenda, attendee list, and a list of the material (reports and presentations) obtained during the meeting are attached. Copies of any of the material may be requested from the author.

**PERSONS PRESENT:** Dr. Ralph Cady from the Nuclear Regulatory Commission (NRC) Office of Nuclear Regulatory Research; see attachment B for a complete list.

### **BACKGROUND AND PURPOSE:**

The IGSC is a new group formed at the NEA that will focus its activities on various aspects of the integrated safety case for high-level nuclear waste repositories. The two existing groups—Performance Assessment Advisory Group (PAAG) and the group for Site Evaluation and Design of Experiments (SEDE) were dissolved and their activities were transitioned, as appropriate, into the mission of the new IGSC. Earlier, the Radioactive Waste Management Committee (RWMC) had approved the formation of the IGSC. The purpose of this trip was to attend the first meeting of the IGSC and assist the NEA Secretariat to formulate the future course of action of the IGSC.

### **SUMMARY OF MEETING:**

Mr. Allan Hooper from U.K. and a member of the RWMC presided over the meeting. The IGSC members were asked to express (orally and in writing) their expectations of the IGSC; the NRC expectations were submitted in a one page written statement and were explained in the meeting. The NEA staff prepared a synthesis of such expectations from all delegates. Some of the common themes were (i) the IGSC should be a forum for information exchange regarding the methodology for building a safety case; (ii) both regulators and implementors should be represented; (iii) the IGSC should produce state of the art reports on collective views; (iv) the IGSC should coordinate with other groups within the NEA (e.g., the Forum on Stakeholders Confidence) and outside the NEA [e.g., the International Atomic Energy Agency (IAEA) and the European Union (EU)]; and (v) it should focus on integration of experiments, design, and safety analysis for building a safety case.

Regarding the activities that were being conducted by the PAAG and the SEDE groups, the IGSC members came to the conclusion that all activities should be brought to a reasonable close and that new proposals be

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prepared for those that should be continued by the IGSC. The new proposals will be considered at the Plenary meeting of the IGSC to be held at the NEA in Paris on 15–17 November 2000.

Dr. Abe van Luik of the U.S. Department of Energy (USDOE), Yucca Mountain Project was elected as the Chairman of the IGSC for a three-year term. A core group of four people consisting of Doug Metcalfe, Canadian Nuclear safety Commission, Gerald Ouzounian, ANDRA, France, Hiroyuki Umeki, Japan Nuclear Cycle Development Institute (JNC), and Juan Luis Santiago, ENRESA, Spain was also formed to assist the Chairman in conducting the normal business of the group.

#### **DETAILED MEETING DESCRIPTION:**

See meeting agenda. (attachment A)

**ROUND TABLE ON EXPECTATIONS:** Attendees were asked to give brief statements about the expectations of their respective organizations regarding the IGSC. Written statements were encouraged. Attachment C is the NRC statement. Several delegates expressed the opinion that the working mechanism of the IGSC group was not entirely clear but supported the general IGSC mission of working on issues related to integration of site characterization, design, and performance assessment into a credible safety case. A few participants were more at ease with the working of the old PAAG and SEDE groups and did not want to lose the activities developed under those groups. It was clear that depending upon the stage of repository development in their respective national programs, members assigned different priorities to various possible activities to be undertaken by the IGSC. For example, programs at a stage of early development give high priority to generic scientific research, while programs in advanced stages assign a much higher priority to site-specific underground testing. However, all participants agreed that the greatest benefit of the IGSC was to provide a forum to implementors and regulators to learn from each other's experiences, to share information, and to develop collective opinions on important subjects. During the meeting, the NEA staff prepared a draft summary of member views on expectations; this summary forms attachment D of this report.

**MODUS OPERANDI OF THE IGSC:** The 100<sup>th</sup> steering committee of the NEA formulated a reformed process for its functioning. According to this process (i) focus of the work will be based on a strategic plan, (ii) a clear distinction will be made between broadly discipline or mission oriented Working Parties and task oriented Working Groups, (iii) The Working Parties will have a mandate for three years and the Working Groups for two years, (iv) formal evaluations of work activities will be carried out by the NEA, (v) workload on the NEA Secretariat and the member countries will be reduced, and (vi) working methods for addressing cross-cutting issues will be improved.

The IGSC is organized as a broad mission oriented Working Party with a mandate to last until the spring RWMC meeting in 2003. The IGSC membership will consist of senior specialists in assembling or reviewing safety cases for deep geologic repositories. Members may belong to implementing, regulating, and research institutions. Members should be able to mobilize resources and communicate with their respective home organizations. The IGSC mission is to focus on (i) the process of repository development for long-lived radioactive waste and (ii) waste system analysis and technological advances. Two other Working Parties under the RWMC are the Forum for Stakeholder Confidence (FSC), which will hold its kick-off meeting on 28–30 August 1999; and Working Party for Dismantling and Decommissioning (WPDD).

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The IGSC will function by creating highly task-oriented Expert Working Groups (with two-year mandates), planning and conducting workshops on emerging issues, and evaluating and assuring quality of the end-product.

The IGSC will report to the RWMC and provide guidance to cooperative projects that may be undertaken. The core and central activity of the IGSC derived directly from the RWMC issues will be focused on the methodology for an integrated safety case the results of which can be used by a majority of the members. The IGSC may also coordinate highly specialized activities in which only a fraction of the IGSC members may be interested. Such specialized activities will be financed and administrated by the members of the project and the IGSC role will be to provide guidance and promote participation. Administrative support for the core activities will be provided by the NEA Secretariat. In the waste management area, the NEA Secretariat has three permanent positions and a one-year project position.

Allan Hooper described the RWMC expectations of the IGSC as a group to seek consensus on the scientific basis for high-level waste management; identification of important uncertainties and their resolution; and confidence required at various stages of the step-wise repository decision making process.

DISCUSSION ON 'WHAT IS A SAFETY CASE': Allan Hooper started the discussion on 'what is a safety case' by quoting from an earlier NEA document: a safety case is a collection of arguments at a given stage of repository development in support of the long-term safety of a repository. He defined three primary steps for developing a safety case (i) establish an assessment basis (i.e., approach, concepts, knowledge base), (ii) conduct a safety assessment (include evolutionary history, sensitivity analyses, and demonstration of compliance with regulatory criteria ), and (iii) evaluate confidence. Claudio Pescatore introduced the somewhat controversial concept of 'regulatory safety criteria do not assure safety' and that safety analysis is really independent of the regulatory criteria. This hypothesis was mostly rejected and the members decided that a precise definition of safety case is neither necessary nor required. Members agreed that all the arguments needed in a country to satisfy its stakeholders, including the regulator, constitutes a safety case and that in detail, it may be different in different countries and it may also depend upon the stage of decision making in the step-wise process.

