

ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.: 50-397
License No.: NPF-21
Report No.: 50-397/99-11
Licensee: Energy Northwest
Facility: Washington Nuclear Project-2
Location: Richland, Washington
Dates: September 27 through October 1, 1999
Inspector: Claude E. Johnson, Senior Reactor Inspector
Engineering and Maintenance Branch
Approved By: Dr. Dale A. Powers, Chief, Engineering and Maintenance Branch
Division of Reactor Safety

ATTACHMENT: Supplemental Information

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PDR ADOCK 05000397
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EXECUTIVE SUMMARY

Washington Nuclear Project-2 NRC Inspection Report No. 50-397/99-11

This inspection consisted of a review of the licensee's inservice inspection examination program plan and schedule, and the implementation of the program plan for the facility. The inspection covers a 1-week period onsite by one region-based inspector.

Maintenance

- The licensee had developed a well-defined second 10-year interval inservice inspection examination program plan, in that, the examination categories, examination methods, augmented inspections, relief requests, code cases implemented, and changes to the examination plan were clearly identified. The licensee had implemented the program requirements appropriately (Section M1.1).
- The overall external material condition of equipment observed in the control room (i.e., electrical and instrumentation panels) and reactor building (i.e., hydrogen recombiner, reactor building cooling water, low pressure core spray, low pressure keep fill, high pressure core spray, residual heat removal, and control rod drive pumps) was good. No rust, loose bolts, or major oil or water leaks were visible (Section M2).
- Nondestructive examination and ASME code repair and replacement procedures were in compliance with regulatory and ASME code requirements. Work packages contained sufficient instructions to accomplish the tasks (Section M3).
- Licensee personnel were knowledgeable of the program, procedures, ASME code requirements, and the corrective action process (Section M4.c).
- The licensee was effective in identifying, resolving, and preventing problems in the area of inservice inspections, with one exception. A letter from General Electric dated May 26, 1998, "Qualitative Assessment of FW Sparger Cracks for WNP-2 - Final," recommended continued operation with the existing sparger for up to 24 months. However, with the current change in the licensee's fuel cycle from 12 to 18 months the licensee would have exceeded the 24-month time period without having an opportunity to conduct the inspections prior to the next refueling outage. The licensee initiated a problem evaluation request to correct this problem and commenced the necessary inspections during the current refueling outage (Section M4.c).
- The quality assurance audit and surveillance reports related to inservice inspection activities were satisfactory (Section M7.1).

Report Details

Summary of Plant Status

Unit 2 was shutdown for Refueling Outage 14 during the inspection.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Inservice Inspection Program

a. Inspection Scope (73753)

The inspector performed a limited review of the licensee's "First 10-Year Interval Inservice Inspection Examination Plan," and a thorough review of the "Second 10-Year Interval Inservice Inspection Plan for WNP-2." In addition, the inspector reviewed ASME code cases implemented, correspondence from the licensee to the NRC for the first and second 10-year intervals to determine if the licensee had submitted relief requests for Code Class 1, 2, and 3 weld examinations where essentially 100 percent full examination coverage could not be achieved. The inspector also reviewed inservice inspection program changes that would require the licensee to obtain approval from the NRC prior to implementation.

b. Observations and Findings

The inspector found that the licensee had committed to ASME, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 1989 Edition, with no Addenda for the second 10-year interval inservice inspection program. The examination program plan identified the examination categories, components to be examined, nondestructive examination methods, augmented inspections, and the applicable code cases implemented. The inservice inspection plan also identified relief requests submitted to the NRC. The inspector verified that: (1) program changes were documented appropriately; (2) ASME code cases implemented that were not listed in Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability ASME, Section XI, Division 1," Revision 11, had been granted approval by the NRC; (3) code welds not receiving essentially 100 percent full examination coverage were documented on relief requests; and (4) augmented inspections were performed as planned. The inspector determined that the licensee had developed a well-defined second 10-year interval inservice inspection examination plan and was implementing the program in accordance with the requirements of 10 CFR 50.55a.



There was one problem identified below in Section M4.b.3 related to a vendor-recommended examination that was affected by a change in fuel cycle. Otherwise, there were no concerns identified in the program examination plan length or schedule.

c. Conclusions

The licensee had developed a well-defined second 10-year interval inservice inspection examination program plan, in that, the examination categories, examination methods, augmented inspections, relief requests, code cases implemented, and changes to the examination plan were clearly identified. The licensee had implemented the program requirements appropriately.

