

February 21, 1995

MEMORANDUM FOR: Malcolm R. Knapp, Director
Division of Waste Management, NMSS

FROM: Margaret V. Federline, Chief
Medical, Academic, and Commercial
Use Safety Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

SUBJECT: FOREIGN TRIP REPORT: INTERNATIONAL PEER REVIEW OF THE
CANADIAN CONCEPT FOR THE DISPOSAL OF SPENT FUEL, WINNEPEG,
PINAWA, TORONTO, CANADA - JANUARY 21-27, 1995

Dr. Budhi Sagar, Technical Director of the Center for Nuclear Waste Regulatory Analyses, and Margaret Federline, Chief, Medical, Academic, and Commercial Use Safety Branch, Division of Industrial and Medical Nuclear Safety participated at the invitation of the OECD Nuclear Energy Agency (NEA) in an international peer review of the Canadian concept for the disposal of spent fuel. This review was held in Winnepeg, Pinawa, and Toronto, Canada, on January 21-27, 1995. The attached report which I have coordinated with Dr. Sagar summarizes the background, approach to conducting the peer review, and preliminary conclusions of the review. I will provide a copy of the final report of the peer review when completed by the group late in March.

A major insight that I drew from this experience is the exceptional value of such international peer reviews of high level waste disposal concepts and methodologies, not only to the country undergoing review, but also to the participants of the review. NEA is to be commended for taking the leadership for such reviews through the Radioactive Waste Management Committee. Because only a small number of repositories will be developed worldwide, intense and focused participation in such peer reviews can afford us valuable insights into how effectively the research and development, site investigation, and performance assessment methodologies are supporting a demonstration of long term performance and how other countries are scrutinizing such demonstrations through their regulatory approach. Valuable insights can also be gained from initiatives in countries such as Canada to enhance public involvement in the regulatory process. I strongly recommend that both the NRC staff and CNWRA

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TRIP REPORT

February 15, 1995

OFFICIAL TRAVELERS:
Margaret V. Federline
Dr. Budhi Sagar

TRAVEL TO: Winnipeg, Pinawa, Toronto,
Canada

BEGINNING ON: 01/21/95
UNTIL: 01/27/95

OFFICE: NMSS

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MEETING TITLE AND/OR AFFILIATION:

International Peer Review of the Canadian Concept for Disposal of
Spent Nuclear Fuel

ORGANIZED BY: Nuclear Energy Agency Secretariat

SUMMARY OF MEETING RESULTS:

Margaret Federline, Chief, Medical, Academic, and Commercial Use Safety Branch, Division of Industrial and Medical Nuclear Safety, Office of Nuclear Material Safety and Safeguards, and Dr. Budhi Sagar, Technical Director of the Center for Nuclear Waste Regulatory Analysis (CNWRA) participated at the invitation of the OECD Nuclear Energy Agency (NEA) in an international peer review of the Canadian concept for the disposal of spent fuel. The peer review group composed of developers and regulators of waste disposal programs from eight countries, broadly reviewed the Canadian waste disposal concept developed by the Atomic Energy of Canada Limited (AECL) and Ontario Hydro. The group reviewed an Environmental Impact Statement (EIS) and nine primary references prepared by AECL to support the acceptability of the concept. The proposed concept envisions deep geologic disposal at depths of 500-1000 meters in the plutonic rock of the Canadian shield using a multi-barrier approach with a series of engineered and natural barriers.

In 1978, the Governments of Canada and Ontario, jointly announced the Canadian Nuclear Fuel Waste Management Program to develop a deep underground repository for the disposal of spent nuclear fuel in intrusive rock of the Canadian Shield. The Federal government's agent, AECL, was given the responsibility for developing the disposal concept. The provincial agent, Ontario Hydro, has supported AECL's work, and developed options for the interim storage and

transportation of the spent nuclear fuel. In developing these technologies, Canada and Ontario, agreed that siting would not be addressed until the disposal concept had been found to be safe, acceptable and technically feasible.

In 1988, after more than 10 years of research, AECL considered that the disposal concept was ready for review, and asked the Minister of Natural Resources to refer the disposal concept for spent nuclear fuel to the Minister of Environment for a public review. In 1989, the Minister of the Environment appointed the Environment Assessment Panel (Panel) to undertake an environmental assessment and review process (EARP), on the concept of deep geological disposal of spent nuclear fuel in Canada and related waste management issues.

In 1990, the Panel held a series of open houses and scoping sessions across Canada, and extensive and varied participation from private citizens, associations, and environmental groups resulted in the identification of a diverse range of related waste management issues ranging from technical to socio-economic and ethical concerns.