Abe van Luik made a presentation on the USDOE plans for developing a safety case for inclusion in the Site Recommendation Considerations Report (SRCR), which is due for completion by December 1999. Depending on comments on the post-closure safety case in the SRCR, the USDOE will decide whether to conduct another iteration for the License Application. He described the development of the safety strategy as originating in the features, events and processes (FEP) list, which is used to define the process model factors, which in turn are used to define the principal factors and potential vulnerabilities. He listed two principal factors critical to performance (i) long waste package life and (ii) low probability of igneous activity. Two factors were identified as providing assurance of performance (i) low seepage and performance of drip shields, and (ii) low radionuclide concentrations. He identified overlying rock, waste package, drip shield plus drift invert flow barrier, unsaturated zone below repository, and saturated zone as principal barriers for the SRCR safety case. He acknowledged that implementor credibility is damaged when external reviewers identify vulnerabilities and therefore suggested that the implementor identify them in the safety case. He suggested that the current design at Yucca Mountain provides significant safety margins for the first 20,000 years.

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Timo Äikäs presented a talk titled '20 Years Gone, 20 Years To Go: Vision Of A Safety Case'. He presented the status of the high-level waste program in Finland. The Olkluto site in Eurajoki (south west Finland) is the site proposed by POSIVA to the government. The local community is in favor of hosting a repository. He emphasized the important role played by the Environmental Impact Assessment (EIA) in site selection and acceptance by the local community. The EIA contained sections on safety during the operational period, safety during transport, and safety during post-closure period. The next step is detailed site characterization and design of the final disposal facility for application of the construction permit in 2010. In addition to including integrated performance assessment, the safety case for the application for construction authorization will include confirmation of site suitability along with identification of suitable rock volumes, demonstration of constructability, and an outline of mechanisms for addressing scientific and social issues. Timo suggested that everybody need not do everything in a safety case and that advantage can be taken of scientific work performed by various programs. He emphasized the utility of a 'sociological' approach to public confidence building by reacting to changing priorities of various stakeholders.

Jorg Hadderman spoke on 'Role of Scientific Understanding in a Safety Case.' Scientific research is important to affect reduction in conservatism, better definition of safety margins, and optimization of repository design. His thesis was that new developments in scientific fields will proceed independent of the progress in the waste management program. The safety assessors should be ready to understand new and possibly unexpected developments and fold them into their analyses. He concluded by saying that fostering scientific progress where there are conflicting views was important to building confidence in the safety case.

Summarizing the technical discussions, Allan Hooper outlined general agreements and remaining issues. There was general agreement on (i) using multiple lines of reasoning; (ii) defining different performance indicators; (iii) demonstrating good science/sound engineering; (iv) assuring logical connections and consistency between safety case components; and (v) describing processes used to develop the safety case including evolutionary history, how issues were resolved, and discussion of remaining disagreements. The issues remaining included (i) how to communicate confidence, (ii) how to demonstrate we have done enough science, (iii) how to describe the safety case to appeal to a wide range of audiences, and (iv) how to describe the overall process (e.g., methodologies, regulator-implementor interactions, response to input from stakeholders).

**IGSC WORK PROGRAM:** Claudio Pescatore introduced the subject by reviewing the ongoing activities of the PAAG and SEDE groups. His presentation is provided as attachment E. He placed the activities related to confidence aspects [e.g., the work of the Integrated Performance Assessments Group (IPAG)], underground testing and stability of geologic environments in the core activities (useful to a majority of IGSC members—three-year mandate category). Radionuclide migration, scenario development, biosphere, excavated disturbed zone, and gas impacts were placed in the technical activities category (useful to a majority of IGSC members—two-year mandate). The Co-operation projects (useful to a few of the IGSC members—administered and funded by participants) included argillaceous media (e.g., the "clay club"), thermochemical database, FEP database, FEP catalogue for clays (FEPCAT), sorption forum, and optimization of backfilling/sealing. He then outlined the history and current status of these activities.

To further discuss the IGSC work program, the participants were divided into four groups. Each group was asked to consider the following (i) is the expected contribution and role of the IGSC sufficiently clear vis-a-vis the needs of developing safety cases fit for the purpose? (ii) which existing activities can be usefully continued, which should be brought to an end and what new activities could be commenced? (iii) utilizing

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the categorization discussed earlier, which of the on-going and new activities should be taken forward by the IGSC itself and which by Task Groups? (iv) what should be the topics for the November meeting? and (v) how should the IGSC measure and report its effectiveness and success?

The input from the four groups was synthesized and a preliminary draft of the synthesis is presented in attachment F. There was general consensus that all of the previous activities of the PAAG and SEDE groups should be brought to an orderly closure. For the GEOTRAP task, it was agreed that the Swedish Nuclear Fuel & Waste Management Co. (SKB) should go ahead in hosting the 5<sup>th</sup> workshop and that at the end of this workshop, a report summarizing the entire set of GEOTRAP workshops be prepared to close it out. For the IPAG-3, a report in preparation should be completed and a proposal for continuing this activity prepared. Most members were of the opinion that the information collection mode of the IPAG should be changed from the use of questionnaires to some other mode. A proposal on geosphere stability should be presented in the November meeting. Members agreed that all activities regarding biosphere be stopped and the IAEA work on the same topic be followed and monitored. Current activities related to scenarios also should be closed with the completion of the report on the scenario workshop. The upkeep of the FEP database was considered important and should be continued. Work related to sorption phase II (validation of models) would continue to completion of first milestone and then a judgment made for further continuation (some delegates expressed concern that without decision points it may run forever). Activities on clay medium, gas migration, and backfill/sealing will be completed and proposals for enhanced work, if any, will be presented to the IGSC for discussion and acceptance. The newly created core group was asked to develop a proposal for the new activity on Safety Case Development and possibly arrange a topical session at the November meeting. A few of the topics for future work by the IGSC were (i) protection of environment (in addition to humans), (ii) knowledge management and traceability of data over long periods of time, (iii) first 1,000 years analysis timeframes and safety indicators, and (iv) total system optimization.

