

November 30, 2011

MEMORANDUM TO: Doug Weaver, Deputy Director
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

FROM: Haile Lindsay, Thermal Engineer **/RA/**
Thermal and Containment Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

SUBJECT: SUMMARY OF NOVEMBER 1, 2011, SFST TECHNICAL EXCHANGE
PUBLIC MEETING

Background

On November 1, 2011, a meeting was held in the Executive Boulevard Building, Rooms 1-B-13 and 1-B-15. No proprietary information was discussed at the meeting. No regulatory decisions were requested or made at the meeting.

The meeting was noticed in on October 18, 2011 and is available in ADAMS under Accession No. ML112911440. The list of meeting attendees is provided as Enclosure 1. A listing of the Technical Exchange presentations is available at ML113120287.

Discussion

The Division of Spent Fuel Storage and Transportation (SFST) hosted its first SFST Technical Exchange on Tuesday, November 1, 2011, from 7:30 am to approximately 4:30 pm. The Technical Exchange began with welcome and opening remarks from Doug Weaver, Deputy Director of SFST. Upon completion of his remarks, a break occurred in order to split the rooms into the two concurrent technical sessions.

Summary from the Technical Session Entitled "Interfaces between Storage and Transportation Casks"

There were two main topics in this session chaired by Meraj Rahimi, Chief of the Criticality Shielding and Dose Assessment Branch. In the morning, the subject was high-burnup fuel and in the afternoon, the discussion focused on the interface between the regulations in 10 CFR Part 71 and Part 72.

Dr. Robert Einziger of the U.S. Nuclear Regulatory Commission (NRC) gave the first presentation in the high-burnup fuel panel. He presented the progress and results of some of the NRC's research programs on cladding for high-burnup fuel. This presentation was followed by that of Albert Machiels of Electric Power Research Institute (EPRI) who further discussed

other research and development on high-burnup cladding from industry programs. These talks focused on the state of the research on high-burnup cladding. The panel presentations shifted to alternative methods to performing criticality evaluations in the case that the performance of the cladding and fuel is unknown as may be for high-burnup fuel. Dr. John Vera of the NRC, Charles Pennington of NAC International, and Keith Morton from Idaho National Laboratory gave talks on moderator exclusion. Dr. Vera focused on the regulatory framework and history of moderator exclusion. Charles Pennington also gave some history with his overall conclusion being that moderator exclusion was an outdated regulation and someone should initiate rulemaking to change it. The main emphasis from Keith Morton's presentation was that packages should have (or get credit for existing) leak tight canisters to satisfy the rule. The last two presentations of the morning session were focused on fuel reconfiguration. The presentation by Dr. David Tang and Dr. Zhian Li of the NRC discussed the implications to criticality and radiation safety in the case of fuel reconfiguration. In the last presentation, Albert Machiels of EPRI argued that the effect on criticality from reconfiguration is small compared to other risks and given other conservative regulatory requirements and analytical assumptions.

The first presentation in the afternoon session on the interface between Part 71 and Part 72 was provided by Earl Easton of the NRC. His presentation discussed the possibility of the definition of "retrievability" being based on a canister and not the fuel assembly given the change to and uncertainty in permanent disposal options for spent fuel. Adam Levin of Exelon also made a presentation about retrievability. He discussed some of the complications in this area due to the many different parties involved: industry, EPRI, Department of Energy (DOE), and NRC. He encouraged retrievability to be a canister/cask based approach. Dr. Einziger gave the next presentation. He talked about acceptance testing and aging management, stressing the importance of taking steps to understand the condition of the components at the end of storage. Jim Connell from Maine Yankee gave a presentation about aging management and discussed the program in place there at the facility. The last two presentations then talked about the possibility of performing a single criticality analysis for Part 71 and Part 72. Andrew Barto of the NRC presented the first presentation on this subject. He introduced the idea of performing a criticality analysis using burnup credit, versus boron credit, when submitting a Part 72 application. Prakash Narayanan from Transnuclear (TN) gave another presentation in this area, focusing also on burnup credit.

After the two sessions, Meraj Rahimi presented a summary of the two sessions and then the audience had a chance to discuss any further questions or comments with the panelists.