M2 Maintenance and Material Condition of Facilities and Equipment

a. Inspection Scope (73753)

During plant tours, the inspector observed the external material condition of some facility equipment.

b. Observations and Findings

The inspector observed the external material condition of the equipment listed below:

- Control room electrical panels
- Reactor Building Cooling Water Pump 1A, 1B, and 1C and associated heat exchangers
- Control Rod Drive Pumps 1B and 1A
- Hydrogen Recombiner B
- Residual Heat Removal Pump 2B
- High pressure core spray pump
- Low pressure core spray pump
- Low pressure core spray keep fill pump

No rust, loose nuts, major oil or water leaks were visible. External material condition of the equipment was good.

c. Conclusions

The overall external material condition of equipment observed in the control room (i.e., electrical and instrumentation panels) and reactor building (i.e., hydrogen recombiner, reactor building cooling, low pressure core spray, low pressure keep fill, high pressure core spray, residual heat removal, and control rod drive pumps) was good. No rust, loose bolts, or major oil or water leaks were visible.

M3 Maintenance Procedures and Documentation

a. Inspection Scope (73753)

The inspector reviewed several nondestructive examination procedures to determine if they had been developed in accordance with regulatory and applicable ASME code requirements. The inspector also reviewed the licensee's ASME code repair and replacement procedure, and the work packages for the removal and installation of the main steam relief valves. The procedures reviewed are listed in the attachment.

b. Observations and Findings

The inspector found that the licensee's nondestructive examination and ASME code repair and replacement procedures contained sufficient detail and inspection criteria to perform the intended examinations, and were in compliance with regulatory and ASME code requirements. The ASME code replacement work packages also contained sufficient instructions to accomplish the tasks.

c. Conclusions

The nondestructive examination and ASME code repair and replacement procedures were in compliance with regulatory and ASME code requirements. The ASME code replacement work packages contained sufficient instructions to accomplish the tasks.

M4 Maintenance Staff Knowledge and Performance

a. Inspection Scope (73753)

The inspector assessed the knowledge and performance of licensee and contractor personnel by observing portions of activities associated with main steam relief valve replacement activities.

The inspector also assessed the effectiveness of the licensee's controls in identifying, resolving, and preventing problems by reviewing corrective actions, root cause analyses, and audits in the area of inservice inspections.

b Observations and Findings

b.1 Personnel Knowledge

The inspector found that the licensee's personnel were knowledgeable of the program, procedures, ASME code requirements, and the corrective action process. Contractor personnel installing the main steam relief valves were journeyman pipefitters, and were experienced in the activities performed.

b.2 Performance

There were few inservice inspection activities available for observation during this inspection. However, the inspector observed activities associated with the ASME code replacement and installation of several main steam relief valves in the drywell. These activities included the torquing of the inlet and outlet flange bolts for the main steam relief valves.

A quality control inspector was observed appropriately verifying inservice inspection activities.

During this inspection, the inspector observed the following deficiencies:

- During alignment of a main steam relief valve to its outlet piping, the inspector noted that the chain for the come-along for rigging was inappropriately wrapped around a support and the flexible test line for the main steam relief valve. The licensee's project engineer initiated a plant tracking log to preclude this problem recurring. The corrective actions included reiterating the proper rigging techniques to contractor personnel.
- During removal of a main steam relief valve, some pitting was noted by the quality control inspector on the flange seal area. There was no acceptance criteria available for the quality control inspector to make an appropriate evaluation of the pitted surface; therefore, the engineer was called to make the determination. Fortunately, the engineer was in the area to make the assessment, and no significant unnecessary dose was accrued by the involved personnel. The licensee's project engineer initiated a plant tracking log to prevent this problem recurring. The corrective action was to include the acceptance criteria in remaining work packages.

The inspector determined that overall the work activities observed were being accomplished in accordance with procedures and work instructions.

b.3 Effectiveness of Licensee Controls

The inspector evaluated the effectiveness of the licensee's controls in identifying, resolving, and preventing problems by reviewing corrective actions, root-cause analyses, and self assessments in the area of inservice inspection. This review determined that problems identified had been appropriately placed into the licensee's



corrective action process. The inspector's review of problem evaluation requests (PERs) indicated that the corrective actions implemented were appropriate.

The inspector reviewed PER 298-0525. This PER addressed cracks identified on the feedwater sparger. As a result of the inspector's question on PER 298-0525, the licensee's representative identified a scheduling problem concerning vendor-recommended examinations of the feedwater spargers.

