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**SUBJECT:** Forwards addl info re weld examination including analytical evaluation of examination results for indication as required by Subsection IWB-3134(b) of ASME Section XI, 1989 Edition.

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Docket No. 50-397

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555

Gentlemen:

Subject: WNP-2, OPERATING LICENSE NPF-21,  
ANALYTICAL EVALUATION OF INSERVICE INSPECTION  
EXAMINATION RESULTS

Reference: ASME Section XI, 1989 Edition, "Rules for Inservice Inspection of Nuclear Power  
Plant Components"

During the recent 1998 refueling outage, the Supply System detected an indication in the heat affected zone of a Reactor Recirculation System suction nozzle to safe-end weld. The indication exceeded the acceptance standards listed in Table IWB-3410-1 of the Reference. The indication was evaluated, and it was subsequently demonstrated that the indication was acceptable for continued service without repair.

Enclosed is additional information regarding the weld examination, including the analytical evaluation of the examination results for the indication as required by Subsection IWB-3134(b) of the Reference.

Should you have any questions or desire additional information regarding this matter, please contact me or Mr. PJ Inserra at (509) 377-4147.

Respectfully,

*D. W. Coleman*

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Manager, Regulatory Affairs

Attachment

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# **ANALYTICAL EVALUATION OF INSERVICE INSPECTION EXAMINATION RESULTS**

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## **Introduction**

During the Spring 1998 refueling outage, an indication was detected in Reactor Recirculation (RRC) System suction nozzle N1A to safe-end weld 24RRC(2)A-1. The indication exceeded the acceptance standards listed in Table IWB-3410-1 of ASME Section XI, 1989 Edition, no Addenda (the Supply System's current inspection interval code). The indication was evaluated in accordance with ASME Section XI, IWB-3132.4. This evaluation demonstrated that the indication is acceptable for continued service without repair.

The examination of the safe-end weld was being performed to satisfy the examination requirements of ASME Section XI, Category B-F, Item Number B5.10, and the second post stress improvement examination for a Category C weld per Generic Letter 88-01, "NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping."

## **Ultrasonic Inspection Technique**

The weld was initially examined with mechanized equipment using a 45 degree shear wave, and 35, 45 and 60 degree refracted longitudinal wave search units from the outside surface. The indication was recorded utilizing a 45 degree shear wave, and 35, 45 and 60 degree refracted longitudinal wave search units. The data was analyzed utilizing "SMART 2000" mechanized inspection equipment and "Tomoview" enhanced data analysis software from General Electric (GE).

## **Examination Results**

The indication discovered in weld 24RRC(2)A-1 is on the inside surface of the safe-end and is located at approximately 5:00 o'clock when looking downstream (in the direction of reactor coolant flow). The indication measures 3.52 inches in length and 0.29 inches in depth, and is in a pipe wall that is 2.0 inches thick. The indication exists in ductile SA 336 Class F8 forged type 304 stainless steel. The indication exceeded the specifications of ASME Section XI, Table IWB-3514-2, for allowable planar flaws in austenitic steels.

Supplemental manual examinations were performed on the indication utilizing 45 degree shear wave and 70 degree refracted longitudinal wave (WSY70) search units. The 45 degree shear wave search unit did not identify any flaw faceting or axially oriented components from the indication that would be expected of an indication resulting from intergranular stress corrosion cracking (IGSCC).

Due to continuing changes in ultrasonic techniques and technology, the ability to detect material variations and conditions has increased. An example of this increase in sensitivity is demonstrated in regards to this indication. The same weld was examined during the Spring 1994 refueling outage with no indication detected at that time. However, when the same data from the 1994 examination is reviewed using the "Tomoview" data analysis software, it can be

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concluded that the same indication existed in 1994. Furthermore, by comparing the 1994 and 1998 indication data and considering equipment inaccuracies, there are no observed changes in depth or length of the indication.

The indication in the safe-end weld is not considered a crack. The sound scattering that occurs prior to impingement at the inside diameter surface is indicative of a weld repair area. The indication does not exhibit responses characteristic of a crack or stress corrosion cracking. Even though the documentation package and review of the radiograph film confirmed there were repairs made during fabrication of this weld, the film location markers are obstructed, thus making it difficult to precisely locate the repairs. The inability to precisely locate where the repairs occurred, relative to the location of the indication, required the indication to be identified as a planer indication. The indication was then evaluated but failed to meet the acceptance criteria of ASME Section XI, Table IWB-3514-2. Therefore, a flaw evaluation in accordance with ASME Section XI, IWB-3600 was required to be performed.

## **IWB-3600 Flaw Evaluation Results**

The linear indication was evaluated using the NASCRAC computer code developed by Failure Analysis Associates. The modeling incorporated the guidance identified in Generic Letter 88-01, NUREG-0313, Revision 2, "Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping," and ASME Section XI, IWB-3600. The flaw was conservatively evaluated as IGSCC using the crack growth rate equation provided in Generic Letter 88-01.

The results of the evaluation demonstrated that if IGSCC were present or were to become active, the indication would not grow to a depth that exceeded ASME Section XI, Tables IWB-3641-5 and 3641-6 acceptance criteria prior to the next scheduled examination in the Spring 2001 refueling outage.

## **Conclusions**

The IGSCC mechanism was not active at the time the weld was examined. The indication is considered an ultrasonic signal reflector condition from a fabrication repair. However, since a direct correlation between the repair and the inservice examination can not be made, it was conservatively decided to evaluate the indication as if the IGSCC mechanism is active and apply the worst loading to determine if the indication is acceptable for continued operation. Under these conditions, it has been determined that this weld is acceptable for continued service until the next scheduled examination. The evaluation demonstrates that, under the worst imposed loading conditions, the flaw meets the acceptance criteria of the ASME Section XI, Tables IWB-3641-5 and IWB-3641-6. The main fracture mechanism that would propagate the flaw is IGSCC. However, if the IGSCC phenomena was present and was to become active, the indication would not increase to a depth that is greater than the ASME Code allowable value prior to the next scheduled examination.