Summary from the Technical Session Entitled "Seismic Issues for Dry Cask Storage Systems and Industry Updates on Existing Technical Issues"

This session chaired by David Pstrak, Chief of the Structural Mechanics and Materials Branch, was established to discuss three separate topics, as follows: 1) methodologies for conducting analysis of the free-standing stack-up configuration during vertical dry cask spent fuel loading operations; 2) a status update of the North Anna Earthquake Event and discuss the performance of the Independent Spent Fuel Storage Installations (ISFSIs) at the North Anna Power Station during the earthquake that took place on August 23, 2011; and 3) to hear input from industry on updates related to two technical issues as part of the Regulatory Issues Resolution Protocol (RIRP) activities.

During the first portion of this panel, Dr. Gordon Bjorkman of the NRC made a presentation entitled "Methodologies Acceptable to the Staff for Performing Seismic Stability Analyses of a Stack-up Configuration within a 10 CFR Part 50 Facility." Additionally, representatives from

industry provided presentations, with the following titles: "Proposed Methodology for Free-standing Stack-up Analysis" (presented by Chuck Bullard of Holtec International); "Comanche Peak Nuclear Power Plant Free-Standing Seismic Analysis" (presented by Bruce Henley from Luminant); "Discussion for Seismic Stack-up" (presented by Michael Yaksh of NAC International).

Discussions that were generated after these presentations were focused around the need for stack-up activities, given that generally licensed storage cask systems listed in 10 CFR 72.214 as approved cask systems, do not incorporate such steps.

In the afternoon session, Bob Tripathi of the NRC made a presentation entitled "SFST Staff's Perspective on Status of ISFSIs at North Anna Nuclear Power Plant after the Seismic Event of August 23, 2011", which described the seismic event that occurred at the North Anna Power Station and the status of the two onsite ISFSIs after this event. Additionally, Dr. Bjorkman provided a presentation entitled "The Possible Influence of ISFSI Pad Flexibility on the Sliding Response of Casks at North Anna due to the Earthquake of August 23, 2011," which described the theory related to how the TN-32 storage casks performed during the seismic event, and what caused them to move several inches on the ISFSI pad.

During the final portion of the afternoon session, industry provided presentations on two technical issues associated with the RIRP activities. One presentation was entitled "Efforts on SCC of Spent Fuel Canisters in Marine Environments in RIRP and ESCP," and was presented by Keith Waldrop of EPRI, and was focused on the Stress Corrosion Cracking phenomenon associated with dry storage casks in marine environments. The second presentation, dealing with top nozzle corrosion cracking, was entitled "Update on PWR Fuel Top Nozzle Stress Corrosion Cracking Implications for 10 CFR 72 and 71", was presented by Brian Gutherman of Gutherman Technical Services, and provided a summary of the interactions between the NRC and industry to resolve technical issues related to this topic. Both of these issues will be discussed in greater detail during an upcoming public meeting.

Upon completion of the two concurrent technical sessions, the Technical Exchange concluded with Doug Weaver providing some closing remarks and answering questions regarding logistics for the Regulatory Conference that would take place on November 2 and 3, 2011, in the Two White Flint North Auditorium.

TAC No. L24378

Enclosure 1: Meeting Attendees
Enclosure 2: Agenda

**2011 SFST Technical Exchange
Nuclear Regulatory Commission
November 1, 2011
Meeting Attendees**

Vonna Ordaz	NMSS/SFST
Kristina Banovac	NMSS/SFST
Doug Weaver	NMSS/SFST
Jeremy Smith	NMSS/SFST
Andrew Barto	NMSS/SFST
Raynard Wharton	NMSS/SFST
Jason Piotter	NMSS/SFST
Earl Easton	NMSS/SFST
Bob Einziger	NMSS/SFST
Matthew Gordon	NMSS/SFST
Michele Sampson	NMSS/SFST
Gordon Bjorkman	NMSS/SFST
Bob Tripathi	NMSS/SFST
Eric Benner	NMSS/SFST
Neil Day	NMSS/SFST
Zhian Li	NMSS/SFST
David Tang	NMSS/SFST
Daniel Forsyth	NMSS/SFST
Clyde Morell	NMSS/SFST
Huda Akhavannik	NMSS/SFST
John Goshen	NMSS/SFST
John Vera	NMSS/SFST
Joe Borowsky	NMSS/SFST
Jon Woodfield	NMSS/SFST
Haile Lindsay	NMSS/SFST
Alexis Sotomayor-Rivera	NMSS/SFST
Norma Garcia-Santos	NMSS/SFST
Luis Cruz	NMSS/SFST
Eli Goldfeiz	NMSS/SFST
Lucieann Vechioli	NMSS/SFST
Veronica Wilson	NMSS/SFST
Meraj Rahimi	NMSS/SFST
David Pstrak	NMSS/SFST
Tae Ahn	NMSS/SFAS
Jack Gwo	NMSS/SFAS
Mysore Nataraja	NMSS/SFAS
Banad Jagannath	NMSS/SFAS
Kwanhee Lee	NMSS/SFAS
Tim Sippel	NMSS/FCSS
Anne T. Boland	NRC/Region III
Rhex Edwards	NRC/Region III
Robert Carrion	NRC/Region II
Dan Hoang	NRC/NRR
Steven Jones	NRC/NRR
Elva Bowden-Berry	NRC/OGC

