

March 29, 2004

Bill Eaton, BWRVIP Chairman
Entergy Operations, Inc.
Echelon One
1340 Echelon Parkway
Jackson, MS 39213-8202

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION - REVIEW OF BWR VESSEL
AND INTERNALS PROJECT REPORT, BWRVIP-104, "EVALUATION AND
RECOMMENDATIONS TO ADDRESS SHROUD SUPPORT CRACKING IN
BWRS"

Dear Mr. Eaton:

By letter dated September 23, 2002, you submitted for NRC staff review, Electric Power Research Institute (EPRI) proprietary report, BWRVIP-104, "Evaluation and Recommendations to Address Shroud Support Cracking in BWRs." The purpose of this report is to address technical issues resulting from an assessment of the General Electric Service Information Letter (SIL) No. 624, "Stress Corrosion Cracking in Alloy 182 Welds in Shroud Support Structure," and BWR Vessel and Internals Project, "BWR Shroud Support Inspection and Flaw Evaluation Guidelines."

The NRC staff has completed its initial review of the BWRVIP-104 report. As indicated in the attached request for additional information (RAI), the NRC staff has determined that additional information is needed to complete the review. If you have any questions, please contact Meena Khanna at (301) 415-2150.

Sincerely,

/RA/

Stephanie M. Coffin, Chief
Vessels & Internals Integrity and Welding Section
Materials and Chemical Engineering Branch
Division of Engineering
Office of Nuclear Reactor Regulation

Project No. 704

Enclosure: As stated

cc: BWRVIP Service List

Bill Eaton, BWRVIP Chairman
 Entergy Operations, Inc.
 Echelon One
 1340 Echelon Parkway
 Jackson, MS 39213-8202

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION - REVIEW OF BWR VESSEL AND INTERNALS PROJECT REPORT, BWRVIP-104, "EVALUATION AND RECOMMENDATIONS TO ADDRESS SHROUD SUPPORT CRACKING IN BWRS"

Dear Mr. Eaton:

By letter dated September 23, 2002, you submitted for NRC staff review, Electric Power Research Institute (EPRI) proprietary report, BWRVIP-104, "Evaluation and Recommendations to Address Shroud Support Cracking in BWRS." The purpose of this report is to address technical issues resulting from an assessment of the General Electric Service Information Letter (SIL) No. 624, "Stress Corrosion Cracking in Alloy 182 Welds in Shroud Support Structure," and BWR Vessel and Internals Project, "BWR Shroud Support Inspection and Flaw Evaluation Guidelines."

The NRC staff has completed its initial review of the BWRVIP-104 report. As indicated in the attached request for additional information (RAI), the NRC staff has determined that additional information is needed to complete the review. If you have any questions, please contact Meena Khanna at (301) 415-2150.

Sincerely,

/RA/

Stephanie M. Coffin, Chief
 Vessels & Internals Integrity and Welding Section
 Materials and Chemical Engineering Branch
 Division of Engineering
 Office of Nuclear Reactor Regulation

Project No. 704

Enclosure: As stated

cc: BWRVIP Service List

DISTRIBUTION:

EMCB R/F	NCChokshi
JRajan	AHiser
	CEMoyer
	WCullen

ADAMS Accession No.: ML040980506

*SEE PREVIOUS CONCURRENCE

INDICATE IN BOX: "C"=COPY W/O ATTACHMENT/ENCLOSURE, "E"=COPY W/ATT/ENCL, "N"=NO COPY EMCB:DE

OFFICE	EMCB:DE	E	EMCB:DE	E	EMCB:DE	EMCB:DE
NAME	MKhanna*		WKoo*		George Georgiev for TChan*	SCoffin
DATE	03/11/2004		03/18/2004		03/18/2004	03/29/2004

OFFICIAL RECORD COPY

cc:

Jim Meister, BWRVIP Vice-Chairman
Exelon Corp.
Cornerstone II at Cantera
4300 Winfield Rd.
Warrenville, IL 60555-4012

William C. Holston, Executive Chairman
BWRVIP Integration Committee
Constellation Generation Group
Nine Mile Point Nuclear Station
P.O. Box 63
Lycoming, NY 13093

Tom Mulford, EPRI BWRVIP
Integration Manager
Raj Pathania, EPRI BWRVIP
Mitigation Manager
Ken Wolfe, EPRI BWRVIP
Repair Manager
Larry Steinert, EPRI BWRVIP
Electric Power Research Institute
P.O. Box 10412
3412 Hillview Ave.
Palo Alto, CA 94303

Al Wrape, Executive Chairman
BWRVIP Assessment Committee
PPL Susquehanna, LLC
2 N. 9th St.
Allentown, PA 18101-1139

H. Lewis Sumner, Executive Chairman
BWRVIP Mitigation Committee
Vice President, Hatch Project
Southern Nuclear Operating Co.
M/S BIN B051, P.O. BOX 1295
40 Inverness Center Parkway
Birmingham, AL 35242-4809

Robert Carter, EPRI BWRVIP
Assessment Manager
Greg Selby, EPRI BWRVIP
Inspection Manager
EPRI NDE Center
P.O. Box 217097
1300 W. T. Harris Blvd.
Charlotte, NC 28221

Denver Atwood, Technical Chairman
BWRVIP Repair Focus Group
Southern Nuclear Operating Co.
Post Office Box 1295
40 Inverness Center Parkway (M/S B031)
Birmingham, AL 35242-4809

