APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-397/94-18

License: NPF-21

Licensee: Washington Public Power Supply System
3000 George Washington Way
P.O. Box 968, MD 1023
Richland, Washington 99352

Facility Name: Washington Nuclear Project-2

Inspection At: Richland, Washington

Inspection Conducted: May 16-20, 1994

Inspector: C. E. Johnson, Reactor Inspector, Maintenance Branch
Division of Reactor Safety

Approved: _____ 6/7/94
for Dr. Dale A. Powers, Chief, Maintenance Branch Date
Division of Reactor Safety

Inspection Summary

Areas Inspected: Routine, announced inspection of the inservice inspection program.

Results:

- Changes submitted for the first 10-year inservice inspection program plan were properly documented (Section 2.1.2).
- The licensee's current program properly classified welds susceptible to intergranular stress corrosion cracking according to guidance from Generic Letter 88-01 (Section 2.1.2).
- The licensee had established a satisfactory inservice inspection program, and was implementing this program properly (Section 2.1.2).
- Quality assurance audits of the inservice inspection program were weak. (Section 2.1.2).

- Three examples of poor industry practices were observed during nondestructive examinations. The licensee took prompt corrective actions to rectify these practices (Section 2.2.2).

- Based on the inspector's observations, it was not apparent that quality assurance was providing any surveillance of inservice inspection activities (Section 2.2.2).

- The inspector identified untreated wood inside the reactor building. This was a violation of a fire protection program requirement (Section 2.2.2).

- Nondestructive examination personnel were properly qualified and certified to perform the assigned examinations (Section 2.3.2).

- Nondestructive examination procedures contained sufficient details and instructions to perform intended work (Section 2.4.2).

- Nondestructive examination reports were properly completed and evaluated (Section 2.4.2).

Summary of Inspection Findings:

- Violation 397/9418-01 was opened (Section 2.2.2).

Attachments:

- Attachment 1 - Persons Contacted and Exit Meeting
- Attachment 2 - Documents Reviewed

DETAILS

1 PLANT STATUS

During this inspection period, Washington Nuclear Project-2 was in the fourth week of the ninth Refueling Outage (R-9).

2 INSERVICE INSPECTION PROGRAM (ISI) 73753

The objective of this inspection was to determine whether the performance of ISI examinations, and the repair and replacement of Class 1, 2, and 3 pressure retaining components were performed in accordance with Technical Specifications, and the applicable ASME Boiler and Pressure Vessel Code, and correspondence between the Office of Nuclear Reactor Regulation and the licensee concerning relief requests and commitments made in response to Generic Letter (GL) 88-01, "NRC Position On IGSCC In Austenitic Stainless Steel Piping."

2.1 ISI Program

2.1.1 Discussion

The inspector met with the licensee's ISI coordinator and the nondestructive examination staff to discuss the ISI program and scheduled examinations. The inspector discussed past and present program status of the ISI program with the ISI coordinator. The licensee representatives informed the inspector that several major activities were scheduled to be worked this outage. Some of the activities scheduled to be worked this outage are listed below:

- Approximately 160 Class 1 and 20 Class 2 ultrasonic, dye penetrant, and magnetic particle examinations of piping welds;
- Ultrasonic examination of approximately 30 welds for intergranular stress corrosion cracking (IGSCC) in accordance with concerns identified in (GL 88-01);
- Ultrasonic examination for sizing the indication in Weld 20RRC(6)-8;
- Complete ultrasonic examination of reactor pressure vessel upper shell course welds; and
- Mechanical stress improvement process of reactor vessel safe-end welds.

There were several other major activities also scheduled.

The review of the current ISI schedule and program plans by the inspector indicated that the licensee had to complete approximately seven startup restraints prior to resuming reactor operations. The schedule appeared to be

aggressive, however the licensee had planned to complete the work as scheduled. The ISI startup restraints are listed below:

- Submit to the NRC for review and approval the examination results and evaluation of an indication identified in ISI Weld 20RRC(6)-8. NRC approval was required prior to restart;
- Complete Visual VT-1 examination of the core spray spargers and associated supply piping;
- Complete the 10-year pressure test and VT-2 examination of Class 1 piping and reactor pressure vessel;
- Complete all ISI examinations identified in the current outage plan;
- Complete inspection of the core support shroud;
- Replace jet pump beams; and
- Examine one feedwater nozzle inner radius for cracking.