Pravin Patel	NRC/NRO
Richard Lee	NRC/RES
Don Algama	NRC/RES
Pat Thurman	Zion Solutions
Jack Bailey	Zion Solutions
Kamran Tassavoli	Transnuclear
David Lee	Transnuclear
Yegeniy Terekin	Transnuclear
Philippe Pham	Transnuclear
Prakash Narayanan	Transnuclear
Jerzy Mackiewicz	Transnuclear
Ray Termini	Exelon
John Schrage	Exelon
Adam Levin	Exelon
Marc Nichol	NEI
Rod McCullum	NEI
Charlie Pennington	NAC
Craig Seaman	NAC
Wren Fowler	NAC
Mike Yaksh	NAC
Tom Danner	NAC
Kaushik Banerjee	Holtec
Tammy Morin	Holtec
Venkat Prabhala	Holtec
Anveshan Bommarreddi	Holtec
Stefan Anton	Holtec
Steve Ewens	Ameren Missouri
Richard Lutz	Ameren Missouri
Kris Cummings	Westinghouse
Robert Quinn	Westinghouse
Jim Andrachek	Westinghouse
Jeff England	SRNL
Dan Leduc	SRNL
Randy Robbins	Dominion
Kent Wietharn	Dominion
S. Lee Samson	Xcel Energy
Jennie Eckholt	Xcel Energy
Gary Weber	AEP/DC Cook Nuclear Plant
Sam Bakhtiari	AEP/DC Cook Nuclear Plant
Albert Machiels	EPRI
Keith Waldrop	EPRI
Cecil Parks	ORNL
Gregory Hall	CH2M-WG Idaho
Andrew Eckhart	So. California Edison
Steven Edwards	Progress Energy
James Connell	Maine Yankee
Robert Mitchell	Yankee Rowe
Eileen Supko	Energy Resources, Inc.
Steve Maheras	PNNL
Yung Liu	ANL
Abdelhalim Alsaed	ENS/INL

Andy Langston
Terry Sides
Brian Gutherman
Bob Keck
Jana Bergman
Carlyn Greene
Bruce Henley
Beth Quattlebaum
Dennis Vandeputte
Donna Haviland
Larry Parker
Jim Steinke
Richard Penney
Jimmy Williams
John Orchard
Carl Benhardt
Maureen Conley

TLI
Southern Nuclear
GTS
DTE Energy
Scientech
UX Consulting
Luminant Power
SCANA – SCE & G
Nine Mile Point
FENOC
Pacific Gas and Energy
Huntington Ingalls Industries
NJ Dept. of Env. Protection
Western Governors' Assoc.
DOE-NV
WSMS

2011 SFST TECHNICAL EXCHANGE AGENDA

November 1, 2011, 8:30 a.m. – 4:45 p.m. (Eastern Daylight Time)

Executive Boulevard Building, Room 1-B-13/B-15

- 7:30 a.m. – 8:30 a.m. Check-in (Security) and Registration
- 8:30 a.m. – 8:45 a.m. Welcome and Opening Remarks*
Doug Weaver, Deputy Division Director, NRC/SFST
- 8:45 a.m. – 9:00 a.m. Morning Break to convene into technical panel sessions
- 9:00 a.m. – 12:00 p.m. Concurrent Morning Technical Sessions

