December 1, 2006

MEMORANDUM TO: Christopher P. Jackson, Chief
Generic Communications and Power Uprate Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

FROM: Thomas W. Alexion, Senior Project Manager ***/RA/***
Generic Communications and Power Uprate Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF NOVEMBER 8, 2006, OPEN MEETING WITH THE BOILING WATER REACTOR (BWR) OWNERS' GROUP (BWROG) TO DISCUSS NEDO-33159, REVISION 0, "EXTENDED POWER UPRATE (EPU) LESSONS LEARNED AND RECOMMENDATIONS"

On November 8, 2006, a Category 2 public meeting was held between the U.S. Nuclear Regulatory Commission (NRC) staff and representatives of the BWROG at NRC Headquarters, One White Flint North, 11555 Rockville Pike, Rockville, Maryland. The purpose of the meeting was to discuss (1) the BWROG's planned revisions to NEDO-33159, (2) the BWROG's responses to previous NRC staff comments on NEDO-33159, and (3) any other NRC comments or feedback.

NEDO-33159 provides assistance to BWR licensees that are in the evaluation and implementation phases of an EPU. The BWROG provided NEDO-33159 to the NRC by letter dated November 23, 2004. The letter indicated that the BWROG was providing NEDO-33159 to the NRC for information and not for NRC approval. The NRC provided comments on NEDO-33159 by letter dated January 12, 2005. NEDO-33159 and the NRC's comments on it are focused on potential adverse flow effects due to power uprate operation.

At this meeting, the BWROG presented an overview of its mission, objectives, membership, organization, committees, activities, and its relationship with the BWR Vessel and Internals Project (BWRVIP). The slides presented for this discussion are available in Agencywide Documents Access and Management System (ADAMS) under Accession No. ML063130042. The staff queried the BWROG about who has the lead responsibility for addressing potential adverse flow effects. The BWROG indicated it depends on the component involved and the resolution of the issue. In general, the BWROG has the overall lead for EPU-related issues; however, some components (e.g., steam dryers) are also under the purview of the BWRVIP. The BWROG indicated that it will be deciding who has the lead responsibility for addressing potential adverse flow effects in 2006-2007.

The BWROG also presented responses to the NRC's comments on NEDO-33159 and presented planned revisions to the document. The slides presented for this discussion are

available in ADAMS under Accession No. ML063130048. The BWROG addressed the staff's comments by either identifying where NEDO-33159 already addresses the comment, or by clarifying the document and/or updating the staff on progress on the comment, as appropriate. Some highlights of the discussions are as follows (note that the numbering of the comments in the following three paragraphs is taken from the numbering used in the staff's January 12, 2005, letter to the BWROG, which is also the same numbering of the comments as presented in this meeting by the BWROG):

Comment 3: In response to this comment regarding the appearance of too narrow a focus on acoustic loads as the only significant loads acting on the steam dryer, the BWROG indicated that current plans are to reference the status of efforts to define dryer loads in the planned revision to NEDO-33159. The staff queried the BWROG regarding consideration of a design procedure for evaluation of the loads on the steam dryer. The BWROG indicated that this has not been decided.

Comment 4: In response to this comment regarding providing specific recommendations for power ascension testing (i.e., specific hold points, durations, inspections, methods), the BWROG indicated that it plans to revise NEDO-33159 to discuss the development of a startup test matrix; however, this would be more process oriented and not would not involve plant-specific details. The staff indicated that guidance in this area would help improve the quality of plant-specific applications and would allow the staff to focus on more significant areas, such as the load definition and stresses due to acoustic resonances.

Comment 7: In response to this comment regarding whether the lessons learned from the detailed implementation of the vulnerability assessment conducted by Exelon for EPU operation of Dresden and Quad Cities was incorporated in NEDO-33159, the BWROG indicated that the significant details are included in Appendix C of the document. However, the staff replied that it didn't see any discussion of main steam line piping and components (e.g., electromatic relief valves) in Appendix C of the document. The BWROG indicated that this comment was helpful.

Regarding planned revisions to NEDO-33159, the BWROG presented planned additions or updates in the following areas: results from the 2005 and 2006 surveys of licensees, additional events from the Institute of Nuclear Power Operations database, recommendations for specific equipment, recommendations on power ascension test program lessons learned, BWR experience on steam dryer loads (Quad Cities, Dresden, and Vermont Yankee), steam dryer inspection and evaluation, operating procedures, project management lessons learned, and licensing process lessons learned. The BWROG indicated that the schedule for the planned revisions is still being developed. The staff's comments on the planned revisions included the following: ensuring that recent electromatic relief valve experience (i.e., January 2006) at Quad Cities is captured, ensuring that contractors can support the project management of EPUs, and ensuring that applications are complete (e.g., ensuring that the steam dryer analyses are complete and not a work in progress).