**MEETING CLOSURE:** A revised IGSC mandate will be prepared keeping in mind the input obtained in this meeting. It will be presented to the RWMC in their April meeting for discussion and approval. A strategic plan that will also spell out the roles and responsibilities of the various participants and the NEA Secretariat will also be prepared.

Dr. Abe van Luik was elected the Chairman for the next three years. He said that his previous experience was that only the core group members did most of the work. He proposed to change that by involving the other members more in various activities. The core group consists of Doug Metcalfe, Gerald Ouzounian, Hiroyuki Umeki, and Juan Luis Santiago. The success of the IGSC will be judged by the extent of use of its end products by member countries.

The next meeting of the IGSC is scheduled on November 15–17, 2000.

#### **IMPRESSIONS/CONCLUSIONS:**

There was a genuine desire on the part of members to integrate the site characterization, design, and performance assessment as they pertain to developing a safety case. It appeared that the Working Groups will have the scope of work, schedule, and end product defined. Two IGSC meetings per year are expected in the future; one of these meetings will always be at the NEA facilities in Paris, the other one will have greater technical content and may be held at other places through invitations. Attendance at the IGSC will present an opportunity to learn about the progress in various national programs on radioactive waste management

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and also about advancements in technology. The NRC should continue to be a member of the IGSC and other NEA groups such as the RWMC.

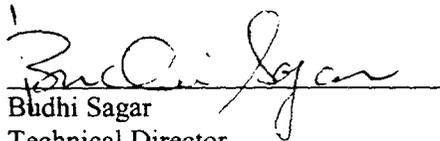
**PROBLEMS ENCOUNTERED:**

None.

**PENDING ACTIONS:**

1. Decision regarding attendance at the November 15–17, 2000, IGSC meeting should be made early. The NRC should plan to present its vision of a safety case in the topical session that will be held at this meeting.
2. There has been interest at the NRC in the activities of the FSC Group. Decision about attending the kick-off meeting of the FSC Group on August 28–30, 2000, at the NEA in Paris should also be made.

**SIGNATURES:**

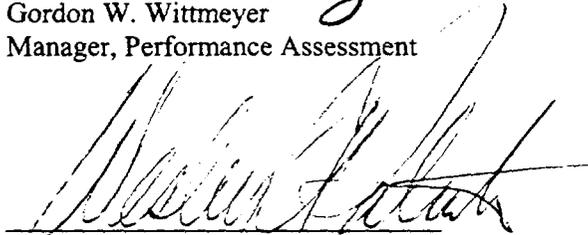
  
Budhi Sagar  
Technical Director

7/3/2000  
Date

**CONCURRENCE:**

  
Gordon W. Wittmeyer  
Manager, Performance Assessment

7/3/2000  
Date

  
Wesley C. Patrick  
President

7/5/2000  
Date

**ATTACHMENT G**

Other Documentation in connection with the Integration Group for the Safety Case (IGSC) Meeting

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June 14–16, 2000  
Paris, France

Progress Towards Geologic Disposal of Radioactive Waste: Where Do We Stand? An International Assessment. Nuclear Energy Agency, Organisation for Economic Co-operation and Development. 1999.

Strategic Areas in Radioactive Waste Management. The Viewpoint and Work Orientations of the NEA Radioactive Waste Management Committee. Nuclear Energy Agency, Organisation for Economic Co-operation and Development. 1999.

Regulatory Reviews of Assessments of Deep Geologic Repositories. Évaluation des dépôts géologiques profonds dans un contexte réglementaire. Nuclear Energy Agency, Organisation for Economic Co-operation and Development. 2000.

Nuclear Energy Agency, Radioactive Waste Management Committee, Integration Group for the Safety Case (IGSC), Status of Implementation. NEA/RWM/IGSC(2000)2—FOR OFFICIAL USE.

On-going, planned, and proposed activities of the IGSC.

Consensus talk in Germany on phase out.

Safety Case: Outstanding Issues—How should we.

Nuclear Energy Agency, Radioactive Waste Management Committee, Integration Group for the Safety Case (IGSC), Draft Mandate of the IGSC. NEA/RWM/IGSC(2000)1—FOR OFFICIAL USE.

Nuclear Energy Agency, Radioactive Waste Management Committee, Integration Group for the Safety Case (IGSC), Discussion Note on the Planning and Evaluation of the IGSC Programme. NEA/RWM/IGSC(2000)4—FOR OFFICIAL USE.

Nuclear Energy Agency, Radioactive Waste Management Committee, Integration Group for the Safety Case (IGSC), Extract from the Minutes of the RWMC 33 Meeting (March 2000). NEA/RWM/IGSC(2000)5—FOR OFFICIAL USE.

Nuclear Energy Agency, Radioactive Waste Management Committee, Integration Group for the Safety Case (IGSC), Introductory Notes on the Concept of Safety Case. NEA/RWM/IGSC(2000)6—FOR OFFICIAL USE.

Room Document—Item 8A. Extract from Minutes of 10<sup>th</sup> SEDE Meeting.

Technical Topic, “What is a Safety Case?” IGSC Workshop June 14–16, 2000. 20 Years Gone, 20 Years to Go: Vision of a Safety Case by Timo Äikäs and Juhani Vira, Posiva Oy, and Timo Vieno, VTT Energy.

An Example of Planning the Safety Case: Revision 4 of DOE’s Postclosure Repository Safety Strategy. IGSC Topical Meeting, 14–16 June 2000 by Abe Van Luik, U.S. Department of Energy.

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## ATTACHMENT G (Cont'd)

Other Documentation in connection with the Integration Group for the Safety Case (IGSC) Meeting  
June 14–16, 2000  
Paris, France

Requirements on the Safety Case. The experience from Peer Reviews and the Confidence Document by Claudio Pescatore, Paris, 14–16 June 2000.

Organisation for Economic Co-operation and Development/Nuclear Energy Agency Radioactive Waste Management Committee, Integration Group for the Safety Case (IGSC). Item 4: Recent Developments at the NEA by Hans Riotte, This item is supported by NEA/RWM/IGSC(2000)5.

Scenario Development Methods and Practice, An evaluation based on the NEA Workshop on Scenario Development, Madrid, May 1999. Draft April 2000. This draft has been prepared by Safety Assessment Management Limited for the OECD Nuclear Energy Agency. A first draft was reviewed by Task Group Leaders. This second draft is for comment by attendees at the Workshop and by IGSC members.