A letter from the vendor dated May 26, 1998, "Qualitative Assessment of FW Sparger Cracks for WNP-2 - Final," recommended continued operation with the existing sparger for up to 24 months. However, with the current change in the licensee's fuel cycle from 12 to 18 months, the licensee would have exceeded the 24-month time period without having an opportunity to conduct the inspections prior to the next refueling outage. The licensee initiated PER 299-2036 to document this issue. The licensee's representative informed the inspector that the spargers were to be inspected during the current refueling outage. The licensee's representative also informed the inspector that this finding was an exception and that they were to ensure that no examinations would be inadvertently omitted as a result of the changed fuel cycle.

c. Conclusions

The licensee's personnel were knowledgeable of the program, procedures, ASME code requirements, and the corrective action process. Contractor personnel installing the main steam relief valves were experienced. Several minor observations were noted during the installation of the main steam relief valves, and the project engineer initiated problem tracking logs to preclude their recurrence. Overall, work activities observed were being performed in accordance with procedures and work instructions.

The licensee was effective in identifying, resolving, and preventing problems in the area of inservice inspections, with one exception. A letter from the vendor dated May 26, 1998, "Qualitative Assessment of FW Sparger Cracks for WNP-2 - Final," recommended a continued operation with the existing sparger for up to 24 months. However, with the change in the licensee's fuel cycle from 12 to 18 months, the licensee would have exceeded the 24-month time period without having an opportunity to conduct the inspections prior to the next refueling outage. The licensee initiated a problem evaluation request to correct this problem and commenced the necessary inspections during the current refueling outage.

M7 Quality Assurance in Maintenance Activities

M7.1 Licensee Self-Assessment Activities

a. Inspection Scope (73753)

The inspector reviewed the licensee's previous quality assurance audit and surveillance reports.



b. Observation and Findings

The inspector verified that deficiencies identified in the quality assurance audit and surveillance reports were documented appropriately in problem evaluation requests and tracked by the licensee's corrective action program. The inspector found that the quality assurance audit and surveillance reports were satisfactory.

c. Conclusions

The quality assurance audit and surveillance reports related to inservice inspection activities were satisfactory.

V. Management Meetings

X1 Exit Meeting Summary

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection. The licensee's representatives acknowledged the findings presented.

The inspector asked the licensee's representatives whether any materials examined during the inspection should be considered proprietary. There was one proprietary document identified that had been reviewed by the inspector and that was subsequently destroyed.



ATTACHMENT

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

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D. Atkinson, Manager, Engineering
D. Coleman, Manager, Regulatory Affairs
T. Erwin, Acting Supervisor, Material Processes and Qualifications
C. Fu, Quality Assurance Engineer
K. Hännäh; Project Engineer
V. Harris, Assistant Manager, Maintenance
T. Hoyle, Supervisor, Component Engineering
C. King, Acting Manager, Design Engineering
D. Ramey, Inservice Inspection Engineer
C. Robinson, Supervisor, Quality Assurance
F. Schill, Licensing Engineer
K. Singh, Lead Engineer, ASME Code Repair and Replacement
G. Smith, Vice President, Generation
D. Welch, Lead, Nondestructive Testing

NRC

E. Merschoff, Regional Administrator
D. Powers, Chief, Engineering and Maintenance Branch
G. Repogle, Senior Resident Inspector

INSPECTION PROCEDURES USED

73753 Inservice Inspection

LIST OF DOCUMENTS REVIEWED

Procedures

QCI 6-3	Ultrasonic Examination Of Dissimilar Metal Welds (Manual)	Revision 3
QCI 6-4	Ultrasonic Examination Feedwater Nozzle Inner Radii	Revision 9
QCI 6-13	Ultrasonic Examination of Ferritic Steel Piping Welds	Revision 8
QCI-3-3	Liquid Penetrant Examination - WNP-2	Revision 5
QCI 4-3	Magnetic Particle Examination - WNP-2	Revision 6

PPM 1.3.30A	Repair And Replacement Of ASME Section III, Code Class MC For Containment Vessels	Revision 0
PPM 13.30	Repair and Replacement And Alteration Of AMSE Items	Revision 14
SWP-ISI-01	ASME Section XI Inservice Inspection	Revision 0
PPM 10.17.2	Main Steam Relief Valve Inspection And Overhaul	Revision 10

Problem Evaluation Requests

295-0328	Request For RHR Pump Casing
295-0639	Jet Pump Retainer Bracket Adjusting Screw Tack Weld
295-1002	Leak In Service Water Train A Return Line
298-0499	Bail Handles from Temporary Wedges Broken
298-0522	Jet Pump Adjusting Screw Tack Weld Was Found Cracked
298-0523	Jet Pump Retainer Bracket Adjusting Screw Does Not Make Contact
298-0525	Crack-Like Indications Noted On Feedwater Sparger Flow Holes
298-0600	Indication Identified Inside RRC Suction Nozzle To Safe End Weld
298-0654	Core Shroud Weld Inspection Misinterpreted