The inspector reviewed the first 10-year ISI program initially submitted to the NRC. There were seven relief reque[illegible]bmitted with the first 10-year ISI program (ISI-2-001,-002,-003,-004,-[illegible]06 and -007 respectively). The NRC staff with technical assistance fro[illegible]aho National Engineering Laboratory evaluated the ISI program plan and the relief requests. The NRC staff granted five of the seven relief requests and denied one (ISI-2-002). The activity for which relief was request but denied was because the NRC staff determined that it was not impractical to perform the activity. Relief request (ISI-2-006) was subsequently withdrawn by the licensee. Based on the evaluation, the NRC staff concluded that the licensee's first 10-year ISI program plan was acceptable.

In January 1992, the licensee submitted a relief request to use Code Case N-498, "Alternate Rules For 10-Year Hydrostatic Pressure Testing For Class 1 and 2 Systems, Section XI, Division 1." This relief request was approved by the NRC by letter dated March 23, 1992. The inspector concluded that changes submitted subsequent to the initial first 10-year ISI program plan were properly documented and had been approved by NRC.

The inspector reviewed the licensee's program implementation in response to GL 88-01. GL 88-01 addressed the NRC Staff position on intergranular stress corrosion cracking (IGSCC) in BWR austenitic stainless steel piping. The technical bases for the NRC staff positions were detailed in NUREG-0313, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping," Revision 2. GL 88-01 requested the licensee to furnish current plans for piping replacement, inspection, repair, and leakage detection on piping that was subject to the generic letter.

The inspector reviewed the licensee's overall program as it related to NRC guidance in GL 88-01. Documentation reviewed indicated that the licensee received GL 88-01 in 1988, however, the licensee did not begin augmented inspections until 1992, during R-7. GL 88-01 specified that certain IGSCC category welds were to be inspected the next refueling outage after receiving the subject generic letter. The inspector questioned the licensee about the extended period of time between receiving GL 88-01 and when the augmented inspections began. Further discussions revealed that the licensee did not properly classify the welds susceptible to IGSCC according to guidance in GL 88-01. The licensee's improper classification of the welds was the reason for the extended period of time between receiving GL 88-01 and when the augmented inspections began. The inspector was informed that 14 nozzle to safe-end welds were originally classified as Category A, instead of either Category D or G. An additional 11 nozzle to safe-end welds in the feedwater and emergency core cooling system, constructed of carbon steel, were included in the scope of GL 88-01. All reclassified welds were inspected during R-7. It appeared that the licensee had established better control over their program, and had properly classified welds susceptible to IGSCC according to GL 88-01, based on the review by the inspector.

The inspector selected ISI records from the first inspection interval related to a Class 2 residual heat removal heat exchanger. The inspector selected this component for review to determine if the licensee had followed their ISI program as required. Records for the Class 2 residual heat removal heat exchanger were available for review. The inspector concluded from the selection of records reviewed, that the licensee had followed their ISI program during the first 10-year interval for this Class 2 component.

The inspector reviewed six quality assurance (QA) audit reports to determine if the licensee had performed an adequate self-assessment of their ISI program. QA audit reports reviewed by the inspector did not contain sufficient information to properly assess the overall ISI program. The licensee's self-assessment of the ISI program appeared weak. For the ISI activities witnessed by the inspector, no QA surveillances were observed. The licensee representatives acknowledged their weakness in this area. The licensee informed the inspector that they were attempting to hire someone with ISI expertise to perform these audits. The licensee also showed the inspector a schedule of proposed ISI audits that would begin in September 1994. The proposed ISI audits appeared to be comprehensive and should enhance the self-assessment process. The inspector concluded that the ISI program self-assessments were weak.

2.1.2 Conclusions

Changes submitted subsequent to the first 10-year ISI program plan were properly documented. The licensee did not properly classify the welds susceptible to IGSCC according to the guidance from GL 88-01. However, the licensee had established better control over this program, and for the welds reviewed had properly classified those welds susceptible to IGSCC according to GL 88-01. It was concluded by the inspector that the licensee had established

a satisfactory ISI program, and was implementing this program properly. The QA audits of the ISI program were weak.