The NRC staff then presented its draft guidance being considered regarding the review of potential adverse flow effects on reactor vessel internals and nuclear power plant systems. The staff's handout is available in ADAMS under Accession No. ML063130051. The staff's draft guidance covers the following areas: pressure fluctuations and vibration in plant systems, design load definition for BWR steam dryers, BWR steam dryer stress and limit curves, evaluation of other plant components, power ascension data, and long-term monitoring

of potential adverse flow effects. The draft guidance also addresses pressurized water reactor steam generator stress and design margin. The staff's draft guidance also references and provides more detailed guidance in the areas of dynamic testing and analysis for potential adverse flow effects, and vibration assessment programs for potential adverse flow effects. The staff indicated that the schedule for finalizing the draft guidance in applicable sections of the Standard Review Plan and Regulatory Guides is March 2007.

During the meeting, the NRC contractors noted that when surveys are made on power plants which have already implemented EPUs, knowledge of additional data would be useful in understanding why acoustic resonance occurs in some plants but does not in others. For example, the following additional data would be useful:

Reduced velocity (Vr) = V/FD, where

V = steam velocity in the main steam line,
F = acoustic resonance frequency in stand pipe (C/4L),
D = diameter of stand pipe (or closed side-branch),
C = speed of sound in steam, and
L = length of stand pipe.

It would also be beneficial to know the dynamic head and the Mach number in the main steam lines. These parameters would indicate the relationship between: (1) the critical reduced velocity for the onset of acoustic resonance (Vr-critical), (2) Vr at the original licensed thermal power, and (3) Vr at the EPU.

It is noted that the above example was verbally discussed by the NRC contractor during the meeting. The basis for the write-up as shown in the above paragraphs was provided by the contractor after the meeting.

The NRC notes that no decisions were made at the meeting. At the conclusion of the meeting, both the BWROG and the NRC staff expressed their appreciation for each other's support of the meeting.

Members of the public were in attendance. A Public Meeting Feedback form was received. The form indicated that the meeting achieved its stated purpose, helped with the understanding of the topic, provided sufficient opportunity to ask questions, and indicated overall satisfaction with the NRC staff who participated in the meeting. The form also commented that the meeting was an excellent opportunity for the NRC staff to provide draft guidance on the review of EPUs regarding steam dryers. This form has been forwarded to the Office of the Executive Director for Operations.

A list of meeting attendees is enclosed. Please direct any inquiries to Tom Alexion at 301-415-1326, or twa@nrc.gov.

Project No. 691

cc: See next page

Enclosure: List of Attendees

systems, design load definition for BWR steam dryers, BWR steam dryer stress and limit curves, evaluation of other plant components, power ascension data, and long-term monitoring of potential adverse flow effects. The draft guidance also addresses pressurized water reactor steam generator stress and design margin. The staff's draft guidance also references and provides more detailed guidance in the areas of dynamic testing and analysis for potential adverse flow effects, and vibration assessment programs for potential adverse flow effects. The staff indicated that the schedule for finalizing the draft guidance in applicable sections of the Standard Review Plan and Regulatory Guides is March 2007.

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Handout #3: ML063130051 **Package: ML063560148** **Summary: ML**063310413

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Public Meeting with Boiling Water Reactor Owners' Group (BWROG)

Extended Power Uprate (EPU) Lessons Learned and Recommendations

November 8, 2006

Meeting Attendees

NAME	ORGANIZATION
John Wu	NRC
Thomas Scarbrough	NRC
Pei-Ying Chen	NRC
Jennifer Dixon-Herrity	NRC
Donna Wright	NRC
David Lochbaum	Union of Concerned Scientists
George Szasz	Structural Integrity Associates
Enrico Betti	General Electric
Craig Nichols	General Electric
Patricia Campbell	General Electric
Lynne Gunderson	NMC
George Inch	CEG - NMP
Allan Roderick	FPL Energy - DAEC
Tim Long	SNC
Ed Hartwig	TVA - Browns Ferry
Kevin Browning	PPL - Susquehanna
Kathy Picciott	Constellation - Nine Mile Point
James Thorson	Fermi 2 - Detroit Edison
Kamal Manoly	NRC
Tom Alexion	NRC
Randy Bunt	BWROG/SNC
Sharon Eldridge	BWROG/Exelon
Tim Abney	GE/BWROG
Dan Pappone	GE
Jai Rajan	NRC
Vic Shah*	Argonne National Laboratory (ANL)
Tom Mulcahy*	ANL Contractor
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*via teleconference

Enclosure

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