Audit/Surveillance Reports

Audit 298-024, "WNP-2 Engineering Audit," dated June 25, 1998

Surveillance Report 297-035, "Reactor Pressure Vessel Leak Test," dated August 28, 1997

Miscellaneous Documents

Interoffice Memorandum, "Evaluation Of Leak In SW Loop A 18-inch Return Line," dated July 15, 1996

General Electric Qualitative Assessment GE-NE-B13-01920-60, Revision 1, "Feedwater Sparger Flaw Disposition," dated May 26, 1998

Work Order Task No. BNP7, "RHR-V-41A; Body To Bonnet Leak," Revision 1

Work Order Task No. FTS3, "OSP-RPV-R801 RPV Leakage Test," Revision 6

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UNITED STATES
NUCLEAR REGULATORY COMMISSION

REGION IV

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NOV 12 1999

Mr. J. V. Parrish (Mail Drop 1023)
Chief Executive Officer
Energy Northwest
P.O. Box 968
Richland, Washington 99352-0968

SUBJECT: NRC INSPECTION REPORT NO. 50-397/99-10

Dear Mr. Parrish:

This refers to the inspection conducted on September 5 through October 16, 1999, at the Washington Nuclear Project-2 facility. The enclosed report presents the results of this inspection.

Based on the results of this inspection, the NRC has determined that one Severity Level IV violation of NRC requirements occurred. The violation is being treated as a noncited violation, consistent with Appendix C of the Enforcement Policy. The noncited violation is described in the subject inspection report. If you contest the violation or severity level of the noncited violation, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 611 Ryan Plaza Drive, Suite 400, Arlington, Texas 76011; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Washington Nuclear Project-2 facility.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response, if requested, will be placed in the NRC Public Document Room (PDR).

Should you have any questions concerning this inspection, we will be pleased to discuss them with you.

Sincerely,

A handwritten signature in cursive script that reads "Linda Joy Smith".

Linda Joy Smith, Chief
Project Branch E
Division of Reactor Projects

Docket No.: 50-397
License No.: NPF-21

PDR ADOCK 993260042

Enclosure:
NRC Inspection Report No. 50-397/99-10

cc w/enclosure:
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Energy Northwest

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E-Mail report to D. Lange (DJL)
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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.: 50-397
License No.: NPF-21
Report No.: 50-397/99-10
Licensee: Energy Northwest
Facility: Washington Nuclear Project-2
Location: Richland, Washington
Dates: September 5 through October 16, 1999
Inspectors: G. D. Replogle, Senior Resident Inspector
G. A. Pick, Senior Project Engineer
P. A. Goldberg, Reactor Inspector
Approved By: Linda Joy Smith, Chief
Project Branch E
Division of Reactor Projects

ATTACHMENT: Supplemental Information

993260263

EXECUTIVE SUMMARY

Washington Nuclear Project-2 NRC Inspection Report No. 50-397/99-10

This information covers a 6-week period of resident inspection.

Operations

- Operators conducted themselves in a professional and safety conscious manner. Operators demonstrated good coordination and control of the plant shutdown. Operators were consistently knowledgeable of important plant issues and, in most instances, properly anticipated plant operations. The inspectors found systems properly aligned for the plant conditions (Sections O1.1 and O2.1).
- Operators did not meet licensee expectations with respect to reactor water level control on one occasion during the shutdown. Shortly after the planned reactor scram, operators entered the emergency operating procedures, as expected, on low vessel level. After operators initiated the reactor core isolation cooling system, they did not maintain reactor water level lower than the system trip setpoint, which was part of the emergency operating procedure recommended band (Section O1.2).
- Operators performed error free fuel movements for the third consecutive refueling outage, which demonstrated sustained superior refueling performance (Section O1.3).

Maintenance

- The inspectors identified a violation of Technical Specification 5.4.1.a in that electricians failed to follow procedures and opened the breaker to the wrong valve. The breaker de-energized the low pressure core spray system minimum flow valve, which rendered the system inoperable. Operators identified the problem and restored the low pressure core spray valve to service within 10 minutes. This Severity Level IV violation is being treated as a noncited violation, consistent with Appendix C of the NRC Enforcement Policy. The problem is in the licensee's corrective action program as Problem Evaluation Request 299-1903 (Section M1.2).
- Management response to the inadvertent de-energization of an electrical bus was excellent. No consequences resulted because of the loss of the electrical bus that occurred when an electrician opened an incorrect electrical cabinet door. Management recognized that, had the mistake occurred when the Division III diesel generator was required to be operable, an emergency safety features actuation would have occurred. Consequently, management utilized the occurrence to reinforce important attention-to-detail concepts with the staff (Section M1.3).
- Overall, the licensee managed the outage well, and work reflected an appropriate focus on safety. The licensee addressed and dispositioned emergent issues, such as fuel bundle assembly problems and unexpected loss-of-fill alarms during reactor core isolation cooling system operation, in a thorough and effective manner (Section M8.1).

