

July 12, 2004

MEMORANDUM TO: Stephen Dembek, Chief, Section 2  
Project Directorate IV  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

FROM: Drew Holland, Project Manager, Section 1 */RA/*  
Project Directorate IV  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF JUNE 24, 2004, MEETING WITH THE BABCOCK AND  
WILCOX OWNERS GROUP AND WESTINGHOUSE OWNERS GROUP  
TO DISCUSS DECAY HEAT REMOVAL IN PRESSURIZED WATER  
REACTORS DURING REFUELING WITH THE UPPER REACTOR  
INTERNALS INSTALLED

On June 24, 2004, a public meeting was held between the NRC staff and representatives of the Babcock and Wilcox Owners Group (B&WOG) and the Westinghouse Owners Group (WOG) at the NRC Headquarters. The purpose of the meeting was to discuss the capability of all pressurized water reactor (PWR) types to have core decay heat removed with upper reactor internals installed while in a refueling plant condition. Presentation material used by the B&WOG and the WOG are available in ADAMS under Accession Nos. ML041770131 and ML041770141.

The meeting began with Dr. J. Uhle of the NRC staff making opening remarks on the nature of the NRC's concerns for this issue. She indicated that the staff is seeking the technical basis for the reliance on natural convection for decay heat removal while in Mode 6 with the upper internals in place, in the event of a loss of forced convection. Further, the staff asked what steps the WOG and the B&WOG will take to upgrade technical specifications (TS), if necessary, to cover this scenario as well as other methods/processes that will guard against boiling in the reactor core during refueling. Mr. M. Henshaw of the B&WOG provided a presentation regarding the Babcock and Wilcox (B&W) designed plants. He explained that the TS allow for B&W designed PWRs to have one operable and operating residual heat removal (RHR) system train with a specified height of water above the reactor vessel flange. He mentioned that the TS are silent on whether or not internals may be installed under those circumstances. B&W PWRs have in excess of twenty square feet of area allowing flow even with the internals in place. He described the flow path on a diagram. The past and present practice of the various B&W PWRs was described not to present a problem while establishing and maintaining refueling plant conditions.

Mr. D. Buschbaum of the WOG's Licensing Subcommittee made his presentation. He explained that the Westinghouse and Combustion Engineering (CE)-designed PWR TS have the same wording as the B&W PWR TS with regard to operability requirements for the RHR system and also with no consideration of the upper internals being in or out of the reactor when a specified amount of water is above the reactor flange. Background regarding the

applicability of NUREG/CR-5820 was given. Dr. Y. Orechwa of the NRC staff explained that he would review the NUREG and discuss the results with the author. Dr. Orechwa explained that without the upper internals installed, no concern exists.

Dr. Orechwa explained that the NUREG/CR-5820 analyses demonstrate that sufficient flow area exists such that this issue may not be a problem for the B&WOG PWRs from a thermal-hydraulics standpoint. This conclusion was a judgement of participants in the meeting in comparing the results of the NUREG work completed on a Westinghouse-designed 3 loop PWR with the other PWR designs. The report indicates that there is a potential for core uncovering due to boiling for plants with small leakage path areas between the upper plenum and upper head regions. This group of PWRs includes plants of Westinghouse and CE design. There is a potential that one train of RHR may be out-of-service for scheduled maintenance during an outage. The significance here is that with loss of the one operating and operable train, natural convection decay heat removal may not be sufficient. It was pointed out that the decay heat levels may be low enough at the end of an outage that a charging pump could provide sufficient forced convection flow. General discussion indicated that the Maintenance Rule (10 CFR 50.65) will require an owner to perform a risk analysis prior to allowing RHR maintenance.

Mr. Buschbaum explained that the issue was brought to the WOG applicable working group in 2002. It was found that significant variation in upper plenum to upper head flow areas among Westinghouse and CE-designed PWRs exists. It was stated that many plants have evaluated the condition with varying results. Some plants address the issue administratively in plant procedures and/or TS Bases. The issue has been communicated to industry through an Institute of Nuclear Power Operations notification.

The WOG explained that they will deal with the issue formally with a Technical Specification Task Force (TSTF) item for a Bases change. This change will specify the use of the Nuclear Management and Resources Council shutdown risk approach for periods with upper internals installed. Affected plants might respond to the condition through a second RHR pump being available or another type of system that can deliver cooling water depending on the heat load. The TSTF is in process and will be managed by the Joint Owners Group.

The WOG and the B&WOG committed to determine how all of their member plants are dealing with this issue and will provide a summary of that information to the NRC formally. No regulatory decisions were made at the meeting. The staff thanked the two owners groups for having done thorough research and providing an informative presentation.

Direct any inquiries to Mr. Drew Holland at 301-425-1436, or [dgh1@nrc.gov](mailto:dgh1@nrc.gov).

Project Nos. 693 and 694

Attachment: List of Attendees

cc w/att: See next page

July 12, 2004

applicability of NUREG/CR-5820 was given. Dr. Y. Orechwa of the NRC staff explained that he would review the NUREG and discuss the results with the author. Dr. Orechwa explained that without the upper internals installed, no concern exists.