An International Peer Review of Safety Report 97: Post-closure Safety of a Deep Repository for Nuclear spent Fuel in Sweden. Nuclear Energy Agency, Organisation for Economic Co-operation and Development.

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ATTACHMENT A

**For Official Use**

**NEA/RWM/IGSC(2000)3**



Organisation de Coopération et de Développement Economiques  
Organisation for Economic Co-operation and Development

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PARIS

**NUCLEAR ENERGY AGENCY  
RADIOACTIVE WASTE MANAGEMENT COMMITTEE**

**NEA/RWM/IGSC(2000)3  
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**Integration Group for the Safety Case (IGSC)**

**PROPOSED AGENDA FOR THE 1ST MEETING OF THE IGSC**

**Paris, IEA, 14-15-16 June 2000**

92438

Document complet disponible sur OLIS dans son format d'origine

English text on

## INTEGRATION GROUP FOR THE SAFETY CASE (IGSC)

**CONVOCAATION AND PROPOSED AGENDA  
FOR THE 1ST MEETING OF THE IGSC  
Paris, IEA, 14-15-16 June 2000**

The first meeting of the Integration Group for the Safety Case will be held at the International Energy Agency (IEA), 9 rue de la Fédération, 75015 Paris (close to the Eiffel Tower; Metro Bir Hakeim – RER: Champ de Mars-Tour Eiffel), on 14-15-16 June 2000. The meeting will start at 10 a.m. on the first day, and is scheduled to end at 12:45 p.m. on the last day.

For a map of the area of the IEA, please type the following URL: <http://www.iea.org/guid.htm>. The contact telephone number during the meeting is: +33 (0)1 40 57 66 07. Alternatively, an email may be sent to: [lydie.guyot@oecd.org](mailto:lydie.guyot@oecd.org).

The meeting will be chaired by Alan Hooper, and the working language is English.

Delegates participating are advised that the security arrangements in force at the IEA include the obligation to present an identity document bearing a photograph. This document will be requested at the time of issuing Delegates' cards for the meeting on first entry to the IEA. It should also be presented subsequently with the card every time IEA premises are entered.

The overall objectives of this first meeting of the IGSC are:

- To acquaint the members of the new Group with one another
- To identify work priorities
- To discuss the Group's mandate and a modus operandi

## DAY 1 - Wednesday 14 June 2000

- 10.00 1. **Opening of the meeting** (*A. Hooper*)
2. **Adoption of the Agenda** NEA/RWM/IGSC(2000)3
3. **Tour de table**  
 Members of the Group are invited to introduce themselves and to review their expectations from the work of the IGSC (a written short text would be helpful).
4. **Recent developments at the NEA** (*H. Riotte*) NEA/RWM/IGSC(2000)5  
 Strategic developments at the NEA will be briefly reviewed and the outcomes of the meeting of the Radioactive Waste Management Committee in March 2000 will be summarised.  
*Coffee*
5. **The route taken to the IGSC** (*J. Holmes*) NEA/RWM/IGSC(2000)2  
 The rationale and process for creating the IGSC will be reviewed.
6. **The IGSC: Terms of Reference, Modus Operandi and Membership** NEA/RWM/IGSC(2000)1  
**Introduction** (*H. Riotte*)  
 The draft Terms of Reference, proposed Modus Operandi and nominated membership will be described. A classification system for the types of activity to be carried out by the IGSC will be introduced.  
**Discussion**  
 The discussion will seek preliminary feedback from IGSC members to enable finalisation of the mandate. The role of a potential Core Group will be discussed. These issues will support the election to be held on Day 3 of the Workshop (Item 10).

12.00 7. **Technical Topic "What is a Safety Case?"**  
(Chairman: Alan Hooper)

NEA/RWM/IGSC(2000)6

The aim of the topical session is to consider and discuss the distinctive characteristics and requirements of a Safety Case in relation to its role to inform decisions at key repository stages. The session will also identify key issues and development needs in order to inform later discussions on the role of the IGSC and its future programme.

**Introductory Presentation** (*Abe van Luik*)

The introductory presentation will further establish the definition of a Safety Case, its key elements and its role in the repository decision process. It will also outline key issues that will be picked-up in subsequent discussions and in three presentations by *Timo Aikäs, Jörg Hadermann, Claudio Pescatore*.

12.30 **Lunch**

14.15 **(Technical Topic continued)**

18.00 **Adjourn**

**DAY 2 - Thursday 15 June 2000**

9.00 (Technical Topic continued)

**Summary of previous day's and continued discussion:**

- What can appropriately be addressed by the IGSC?
- The IGSC's expected, distinctive contribution and role in the international context

*Coffee*10.40 **8. IGSC WORK PROGRAMME**

The aim of this agenda item is to establish an outline the work programme of the IGSC for a period of three years in order to enable a detailed programme to be finalised for agreement at the planned November meeting of the IGSC. It is also proposed to agree a technical topic to be addressed at the November meeting.

**8a. Review of current activities (C. Pescatore)**

To provide context for the following discussions in the breakout session on the IGSC programme, the presentation will provide an update on the progress, current status and anticipated completion dates of activities presently attributed to the IGSC.

*Annex 2 of*  
NEA/RWMC/IGSC(2000)2

Room Document

11.00 **8b. Breakout session****Introduction (A. Hooper)****Discussions in Breakout Groups**

The intention is to divide the meeting into 4 Breakout Groups, each of which will consider the following questions:

- Is the expected contribution and role of the IGSC sufficiently clear vis-à-vis the needs of developing safety cases fit for the purpose?
- Which existing activities can be usefully continued which should be brought to an end and what new activities could be commenced (indicating priorities)?
- Utilizing the categorization discussed under Item 6,

which of the on-going and new activities should be taken forward by the IGSC itself and which by Task Groups?

- What should be the topic (or topics) for the November meeting?
- How should the IGSC measure and report its effectiveness and success?

12.30

*Lunch*

14.00

**(Breakout session continued)**

15.30

*Coffee*

16.00

**8c. Plenary session taking reports back from Breakout Groups**

Each Group will make a 10-minute presentation on its views to be followed in each case by discussion.