Engineering

- Engineers performed a thorough evaluation of an unexpected reactor core isolation cooling system loss-of-fill annunciator. The annunciator alarmed after the system automatically secured on high reactor water level. Engineers determined that the system remained full, but the pressure was less than expected because of known system out-leakage through a lube oil cooler. Short-term corrective measures were acceptable (Section E2.1).
- Engineers effectively evaluated improperly assembled fuel bundles. Licensee contractors identified that the vendor had assembled at least three fuel bundles 90 degrees from the correct configuration. Approximately 25 percent of the core was potentially susceptible to the problem. Plant and vendor engineers successfully demonstrated that the existing core analysis remained conservative assuming the worst-case bundle arrangement (Section E2.2).

Plant Support

- While most systems were in good material condition, the inspectors identified poor painting and preservation of some standby service water system valves (e.g., valves in the residual heat exchanger rooms) (Section O2.1).
- During routine plant tours, the inspectors verified that the licensee properly maintained emergency preparedness facilities and found on-shift staffing consistent with the Emergency Plan (Section P2.1).
- During routine tours, the inspectors observed no problems with protected area illumination levels, maintenance of the isolation zones around protective area barriers, controls associated with de-vitalization of the Division III diesel generator room, and the status of security power supply equipment (Section S2.1).



Report Details

Summary of Plant Status

At the beginning of the inspection period, the plant operated at 78 percent power. Power gradually coasted down to 73 percent on September 18, when operators shut down the plant to begin Refueling Outage R14.

I. Operations

O1 **Conduct of Operations**

O1.1 General Comments (71707)

Operators were knowledgeable of important plant parameters and problems and appropriately focused on safety. For the most part, operators conducted the shutdown in a thorough and methodical manner.

O1.2 Poor Reactor Level Control During Reactor Core Isolation Cooling System Operation

a. Inspection Scope (71707)

The reactor core isolation cooling system was placed into service on September 18, but tripped on high reactor vessel level shortly thereafter. The inspectors reviewed the details surrounding this unexpected occurrence after noting the issue during the review of operator logs.

b. Observations and Findings

The inspectors observed that operators did not meet licensee expectations with respect to reactor water level control on one occasion during the shutdown. After the planned reactor scram, operators entered the emergency operating procedures, as expected, on low vessel level. Operators then initiated the reactor core isolation cooling system to maintain reactor vessel inventory. Since the operators remained in the emergency operating procedures, they were expected to maintain vessel level from +13 inches (reactor scram setpoint) to +54 inches. Contrary to the expectations, operators failed to take positive control of the reactor core isolation cooling system operation and the system tripped at +54.5 inches (automatic reactor core isolation cooling trip setpoint).

The licensee stated that the level increased faster than expected because of low decay heat, rapid quenching of the steam by the reactor core isolation cooling system, and level swell caused by rapid pressure changes. Nonetheless, since the approximate decay heat level and other normal plant responses were known, operators did not properly anticipate plant response prior to initiating the reactor core isolation cooling system.

c. Conclusions

Operators did not meet licensee expectations with respect to reactor water level control on one occasion during the shutdown. Shortly after the planned reactor scram,



operators entered the emergency operating procedures, as expected, on low vessel level. After operators initiated the reactor core isolation cooling system, they did not maintain reactor water level lower than the system trip setpoint which was part of the emergency operating procedure recommended band.

O1.3 Refueling Operations

a. Inspection Scope (71707)

The inspectors monitored refueling operations.

b. Observations and Findings

Fuel movements were accomplished in a systematic and error-free manner. This was the third consecutive refueling outage with error-free refueling operations, which demonstrated sustained superior refueling performance.

O2 **Operational Status of Facilities and Equipment**

O2.1 Engineered Safety Feature System Walkdowns

a. Inspection Scope (71707, 71750)

The inspectors walked down accessible portions of the following safety-related systems:

- High pressure core spray
- Low pressure core spray
- Residual heat removal, Trains A, B, and C
- Reactor core isolation cooling
- Division I, II, and III emergency diesel generators
- Standby gas treatment system, Trains A and B
- Standby liquid control system
- Standby service water system, Trains A, B, and C

b. Observations and Findings

The inspectors found the systems properly aligned for the plant conditions and generally in good material condition. The inspectors identified that painting and preservation of some standby service water system valves was poor. Service water system valves in the residual heat removal system heat exchanger rooms were unusually corroded, when compared to components in other areas of the plant.