2.2 Observation of Nondestructive Examinations (NDEs)

2.2.1 Discussion

The inspector observed several NDE methods used to detect flaw indications (surface and subsurface). Some of the methods observed were manual ultrasonic examination (UT), automated UT examination, magnetic particle, and liquid penetrant. The inspector observed NDEs performed on code class components such as reactor vessel safe-end welds, reactor pressure vessel upper shell course and seam welds, and circumferential welds in the feedwater and main steam lines. The inspector verified that approved procedures were available and being followed. Equipment was calibrated as required, and data taken by the NDE technicians were properly recorded.

Before UT examinations began, the inspector observed the calibration of equipment. Calibrations were satisfactorily performed according to applicable procedures. UT instruments were found to be calibrated for screen height linearity, amplitude control linearity, and linear sweep using appropriate reference blocks. The inspector observed the preparation and use of proper UT distance amplitude correction curves. The inspector verified the size, frequency, and angles of the search units (transducers) used, as well as the scanning techniques, scanning sensitivity, direction, rate of search unit movement, overlap, and coverage, which were in accordance with the applicable NDE procedure. The inspector verified that a system calibration check was performed before the examination to verify the instrument sensitivity and sweep range calibration.

The inspector made the following observations while witnessing UT calibrations:

(1) The cathode ray tube screen of the UT instrumentation went blank during a calibration. The problem was determined by the NDE technician to be a low-charged battery pack. The inspector questioned the NDE technician on whether instrument battery packs were charged every night before the next examinations were to be performed. The inspector was told that battery charging was at the discretion of the NDE technician. The inspector told the NDE technician that charging battery packs before use was a good industry practice. The calibration was eventually voided, and the technician performed the calibration again with a properly charged battery pack.

(2) An NDE technician was about to begin calibration checks prior to taking the surface temperature of the calibration block until the inspector questioned the NDE technician. The technician informed the inspector that he had planned to take the surface temperature during the calibration checks. The inspector told the NDE technician that good industry practice would require that surface temperature of the

calibration block be taken prior to and during the performance of the calibration checks.

The observations made by the inspector were discussed with the NDE supervisor. The inspector informed the NDE supervisor that good industry practices should be adhered to and be consistently applied by all technicians. The licensee's NDE supervisor agreed with the inspector's observations and held meetings with all NDE technicians on the expectations of NDE technicians adhering to good industry practices, and the consistency of those practices. The inspector was satisfied with the licensee's corrective actions. No other discrepancies were noted during UT calibrations.

The inspector observed manual UT examinations performed on the reactor pressure vessel shell course and seam welds. The inspector also observed automated UT examination on circumferential Weld BD-10 on the feedwater system. The automated UT examination was performed with the SMART 2000 Ultrasonic System. These UT activities appeared to have been performed properly.

The inspector observed magnetic particle examinations on 4 circumferential welds on the main steam system (Nozzles N3C and N3D). Several liquid penetrant examinations were observed by the inspector on shop welds for a Code replacement valve and associated piping. The NDEs observed by the inspector were performed in accordance to approved procedures. One observation was made during a magnetic particle examination which was also discussed with the NDE supervisor. The inspector observed an NDE technician using excessive force (i.e., hammering) to clean magnetic powder particles from the electromagnetic yoke. The NDE technician was informed of the inspector's observation.

The three observations noted by the inspector were not violations but rather examples of poor industry practices. Apparently, the licensee's corrective actions precluded repeat occurrences, because the inspector did not observe any more poor practices on subsequent NDEs.

The inspector observed the initial setup and preload of the mechanical stress improvement process (MSIP) for Safe-End Extension N16. The use of the MSIP was to mitigate stress corrosion cracking in BWR piping systems. The MSIP removes residual tensile stresses from weldments, thus preventing the initiation of cracks and retarding the growth of pre-existing flaws in piping systems. The MSIP was an acceptable method of stress improvement recommended by NUREG-0313 for mitigation of intergranular stress corrosion cracking for BWR piping. The licensee planned to perform this process on approximately 44 welds that were sensitive to intergranular stress corrosion cracking. After completion of the process for Safe-End Extension N16, the welds were inspected by the automated UT to detect any cracks. None were detected. The inspector concluded that the licensee was performing the MSIP in accordance to work instructions.

Although the inspector did not observe any licensee QA personnel monitoring the ISI activities, there was a contractor (Atomic Energy Authority O'Donnell)

quality control inspector monitoring the MSIP activities. The inspector did not observed any discrepancies.