<p align="center">Interfaces Between Storage and Transportation Casks**</p> <p align="center">Moderator: Meraj Rahimi, Branch Chief, NRC/SFST</p> <p align="center">Room EBB-1-B-13</p>	<p align="center">Seismic Issues for Dry Cask Storage Systems and Industry Update on Existing Technical Issues***</p> <p align="center">Moderator: David Pstrak, Branch Chief, NRC/SFST</p> <p align="center">Room EBB-1-B-15</p>
<p>Panel Discussion on High Burnup Fuel</p> <p>Purpose: This session will include discussions on alternatives for addressing criticality safety requirements for high burnup fuel transportation.</p> <p>NRC's View on Cladding Material Properties – Bob Einziger</p> <p>Industry's View on Cladding – Albert Machiels, EPRI</p> <p>NRC's View on Moderator Exclusion – John Vera</p> <p>Industry's View on Moderator Exclusion – Charles Pennington, NAC; and Dana K. Morton, INL</p> <p>NRC's View on Reconfiguration – David Tang and Zhian Li</p> <p>Industry's View on Reconfiguration – Albert Machiels, EPRI</p>	<p>Panel Discussion on Stack – Up Analysis</p> <p>Purpose: Discuss methodologies for conducting analysis of the free-standing stackup configuration during vertical dry cask spent fuel loading operations.</p> <p>NRC's View on Stack-Up Analysis – Gordon Bjorkman</p> <p>Industry's View on Stack-Up Analysis – Chuck Bullard, Holtec; Bruce Henley, Luminant; and Michael Yaksh, NAC</p>

12:00 p.m. – 1:00 p.m. Lunch

1:00 p.m. – 3:45 p.m. Concurrent Afternoon Technical Sessions

<p style="text-align: center;">Interfaces Between Storage and Transportation Casks</p> <p style="text-align: center;">Moderator: Meraj Rahimi, Branch Chief, NRC/SFST</p> <p style="text-align: center;">Room EBB-1-B-13</p>	<p style="text-align: center;">Seismic Issues for Dry Cask Storage Systems and Industry Update on Existing Technical Issues</p> <p style="text-align: center;">Moderator: David Pstrak, Branch Chief, NRC/SFST</p> <p style="text-align: center;">Room EBB-1-B-15</p>
<p>Panel Discussion on Part 71/72 Interface</p> <p>Purpose: This session will focus on the retrievability requirements (by assembly/canister), casks/contents integrity after a period of storage and the use of a common criticality safety method for satisfying requirements both under 10 CFR 71 and 72.</p> <p>NRC's View on Retrievability – Earl Easton</p> <p>Industry's View on Retrievability – Adam Levin, Exelon Corporation</p> <p>NRC's View on Acceptance Testing and Aging Management – Bob Einziger</p> <p>Industry's View on Acceptance Testing and Aging Management – Jim Connell, Maine Yankee</p> <p>NRC's View on Burnup Credit vs. Boron Credit – Drew Barto</p> <p>Industry's View on Burnup Credit vs. Boron Credit – Prakash Narayanan, Transnuclear</p>	<p>Panel Discussion on the Status of the North Anna Nuclear Power Plant Earthquake Event and ISFSIs</p> <p>Purpose: Provide a status update of the North Anna Earthquake Event and discuss the performance of the ISFSIs at the North Anna Power Station during the earthquake that took place on Tuesday, August 23, 2011.</p> <p>NMSS/SFST's View on the North Anna Earthquake Event – Bob Tripathi and Gordon Bjorkman</p> <p>Panel Discussion on Industry's Update on Regulatory Issues Resolution Protocol (RIRP) Activities</p> <p>Purpose: To receive an update from industry on the two pilot RIRP activities:</p> <ul style="list-style-type: none">- Marine Corrosion: Keith Waldrop, EPRI- Top Nozzle: Brian Gutherman, Gutherman Technical Services

3:45 p.m. – 4:00 p.m. Break to reconvene in room EBB-1B-13/15

4:00 p.m. – 4:30 p.m. Stakeholder questions and feedback

4:30 p.m. – 4:45 p.m. Closing Remarks

4:45 p.m.

Adjourn

* If you want to participate in this session, which lasts from 8:30 a.m. – 8:45 a.m., use the following information: GoToMeeting Link: <https://www1.gotomeeting.com/join/214721648> with the Bridgeline Number: 877-917-1755, and Passcode: 40631.

**** If you want to participate in this session, which lasts from 9:00 a.m. – 3:45 p.m., use the following information: GoToMeeting Link: <https://www1.gotomeeting.com/join/122826616> with the Bridgeline number: 888-603-9610 and Passcode 58086. (Revised)**

*** If you want to participate in this session, which lasts from 9:00 a.m. – 4:45 p.m., use the following information: GoToMeeting Link: <https://www1.gotomeeting.com/join/613405840> with the Bridgeline number: 888-769-9038 and Passcode 54889.