

ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

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Licensee: Energy Northwest  
Facility: WNP-2  
Location: Richland, Washington  
Dates: June 13 through July 24, 1999  
Inspectors: G. D. Replogle, Senior Resident Inspector  
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ATTACHMENT: Supplemental Information

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## EXECUTIVE SUMMARY

WNP-2  
NRC Inspection Report No. 50-397/99-08

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

### Operations

- The conduct of operations was professional and safety conscious. Operators consistently demonstrated knowledge of important plant parameters and problems (Section O1.1).
- Following the fuel savings dispatch outage, operators controlled the plant startup to criticality well and consistently utilized three-way communications. The control room supervisor provided appropriate direction to the crew, and the operations manager oversaw the evolution (Section O4.1).
- The inspectors identified that Procedure 3.1.1, "Master Startup Checklist," Revision 24, provided inconsistent guidance and required a high level of operator knowledge to properly implement. The procedure recommended that steps be performed in a sequence that was not possible to implement (Section O4.1).
- A control room supervisor demonstrated an excellent questioning attitude and plant ownership when reviewing engineering work. The control room supervisor refused to accept an operability evaluation associated with Residual Heat Removal Pump-2C control circuit time delay relays because the conclusions were based on minimal test information. As a result, engineers performed additional testing and found that local magnetic interference affected relay timing and could, under some circumstances, affect pump operability. Planned corrective measures to address the problem were acceptable (Section O4.2).

### Maintenance

- The conduct of maintenance was professional and thorough (Section M1.1).
- A noncited violation of Technical Specification 5.4.1.a resulted because an instrument and controls technician failed to properly isolate a drywell pressure switch in accordance with a surveillance procedure. Consequently, the misoperation resulted in an unexpected control room alarm and satisfied one-half of the high pressure core spray system injection logic. In response to the event, the licensee performed a credible investigation and planned appropriate corrective measures. This deficiency is in the corrective action program as Problem Evaluation Request 299-1336 (Section M1.2).
- Overall, plant material condition was very good. Several material condition improvements were completed during the fuel savings dispatch outage including repair of: Reactor Water Cleanup Pump B, the turbine building roof, 100 control room deficiencies, and 70 steam leaks. Additionally, the fire protection control circuits were modified to minimize the potential for water hammer on the system (Section M2.1).

### Engineering

- The engineering investigation into an automatic main steam isolation valve closure was thorough. Engineers instrumented the control circuit and found that a degraded relay erroneously changed states in response to minor vibrations. The relay misoperation, in conjunction with expected system logic operation during surveillance testing, resulted in the system isolation (Section E8.1).

### Plant Support

- 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 (Section P2.1).
- The inspectors noted a significant improvement with respect to liquid effluent discharges to the Columbia River. As a result of concentrated efforts at minimizing liquid waste and treating and reusing waste water, no discharges were made to the river in the past 10 months. This was a substantial improvement from prior years when discharges sometimes totaled more than a million gallons per year (Section R1.1).
- During routine tours, the inspectors observed no problems with protected area illumination levels, maintenance of the isolation zones around protective area barriers, 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 was shut down for its fuel savings dispatch outage. The plant entered Mode 2 and achieved criticality on June 30, 1999. Mode 1 was entered on July 2, and the plant was synchronized to the grid on July 3. Sixty percent power was attained on July 6 where it remained for several days at the request of Bonneville Power Administration for economic dispatch. On July 12 plant power was raised to 100 percent, where it essentially remained for the remainder of the inspection period.

### I. Operations

#### **O1 Conduct of Operations**

##### **O1.1 General Comments (71707)**

The inspectors conducted frequent reviews of ongoing plant operations. Operators demonstrated consistent knowledge of important plant parameters and problems and maintained a focus on safety.

#### **O2 Operational Status of Facilities and Equipment**

##### **O2.1 Engineered Safety Feature System Walkdowns**

###### **a. Inspection Scope and General Comments (71707)**

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
- Divisions I, II, and III emergency diesel generators
- Standby gas treatment, Trains A and B
- Standby liquid control
- Standby service water, Trains A, B, and C

###### **b. Observations and Findings**

The systems were found to be properly aligned for the plant conditions and generally in good material condition.