17.15

**8d. Review of Breakout Group presentations**  
*(J. Holmes)*

An initial synthesis will be made of the Breakout Group responses. Overnight, a more comprehensive synthesis will be made to form a starting point for the following day's discussions.

17.30

**8e. Programme decision making**  
*(H. Riotte and J. Holmes)*

NEA/RWM/IGSC(2000)4

It is anticipated that choices will need to be made between options for future work programme activities, and that there will be programme constraints on both NEA and participant organisation resources. The presentation will present, for discussion, a draft framework for systematic decision making on programme activities and will review resource constraints.

18.00

*Adjourn*

**DAY 3 - Friday 16 June 2000**

- 9.00    **8f.    Synthesis of programme suggestions (A. Hooper)**
- Presentation of an overnight synthesis of Breakout Group considerations.
- Plenary discussion to agree on a preliminary outline programme and technical topic for November meeting.
- Coffee*
- 9.    Recap on role and mandate of the IGSC**
- Discussion of whether any modifications should be made to the mandate in light of considerations of the future programme.
- 10.    Election of Chairman and Core Group**
- A Chairman of the IGSC needs to be elected for a period of time (3 years? - to be decided). If it is decided that a Core Group is appropriate, its members need to be agreed.
- 11.    Review of Workshop and main outcomes (A. Hooper)**
- 12.    Date of next meeting**
- The weeks of 6 or 13 November 2000 are proposed.
- 13.    Any other business**
- 12.45    **Close of Workshop**

**ATTACHMENT B**

## INTEGRATION GROUP FOR THE SAFETY CASE (IGSC)

## LIST OF PARTICIPANTS

1st meeting, Paris, IEA, 14-15-16 June 2000  
 Chairman: Dr. Alan Hooper (UK Nirex Ltd)

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## ATTACHMENT C

**Input from the U.S. Nuclear Regulatory Commission  
Agenda Item No. 3 of the First IGSC Meeting  
June 14-15, 2000**

**Ralph E. Cady, U.S. Nuclear Regulatory Commission  
and  
Budhi Sagar, Center for Nuclear Waste Regulatory Analyses**

The U.S. Nuclear Regulatory Commission (NRC) strongly endorses the joining of the PAAG and SEDE groups to create a single IGSC group and expects that the new group will be effective in developing resolution of repository related issues that are integrated with respect to site characterization, design, and safety assessment. The NRC intends to use, as appropriate, the information on important issues and their resolutions generated by this international group in its regulatory review of the safety case expected to be included in a license application within the next three years. We expect the IGSC to be an open forum in which technical topics for further work will be selected based on (i) their importance to the safety case, (ii) interest of a majority of its members especially in terms of the schedules of their national programs, and (iii) a reasonable chance of significant contributions within a fixed time frame. We also expect that both the implementors and the regulators will be free to participate in any of the working groups.

Based on staff discussions at the NRC, and also previous discussions with the NEA Secretariate, the topics of greatest interest to the NRC are:

- (1) How to determine the sufficiency of data and models during various phases of repository development (site selection, decision to begin construction, decision to emplace waste, decision to close repository)? For the stage of development in the U.S., the NRC has a strong interest in the stage where decisions to begin construction are to be made.
- (2) What is an adequate method to model flow and transport in a fractured rock. The NRC has interests in both the partially and fully saturated conditions? We are especially interested in cases where the rocks are moderately fractured so that representation as a continuum may or may not be appropriate.
- (3) What are the appropriate methods for verifying (to a level appropriate to decision making) the very long predicted lives of the waste packages given that they will have to function under future conditions of complex coupling between hydrologic-thermal-chemical-mechanical processes?
- (4) How should the safety case accommodate conceptual model uncertainty for both the nominal case and also for various scenarios?
- (5) To what level of detail should the biosphere be characterized? How should site-specific conditions be incorporated into characterization of the biosphere?

The NRC will participate in discussions on other topics proposed by other participants. It is possible that mandates for working groups may be defined broadly based on a combination of interests of various participants.

**ATTACHMENT D**

# ATTACHMENT D

## Synthesis of views on expectations of IGSC

This note summarizes the views expressed on the expectations of the IGSC in written contributions and orally in the tour de table :

1. The IGSC should be a Forum for information exchange and sharing of experience and lessons learned on issues such as the preparation, communication, review and reaction to safety assessments, site investigations and engineering design.
2. It should provide a mechanism for interaction of regulators and implementors, seeking to achieve ~~consensus~~ <sup>common safety</sup> consensus on the treatment of issues such as ~~definition of the safety case~~ and methods for elaboration of the safety case.
3. The IGSC should communicate its findings on the integration of the safety case and synthesis of common understanding to different audiences through :
  - state of the art reports
  - ~~policy position papers~~
  - collective viewsIt should ~~consider~~ <sup>take into account</sup> the use of innovative techniques for the presentation of the safety case to different audiences.
4. The IGSC should ensure coordination, and conduct joint initiatives with other groups within the NEA, e.g., the Forum on Stakeholder Confidence, and externally, e.g., the IAEA and European Community.
5. The IGSC should provide a mechanism for the review of national projects developing a safety case. ?
6. The IGSC should identify and collectively address <sup>key challenges</sup> key issues and challenges for the development and communication of ~~confidence in~~ the safety case. It should address the integration of experiments and modelling, and of site characterisation, science and safety assessment. Particular areas proposed include :
  - (i) How to determine the sufficiency of data and models.
  - (ii) How should the safety case incorporate conceptual model uncertainty.
  - (iii) The integration of different lines of knowledge to ensure consistency.
  - (iv) Exchange of views and approaches on modelling.
  - (v) How the reasoning underlying safety arguments can be presented in a way which gains confidence in a wide range of stakeholders.
  - (vi) What is meant by robustness.
  - (vii) Approaches to simplification and improvement in intelligibility of safety cases.
  - (viii) How much information needs to be presented to develop an acceptable safety case.
  - (ix) Optimisation of the use of data gathered in the field, in situ and in laboratories.
  - (x) Development of a consistent understanding of the site and repository system.
  - (xi) Transfer of data from site investigations to performance assessment.
  - (xii) Decision making in the face of uncertainty
  - (xiii) How to clearly define elements of the safety case and how they apply in the real world.
  - (xiv) How to put together arguments for many different stakeholder groups.

