August 21, 2001

MEMORANDUM TO: Martin Virgilio, Director
Office of Nuclear Material Safety
and Safeguards

FROM: Michael F. Weber, Director /RA/
Division of Fuel Cycle Safety
and Safeguards, NMSS

SUBJECT: EXECUTIVE SUMMARY FOR FOREIGN TRAVEL CONDUCTED BY BRUCE MORAN ON JULY 22 THROUGH 27, 2001

Bruce Moran, of the Office of Nuclear Materials Safety and Safeguards, Division of Fuel Cycle Safety and Safeguards (NMSS/FCSS) traveled to Canada to participate in the meeting of the Geological Repository Safeguards Experts Group held July 24 through 26, 2001, in Gimli, Manitoba (near the Canadian Underground Rock Laboratory). Sixteen persons representing six countries and two international organizations participated in the meeting.

The meeting addressed the need for geophysical monitoring as a component of geological repository safeguards and included a tour of the Underground Rock Laboratory. The visit to the Underground Rock Laboratory, combined with the presentations and discussions held with the facility's miners and geophysicists contributed significantly to the discussions held in Gimli. Significant progress was made on issues related to International Atomic Energy Agency (IAEA) acceptance of proposed spent fuel diversion paths for geological repositories, identification of safeguards measures needed under an integrated safeguards approach, geophysical techniques to be used in geophysical monitoring, and pre-construction baseline measurements of safeguards relevant characteristics for geological repository sites.

The next Experts Group meeting is tentatively scheduled for Sweden in March 2002. The meeting will address the interface between IAEA safeguards and safety to evaluate the possibility of sharing monitoring systems (e.g., tunnel integrity and radiological monitors).

A more detailed report of the meeting is provided in Attachment 1. Minutes of the meeting will be prepared by the Chair of the meeting (Peter Button, Canada) and distributed to the participants.

Attachment: Summary of Meeting

cc: J. Dunn Lee, OIP
M. Peterson, OIP
M. Federline, NMSS
T. Sherr, NMSS
C. Haney, NMSS
R. Lewis, NMSS
M. Kelly, NMSS
C. W. Reamer, NMSS

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Summary of the July 2001 Geophysical Repository Safeguards Experts Group Meeting

Bruce Moran, of the Office of Nuclear Materials Safety and Safeguards, Division of Fuel Cycle Safety and Safeguards (NMSS/FCSS) and Mark Abhold, Los Alamos National Laboratory (LANL), traveled to Canada to participate in the meeting of the Geological Repository Safeguards Experts Group held July 24 through 26, 2001, in Gimli, Manitoba (near the Canadian Underground Rock Laboratory). Sixteen persons representing six countries (i.e., Belgium, Canada, Finland, Germany, Sweden, and the United States) and two international organizations (i.e., Euratom and International Atomic Energy Agency) participated in the meeting. Participation at the meeting was expanded from the previous meetings through the addition of Belgium and an additional program manager from the IAEA.

During the first day of the meeting, reports from the participating states were presented and action items from the previous meeting were reviewed. On the second day, presentations were made at the Canadian Underground Rock Laboratory and the facility was toured. Reports were provided on Geological Repository Safeguard and Integrated Safeguards (IAEA); ESARDA considerations on the influence of integrated safeguards on the back-end of the fuel cycle (Sweden); data relevant to a geological repository safeguards baseline (Canada); questions and answers on baseline measurements (Canada); geophysical methods used in site screening, evaluation, and characterization (Canada); geophysical characterization of fractured granite relative to geological repositories (Canada); overview of Canada's high-level waste management program (Canada); status of the Canada's geological repository (Canada); and status of Germany's geological repository (Germany). The tour of the repository included a description of the facility and stops at the 130, 240, and 420 m depth levels. Presentations during the tour of the underground areas addressed scenarios for clandestine retrieval of spent fuel from the repository and characteristics of the rock relative to geophysical monitoring. The visit to the Underground Rock Laboratory, combined with the discussions held with the Canadian miners and geophysicists, contributed significantly to achieving progress during the Experts Group discussions.

During the discussion of action item status, Mr. Moran informed the other participants that, after a discussion of the priorities of U.S. support projects with the IAEA, the U.S. Government had decided that it would not undertake the specific actions proposed for U.S. study at the previous meeting. Only U.S. participation on the Experts Group would be supported at this time.

The third day of the meeting addressed issues identified during the first two days of the meeting. The initial discussion addressed details on how geophysical methods would be used and what specific information would be needed for establishing site baseline characteristics. Discussions were based on a reestablished understanding of the safeguards approach; agreement on the need for geophysical monitoring both within traditional and integrated safeguards; and agreement on the definition of baseline measurements. Significant progress was made on the following four issues:

1. Diversion paths. The IAEA program managers agreed that undeclared excavations represented a credible diversion path that must be addressed by the safeguards approach. Under a traditional safeguards approach for the underground facility, geophysical monitoring supported by satellite surveillance would be used to detect this diversion path. This view must receive IAEA management concurrence.

ATTACHMENT

2. Integrated safeguards. A proposal for the application of integrated safeguards to the underground facility of geological repositories was prepared. Under integrated safeguards, geophysical monitoring from the surface would be replaced by complementary access inspections. The complementary access inspections would search for undeclared portals to the underground at locations on and neighboring the repository site. The remaining elements of the underground facility's safeguards approach would remain in place. The IAEA program managers will provide this proposal to IAEA management for their consideration.

3. Geophysical monitoring techniques. The participants agreed that passive seismic monitoring from the surface and seismic and ground-penetrating radar techniques from within the tunnels would be the most generally applicable geophysical methods for geological repository safeguards. At repository depths, the brine and/or clay content of the geological layers through which signals must pass are expected to prevent effective surface implementation of the electromagnetic methods. In addition, at repository depths, active seismic techniques used from the surface would not have sufficient resolution to identify undeclared tunnels.

4. Safeguards baseline. The participants agreed that the only safeguards technique that should have a baseline established before excavations begin was satellite surveillance. The value of a passive seismic/acoustic baseline before excavations are initiated remained unresolved. It was agreed that an environmental sampling baseline should be established immediately before nuclear materials are received on the site.

Two other issues were addressed but not resolved:

1. Declaring emplaced spent fuel to be "retained waste." The retained waste designation applies to nuclear materials of low interest to safeguards that do not meet the safeguards termination criteria. For these materials, annual inventories are not required but the operator must maintain a record of the materials present. The requirements appeared to match the geological repository safeguards proposals. This issue may be further discussed at the next meeting after the participants have had time to evaluate the implications of such a declaration.

2. Danger of false indications of diversion from geophysical techniques. As the geophysical monitoring technology improves and becomes more sensitive and as excavation of the repository changes underground water and brine conditions, new data from the geophysical monitors may be different from past readings. These changes could be interpreted as indicators of possible actions related to a diversion of spent fuel. Additional information is needed to address this issue.

The IAEA Program Manager asked if the U.S. would lead and provide experts to the safeguards team the IAEA plans to assemble to review Finland's geological repository plans and to develop a site-specific safeguards approach. The U.S. participants responded that the U.S. would consider the request. A participant from Germany volunteered to begin to assemble questions that the safeguards team should address during the review.

The next meeting is tentatively scheduled to be held in Sweden during March 2002. The meeting will address the interface between IAEA safeguards and geological repository safety programs to evaluate the possibility of sharing monitoring systems (e.g., tunnel integrity and radiological monitors).