## O4 Operator Knowledge and Performance

### O4.1 Operations Performance During Plant Startup

#### a. Inspection Scope (71707)

On June 30, 1999, the inspectors observed portions of the reactor startup and verified the completion of several startup prerequisites.

#### b. Observations and Findings

Operators performed the startup in a controlled and deliberate manner, and the operations manager oversaw the evolution. Control room supervisors exhibited appropriate command and control and were involved with key plant evolutions. Control room briefings were informative and well focused. Crew members consistently demonstrated the use of three-way communications.

The inspectors identified that Procedure 3.1.1, "Master Startup Checklist," Revision 24, provided inconsistent guidance and required a high level of operator knowledge to properly implement. The procedure recommended that all steps be performed in sequence. However, it was not possible to implement the steps in sequence. For example, step 6.2.32 recommended placing the drywell cooling system in service in accordance with Procedure 2.3.2, "Primary Containment Cooling System," Revision 10. At that time, placing the drywell cooling system in service may have challenged lower drywell temperature limits. Additionally, step 6.2.64 specified placing the reactor core isolation cooling system in service, but reactor system temperature and pressure were not sufficient to complete the step at that time. Nonetheless, operators completed the necessary steps in an appropriate manner and obtained the permission from the control room supervisor prior to deviating from the specified sequence of the procedure, which was consistent with administrative requirements. The licensee agreed with the inspector's observations and planned to modify Procedure 3.1.1.

The inspectors also identified two valve labeling problems. First, Valve PI-V-X78f, Reactor Recirculation Pump 1A pressure instrument isolation, had two tags. One appropriate identification tag and another tag that corresponded to an excess flow check valve, an inappropriate tag. Second, the nomenclature for one valve in Procedure 3.1.1 was inconsistent with the valve tag. The procedure referenced Valve PI-V-X74b, residual heat removal pump differential pressure instrument isolation, while the tag indicated RHR-PI-V-X74b. After the inspectors discussed the issues with operations management, the licensee implemented actions to correct the discrepancies.

#### c. Conclusion

Following the fuel savings dispatch outage, operators controlled the plant startup to criticality well and consistently utilized three-way communications. The control room supervisor provided appropriate direction to the crew, and the operations manager oversaw the evolution.

The inspectors identified that Procedure 3.1.1 provided inconsistent guidance and required a high level of operator knowledge to properly implement. The procedure recommended that steps be performed in a sequence that was not possible to implement. The inspectors also identified two valve labeling problems.

O4.2 Operations Performance in Response to Residual Heat Removal Pump Failures

a. Inspection Scope (71707, 37551)

The inspectors evaluated the investigation into repeated failures of the breaker for Residual Heat Removal Pump-2C to remain closed. These failures were first discussed in NRC Inspection Report 50-397/99-07, Section E1.1.

b. Observations and Findings

As documented in Problem Evaluation Request 299-1166, Residual Heat Removal Pump-2C breaker closed and inexplicably opened during surveillance testing. The licensee cleaned components in the pump control circuits and successfully tested the pump. Plant engineers recommended that the pump be declared operable based on the test results.

Contrary to the engineering recommendation, the control room supervisor did not believe that adequate information was obtained to provide reasonable assurance for operability. He based his conclusion on the failure to identify the root cause and the potential for an uncorrected, sporadic problem to affect pump operability. Accordingly, the control room supervisor did not return the pump to service but requested that engineering accomplish additional corrective measures and testing to determine and correct the root cause.

