U.S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No: 50-397/90-14

Docket No: 50-397

Licensee: Washington Public Power Supply System
P. O. Box 968
Richland, WA 99352

Facility Name: Washington Nuclear Project No. 2 (WNP-2)

Inspection at: WNP-2 Site near Richland, Washington

Inspection Conducted: May 14 - June 17, 1990

Inspectors: C. J. Bosted, Senior Resident Inspector

R. C. Sorensen, Resident Inspector

Approved by: P. J. Morrill for P. H. JOHNSON 7/11/90
P. H. Johnson, Chief Date Signed
Reactor Projects Section 3

Summary:

Inspection on May 14 - June 17, 1990 (50-397/90-14)

Areas Inspected: Routine inspection by the resident inspectors of control room operations, licensee actions on previous inspection findings, engineered safety feature (ESF) status, surveillance program, maintenance program, licensee event reports, special inspection topics, procedural adherence, and review of periodic reports. During this inspection, Inspection Procedures 30703, 61726, 62703, 71707, 71710, 90712, 90713, 92700, 92701, 92702 and 93702 were covered.

Safety Issues Management System (SIMS) Items: None.

Results: General Conclusions and Specific Findings

Significant Safety Matters: None.

Summary of Violations and Deviations: One non-cited violation was identified in the failure to classify an emergency event following an explosion in the 25 kilovolt potential transformer cabinets.

Open Items Summary:

Six followup items and three LERs were closed.

## DETAILS

1. Persons Contacted

A. Oxsen, Deputy Managing Director
*C. Powers, Director, Engineering
*J. Baker, Plant Manager
*C. McGilton, Manager of Operational Assurance
*R. Chitwood, Emergency Planning Manager
C. Edwards, Quality Control Manager
R. Graybeal, Health Physics and Chemistry Manager
*J. Harmon, Maintenance Manager
A. Hosler, Licensing Manager
*D. Kobus, Quality Assurance Manager
*R. Koenigs, Technical Manager
*S. McKay, Operations Manager
*J. Peters, Administrative Manager
*G. Gelhaus, Assistant Technical Manager
W. Shaeffer, Assistant Operations Manager
*R. Webring, Assistant Maintenance Manager

The inspectors also interviewed various control room operators, shift supervisors and shift managers, maintenance, engineering, quality assurance, and management personnel.

*Attended the Exit Meeting on June 21, 1990.

2. Plant Status

At the start of the inspection period, the plant was conducting the annual refueling outage.

An Unusual Event was declared on May 27 when the "A" emergency diesel generator caught fire during a 24 hour test run (see paragraph 8 for details). On June 3, an electrical short in the 25 kilovolt (KV) bus caused an explosion which destroyed a portion of the electrical bus (see paragraph 9 for details).

The outage was scheduled to be completed on June 3; however, repairs of the emergency diesel generator extended the outage.

3. Previously Identified NRC Inspection Items (92701, 92702)

The inspectors reviewed records, interviewed personnel, and inspected plant conditions relative to licensee actions on previously identified inspection findings:

a. (Closed) Enforcement Item (397/89-17-01): Failure to Take Corrective Action for Shutdown Cooling Isolations.

A number of shutdown cooling system isolations occurred during testing on the excess flow check values. This testing occurred during the 1989 outage. Reactor System pressure was raised for testing to provide a pressure head to operate the valves. The selected control band for the pressure was 100 to 125 psig.

Automatic isolation of shutdown cooling was actuated at 122 psig. During the performance of later testing, the pressure instrument used by the operators to control pressure was isolated and indicated a constant value. The control room operator was unaware of this until system pressure slowly increased and a high pressure isolation occurred at 122 psig.

Plant procedure PPM 7.4.6.3.4.1, "Surveillance Testing of Reactor Pressure Vessel Excess Flow Check Valves," was revised to identify the consequences of each instrument removed from service including specific valve identification. During the performance of excess flow check valve testing during the outage covered by this inspection, this procedure was performed without incident.