II. MAINTENANCE

M1 Conduct of Maintenance

M1.1 General Comments - Maintenance

a. Inspection Scope (61726, 62707)

The inspectors inspected the following maintenance and surveillance activities:

- Work Order OOBC6 - high pressure core spray system electrical panel modification
- Reactor core isolation cooling keepfill system troubleshooting (event-related review)
- Procedure ISP-EFC-B108, "Excess Flow Check Valve Test of Containment Atmosphere and Suppression Pool Level Instrument Sensing Lines," Revision 3
- Procedure TSP-CONT-R801, "Containment Isolation Valve and Penetration Leak Test Program," Revision 2
- Procedure ESP-MOV-GRP2, "MOV Thermal Overload Group 2," Revision 1 (event-related review)
- Bus SM-3 troubleshooting plan (event-related review)

b. Observations and Findings

Maintenance and surveillances were generally conducted in a thorough and professional manner utilizing three-way communications. The inadvertent de-energization of Valve LPCS-V-11, low pressure core spray system minimum flow valve, is discussed in Section M1.2. The inadvertent de-energization of the Division II bus is discussed in Section M1.3. A problem with the reactor core isolation cooling keepfill system is discussed in Section E2.1.

M1.2 Inadvertent Loss of Low Pressure Core Spray Valve LPCS-V-11

a. Inspection Scope (62707)

On September 21, 1999, an electrician inappropriately opened the breaker to Valve LPCS-V-11 that was required to be operable. The inspectors reviewed the event circumstances.

b. Observations and Findings

During motor-operated valve testing, an electrician erroneously opened the feeder breaker to Valve LPCS-V-11, which de-energized the valve and rendered the system



inoperable. Operators responded well and repositioned the affected breaker within 10 minutes of the misoperation. The licensee initiated an incident review board.

The incident review board found that the electrician had accidentally referenced an inappropriate document when performing the work. The work package required the electrician to open the valve breaker identified on a specific page in the work package itself. Instead, the electrician referenced the same page number in a related procedure, which specified working on Valve LPCS-V-11. Nonetheless, the electrician was briefed on protected status of the low pressure core spray system earlier in the shift and should have known not to work on Valve LPCS-V-11. The failure to perform work specified by the work package was a violation of Technical Specification 5.4.1.a. This requirement, in part, specifies that maintenance procedures be properly implemented. This Severity Level IV violation example is being treated as a noncited violation, consistent with Appendix C of the NRC Enforcement Policy. The problem is in the licensee's corrective action program as Problem Evaluation Request 299-1903 (50-397/99010-01).

As corrective measures, the licensee reinforced attention-to-detail concepts and briefed the event to all maintenance crews. Additionally, the licensee conspicuously posted the protected systems in several plant locations. The inspectors found the corrective measures acceptable.

c. Conclusions

The inspectors identified a violation of Technical Specification 5.4.1.a in that electricians failed to follow procedures and opened the breaker to the wrong valve. The low pressure core spray system minimum flow valve was de-energized, which rendered the system inoperable. Operators identified the problem and restored the low pressure core spray valve to service within 10 minutes. This Severity Level IV violation is being treated as a noncited violation, consistent with Appendix C of the NRC Enforcement Policy. The problem is in the licensee's corrective action program as Problem Evaluation Request 299-1903.

M1.3 Inadvertent Loss of Nonsafety-Related Bus SM-2

a. Inspection Scope (62707, 61726)

On October 13, electricians did not follow work instructions and inappropriately opened a panel on Bus SM-3. A panel safety feature de-energized all the components in the panel, which ultimately resulted in the loss of power to Bus SM-2. The inspectors observed the site management response to the event.

b. Observations and Findings

Buses SM-2 and SM-3 are nonsafety-related electrical buses that power loads such as circulating water pumps and other nonsafety components that are normally needed at power. The buses also feed safety-related Buses SM-8 (Division II, fed from SM-3) and SM-4 (Division III, fed from SM-2).



The work required electricians to view a misaligned SM-3 grounding bar that prevented cabinet closure. The feeder breaker to Bus SM-3 (S3) was open at the time. Since part of the grounding bar was not easily accessible, the electricians needed to open another panel below the grounding bar. The electricians failed to heed a warning statement cautioning against opening the panel because they thought the statement no longer applied. The electricians failed to realize that there was still power to the line side of the breaker, where some undervoltage control circuits still received power. When the panel was opened, power was lost to undervoltage control circuits associated with the SM-2 and SM-3 buses. The SM-2 feeder breaker (S2) subsequently tripped and extinguished local area lighting. No significant consequences resulted because no major SM-2 or SM-3 components were needed. Since the misoperated components were not safety-related, no violation of NRC requirements occurred.