During a break while MSIP preparations were underway, the inspector toured the primary containment and observed untreated wood stacked near the southwest valve room inside the reactor building on elevation 501 foot. The inspector notified appropriate licensee personnel of this finding. The inspector and a licensee representative verified that a 4 x 4 inch x 4 foot long (approximate) block of wood was untreated. The remaining stack of wood was not examined for untreated wood by the inspector. Licensee personnel, however, examined the remaining wood in the stack and initiated Problem Evaluation Request No. 294-0441 because additional untreated wood was found. The inspector reviewed Procedure No. 1.3.10, "Fire Protection Program Implementation,", Revision 15. Paragraph 6.3.9 of Procedure 1.3.10 requires that temporary wood/blocking used in the plant shall be treated with Underwriters' Laboratory listed pressure impregnated fire retardant process, if possible. It was also specified that as a minimum it shall be treated with a painted on, flame retardant. Contrary to Procedure 1.3.10, the untreated wood inside the reactor building was a violation (397/9418-01).

The inspector reviewed Plant Problem Nonconformance Report NCR 291-0345 to determine if the licensee implemented adequate corrective actions to a separate issue. Specifically, during an ISI on the shutdown cooling suction line of the 20-inch reactor recirculation system, the licensee identified a linear indication on pipe-to-valve Weld RHR-V-113. Review of the licensee's corrective action indicated that an additional sample equal in number to the original sample of welds were selected for examination. The licensee notified the NRC as specified by GL 88-01 of the indication found. The licensee monitored this indication for growth. The licensee had examined this indication every outage since it was identified in R-6. Discussions with licensee representatives indicated that there had been no growth detected in the recent inspections. NRC approval of the licensee's flaw evaluation and/or repair had been required in the past, and was also required prior to startup this outage. These findings indicated that the licensee's controls were effective in identifying the problem, and initiating a corrective action plan to monitor further growth of the indication.

2.2.2 Conclusions

Approved procedures were available and were being followed. Equipment was calibrated as required, and data taken by the NDE technicians was properly recorded. Several observations were noted during NDE activities that were poor industry practices. Observations noted by the inspector were not violations but rather poor practices. The licensee's corrective actions regarding the poor practices was satisfactory. NDEs were observed to be performed in accordance to approved procedures. The inspector did not observe the presence of licensee QA personnel monitoring ongoing ISI activities. Untreated wood was located in the reactor building, which was a violation of Procedure 1.3.10. Review of Plant Problem Report No. 291-0345 indicated that

the licensee was effective in identifying a weld flaw, and initiating a corrective action plan to monitor further growth of the indication.

2.3 Personnel Qualifications and Certifications

2.3.1 Discussion

The inspector reviewed the qualifications and certifications of General Electric technicians performing the NDEs, and Atomic Energy Authority O'Donnell technicians performing the MSIP. The documents reviewed by the inspector indicated that NDE technicians were qualified to perform the intended work. During the inspection, the inspector observed those same NDE technicians perform various NDEs and the MSIP. NDE technicians were knowledgeable of procedural requirements, examination techniques, and test equipment. The inspector verified that qualification and certification records properly reflected the employer's name; person certified; activity qualified for performance; level of certification; effective period of certification; L-III signature certifying the individual; and the annual visual acuity and color vision examination. The inspector determined that NDE technicians designated as qualified to perform the examinations were properly certified according to the applicable industry standard ASNT-TC-1A. No discrepancies were identified.

2.3.2 Conclusions

The documents reviewed by the inspector indicated that NDE technicians were qualified and certified to perform the assigned examinations. The NDE technicians were also properly certified according to industry standard ASNT-TC-1A.

2.4 ISI Procedures and Records Review

2.4.1 Discussion

The inspector reviewed NDE procedures associated with the type of ISI examinations being performed for consistency with the requirements of the ASME Code, Section V, 1980 Edition. The procedures reviewed by the inspector are listed in Attachment 2.

The inspector reviewed documentation that indicated the authorized nuclear inservice inspector had verified that procedures used had been demonstrated as satisfactory, as required by Section V of the ASME Code.

The inspector determined that the procedures contained sufficient details and instructions to perform the intended examinations. The inspector determined that the sampled NDE reports had been properly completed and submitted to the NDE supervisor, for review and evaluation. NDE records requested by the inspector were retrievable by the licensee's representatives.

2.4.2 Conclusions

The ISI procedures contained sufficient details and instructions to enable the performance of the NDEs that were observed. The NDE reports sampled had been properly completed and evaluated. The NDE records were retrievable.