This item is closed.

b. (Closed) Enforcement Item (397/89-38-02): Incorrect Torque Values on Four Occasions.

From June 1988 through November 1989, during maintenance actions, incorrect torque was applied to a number of threaded fasteners on safety related equipment. A number of causes were identified by the licensee. Plant management requested that the Safety and Assurance organization perform an assessment of the torque practices used in the plant.

The inspector reviewed QA Surveillance Report 2-90-036, which was issued on April 2, 1990, which identified a number of program and implementation problems. The Maintenance department has undertaken a number of steps to correct the condition. The EPRI Good Practice on bolting and fasteners has been included in the maintenance training, and PPM 10.2.10, "Fasteners Torque and Tensioning" was revised on April 20, 1990 to change the process.

The inspector reviewed the procedure, training changes, and the EPRI documents used to improve these areas. The corrective actions appear to correct the programmatic problems; implementation will be followed up during the routine inspection program. This item is closed.

c. (Closed) Enforcement Item (397/89-38-03): Ineffective Corrective Actions

Through the combination of industry operating experience information and actual previous experience with loosening fasteners at WNP-2, ample opportunity existed to determine the cause of the loosening of bolts in the residual heat removal system. The inspector found four loose motor operator-to-yoke capscrews. These had been checked

under the preventive maintenance program within the previous two months.

The licensee initiated a design change to mechanically prevent the fasteners from becoming loose. The inspector reviewed Basic Design Change (BDC) 90-0016-0A, which was issued on April 20, 1990 and installed mechanical antirotational devices on the fasteners of 23 valves. This item is closed.

d. (Closed) Enforcement Item (397/89-40-01): Preventive Maintenance Errors.

Errors during the performance of preventive maintenance (PM) occurred in three areas. In one case, bolts were checked finger tight that were supposed to be torqued up to 450 ft-lbs. In another case, battery electrolyte level was not checked during the monthly inspection, and in the last example, emergency lighting was not restored following the PM task.

Procedure PPM 10.25.63, "Emergency Lighting Inspection," was revised to include specific instructions to check the lighting is restored following maintenance, and to include a battery level check on the monthly surveillance sheet. The other item was included in the responses to 89-38-02 and 03 above. This item is closed.

e. (Closed) Follow-up Item (397/89-22-01): Verify Valve Numbers are Included in Excess Flow Check Valve Testing.

During a Management Meeting, licensee management committed to revise the excess flow check valve test procedure to include valve numbers in the test procedure which was to be used during refueling outage R-5.

The inspector reviewed PPM 7.4.6.3.4.1.A-G, "Excess Flow Check Valve Main Steam Flow" which was issued on May 29, 1990. Valve numbers were found to have been included in the procedure. This commitment was completed. This item is considered closed.

f. (Closed) Follow-up Item (397/89-31-03): Enhanced Procedures for Safety Related Breakers.

Safety related breakers were being scheduled in the PM program based on time in service (ie; periodic). The manufacturer's technical manual stated that PMs should be conducted after a pre-determined number of operations of the breaker. The number of breaker cycles was not monitored. No breaker was found to have exceeded the manufacturer's recommendation. The licensee committed to revising their procedures to include a tracking vehicle for the number of breaker operations.

The inspector reviewed the data sheets attached to the PM work order, which includes a data point for the breaker counter. The computer tracking program was also reviewed which tracks the breaker

operation data. No discrepancies were identified. This item is closed.

g. (Open) Deviation (397/89-31-01): Lighting Not Established per FSAR in RHR Valve Rooms.

Emergency lighting powered from the emergency diesel generators was found to be inoperative due in large part to burned out light bulbs. No other emergency lighting was available in these rooms.