The inspectors considered the management response to be excellent. Plant management recognized that, had the problem occurred at a different time, an emergency safety features actuation would have occurred. Normally, a loss of Bus SM-2 would result in the autostart of the Division III diesel generator, but the diesel generator was out of service. This type of event, with no actual safety consequences, could have easily been ignored. Instead, management utilized the event to refocus the site on attention-to-detail concepts and the importance of a questioning attitude. Refocusing the staff in this manner was effective at precluding more significant human performance errors. No additional human performance errors were experienced during the remainder of the inspection period.

c. Conclusion

Management response to the inadvertent de-energization of an electrical bus was excellent. There were no consequences to the loss of the electrical bus that resulted when an electrician opened an incorrect electrical cabinet door. Management recognized that, had the mistake occurred when the Division III diesel generator was required to be operable, an emergency safety features actuation would have occurred. Consequently, management utilized the occurrence to reinforce important attention-to-detail concepts with the staff.

M8 Miscellaneous Maintenance Issues

M8.1 Outage Management and Control (62707)

Overall, the licensee managed the outage well, and work reflected an appropriate focus on safety. The outage progressed essentially on schedule and the licensee maintained appropriate resources. Accordingly, the licensee addressed and dispositioned emergent issues, such as fuel bundle assembly problems and unexpected loss-of-fill alarms during reactor core isolation cooling system operation, in a thorough and effective manner.

III. ENGINEERING

E2 Engineering Support of Facilities and Equipment

E2.1 Unexpected Reactor Core Isolation Cooling System Operation

a. Inspection Scope (37551)

On September 18, 1999, the reactor core isolation cooling system isolated on high reactor vessel level. Following the isolation, the loss-of-fill annunciator alarmed, which was unexpected. The inspectors reviewed the engineering work associated with troubleshooting and correcting this problem.

b. Observations and Findings

In response to the annunciator, operators secured the reactor core isolation cooling system and filled and vented the discharge piping. Loss of fill was a concern because a water hammer could cause significant damage to the system. In lieu of the reactor core isolation cooling system, operators utilized the condensate system for reactor vessel makeup for the remainder of the shutdown.

Engineering later determined that the system had not lost fill; however, system pressure had dropped to just below the alarm setpoint but remained a few pounds greater than the point for onset of voiding. The engineers performed additional testing and determined that the pressure loss resulted from an existing leakage pathway. When the system starts, a valve to the lube oil cooler opens. At reactor vessel high level when the system secures, the valve remains open, which diverted sufficient flow to decrease pressure and actuate the loss-of-fill annunciator. Overall, the inspectors determined that engineers performed a thorough evaluation.

As a corrective measure, the licensee revised the alarm response procedures to instruct operators to close the lube oil cooler valve when the loss-of-fill annunciator alarms. However, the inspectors observed that the procedure change constituted an operator workaround. The system cycles on and off many times during the course of an event, and the annunciator might alarm each time the system cycles off. As such, operators might have to take manual action to close the lube oil cooling valve several times. The licensee acknowledged the comment and indicated that longer-term corrective actions may address this concern.

c. Conclusions

Engineers performed a thorough evaluation of an unexpected reactor core isolation cooling system loss-of-fill annunciator. The annunciator alarmed after the system automatically secured on high reactor water level. Engineers determined that the system remained full, but the pressure was less than expected because of known system out-leakage through a lube oil cooler. Short-term corrective measures were acceptable.

E2.2 Misassembled Fuel Bundles

a. Inspection Scope (37551)

During fuel cladding inspections, contractors identified that one first burn fuel bundle had been assembled 90 degrees from the proper orientation. The inspectors evaluated the engineering response to the problem.

b. Observations and Findings

The licensee inspected a total of 8 first-burn fuel bundles and 10 new fuel bundles manufactured at the ABB (Asea Brown Boveri) Hematite facility. The licensee found additional assembly problems with two new fuel bundles, and properly reassembled them prior to use. All of the misoriented bundles were manufactured at the same time. ABB operates under its own NRC-approved quality assurance program.

The licensee determined that approximately 280 fuel bundles, including new, first-burn, and second-burn fuel, were potentially susceptible to the assembly problem. This was the total population of fuel assembled at the ABB Hematite facility.