7. The IGSC should oversee and conduct technical activities supporting the safety case, including the continuation of key activities of the PAAG and SEDE. It should create ~~benchmark~~ common tools for the safety case. Particular technical issues identified include :

- (i) What is an adequate method to model flow and transport in factured rocks.
- (ii) Approaches to verifying the predicted long lives of waste packages.
- (iii) To what level of detail should the biosphere be characterised.
- (iv) The systematic development of repository design and the engineered barrier system.
- (v) Scenario techniques.

8. The IGSC should provide a ~~mechanism~~ <sup>forum discussion of</sup> for the ~~early identification~~ <sup>technical</sup> of key scientific uncertainties and issues.

ATTACHMENT E



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# IGSC

## Item 8a

*Review of current or planned activities*



# Types of IGSC Activities /1

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- **Classification scheme**

- » To help organise IGSC initiatives
- » To help prioritise activities

Based on

- technical content
- level of support from Member countries
- level of support from NEA secretariat



# Types of IGSC Activities /2

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- **Core Activity**
  - centre of IGSC work: promoting an integrated safety case
  - majority of IGSC members make directly use of the product
  - results directly support RWMC issues
- **Technical Activity**
  - technical and scientific basis for integrated safety cases
  - IGSC closely follows the conduct of the activity
  - RWMC analyses results
- **Co-operation Project**
  - highly specialised activities and/or limited interest
  - financed/administered by the members of the project
  - IGSC gives guidance and promotes participation
  - RWMC informed about objectives and results



# On-going or planned activities /1

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- **General Classification of On-Going or Planned Activities**
  - » Preparation/Documentation of Safety Case
  - » Geosphere Evaluation
  - » Engineered Barrier System
  - » Supporting Activities



# On-going or planned activities /2

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- **IGSC Core Activities**

- » Confidence aspects (IPAG)
- » Report on Underground Testing
- » Stability of Geological Environments

- **IGSC Technical Activities**

- » Radionuclide migration (GEOTRAP)
- » Scenario development
- » Biosphere
- » Excavation disturbed zone
- » Gas impacts



# On-going or planned activities /3

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- **IGSC Co-operation Projects**
  - » Argillaceous media (Clay Club)
  - » Thermochemical database (TDB)
  - » FEPs database
  - » FEP catalogue for clays (FEPCAT)
  - » Sorption project (I and II)
  - » Optimisation of backfilling/sealing



## CORE ACTIVITY

### Confidence Aspects

---

- Review of current evidences and arguments used to support the development and results of current safety cases.
- Start (1999.05)                      Report (2001.06)
- IPAG membership changes with time, depending on focus; Questionnaire; Use of consultant is important.
- IPAG-3 is on-going.
- Consultant and secretariat at about 1 man.month/year each; the Secretariat has received financial contributions from participants.
- The IGSC is invited to take advantage of the IPAG-3 initiative, and to support and develop further the area of confidence development, evaluation, and documentation.



## CORE ACTIVITY

### Going Underground for Testing

---

- Rationalise further use of underground facilities (Report “*Going Underground for Testing, Characterisation and Demonstration*”)
- Start (1998.09); Paper (end-2000).
- Draft paper presented at RWMC-33
- Endorsement received by RWMC. The Report should be re-checked, edited and completed by end-2000.
- Complementarity with IAEA document has been ensured.
- Remaining NEA work: 3 man.weeks + preparation of the publication (lay-out)
- IGSC reviews final report?



## CORE ACTIVITY

### Lessons from GEOTRAP (Publication)

---

- Prepare an open publication on the main outcomes of project, aimed at the technical community at large (a paper to be submitted to an acknowledged scientific journal should be considered).
- Start (mid-2000) Publication (2001.09)
- Publication based on the internal NEA document .
- Not started yet. Approved in principle by PAAG/SEDE.
- Consultants' support (minimum 1 man month) for the drafting. Funding to be covered by interested organisations; NEA involvement: to be determined.
- It is proposed that the IGSC support this initiative.



## CORE ACTIVITY

### Stability of Deep Geological Environments

---

- Report on approaches to deal with “*Time Dependency in the Geosphere, from Site Characterisation to Performance Assessment*” in order to produce better statement of confidence regarding geosphere stability.
- Start: early 2000; Report: early 2002
- Task-oriented group in a 2-year framework. Use of a questionnaire. Consideration of the outcomes of the Scenario Development workshop and of the IPAG-3 exercise.
- Discussed and agreed at SEDE
- Support from a consultant is to be planned (minimum 3 man. months to be funded by interested organisations)
- NEA work: to be determined according to the level of consultant’s support + preparation of the publication.
- Typical integrated work to be put under the IGSC auspices. Should be discussed.



## TECHNICAL ACTIVITY

### Scenario Development

---

- Update the 1992 NEA booklet on scenario analysis (great changes have occurred in this area).
- Start: 1998.05    Workshop: 1999.05    Proceedings: 2000.00
- Draft synthesis of workshop is available.
- Synthesis based on questionnaire and position statements prepared based on discussions at workshop.
- Consultant (1 man.month)
- 1 man.month Secretariat time is foreseen to add papers and format them.
- The IGSC is invited to consider follow-up activity after the Madrid Workshop report becomes available.



## TECHNICAL ACTIVITY

### Role of Biosphere Analysis

---

- Promote the debate on the role of biosphere in a safety case, and to interact with BIOMASS or its successor project at IAEA.
- Start: 1999.05
- Ad-hoc group
- A discussion document exists dealing with the representation biosphere and its role in a safety case. A small ad-hoc group exists.
- 2 man.week Secretariat time.
- Interface with BIOMASS has been useful.
- IGSC should discuss the continuation of this effort



# TECHNICAL ACTIVITY

## Confidence in Geosphere Transport Models for Site-Specific Performance Assessment (GEOTRAP IV)

---

- Document the 4th workshop GEOTRAP (June 1999).
- Start: 1999.01      Workshop: 1999.06      Proceedings: 2000.
- Proceedings are being finalised. These include synthesis review of workshop.
- Remaining NEA work: compilation of all components (synthesis, papers, etc) into a document fit for publication.