Robin Dyle, Technical Chairman
BWRVIP Integration Committee
Southern Nuclear Operating Co.
42 Inverness Center Parkway (M/S B234)
Birmingham, AL 35242-4809

Jeff Goldstein, Technical Chairman
BWRVIP Mitigation Committee
Entergy Nuclear NE
440 Hamilton Ave. (M/S K-WPO-11c)
White Plains, NY 10601

Dale Atkinson, BWRVIP Liason to EPRI Nuclear
Power Council
Energy Northwest
Columbia Generating Station (M/S PEO8)
Snake River Complex
North Power Plant Loop
Richland, WA 99352-0968

Richard Ciemiewicz, Technical Vice Chairman
BWRVIP Assessment Committee
Exelon Corp.
Peach Bottom Atomic Power Station
M/S SMB3-6
1848 Lay Road
Delta, PA 17314-9032

Gary Park, Chairman
BWRVIP Inspection Focus Group
Nuclear Management Co.
Monticello Nuclear Plant
2807 W. Country Road 75
Monticello, MN 55362-9635

George Inch, Technical Chairman
BWRVIP Assessment Committee
Constellation Nuclear
Nine Mile Point Nuclear Station (M/S ESB-1)
348 Lake Road
Lycoming, NY 13093

REQUEST FOR ADDITIONAL INFORMATION
OF THE BWRVIP VESSEL AND INTERNALS PROJECT REPORT BWRVIP-104

The staff has reviewed the topical report BWRVIP-104 "Evaluation and Recommendations to Address Shroud Support Cracking in BWRs," dated September 2002. In order to complete the review, the staff needs additional information from the BWRVIP. The staff's request for additional information (RAI) is provided below. The staff has made several recommendations in the RAI. The RAIs have been discussed with the BWRVIP, either during the meeting that was held on November 4, 2003, at NRC headquarters in Rockville, Maryland, or during the March 1, 2004, conference call.

- (1) The new criteria for performing EVT-1 of weld H9 (requiring visual examination of both sides, top and bottom of the weld) should also apply to the inspection of the H8 weld. Both the H8 and H9 welds have a similar degree of susceptibility to IGSCC, in terms of material (Alloy 182), weld geometry and electrochemical potential (ECP at lower plenum). The staff requests that the BWRVIP address this concern.
- (2) The new criteria should also apply to eddy current examination (ET) of shroud support structure welds. In BWRVIP-38, "BWR Shroud Support Inspection and Flaw Evaluation Guidelines," eddy current testing (ET) is one of the acceptable examination methods for IGSCC. In BWRVIP-104, ET is not discussed. ET is a test method for detecting surface flaws. To perform an effective examination for IGSCC by ET, both sides of the weld or component should be inspected. The staff requests that the BWRVIP address this issue.
- (3) The maximum reinspection period for EVT-1 should be based on an assessment of the non-destructive examination method's detection resolution. The BWRVIP-104 report has identical reinspection periods for EVT-1 as for ultrasonic examination (UT). However, UT is a more sensitive inspection method than EVT-1 because UT can inspect the volume of the weld and EVT-1 is limited to the surface. In addition, EVT-1 may not be able to detect very fine and tight surface flaws, such as IGSCC. Furthermore, surface conditions such as oxidation, debris and lighting conditions may impact the ability of flaw detection by EVT-1. To allow for a reinspection period of 10 years for EVT-1, the staff requests that the BWRVIP demonstrate that the detection capability of EVT-1 is equivalent to that of UT.
- (4) In the BWRVIP-104 report, the maximum reinspection period of the flawed weld H9 is proposed to be once every 10 years. The staff notes that in BWRVIP-38, the reinspection period of the unflawed weld H9 is also once every 10 years. The staff considers that it is not conservative to have the same reinspection interval (once every 10 years) for both flawed and unflawed weld conditions, particularly when the flaws detected in those welds are capable of propagating into the reactor pressure vessel (RPV) low alloy steel. Therefore, the staff recommends that the reinspection interval for flawed H9 welds should not exceed six years. The staff also recommends that if the results of three successive reinspections show no flaw growth, the maximum reinspection period of such welds may be relaxed to once every 10 years when justified by a flaw evaluation.

ENCLOSURE

Extensive cracking of weld H9 was found in Tsuruga, Unit 1 at Japan. The flaws in those welds are axially oriented and have a potential of propagating into the RPV low alloy steel and impacting the integrity of the primary pressure boundary. Although the analytical evaluation performed in BWRVIP-104 has shown that the growth of such flaws are slow and may take more than 10 years to impact the integrity of the RPV, by considering the safety consequences and to ensure defense in depth, the staff recommends a maximum reinspection period of 6 years for the flawed weld H9. The staff requests that the BWRVIP address the staff's recommendation.

- (5) It is desirable to combine BWRVIP-104 with BWRVIP-38 to become one document.
- (6) For core shrouds repaired by tie rods, the effectiveness of the repair depends, in part, on the integrity of the shroud support plate, as one end of the repair tie rods is anchored to the shroud support plate. The shroud support plate was fabricated by connecting a number of smaller plate sections through welding. The section welds are susceptible to IGSCC. However, inspection of those section welds was not required in BWRVIP-38 and BWRVIP-104. Cracking of the section welds was reported in Tsuruga, Unit 1, at Japan. Since the cracking of the plate section welds has the potential of affecting the rigidity of the shroud support plate, the integrity of such welds should be confirmed by periodic inspection, to ensure that the repair tie rods will perform its function properly. The staff recommends that the BWRVIP propose an inspection schedule for the support plate section welds.