Dr. Orechwa explained that the NUREG/CR-5820 analyses demonstrate that sufficient flow area exists such that this issue may not be a problem for the B&WOG PWRs from a thermal-hydraulics standpoint. This conclusion was a judgement of participants in the meeting in comparing the results of the NUREG work completed on a Westinghouse-designed 3 loop PWR with the other PWR designs. The report indicates that there is a potential for core uncover due to boiling for plants with small leakage path areas between the upper plenum and upper head regions. This group of PWRs includes plants of Westinghouse and CE design. There is a potential that one train of RHR may be out-of-service for scheduled maintenance during an outage. The significance here is that with loss of the one operating and operable train, natural convection decay heat removal may not be sufficient. It was pointed out that the decay heat levels may be low enough at the end of an outage that a charging pump could provide sufficient forced convection flow. General discussion indicated that the Maintenance Rule (10 CFR 50.65) will require an owner to perform a risk analysis prior to allowing RHR maintenance.

Mr. Buschbaum explained that the issue was brought to the WOG applicable working group in 2002. It was found that significant variation in upper plenum to upper head flow areas among Westinghouse and CE-designed PWRs exists. It was stated that many plants have evaluated the condition with varying results. Some plants address the issue administratively in plant procedures and/or TS Bases. The issue has been communicated to industry through an Institute of Nuclear Power Operations notification.

The WOG explained that they will deal with the issue formally with a Technical Specification Task Force (TSTF) item for a Bases change. This change will specify the use of the Nuclear Management and Resources Council shutdown risk approach for periods with upper internals installed. Affected plants might respond to the condition through a second RHR pump being available or another type of system that can deliver cooling water depending on the heat load. The TSTF is in process and will be managed by the Joint Owners Group.

The WOG and the B&WOG committed to determine how all of their member plants are dealing with this issue and will provide a summary of that information to the NRC formally. No regulatory decisions were made at the meeting. The staff thanked the two owners groups for having done thorough research and providing an informative presentation.

Direct any inquiries to Mr. Drew Holland at 301-425-1436, or [dgh1@nrc.gov](mailto:dgh1@nrc.gov).

Project Nos. 693 and 694

Attachment: List of Attendees

cc w/att: See next page

**DISTRIBUTION:**

PUBLIC	RidsNrrLAEPeyton	DHolland	RidsAcrsAcnwMailCenter
PDIV-2 Reading	RidsOgcRp	RGramm	RidsNrrDlpmLpdiv (HBerkow)
RidsNrrDlpm (TMarsh)	JUhle	TTjader	AMunoz
		GShukla	YOrechwa

**MEETING NOTICE ACCESSION NO.: ML041550854**

**PRESENTATION SLIDES ACCESSION NOS. ML041770131 and ML041770141**

**ADAMS Accession No.: ML041950378 NRC-001 PKG No.: ML041950410**

OFFICE	PDIV-1/PM	PDIV-2/LA	SRXB	PDIV-2/SC
NAME	DHolland:mp	EPeyton	JUhle	SDembek
DATE	7-12-04	7/9/04	7/9/04	7/12/04

DOCUMENT NAME: C:\ORPCheckout\FileNET\ML041950378.wpd

OFFICIAL RECORD COPY

**ATTENDANCE LIST**

**MEETING WITH WESTINGHOUSE OWNERS GROUP (WOG)**

**AND BABCOCK AND WILCOX OWNERS GROUP (B&WOG)**

**JUNE 24, 2004**

**WOG**

D. Buschbaum (TXU)  
G. Bischoff (Westinghouse)  
J. Andrechek (Westinghouse)  
S. DiThomasso (Westinghouse)  
F. Schiffley (Exelon)  
H. Crawford (Exelon)  
D. Bajumpaa (Dominion)

**B&WOG**

Gayle Elliott (Framatome)  
M. Henhaw (Duke)

**NRC**

D. Holland  
J. Uhle  
Y. Orechwa  
A. Munoz  
T. Tjader  
G. Shukla

B&W Owners Group

Project No. 693

cc:

Mr. Howard C. Crawford  
AmerGen Energy Company  
Route 441 South  
P.O. Box 480  
Middletown, PA 17057-0480

Mr. David J. Firth  
Manager, B&W Owners Group Services  
Framatome ANP  
3315 Old Forest Road  
Lynchburg, VA 24501

Mr. W. R. McCollum, Chairman  
B&WOG Executive Committee  
Duke Energy Corporation  
Oconee Nuclear Station  
MC ONO 1VP  
7800 Rochester Highway  
Seneca, SC 29672

Mr. James F. Mallay  
Director, Regulatory Affairs  
Framatome ANP  
3315 Old Forest Road  
Lynchburg, VA 24501

Westinghouse Owners Group

Project No. 694

cc:

Mr. James A. Gresham, Manager  
Regulatory Compliance and Plant Licensing  
Westinghouse Electric Company  
P.O. Box 355  
Pittsburgh, PA 15230-0355

Mr. Gordon Bischoff, Manager  
Owners Group Program Management Office  
Westinghouse Electric Company  
P.O. Box 355  
Pittsburgh, PA 15230-0355