While the fuel itself is symmetrically loaded in each fuel bundle, the burnable poisons are not. The bundle rotation interchanged the location of two 1-percent and two 4-percent poison rods. The licensee performed an analysis, assuming worst-case bundle locations and multiple bundle misorientations and determined that: (1) the problem resulted in a negligible impact on the existing thermal limit analysis and (2) the existing Core Operating Limits Reports for Cycles 13, 14, and 15 remained conservative and valid. Using a similar analysis, ABB came to the same conclusions. Therefore, the licensee determined that no additional fuel inspections to look for this specific problem would be performed. The inspectors found the analysis and conclusions to be acceptable.

c. Conclusions

Engineers effectively evaluated improperly assembled fuel bundles. Licensee contractors identified that the vendor had assembled at least three fuel bundles 90 degrees from the correct configuration. Approximately 25 percent of the core was potentially susceptible to the problem. Plant and vendor engineers successfully demonstrated that the existing core analysis remained conservative assuming the worst-case bundle arrangement.



E8 Miscellaneous Engineering Issues (92903)

E8.1 (Closed) Inspection Followup Item 50-397/98023-01: Kaowool fire seal not installed in accordance with design.

The NRC identified that the Kaowool barrier material installed in Penetration X099 was not adequately packed and did not conform to the penetration design. Licensee Drawing KW-1, Revision 0, specified that the Kaowool should be adequately compressed in the opening.

The inspectors reviewed Problem Evaluation Request 298-2023, dated December 16, 1998, which addressed the problem. The corrective actions included: (1) reworking the penetration; (2) performing an inspection of the accessible, similar penetrations; (3) reworking seals; and (4) revising procedures to provide clear inspection criteria. The inspectors verified that the corrective actions were complete and found the measures to be acceptable.

The inspectors determined that the improper installation of the Kaowool did not constitute a violation of NRC requirements. In the Final Safety Analysis Report, the licensee had only committed to provide a seal capable of radiant protection from fires in the reactor building. The Kaowool was not a rated fire barrier. The as-found Kaowool penetration met the licensee's commitments to the NRC.

E8.2 (Closed) Unresolved Item 50-397/99007-03: Missing ABB fuel pin compression springs.

After the licensee identified two fuel bundles with missing springs, the inspectors opened this item pending further analysis of the as-found condition. The licensee was concerned that other fuel bundles in the core might be missing springs.

The springs, located at the top of each fuel pin, hold the fuel pins in place during shipping, while horizontal to prevent damage, and plant operations. The licensee worked with ABB and determined that the issue was not a safety concern. A secondary purpose is to maintain the fuel pins in their seats during operations. However, the licensee and ABB determined that the weight of each pin would maintain the pins secured under worst case flow conditions. Finally, the springs hold the upper tie plate in place; however, because of the small force requirements, most springs could be missing without experiencing a problem. The evaluation was acceptable.

IV. Plant Support

P2 Status of Emergency Preparedness Facilities, Equipment, and Resources

P2.1 General Comments (71750)

During routine plant tours, the inspectors verified that the emergency preparedness facilities were properly maintained and that the licensee maintained at least the minimum staffing required by their Emergency Plan. No problems were found.

S2 Status of Security Facilities and Equipment

S2.1 General Comments (71750)

During routine tours, the inspectors observed protected area illumination levels, maintenance of the isolation zones around protective area barriers, and the status of security power supply equipment. Additionally, the inspectors verified that the devitalization of the Division III diesel generator room was properly controlled. No problems were observed.

V. MANAGEMENT MEETINGS

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management on October 19, 1999. The licensee acknowledged the findings presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.



ATTACHMENT

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

J. V. Parrish, Chief Executive Officer
D. K. Atkinson, Engineering Manager
I. M. Borland, Radiation Protection Manager
S. A. Boynton, Quality Assurance Manager
J. W. Dabney, Outage Manager
P. J. Inserra, Licensing Manager
D. W. Martin, Security Manager
W. S. Oxenford, Operations Manager
D. J. Poirier, Maintenance Manager
G. O. Smith, Vice President - Generation/Nuclear Plant General Manager
R. L. Webring, Vice President - Operations Support

INSPECTION PROCEDURES USED

IP 37551: Onsite Engineering
IP 61726: Surveillance Observations
IP 62707: Maintenance Observations
IP 71707: Plant Operations
IP 71750: Plant Support
IP 92903: Engineering Followup

ITEMS OPENED AND CLOSED

Opened and Closed

50-397/99010-01 NCV Low pressure core spray system rendered inoperable because of failure to follow procedure (Section M1.2)

Closed

50-397/98023-01 IFI Kaowool not installed per design (Section E8.1)
50-397/99007-03 URI Missing fuel pin compression springs (Section E8.2)

LIST OF ACRONYMS USED

ABB Asea Brown Bovari
CFR Code of Federal Regulations
IFI inspection followup item
NCV noncited violation
NRC U. S. Nuclear Regulatory Commission
PDR public document room
URI unresolved item
WNP-2 Washington Nuclear Project-2