In response to the control room supervisor's suggestions, numerous control circuit relays were replaced with units that were verified to operate correctly. However, during retesting, additional breaker failures to remain closed occurred. Engineers instrumented the control circuit and found that magnetic interference in the control cabinet, from adjacent relays, affected the relay timing. For example, one relay had a bench-tested response time of 20 msec, but the installed response time was 170 msec. This delay interrupted the circuit coordination and provided an open signal to the breaker after it had already closed. With the new test data, engineers and craftsmen adjusted the relay timing so that the circuit would respond appropriately. Personnel closely monitored the circuit response during subsequent testing to ensure that the problem was resolved. The licensee planned to implement a future modification to minimize the effects of the magnetic interference on the relays.

c. Conclusion

A control room supervisor demonstrated an excellent questioning attitude and plant ownership when reviewing engineering work. The control room supervisor refused to accept an operability evaluation associated with Residual Heat Removal Pump-2C control circuit time delay relays because the conclusions were based on insufficient test



information. As a result, engineers performed additional testing and found that local magnetic interference affected relay timing and could, under some circumstances, affect pump operability. Planned corrective measures to address the problem were acceptable.

## II. MAINTENANCE

### M1 Conduct of Maintenance

#### M1.1 General Comments - Maintenance

##### a. Inspection Scope (61726, 62707)

The inspectors observed portions of the following maintenance and surveillance activities, except as noted:

- Work Order GMG-006, Control Rod Drive Valve CRD-V-34 replacement.
- Procedure OSP-RSCS-C401, "RSCS [Rod Sequence Control System] CFT [Channel Functional Test] Prior to Reactor Startup." Revision 0.
- Procedure OSP-RWM-C401, "Rod Worth Minimizer Startup CFT," Revision 2.
- Procedure OSP-ELEC-M701, "Diesel Generator 1 - Monthly Operability Test," Revision 7.
- Procedure TSP-CONT-B801, "Drywell/Wetwell Bypass Leak Rate Test," Revision 1 (event related review).

##### b. Observations and Findings

The conduct of maintenance and surveillances was generally professional and thorough. A problem implementing the drywell/wetwell bypass leak rate test is discussed in Section M1.2.

#### M1.2 Drywell/Wetwell Bypass Leak Rate Test

##### a. Inspection Scope (61726)

During the drywell/wetwell bypass leak rate test an unexpected "HPCS [high pressure core spray] DRYWELL PRESS HIGH" alarm came in. The inspectors reviewed the circumstances that led to the alarm.



b. Observations

On June 17, 1999, the control room received an unexpected "HPCS DRYWELL PRESS HIGH" alarm during the performance of the drywell/wetwell bypass leak rate test. An instrumentation and controls technician failed to isolate a drywell pressure switch (MS-PS-47B) in accordance with Procedure TSP-CONT-B801. The high pressure signal satisfied half the logic necessary for a high pressure core spray injection. The licensee convened an Incident Review Board to address the issue.

The inspectors reviewed the Incident Review Board report and concluded that the licensee had performed a credible investigation and had developed reasonable recommendations. The licensee attributed the root cause to human error for failure to adequately self-check. The licensee identified that the surveillance procedure needed clarification in that Attachment 9.4: (1) did not provide valve numbers for the instrument isolation valves and (2) failed to list the affected instrumentation in a logical, user-friendly manner. Immediate corrective actions consisted of counseling the individual involved, reviewing the event with other crews, and establishing and verifying system lineups prior to recommencing testing. The licensee also planned to clarify Procedure TSP-CONT-B801.

The failure to isolate a pressure switch in accordance with Procedure TSP-CONT-B801 violated Technical Specification 5.4.1.a. This Severity Level IV violation is being treated as a noncited violation, consistent with Appendix C of the NRC Enforcement Policy. The violation is in the corrective action program as Problem Evaluation Request 299-1336 (50-397/99008-01).

c. Conclusions

A noncited violation of Technical Specification 5.4.1.a resulted because an instrument and controls technician failed to properly isolate a drywell pressure switch in accordance with a surveillance procedure. Consequently, the misoperation resulted in an unexpected control room alarm and satisfied one-half of the high pressure core spray system injection logic. In response to the event, the licensee performed a credible investigation and planned appropriate corrective measures. This deficiency is in the corrective action program as Problem Evaluation Request 299-1336.