# TECHNICAL ACTIVITY

## Geological Evidence and Theoretical Bases for Radionuclide Processes in Heterogeneous Media (GEOTRAP V)

---

- 5th GEOTRAP Workshop
- Start: 2000.01
- Programme Committee to help develop and structure the workshop (ad-hoc membership) +1 or 2 consultants to help prepare and document the workshop.
- Planning only. Activity postponed for a few months.
- It is proposed to ask P. Smith, SAM Ltd., to help prepare and document the workshop (4 man.weeks to be covered by registration fees) and to ask host organisation to provide in-kind additional help.
- NEA work: 8 man.weeks + preparation of the proceedings for publication. One alternative is to sub-contract a large part of the workshop preparation and documentation. This implies a contract of at least 8 man.weeks and NEA work reduced to 2-4 man.weeks + preparation of the proceedings. Funding is an issue
- It is suggested that the IGSC continue to support this initiative in order to complete the GEOTRAP workshop series.



# TECHNICAL ACTIVITY

## Lessons Learnt from the GEOTRAP Project

### (Internal Document)

---

- Prepare an internal NEA document that compiles and rationalise the key lessons learnt from the project, both from technical and organisational stand points, and that provides suggestions for potential follow-up activities.
- Internal NEA document based on a questionnaire
- Start: 1999.11                      Draft: 2000.12                      Document: 2001.02
- Not started yet. Approved by SEDE and PAAG. Should still be approved by GEOTRAP Contact persons.
- Consultant's support (2 man.weeks of P. Smith, SAM Ltd) to be covered by the NEA budget.
- NEA work: 2 man.weeks.
- It is suggested that the IGSC support this initiative in order to better prepare the discussion of follow-on to GEOTRAP.



## TECHNICAL ACTIVITY

### Follow-on Activities to Geotrap and to activities in the Field of Radionuclide Transport Through the Geosphere

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- Continuation of work dealing with Radionuclide transport through the geosphere and geochemistry.
- IGSC invited to consider follow-on based on internal NEA study (discussion at November meeting?)



## TECHNICAL ACTIVITY

### Excavation Disturbed Zone

---

- Openly document the SEDE 1998 Topical Session on *Characterisation and Representation of the Excavation Disturbed Zone*.
- Start: 1999.01                      Report: 2000...
- Work to be carried out by a consultant and the Secretariat
- On-going work
- Consultant (T. McEwen, QuantiSci-Enviros) supported by NIREX
- Remaining NEA work: a few days + preparation of the publication.
- IGSC invited to endorse completion as soon as possible



## TECHNICAL ACTIVITY

### Impact of Gas Migration on Barrier Performances

---

- Develop practical ways forward to understand and address open issues. Workshop being organised on the basis of the EC/NEA Status Report on *Gas Migration and Two-Phase Flow through engineered and Geological Barriers for a Deep Repository for Radioactive Waste* (to be published by the end of 1999).
- Start: 1999.10                      Workshop: 2000.06                      Proceedings: 2000.12
- Join NEA/EC workshop hosted by ANDRA in Reims, France on 26-28 June 2000 (tbc).
- Consultant (W. Rodwell, AEA) funded via workshop registration fees (approx. 3 man.weeks)
- Remaining NEA work: 2 man.weeks + preparation of the publication.
- This initiative covers all relevant safety aspects linked with gas in underground repositories, and is placed under the IGSC auspices.



## TECHNICAL ACTIVITY

### Optimisation of Backfilling and Sealing Systems

---

- Provide a framework to guide and explain the selection and design of such systems taking into account, in particular, their safety-relevant functions; the influence of the surrounding geological settings; their characterisation; and the confidence in their performances at the required time-scale.
- Start: As soon as possible 1st Workshop: Spring 2001
- Task-oriented group on the Clay Club model with GEOTRAP-like working method.
- Agreed by SEDE with initial support by numerous organisations (GRS, SCK/CEN, ENRESA, UKEA, NIREX, ANDRA, POSIVA, USDOE/WIPP, ONDRAF/NIRAS, SKB, SKI, NAGRA).
- Complementarity with the existing EC Cluster and the submitted BENIPA project will also be ensured.
- Consultant's support to be funded by the participating organisations + co-funding of activities when requested.
- A clear commitment from NEA (i.e. Secretariat resources) towards this initiative is needed, especially during the launching phase.
- Important integration topic. Proposed to be started under IGSC auspices.



## CO-OPERATION PROJECT “Clay Club”

---

- A consistent understanding of the behaviour of argillaceous media under repository conditions is still missing. Also there is a need to compare experiences and understanding of the various types of argillaceous media.
- Start: 1991
- This working group has a highly focused programme of work and an ad-hoc funding system. The clay club has a broader remit than considered usual for IGSC task-oriented groups, i.e. it has multiple tasks and has a longer planning.
- Ad-hoc funding of the activities (established “culture” of the Clay Club)
- It is suggested to continue the Clay club under the IGSC auspices, as it responds to the specific needs of a group of Member countries.



## CO-OPERATION PROJECT

### Thermochemical Database (TDB) Project

---

- Start: 1999.05                      Workshop: 2000.11
- Semi autonomous project: Management Board; Technical Board; Review Groups
- Phase I activities completed; Phase II activities in time (funded); Phase III to be considered shortly.
- Independent budget for consultant.
- Full-time secretariat supplied by NEA Data Bank.
- The IGSC should give guidance and take note of progress as needed. Participation in TDB workshop is suggested.



## CO-OPERATION PROJECT

### The International FEPs Database

---

- Provides an international database of Features, Events and Processes based on nationally developed databases. Updating and maintenance by User Group
- Start: 1995 Database (CD Rom): 2000.01
- A User Group with membership fee has been set up.
- This database is now available (draft) and is being used world-wide. It will require maintenance and further development.
- Fee is used mostly to support the work of a consultant
- 1.5 man.month Secretariat's time
- The IGSC is invited to continue to support the use and development of this database, at least for the current year.



## CO-OPERATION PROJECT

### Scientific Basis for Sorption

---

- Assess the potentialities and progress of chemical modelling of sorption as support to performance assessment.
- Start: 1997      Workshop: 1998.05      Report of 1st Phase: 2000
- On-going initiative to set up a semi-autonomous project (Phase 2 is about to start)
- Documentation of Phase 1
- Administrative preparation of Phase 2
- Consultant's work funded by participants to Phase 1
- Phase 2 based on the same principle
- The IGSC should give guidance and take note of progress as needed.