Procedure 10.25.64, "Normal and Emergency Lighting," was revised on February 21, 1990, and an interoffice memorandum was issued to revise the electrical shop practices to assign shift personnel to check various plant buildings for burned out or inoperative lighting. All emergency powered 120 volt lighting was identified with a blue sticker. During follow-up by the inspector, a number of blue stickered lights were found to be inoperative for a up to ten days. This was brought to maintenance management attention. The inspector was not satisfied that this item has been resolved, and therefore it will remain open.

h. (Open) Follow-up Item (397/88-32-01): Discrepancies Regarding ATWS Modifications

This item was not completed by the licensee and was not ready for closure by the inspector. Licensee efforts will be reviewed in a future inspection.

4. Operational Safety Verification (71707)

a. Plant Tours

The following plant areas were toured by the inspectors during the course of the inspection:

- Reactor Building
- Control Room
- Diesel Generator Building
- Radwaste Building
- Service Water Buildings
- Technical Support Center
- Turbine Generator Building
- Yard Area and Perimeter

b. The following items were observed during the tours:

(1) Operating Logs and Records. Records were reviewed against Technical Specification and administrative control procedure requirements.

(2) Monitoring Instrumentation. Process instruments were observed for correlation between channels and for conformance with Technical Specification requirements.

(3) Shift Manning. Control room and shift manning were observed for conformance with 10 CFR 50.54.(k), Technical Specifications, and administrative procedures. The attentiveness of the operators was observed in the execution of their duties and the control room was observed to be free of distractions such as non-work related radios and reading materials.

(4) Equipment Lineups. Valves and electrical breakers were verified to be in the position or condition required by Technical Specifications and Administrative procedures for the applicable plant mode. This verification included routine control board indication reviews and conduct of partial system lineups. Technical Specification limiting conditions for operation were verified by direct observation.

(5) Equipment Tagging. Selected equipment, for which tagging requests had been initiated, was observed to verify that tags were in place and the equipment was in the condition specified.

(6) General Plant Equipment Conditions. Plant equipment was observed for indications of system leakage, improper lubrication, or other conditions that would prevent the system from fulfilling its functional requirements. Annunciators were observed to ascertain their status and operability.

(7) Fire Protection. Fire fighting equipment and controls were observed for conformance with administrative procedures.

(8) Plant Chemistry. Chemical analyses and trend results were reviewed for conformance with Technical Specifications and administrative control procedures.

(9) Radiation Protection Controls. The inspectors periodically observed radiological protection practices to determine whether the licensee's program was being implemented in conformance with facility policies and procedures and in compliance with regulatory requirements. The inspectors also observed compliance with Radiation Exposure Permits, proper wearing of protective equipment and personnel monitoring devices, and personnel frisking practices. Radiation monitoring equipment was frequently monitored to verify operability and adherence to calibration frequency.

(10) Plant Housekeeping. Plant conditions and material/equipment storage were observed to determine the general state of cleanliness and housekeeping. Housekeeping in the radiologically controlled area was evaluated with respect to controlling the spread of surface and airborne contamination.

(11) Security. The inspectors periodically observed security practices to ascertain that the licensee's implementation of the security plans was in accordance with site procedures, that the search equipment at the access control points was

operational, that the vital area portals were kept locked and alarmed, and that personnel allowed access to the protected area were badged and monitored and the monitoring equipment was functional.

5. Engineered Safety Feature System Walkdown (71707, 71710)

Selected engineered safety feature systems (and systems important to safety) were walked down by the inspectors to confirm that the systems were aligned in accordance with plant procedures. During the walkdown of the systems, items such as hangers, supports, electrical power supplies, cabinets, and cables, were inspected to determine that they were operable and in a condition to perform their required functions. The inspectors also verified that the system valves were in the required position and locked, as appropriate. The local and remote position indication and controls were also confirmed to be in the required position and operable.