ATTACHMENT 1

1 PERSONS CONTACTED

1.1 Washington Public Power Supply System Personnel

J. Albers, Manager, Radiation Protection
*P. Bemis, Manager, Regulatory Programs
*J. Benjamin, Manager, Quality Assessments
*S. Davison, Assistant Manager, Quality Assurance Plant Support
D. Dinger, Acting Supervisor, Health Physics
*M. Flasch, Director of Engineering
*C. Foley, Principal Licensing Engineer
*J. Gearhart, Director, Quality Assurance
*D. Hoggarth, Authorized Nuclear Inspector
*C. Jones, Authorized Nuclear Inspector
C. Mackaman, Licensing Engineer
*D. Moen, Manager, Materials and Inspection
*M. Monopoli, Manager, Maintenance Division
J. Muth, Manager, Plant Assessments
M. Nolan, Supervisor, Radwaste
*C. Noyes, Manager, Engineering Programs
*J. Parrish, Assistant Managing Director of Operations
R. Patch, Supervisor, Health Physics
*D. Ramey, Inservice Inspection Engineer
P. Rannells, Acting Training Manager, Health Physics
B. Rigby, Supervisor, Health Physics Planning
V. Shockley, Manager, Health Physics
*J. Swailes, Plant Manager
*D. Swank, Licensing Engineer
*D. Welch, Supervisor, Nondestructive/Inservice Inspection
J. Wiles, Quality Assurance Engineer
*S. Willman, Quality Assurance Technical Specialist, Plant Assessment Group

1.2 General Electric

P. Bailey, Project Manager
J. Leonard, Project Manager, Reactor Pressure Vessel
W. Money, Project Manager, Smart 2000 System

1.3 Atomic Energy Authority O'Donnell

T. Damico, Supervisor

1.4 NRC Personnel

*R. Barr, Senior Resident Inspector
M. Cillis, Radiation Specialist
A. Gaines, Radiation Specialist
*D. Proulx, Resident Inspector

In addition to the personnel listed above, the inspector contacted other personnel during this inspection period.

*Denote personnel that attended the exit meeting on May 20, 1994.

2 EXIT MEETING

An exit meeting was conducted on May 20, 1994. During this meeting, the inspector reviewed the scope and findings of the report. The licensee did not express a position on the inspection findings documented in this report. The licensee did not identify as proprietary, any information provided to, or reviewed by, the inspector.

ATTACHMENT 2

DOCUMENTS REVIEWED

PROCEDURES

1.3.10, "Fire Protection Program Implementation," Revision 15

8.3.1, "ISI, IST And Appendix J Examination And Testing Program Administration And Control," Revision 6

8.3.4, "Non-Destructive Testing And Examination Program," Revision 9

1.3.30, "Repair, Replacement And Alteration Of ASME Items," Revision 10

NOS-33, "Inservice Inspections," Revision 6

EDP 4.5, "Conduct Of Inservice Inspections," Revision 5

QCI 3-3, "Liquid Penetrant Examination - WNP-2," Revision 4

QCI 4-3, "Magnetic Particle Examination - WNP-2," Revision 5

QCI 6-13, "Ultrasonic Examination Of Ferritic Steel Piping Welds," Revision 6

GE-UT-208, "Procedure for Automated Ultrasonic Examination of Similar and Dissimilar Piping Welds for IGSCC," Revision 1

ISI OUTAGE PLAN

R9 ISI Outage Plan, dated April 1994

AUDIT REPORTS

90-542
292-0059
92-602
293-0012
93-647
293-0028

PLANT PROBLEM REPORT

294-0441

NDE REPORTS

R-R9-027
1MSM-064
1MSM-065
R-R9-G02
R-R9-G03
5-94-20-1
1RHR-214

1RHM-014
1RHM-026
1RHU-046
1RHU-045
1RHU-047
1RHU-044
1RHU-048
1RHU-064
1RHU-063
1RHU-062
1RHU-061
R-R9-G05
R-R8-107
R-R8-108
R-R8-121
R-R8-114
1RRU-136
1RRU-132

CALIBRATION SHEETS

CA-R9-098
CA-R9-099
C-R9-G16
C-R9-G17
C-R9-G18
C-R9-G11
C-R9-G20
C-R9-G21
CM-R8-106 and 107
CM-R8-116 and 117
CM-R8-112 and 113