The information presented at the scoping sessions was used by the Panel in developing the EIS guidelines issued to AECL in March 1992. AECL subsequently prepared the EIS and submitted it, along with nine supporting Primary References, to the Panel in October 1994. The EIS is presently undergoing a 9-month public review to determine if it meets the guidelines. If there are no deficiencies, public hearings could begin later this year.

The objective of the NEA international peer review was to provide an independent, expert review of the disposal concept developed by the AECL. It is anticipated that Natural Resources Canada will provide the final report of the NEA peer review to the Panel, as part of the documentation for the upcoming public hearings scheduled to begin later this year. This report will form part of the information considered by the Panel when it comes forward with its recommendations to the two Ministers of Environment and Natural Resources on the acceptability of the disposal concept, and the next steps for the long-term management of spent nuclear fuel in Canada.

Although, Ms. Federline and Dr. Sagar were unable to attend because of conflicting priorities, the peer review group met in Paris at the NEA on November 24, 1994, to interpret the mandate, identify the scope of the review, and to develop working procedures. The review was structured to benefit from experience gained in other countries, and the reviewers knowledge of the Canadian program, as well as the EIS documentation. The review generally focused on: (1) scientific and technical information supporting the relevance of the concept; (2) a review of the methodologies used to integrate the scientific and technical information into the development of the overall disposal concept; (3) a review of the modelling activities and techniques to build confidence; and (4) a review of the underlying assumptions and overall degree of conservatism in demonstrating the robustness of the overall safety case.

Prior to the meeting in Canada, the peer review group members thoroughly reviewed the EIS and supporting references which focused on post closure assessments. Written comments and questions developed by the reviewers were provided to Natural Resources Canada in order to focus the on-site review and discussions. On January 22, 1995, the peer review group held a working session in Winnipeg, Canada. On January 23, 24 and 25, the peer review group met with Natural Resources Canada and AECL at the Whiteshell facility in Pinawa, Canada, to discuss the EIS, the post closure assessment methodology, geosphere and biosphere modelling activities and disposal facility engineering. On January 26 and 27, the review group met in closed session to discuss issues raised in the review and to develop a consensus on the outline and conclusions of the review group report.

On the afternoon of January 27, the review group met with management representatives from Natural Resources Canada, AECL, Ontario Hydro and staff of the independent panel to discuss its preliminary conclusions. The group acknowledged the pioneering role of Canada in the development of probabilistic safety assessment as well as the international recognition of the quality of the Canadian Nuclear Waste Management Research Program. The EIS documentation and supporting reference documents reflect an excellent understanding of the scientific issues and reflect a well-balanced investigational effort. The review group generally concluded that the concept has been sufficiently demonstrated and that a state of knowledge exists which would strongly benefit from moving to the siting phase. It was felt that the issues that remain can best be addressed in parallel with siting activities.

Some issues of concern to the review group were also outlined. The review group recognized potential differences in interpretation of Atomic Energy Control Board regulations especially as these relate to the safety beyond the time period of 10,000 years. It was indicated that the post-closure safety results obtained using the SYVAC code lacked transparency because of the very large number of parameters and the way SYVAC scenarios were distinguished from human intrusion scenarios. In addition the SYVAC codes and other research codes will need to be validated before their application to an actual site. The group noted that the application of the methodology used in the EIS to a real site will have to be more rigorous. Also, the review group cautioned that the case study included in the EIS is based on the Underground Research Laboratory site at which the rock characteristics are extremely favorable and that a site with less favorable characteristics may not demonstrate such wide margins of safety. A final report of the peer review is planned to be completed by March 1995.

A major insight that I drew from this experience is the exceptional value of such international peer reviews of high level waste disposal concepts and methodologies, not only to the country undergoing review, but also to the participants of the review. NEA is to be commended for taking the leadership for such reviews through the Radioactive Waste Management Committee. Because only a small number of repositories will be developed worldwide, intense and focused participation in such peer reviews can afford us valuable insights

into how effectively the research and development, site investigation, and performance assessment methodologies are supporting a demonstration of long term performance and how other countries are scrutinizing such demonstrations through their regulatory approach. Valuable insights can also be gained from initiatives in countries such as Canada to enhance public involvement in the regulatory process. I strongly recommend that both the NRC staff and CNWRA personnel continue to participate in such peer reviews to benefit from the perspectives of others who are facing similar challenges in siting and regulating high level waste disposal facilities.

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Attachment: Trip Report

cc: J. Taylor, EDO
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R. Bernero, NMSS
C. Paperiello, NMSS
R. Brady, SEC/ADM
OPA

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DATE	02/21/95											

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