April 27, 2012

MEMORANDUM TO: John R. Jolicoeur, Chief
Licensing Processes Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

FROM: Jonathan G. Rowley, Project Manager ***/RA/***
Licensing Processes Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF MARCH 7, 2012, MEETING WITH THE PRESSURIZED WATER REACTOR OWNERS GROUP REGARDING THE PLAN FOR ADDRESSING BORIC ACID PRECIPITATION TO SUPPORT CLOSURE OF GENRIC SAFETY ISSUE-191

On March 7, 2012, a public meeting was held between the U.S. Nuclear Regulatory Commission (NRC) staff and representatives of the Pressurized Water Reactor Owners Group (PWROG) at NRC Headquarters, One White Flint North, 11555 Rockville Pike, Rockville, Maryland.

The purpose of the meeting was to discuss the PWROG path forward to address the NRC staff concerns that debris associated with Generic Safety Issue (GSI)-191 may affect boric acid precipitation. The NRC staff is concerned that the deposition of debris at the core inlet and within the reactor core will have an influence on the precipitation of boric acid within the core following a cold-leg break in a pressurized water reactor.

The PWROG discussed its plans for resolving the boric acid precipitation issue relative to GSI-191 closure. The program is intended to include the effects of debris that may deposit at the core inlet or within the core. The objective of the PWROG plan is to show that the deposition of debris will not increase the potential for boric acid precipitation. The presentation and discussion centered on the steps the PWROG plans to go though to meet the objective.

The NRC staff requested the PWROG consider the following as it moves forward with the plan:

1) The NRC staff questioned whether the stated objective (the potential for boric acid precipitation in the core is not increased) and the success criteria (a temperature excursion does not occur) were in alignment.

2) The NRC staff stated that an order of magnitude approximation of plant mixing conditions was not adequate and that the mixing conditions should be realistic or conservative during testing.

3) The NRC staff questioned how the proposed computational fluid dynamics model would be able to accurately solve the problem since it was designed for full power flow rates and only modeled one quarter of the vessel. Accident flow rates are orders of magnitude lower than full power. The one-quarter vessel model does not appear to be able to model flow paths for some of the potential break scenarios.

4) The NRC staff stated that the size and shape of the lower plenum should be considered in the test rig.

5) The NRC staff was not sure that the proposed heater bundle in the conceptual design of the test section would provide accurate scaled results due to the limited number of fuel rods modeled. Particularly, the NRC staff was concerned about accurate simulation in the test of circulating currents, wall effects, and head loss from the test rig.

6) During the discussion of the 3x3 test rig results, the NRC staff noted that the lack of transport of debris to the modeled fuel assemblies was not an indication that debris would not transport in the plant. Based on observations made during their visit to the 3x3 facility, the attending NRC staff did not consider the facility adequately or conservatively modeled parameters that could affect debris transport and the flow rate in the test was lower than expected in the plant.

7) The NRC staff had several questions about the planned test conditions. The test conditions should be discussed with the NRC staff prior to the start of any test program.

8) The success criterion for the test program was stated to be no temperature excursion of the heater rods. In discussions, temperature excursion was defined as maintaining temperatures below 800 °F. The NRC staff considers the buildup of fibers and its impact on diffusion into the lower plenum to be a key issue. The NRC staff expressed that temperature is not considered a valid criterion for success in these experiments since it will not address the impact of blockage and degraded diffusion of boric acid into the lower plenum or local degradation of mixing within the core lower regions. The amount of fibrous material that can delay, retard, or prevent diffusion of boric acid into the lower plenum is a key issue. Fibers that collect at the first few spacer grid locations could also inhibit mixing in the core and cause local boric acid concentrations to increase, leading to earlier precipitation. These issues are important to justifying the current assumptions in the vendor's analyses. The NRC staff holds that a "no temperature excursion" as a success criterion, does not apply to these key phenomena as there may not be a temperature excursion during the build-up of boric acid due to fibers inhibiting mixing or diffusion into the lower plenum.

A list of attendees is enclosed. The slide presentations presented by the PWROG representatives can be found in the Agencywide Documents Access and Management System under Accession No. ML12083A004.

Project No. 694

Enclosure:
List of Attendees

4) The NRC staff stated that the size and shape of the lower plenum should be considered in the test rig.

5) The NRC staff was not sure that the proposed heater bundle in the conceptual design of the test section would provide accurate scaled results due to the limited number of fuel rods modeled. Particularly, the NRC staff was concerned about accurate simulation in the test of circulating currents, wall effects, and head loss from the test rig.

6) During the discussion of the 3x3 test rig results, the NRC staff noted that the lack of transport of debris to the modeled fuel assemblies was not an indication that debris would not transport in the plant. Based on observations made during their visit to the 3x3 facility, the attending NRC staff did not consider the facility adequately or conservatively modeled parameters that could affect debris transport and the flow rate in the test was lower than expected in the plant.

7) The NRC staff had several questions about the planned test conditions. The test conditions should be discussed with the NRC staff prior to the start of any test program.