**M2 Maintenance and Material Condition of Facilities and Equipment**

**M2.1 Review of Material Condition During Plant Tours**

a. Inspection Scope (62707)

During this inspection period, the inspectors conducted interviews and routine plant tours to evaluate plant material condition.

b. Observations and Findings

Overall plant material condition was very good with some exceptions. The following material condition improvements were completed this inspection period:

- Replaced Reactor Water Cleanup Pump B.
- Repaired the turbine building roof. Rain water leakage into the turbine building had caused a minor fire (NRC Inspection Report 50-397/99-07, Section M2.1).
- Repaired approximately 100 control room deficiencies.
- Repaired approximately 70 steam leaks.
- Installed time delay relays in the fire pump control circuits. The modification was implemented to prevent the fire pumps from starting at the same time and to minimize the effects from water hammer on fire protection system piping. A water hammer event had caused localized flooding in the reactor building (NRC Inspection Reports 50-397/98-16 and 50-397/98-20).

The following material condition problems were observed.

- Seven safety relief valves were weeping into the suppression pool. In response to the problem, operators periodically drained the suppression pool and initiated suppression pool cooling. The licensee planned to replace the leaking valves the next refueling outage.
- The inspectors observed a lower bearing oil leak on the Standby Service Water Pump B motor. Through discussions with the engineers and operators, the inspectors determined that adequate controls were currently in place to ensure that bearing oil level would be maintained during a postulated event. The licensee planned to correct the leak during the next refueling outage.
- Tower Makeup Pump A was inoperable during the inspection period. The pump failed in June 1999, and the licensee planned to return the pump to service in late July. The plant is equipped with three 50 percent capacity pumps. If another pump failed, a power reduction would be required.

c. Conclusions

Overall, plant material condition was very good. The licensee completed several material condition improvements during the fuel savings dispatch outage including repair of: Reactor Water Cleanup Pump B, the turbine building roof, 100 control room deficiencies, and 70 steam leaks. Additionally, the fire protection control circuits were modified to minimize the potential for water hammer on the system. The material condition concerns that remained, such as seven weeping safety relief valves, a standby service water pump bearing oil leak, and a nonfunctional tower makeup pump, were included in the corrective maintenance program.



### III. ENGINEERING

#### E.8 Miscellaneous Engineering Issues (92700)

##### E8.1 (Closed) Licensee Event Report 50-397/99-001: degraded relay causes main steam isolation valve closure.

On June 28, 1999, the plant was in Mode 4 and a main turbine throttle valve position switch surveillance was in progress. As was expected during the surveillance, one-half of the main steam isolation valve closure logic was satisfied. However, a relay in the other half of the logic circuit unexpectedly actuated and all eight main steam isolation valves closed. Since the plant was in Mode 4, there were no safety consequences. Plant engineers investigated the event.

The inspectors determined that engineering conducted a thorough investigation. The engineers instrumented the control circuit and found a degraded relay. The relay erroneously changed states in response to minor vibrations emanating from adjacent components. During further investigation, the electrical contact spring tension was found well below vendor specifications. The defective relay was replaced with a properly operating unit. The licensee planned to identify the root cause and take additional corrective measures, if necessary. The inspectors found the planned and completed corrective measures 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.

#### R1 Radiological Protection and Chemistry Controls

##### R1.1 Liquid Effluent Controls General Comments (71750)

The inspectors noted a significant improvement with respect to liquid effluent discharges to the Columbia River. As a result of concentrated efforts at minimizing liquid waste and treating and reusing waste water, no discharges were made to the river in the past 10 months. Total effluent releases for the past 12 months were approximately 70,000 gallons. This was a substantial improvement from prior years. For example, the 1998 discharge was 650,000 gallons, the 1997 discharge was 376,000 gallons, and prior discharges were well over 1,000,000 gallons per year.

**S2 Status of Security Facilities and Equipment**

**S2.1 General Comments (71750)**

During routine tours, the inspectors observed no problems with protected area illumination levels, maintenance of the isolation zones around protective area barriers, and the status of security power supply equipment.

**V. MANAGEMENT MEETINGS**

**X1 Exit Meeting Summary**

The inspectors presented the inspection results to members of licensee management on July 29, 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.