Accessible portions of the following systems were walked down on the indicated dates.

| System | Dates |
|---|---|
| Diesel Generator Systems, Divisions 1, 2, and 3. | June 4 |
| Hydrogen Recombiners | May 15, 22, 27 |
| Low Pressure Coolant Injection, (LPCI) Trains "A", "B", and "C" | May 15, 22, 27 |
| Low Pressure Core Spray (LPCS) | May 15, 22, 27 |
| Residual Heat Removal (RHR), Trains "A" and "B" | May 15, 22, 27, June 3, 12 |
| Standby Liquid Control (SLC) System | May 29 |
| 125V DC Electrical Distribution, Divisions 1 and 2 | May 15, 22, 27, June 3, 12 |
| 250V DC Electrical Distribution | May 15, 22, 27, June 3, 12 |

No violations or deviations were identified.

6. Surveillance Testing (61726)

a. Surveillance tests required to be performed by the Technical Specifications (TS) were reviewed on a sampling basis to verify that: 1) the surveillance tests were correctly included on the facility schedule; 2) a technically adequate procedure existed for performance of the surveillance tests; 3) the surveillance tests had been performed at the frequency specified in the TS; and 4) test

results satisfied acceptance criteria or were properly dispositioned.

b. Portions of the following surveillance tests were observed by the inspectors on the dates shown:

| Procedure | Description | Dates Performed |
|---|---|---|
| 8.3.178 | HPCS DG Governor Test | May 30 |
| 7.4.8.1.1.2.6 | HPCS Diesel Generator Loss of Power Test | May 31 |
| 7.4.6.3.4.1G | Excessive Flow Check Valve Testing | June 1 |
| 8.3.125 | RCIC Uncoupled Overspeed Trip Test | June 5 |
| 10.24.17 | Friction Testing Control Rod Drives | May 22 |
| 8.3.120 | Recirc Flow Control Calibration "A" | May 22 |

No violations or deviations were identified.

7. Plant Maintenance (62703)

a. During the inspection period, the inspectors observed and reviewed documentation associated with maintenance and problem investigation activities to verify compliance with regulatory requirements and with administrative and maintenance procedures, required QA/QC involvement, proper use of safety tags, proper equipment alignment and use of jumpers, personnel qualifications, and proper retesting. The inspectors verified that reportability for these activities was correct.

The inspectors witnessed portions of the following maintenance activities:

| Description | Dates Performed |
|---|---|
| Inspect DIV I DG for damage per AS 5869 | May 29 |
| Disassemble and repair DIV I DG per AS 5866 | May 29 |
| Replace reactor pressure vessel (RPV) Upset Level Transmitter per AS 1452 | June 1 |
| Repair isophase bus duct per AS 5998 | June 11-12 |

b. The inspector travelled off site to the repair facility to observe the emergency diesel generator repairs. Since the repair facility did not have a Class 1E quality program, the licensee transported it's inspectors and engineers to that location to control the work. The inspector found that both quality assurance and quality control engineers and members of the plant technical and engineering staff were present and closely monitoring the work being performed in the repair facility. Welding performed on the generator shaft was done by a qualified licensee welder and all nondestructive testing was performed by a qualified licensee inspector. The licensee's QA representative showed the inspector the area at the facility in which spare parts and test equipment were isolated and stored. All parts were found to be tagged with the licensee's store house "green" QC tags and the test equipment had current licensee M&TE tags.

No violations or deviations were identified.

8. Unusual Event Caused by Fire in Diesel Generator Bearing (93702)

On May 27, 1990, during a 24 hour test run of emergency diesel generator (EDG) division 1, an oil fire occurred on the generator south end radial bearing. At the time of the fire, the EDG had been operating for about 12 hours. The fire was quickly extinguished and the EDG was tripped from the control room. An Unusual Event was declared and exited at 5:48 pm. A Department of Energy (DOE) fire department team responded.

During the operation of the EDG, operators had been stationed in the EDG room to monitor equipment conditions. Just before the operator observed the fire, he had been investigating a change in noise from the generator. High bearing temperature and high EDG vibration alarms were received at 5:47 pm, and the operator noted flames coming from the generator bearing. An operator contacted the control room about the fire and another operator used a hand held fire extinguisher to put out the fire. fire. The control room tripped the EDG and activated the DOE fire alarm.