8) The success criterion for the test program was stated to be no temperature excursion of the heater rods. In discussions, temperature excursion was defined as maintaining temperatures below 800 °F. The NRC staff considers the buildup of fibers and its impact on diffusion into the lower plenum to be a key issue. The NRC staff expressed that temperature is not considered a valid criterion for success in these experiments since it will not address the impact of blockage and degraded diffusion of boric acid into the lower plenum or local degradation of mixing within the core lower regions. The amount of fibrous material that can delay, retard, or prevent diffusion of boric acid into the lower plenum is a key issue. Fibers that collect at the first few spacer grid locations could also inhibit mixing in the core and cause local boric acid concentrations to increase, leading to earlier precipitation. These issues are important to justifying the current assumptions in the vendor's analyses. The NRC staff holds that a "no temperature excursion" as a success criterion, does not apply to these key phenomena as there may not be a temperature excursion during the build-up of boric acid due to fibers inhibiting mixing or diffusion into the lower plenum.

A list of attendees is enclosed. The slide presentations presented by the PWROG representatives can be found in the Agencywide Documents Access and Management System under Accession No. ML12083A004.

Project No. 694

Enclosure:
List of Attendees

DISTRIBUTION:
See attached page

ADAMS Accession No.: ML12115A030; Pkg.: ML12116A056; ML12083A004 (Presentation); ML120481076 (Notice) **NRR-106**

OFFICE	PLPB/PM	PLPB/LA	PLPB/ BC	PLPB/PM
NAME	JRowley	DBaxley	JJolicoeur	JRowley
DATE	4/27/2012	4/26/2012	4/27/2012	4/27/2012

OFFICIAL RECORD COPY

Memo to J. Jolicoeur from J. Rowley dated

SUMMARY OF MARCH 7, 2012, MEETING WITH THE PRESSURIZED WATER REACTOR OWNERS GROUP REGARDING THE PLAN FOR ADDRESSING BORIC ACID PRECIPITATION TO SUPPORT CLOSURE OF GSI-191

DISTRIBUTION:

PUBLIC	PLPB R/F	RidsNrrDpr	
RidsNrrLADBaxley	RidsNrrDss	JJolicoeur (Hardcopy)	SBailey
RidsAcrsAcnwMailCenter	JRowley	RidsOgcMailCenter	JackDavis
RidsNrrDssSsib	RidsNrrDprPlpb	SSmith	PKlein
BTitus	JLehning	YHsii	LWard
GMakar			

EXTERNAL DISTRIBUTION:
kurt.flaig@dom.com
madingl@wcnoc.com
andreyts@westinghouse.com
maruscjt@westinghouse.com
bob.schomaker@areva.com
kiran.mathur@pseg.com
William.cross@fpl.com
sumpl@comcast.net
jbergman@curtisswright.com
rohollo@wcnoc.com
finkdj@westinghouse.com
Thomas.remick@sce.com
barnetmk@westinghouse.com
njstring@southernco.com
raloftin@southernco.com
zachart@westinghouse.com
nowinowa@westinghouse.com
mar@nei.org
jcb@nei.org
kepeter@wcnoc.com
testam@firstenergycorp.com
tsande@alionscience.com
dfb4@pge.com
geq1@pge.com
gfergus@entergy.com
kalfier@entergy.com
badkiso@entergy.com
mharr10@entergy.com
wbeckius@chartermi.net
carl.stafford@aps.com

List of Attendees

**Public Meeting with the Pressurized Water Reactor Owners Group (PWROG)
Regarding the Plan for Addressing Boric Acid Precipitation to
Support Closure of Generic Safety Issue-191**

March 7, 2012

Name	**Organization**
Jonathan Rowley	NRC
William Ruland	NRC
Jack Davis	NRC
Steward Bailey	NRC
Greg Makar	NRC
Y. Gene Hsii	NRC
Steve Smith	NRC
Paul Klein	NRC
Brett Titus	NRC
John Lehning	NRC
Leonard Ward	NRC
Richard Loftin	PWROG/Southern Nuclear Company
Jack Stringfellow	PWROG/Southern Nuclear Company
Maurice Dingler	PWROG
Timothy S. Andreychek	PWROG/Westinghouse Electric Company
Kurt Flaig	PWROG/Dominion
John Maruschak	PWROG/Westinghouse Electric Company
Mary Barnett	PWROG/Westinghouse Electric Company
Mark Richter	Nuclear Energy Institute
Jana Bergman	Scientech
Bob Schmaker	PWROG/AREVA NP
Kiran Mathur	PWROG/Pacific Gas and Electric Company
William A. Cross	NextEra Energy Inc.
Paul Leonard	Industry Consultant
Ron Holloway	Wolf Creek Nuclear Operating Company
Tom Remick	Southern California Edison
Dave Fink	Westinghouse Electric Company
Thomas Zachariah	PWROG/Westinghouse Electric Company
Anthony Nowinowski	PWROG/Westinghouse Electric Company
John Butler	Nuclear Energy Institute

ENCLOSURE

Name	**Organization**
Ken Petersen	Strategic Teaming and Resource Sharing
Mike Testa	First Energy Nuclear Operating Company
Timothy Sande*	Alion Science
Gregory Ferguson*	Entergy Nuclear Operations, Inc.
Kristin Alfieri*	Entergy Nuclear Operations, Inc.
Dan Brosnan*	Pacific Gas and Electric Company
Greg Quitoriano*	Pacific Gas and Electric Company
Brian Adkison*	Entergy Nuclear Operations, Inc.
Mark Harris*	Entergy Nuclear Operations, Inc.
Carl Stafford*	Arizona Public Service Company
William Beckius*	Public

* participated via telephone