ATTACHMENT F

## IGSC WORK PROGRAMME

1. Communicate of Technical Arguments/IPAG-3
  - Receive completed report on current activity (November meeting ?)
  - Review achievements
  - Define further initiative if not achieving good communication to range of audiences
  
2. Radionuclide Transport/GEOTRAP
  - GEOTRAP IV Proceedings to be published by November meeting
  - Set up planning meeting for GEOTRAP V (priority task for new member of secretariat) ; IGSC to review and (when satisfied) approve scope/contents ; hold workshop six months later
  - Initiate Project Synthesis Report ONLY when GEOTRAP V is defined
  - Review outcome at 2001 Meeting
  
3. Geosphere Stability
  - Take current proposal at November meeting
  - Should be supported

## IGSC WORK PROGRAMME (2)

4. Biosphere (current proposal)
  - Low key monitoring activity of other initiatives by means only of report by individual(s) to plenary.
5. Scenario Development
  - Receive completed report on current activity (November meeting ?)
  - Review achievements
  - Define further initiative if current approach /information not achieving sufficient confidence
6. FEP Database
  - Carry on to current completion date → end of this year
7. Thermodynamic Database
  - Carry on to current completion date → end Phase II (2001)
8. Sorption Forum
  - Carry on to current completion date → Phase II (1<sup>st</sup> milestone ?)

## 9. Clay Club

- Carry on current completion date → self-healing study

*New life clay!*

## IGSC WORK PROGRAMME (3)

### 10. Gas Migration

- Receive report on workshop at November meeting
- Consider priority of any issues identified (for more work)

### 11. Backfilling/Sealing

- Take enhanced proposal at November meeting
- Should be supported

### 12. Monitoring and Retrievability

- Review RWMC and other (EC/IAEA) documents
- Communicate readiness for technical activity if required by RWMC

### 13. Safety Case Development NEW ACTIVITY

→ Definition of process, components, methodology and means of ensuring consistency which are required to build a safety case, including

- Development of a consistent understanding of a site and its representation in the safety case
- Representation of the biosphere

\* Core Group to develop description of activity/implementation including arranging as Topical Session at November meeting.

## POSSIBLE FURTHER ACTIVITIES

1. Protection of the Environment
2. Knowledge management and traceability of data over long time periods
3. « First 1000 years analysis »/Timeframes and safety indicators
4. Total system optimisation (Possible Future development of « Backfilling/Sealing » activity)
5. Synthesis of delegates' inputs
6. Synthesis of delegates' outstanding issues

## INFORMATION EXCHANGE

1. International Reports to be made of issues where input is sought and of a look forward.
2. Mechanism of giving notice of issues is required (e.g. e-mail 3 weeks ahead)
3. Delegates to do homework (with colleagues) in advance.

ATTACHMENT G

## ATTACHMENT G

Other Documentation in connection with the Integration Group for the Safety Case (IGSC) Meeting  
June 14–16, 2000  
Paris, France

Progress Towards Geologic Disposal of Radioactive Waste: Where Do We Stand? An International Assessment. Nuclear Energy Agency, Organisation for Economic Co-operation and Development. 1999.

Strategic Areas in Radioactive Waste Management. The Viewpoint and Work Orientations of the NEA Radioactive Waste Management Committee. Nuclear Energy Agency, Organisation for Economic Co-operation and Development. 1999.

Regulatory Reviews of Assessments of Deep Geologic Repositories. Évaluation des dépôts géologiques profonds dans un contexte réglementaire. Nuclear Energy Agency, Organisation for Economic Co-operation and Development. 2000.

Nuclear Energy Agency, Radioactive Waste Management Committee, Integration Group for the Safety Case (IGSC), Status of Implementation. NEA/RWM/IGSC(2000)2—FOR OFFICIAL USE.

On-going, planned, and proposed activities of the IGSC.

Consensus talk in Germany on phase out.

Safety Case: Outstanding Issues—How should we.

Nuclear Energy Agency, Radioactive Waste Management Committee, Integration Group for the Safety Case (IGSC), Draft Mandate of the IGSC. NEA/RWM/IGSC(2000)1—FOR OFFICIAL USE.

Nuclear Energy Agency, Radioactive Waste Management Committee, Integration Group for the Safety Case (IGSC), Discussion Note on the Planning and Evaluation of the IGSC Programme. NEA/RWM/IGSC(2000)4—FOR OFFICIAL USE.

Nuclear Energy Agency, Radioactive Waste Management Committee, Integration Group for the Safety Case (IGSC), Extract from the Minutes of the RWMC 33 Meeting (March 2000). NEA/RWM/IGSC(2000)5—FOR OFFICIAL USE.

Nuclear Energy Agency, Radioactive Waste Management Committee, Integration Group for the Safety Case (IGSC), Introductory Notes on the Concept of Safety Case. NEA/RWM/IGSC(2000)6—FOR OFFICIAL USE.

Room Document—Item 8A. Extract from Minutes of 10<sup>th</sup> SEDE Meeting

Technical Topic, “What is a Safety Case?” IGSC Workshop June 14–16, 2000. 20 Years Gone, 20 Years to Go: Vision of a Safety Case by Timo Äikäs and Juhani Vira, Posiva Oy, and Timo Vieno, VTT Energy.

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## ATTACHMENT G (Cont'd)

Other Documentation in connection with the Integration Group for the Safety Case (IGSC) Meeting  
June 14–16, 2000  
Paris, France

An Example of Planning the Safety Case: Revision 4 of DOE's Postclosure Repository Safety Strategy. IGSC Topical Meeting, 14–16 June 2000 by Abe Van Luik, U.S. Department of Energy.

Requirements on the Safety Case. The experience from Peer Reviews and the Confidence Document by Claudio Pescatore, Paris, 14–16 June 2000.

Organisation for Economic Co-operation and Development/Nuclear Energy Agency Radioactive Waste Management Committee, Integration Group for the Safety Case (IGSC). Item 4: Recent Developments at the NEA by Hans Riotte, This item is supported by NEA/RWM/IGSC(2000)5.

Scenario Development Methods and Practice, An evaluation based on the NEA Workshop on Scenario Development, Madrid, May 1999. Draft April 2000. This draft has been prepared by Safety Assessment Management Limited for the OECD Nuclear Energy Agency. A first draft was reviewed by Task Group Leaders. This second draft is for comment by attendees at the Workshop and by IGSC members.

An International Peer Review of Safety Report 97: Post-closure Safety of a Deep Repository for Nuclear spent Fuel in Sweden. Nuclear Energy Agency, Organisation for Economic Co-operation and Development.

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