The fire was promptly extinguished before the site emergency response team arrived. Following the DOE fire department's arrival, a reflash watch was stationed until the bearing cooled.

Licensee investigation into the event concluded that the thrust bearing at the north end of the generator had failed just prior to the south end radial bearing failure. The thrust bearing failure was attributed to a lack of lubricating oil. An extra groove machined into the face of the bearing cap provided a leakage path for oil around an "O" ring - this appears to be a design deficiency. (Note: just after the end of the inspection period, the licensee filed a Part 21 report on this manufacturer defect with the NRC.) When the thrust bearing failed it allowed the generator shaft to move axially through the flexible couplings. This failed the bearing retainers on the radial bearing. When the radial bearing failed it seized several of the rollers and the resulting friction ignited the oil in that bearing.

Following repairs of the shaft and bearings, the generator was in the process of final electrical tests prior to reassembly, when it was discovered that two of the rotor field coils had internal shorts. Licensee engineers do not believe that the coil shorts were caused by the bearing failure. At the end of the reporting period, the generator rotor was being disassembled to replace all rotor field windings.

No violations or deviations were identified.

9. Electrical Explosion in the 25 Kilo Volt (KV) Buss (93702)

On June 3, while attempting to energize the station normal step-up transformers from the 500 KV bus, a short circuit on the 25 KV side of the transformer caused a failure in the bus-work. The failure led to an explosion in the bus panels, activation of local fire alarms, and minor injury to three workers in the area.

The buses were being energized by "back feeding" the station step-up transformers with the main generator disconnects open. The bus bars had been previously grounded with two sets of ground straps during the outage. The generator side of the disconnect links was grounded by bolting heavy duty cable between the main bus bars and the plant ground system. The transformer side of the disconnect links was grounded by attaching woven metal straps to the potential transformer connections and station ground using "Vise Grips" pliers.

The ground straps had not been removed prior to reenergizing the bus. Some confusion arose because the ground straps for the generator side of the disconnect links were to remain in place while the ground straps for the other side of the disconnects were to be removed. Both sets of ground straps were "red tagged", and a clearance review by Operations prior to energizing the bus was performed. The clearance operator and the Shift Manager discussed the red tags, but the Shift Manager thought that both sets of tags were issued to a common set of ground straps on the generator side of the disconnect links.

The tags were labeled "A (B or C)[phase] generator side" and "A (B or C)[phase] PT generator side". The disconnect links had been removed and the generator ground straps were to remain in place. The Shift Manager, mistaking believing that both sets of red tags were for a common set of ground straps, directed the operator to remove the red tags for the "A (B or C)[phase] PT generator side" straps but to leave the ground straps in place. An equipment operator followed his instructions and removed the tags and did not question why the ground straps were to remain in place, why there were no other tags hanging on the ground straps.

Upon energizing the 25 KV bus, the ground straps and pliers attaching them to connecting points immediately failed. The pliers were ejected from the cabinets. A "smoothing" resistor located between the potential transformers and the bus, which was not designed to carry fault current, vaporized, creating a plasma cloud inside each lightning arrester cabinet located just below the bus ducts. Once the resistor vaporized, voltage started increasing, which started conducting through the plasma, instantly heating the air inside the cabinets which rapidly raised the

air pressure. The panel covers were blown off the lightning arresters and the walls of the bus ducts were blown outward. The one inch copper bus straps which connect the lightning arresters to ground were burnt off and ejected from the cabinets.

The panel covers struck scaffolding located next to the panels causing several scaffolding tubes to be deformed. One panel cover and a large assortment of fasteners were found 60-70 feet from their original location.

Three workers who were in the area received minor injuries and were transported to a local hospital for examination. All three suffered some hearing dysfunction due to the noise of the event.

