March 21, 2007

MEMORANDUM TO: Jennifer L. Uhle, Deputy Director
Materials Engineering
Division of Fuel, Engineering and Radiological Research
Office of Nuclear Regulatory Research

FROM: C. E. Carpenter, Sr. Materials Engineer ***/RA/***
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SUBJECT: SUMMARY OF INFORMATION EXCHANGE MEETING BETWEEN THE NRC AND IRSN STAFFS

On January 25-26, 2007, the U.S. Nuclear Regulatory Commission's (NRC) Offices of Nuclear Regulatory Research (RES), Nuclear Reactor Regulation (NRR), and New Reactors (NRO), hosted representatives from France's Institut de Radioprotection et de Sûreté Nucléaire (Institute for Radiation Protection and Nuclear Safety, IRSN), for a non-public information exchange meeting. The two major topic areas for this meeting were reactivity-initiated accidents (RIAs) and loss-of-coolant accident (LOCA) evaluation methods. Meeting attendees are included in Enclosure 1, and the presentations are included in Enclosures 2-17.

Dr. Brian Sheron, Director, RES, began the meeting on Thursday, January 25, 2007, with an overview of the NRC's Office of Nuclear Regulatory Research (Enclosure 2, ML070790057). This was followed by an overview of the IRSN organization (Enclosure 3, ML070780289, ML070780295) by Alain Chabod, Head, IRSN's Reactor Safety Division, and by François Barre, Head, IRSN's Fuel Accident Department. Mr. Chabod gave an overview (Enclosure 4, ML070780283) of the evolution of the fuels used in the various French nuclear power plants (NPPs). This was followed by a presentation (Enclosure 5, ML070780568) by Ralph Landry, Acting Chief, Nuclear Performance and Code Review Branch, NRR, of fuel performance trends in the U.S.

Regarding the RIA presentations, David Boirel of IRSN's Safety Reactor Division discussed France's safety demonstration status and its evolution since 1974 (Enclosure 6, ML070800041). Aude Foucher-Aisne, also of IRSN's Safety Reactor Division, described the high burn up criteria status and their evolution (Enclosure 7, ML070780269). Marc Petit, Head of Laboratory in IRSN's Major Accident Prevention Division, discussed the physical phenomena that were taken into account in the RIA safety demonstration (Enclosure 8, ML070780279). Paul Clifford, of NRR's Nuclear Performance and Code Review Branch, presented the NRC's RIA interim acceptance criteria (Enclosure 9, ML070780504). This was then followed by a brief discussion of areas of potential collaboration, which is described further below.

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Sandrine Bouton of the Safety Reactor Division presented IRSN's work program for LOCA safety demonstration reexamination (Enclosure 10, ML070780374). Georges Hache then presented the physical phenomena to be taken into consideration during a LOCA analysis (Enclosure 11, ML070780377, ML070780378), and the considerations and questions raised by a review of research and development work into the LOCA acceptance criteria (Enclosure 12, ML070780307, ML070780374). Finally, Sébastien Israel discussed the design break LOCA safety issues (Enclosure 13, ML070780381, ML070780384). The meeting was then adjourned for the day.

On Friday, January 26, 2007, Mr. Landry resumed the presentations with a discussion of the NRC's LOCA approach in the current 10 CFR 50.46 (Enclosure 14, ML070780605, ML070780612). Ralph Meyer, RES, discussed embrittlement criteria in 10 CFR 50.46 for LOCAs (Enclosure 15, ML070790047, ML070790052). Robert Tregoning, RES, presented a description of the development of passive system LOCA frequencies for the proposed risk-informing of 10 CFR 50.46 by using an expert elicitation process by which pipe failure frequencies were obtained (Enclosure 16, ML070790060); and, Richard Dudley, NRR, described the status of the proposed rule for risk-informing of 10 CFR 50.46 (Enclosure 17, ML070780534).

At the conclusion of the discussions on RIA and LOCA, the NRC and IRSN staff discussed potential areas of cooperation. Specifically, regarding RIA collaboration, the following areas were proposed:

- Discussion of what tests to be conducted at CABRI water loop – J. Voglewede/M. Petit
- Compare NRC Codes to IRSN Codes – J. Voglewede/M. Petit
- Share results of IRSN's PATRICIA tests – NRC/M. Petit
- Obtain information on EPRI's NFIR test – NRC/M. Petit
- Fuel-coolant interaction information – NRC/M. Petit and A. Taisne
- Spallation criteria – NRC/M. Petit and A. Taisne
- Orientation of hydrides in different vendor's products – NRC/M. Petit
- Fission gas release as function of cladding constraint – H. Scott/M. Petit
- Exchange of regulatory approach documents (NUREGs, Standard Review Plans, etc.) – NRC/D. Boirel and A. Taisne

With regards to LOCA cooperation, the following areas were proposed:

- Uncertainty - all aspects
- Discussion on Code reviews and methodology (e.g., ASTRUM), and review, assessment and approval of 3D analysis methods
- Expulsion and movement of fuel
- Information exchange on EPR LOCA management, especially depressurization
- Information exchange on modification of LOCA acceptance criteria
- Discussion on maximum blockage evaluation (ductile), predicting of coolability of blockage, and treatment of balloon/burst region
- High-pressure oxidation
- Boron dilution PRA
- SBLOCA pump trips
- TBS determination; whip restraints

The meeting ended with an agreement to continue information exchanges on relevant technical materials.

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