The fire brigade responded to the scene, but no fire was reported. There was some smoke in the area, which quickly dissipated.

Post incident reviews of fault monitoring equipment on the 500 KV line indicated that approximately 126,000 amps were drawn on the 25 KV side. This was within the design value of 386,000 amps. The fault current seen represents about 3000 MWs of power, which was absorbed during the 5.5 cycles of fault.

On being informed of this event, the NRC Regional emergency preparedness analyst reviewed the known facts against the licensee's classification criteria described in Emergency Plan implementing procedure 13.1.1, "Emergency Classification", dated October 20, 1989, and Chapter 2 of the NFPA Fire Protection Manual, which defines explosions. EPIP 13.1.1, Section 2.b.5, requires the declaration of an unusual event for an explosion within the protected area not affecting plant operation. Accordingly the analyst telephoned the Manager of Emergency Preparedness and requested an explanation regarding why the explosion had not been classified as an unusual event. The Manager of Emergency Preparedness stated that at the request of his management, he had initiated a review of their classification of the event. The emergency preparedness analyst asked to be informed of the results of their review. The Manager of Emergency Preparedness reported they had completed their review and on June 7, the review was distributed to plant management. The review was stated to have concluded that the event should have been classified as an unusual event.

The Regional analyst also contacted the Headquarters Duty Officer regarding the event and was informed that the licensee notified the Headquarters Operations Officer regarding the event at 8:09 pm, Eastern time, on June 3, and upgraded the notification pursuant to 10 CFR 50.72 on June 4, when it was determined a press release covering the event would be made.

On June 13, 1990, the Manager of Emergency Preparedness also informed the analyst that he had informed state agencies of the event on June 3 and of the results of his review on June 7. The Manager of Emergency Preparedness also described the following actions to preclude similar problems in this area.

a. The licensee had discussed the results of their investigation with the operations staff, to increase their awareness regarding the failure to classify the event.

b. The classification of this event will be included in their training program.

The failure to classify this event is considered to be a Severity Level V violation of Technical Specification 6.8.1.f and of emergency plan implementing procedure EPIP 13.1.1 (Enforcement Item 397/90-14-01). Since the licensee identified this condition and took corrective actions before the conclusion of the inspection period, under the provisions of Section V.G of the Enforcement Policy, no further response to this violation is required, and this issue is considered closed.

10. Licensee Event Report (LER) Followup (90712, 92700)

The following LERs associated with operating events were reviewed by the inspectors. Based on the information provided in the report, it was concluded that reporting requirements had been met, root causes had been identified, and corrective actions were appropriate. The below listed LERs are considered closed.

| LER NUMBER | DESCRIPTION |
|---|---|
| 89-43-00 | Inoperability of the High Pressure Core Spray System |
| 89-44-00 | HPCS System Potentially Inoperable Due to Undersized Thermal Overloads |
| 90-01-00 | Entry into Technical Specification 3.0.3 Due to Failed Diesel Fuel Surveillance |

No violations or deviations were identified.

11. Review of Periodic and Special Reports (90713)

Periodic and special reports submitted by the licensee pursuant to Technical Specifications 6.9.1 and 6.9.2 were reviewed by the inspector.

This review included the following considerations: the report contained the information required to be reported by NRC requirements; test results and/or supporting information were consistent with design predictions and performance specifications; and the reported information was valid. Within the scope of the above, the following reports were reviewed by the inspectors.

o Monthly Operating Report for May 1990.

No violations or deviations were identified.

12. Exit Meeting (30703)

The inspectors met with licensee management representatives periodically during the report period to discuss inspection status and an exit meeting was conducted with the indicated personnel (refer to paragraph 1) on June 21, 1990. The scope of the inspection and the inspector's findings, as noted in this report, were discussed and acknowledged by the licensee representatives.

The licensee did not identify as proprietary any of the information reviewed by or discussed with the inspector during the inspection.