U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-344/90-38

Docket No. 50-344

License No. NPF-1

Licensee: Portland General Electric Company
121 S. W. Salmon Street
Portland, Oregon 97204

Facility Name: Trojan

Inspection at: Rainier, Oregon

Inspection conducted: November 18, - December 31, 1990

Inspectors: R. C. Barr
Senior Resident Inspector

J. F. Melfi
Resident Inspector

Approved By: P. J. Merrill 1/30/91
P. J. Merrill, Chief Date Signed
Reactor Projects, Section I

Summary:

Inspection on November 18 - December 31, 1990 (Report 50-344/90-38)

Areas Inspected: Routine inspection of operational safety verification, maintenance, surveillance, refueling activities, and follow-up on previously identified items. Inspection procedures 30703, 62703, 71707, 92700, 92701 and 93702 were used as guidance during the conduct of the inspection.

Safety Issues Management System (SIMS) Item

Multi-Plant Action X804 (Section 7).

Results:

General Conclusions and Specific Findings

The licensee should consider improving tracking and prioritizing of maintenance requests, nonconformance reports, corrective action requests and regulatory commitments. As a result of not correctly prioritizing and tracking these items, deficiencies in safety components are not always corrected in a reasonable time (Section 4 and Section 7).

Significant Safety Matters

None

Summary of Violations and Deviations

None

Open Items Summary

One unresolved item and three LERs were closed. One Temporary Instruction remains open.

Details

1. Persons Contacted

   a. Portland General Electric

      *J. E. Cross, Vice President, Nuclear
      *W. R. Robinson, Plant General Manager
      *G. D. Hicks, General Manager, Plant Support
       C. K. Seaman, General Manager, Nuclear Quality Assurance
       T. D. Walt, General Manager, Technical Functions
      *C. P. Yundt, General Manager, Trojan Excellence
      *A. R. Ankrum, Manager, Nuclear Security
      *M. W. Hoffman, Manager, Nuclear Safety and Regulation
      *M. B. Lackey, Manager, Planning and Control
      *J. W. Lentsch, Manager, Personnel Protection
       W. O. Nicholson, Manager, Operations
      *W. F. Peabody, Manager, Nuclear Plant Engineering
      *S. M. Quennoz, Manager, Technical Services
      *M. J. Singh, Manager, Plant Modifications
      *J. F. Whelan, Manager, Maintenance
      *S. A. Bauer, Branch Manager, Nuclear Regulation
      *C. M. Dieterle, Branch Manager, Nuclear Plant Engineering
       G. P. Enterline, Branch Manager, Operations
       J. Mody, Branch Manager, Plant Systems Engineering
       D. L. Nordstrom, Branch Manager, Quality Operations
       J. D. Reid, Branch Manager, Quality Support Services
       G. L. Rich, Branch Manager, Radiation Protection
      *D. R. Swanson, Branch Manager, Nuclear Safety
       J. J. Taylor, Branch Manager, PM/EA
       R. L. Russell, Outage Manager
       J. A. Benjamin, Supervisor, Quality Audits
      *W. J. Williams, Compliance Engineer
      *G. R. Alberthal, Engineer, Nuclear Safety and Regulation
      *C. F. Markus, Engineer, Nuclear Safety and Regulation

   b. Oregon Department of Energy

      A. Bless, Resident Engineer

   The inspectors also interviewed and talked with other licensee employees during the course of the inspection. These included shift supervisors, reactor and auxiliary operators, maintenance personnel, plant technicians and engineers, and quality assurance personnel.

   *Denotes those attending the exit interview.

2. Plant Status

   The facility operated at 100% power throughout the inspection period.

3. Operational Safety Verification (71707)

During this inspection period, the inspectors observed and examined activities to verify the operational safety of the licensee's facility. The observations and examinations of those activities were conducted on a daily, weekly or biweekly basis.

Daily the inspectors observed control room activities to verify the licensee's adherence to limiting conditions for operation as prescribed in the facility Technical Specifications. Logs, instrumentation, recorder traces, and other operational records were examined to obtain information on plant conditions, trends, and compliance with regulations. On occasions when a shift turnover was in progress, the turnover of information on plant status was observed to determine that pertinent information was relayed to the oncoming shift personnel.

Each week the inspectors toured the accessible areas of the facility to observe the following items:

(a) General plant and equipment conditions.
(b) Maintenance requests and repairs.
(c) Fire hazards and fire fighting equipment.
(d) Ignition sources and flammable material control.
(e) Conduct of activities in accordance with the licensee's administrative controls and approved procedures.
(f) Interiors of electrical and control panels.
(g) Implementation of the licensee's physical security plan.
(h) Radiation protection controls.
(i) Plant housekeeping and cleanliness.
(j) Radioactive waste systems.
(k) Proper storage of compressed gas bottles.

Weekly, the inspectors examined the licensee's equipment clearance control with respect to removal of equipment from service to determine that the licensee complied with technical specification limiting conditions for operation. Active clearances were spot-checked to ensure that their issuance was consistent with plant status and maintenance evolutions. Logs of jumpers, bypasses, caution and test tags were examined by the inspectors.

Each week the inspectors conversed with operators in the control room, and with other plant personnel. The discussions centered on pertinent topics relating to general plant conditions, procedures, security, training and other topics related to in-progress work activities.

The inspectors examined the licensee's Corrective Action Program (CARs) to confirm that deficiencies were identified and tracked by the system. Identified nonconformances were being tracked and followed to the completion of corrective action.

Routine inspections of the licensee's physical security program were performed in the areas of access control, organization and staffing, and detection and assessment systems. The inspectors observed the access

control measures used at the entrance to the protected area, verified the integrity of portions of the protected area barrier and vital area barriers, and observed in several instances the implementation of compensatory measures upon breach of vital area barriers. Portions of the isolation zone were verified to be free of obstructions. Functioning of central and secondary alarm stations (including the use of CCTV monitors) was observed. On a sampling basis, the inspectors verified that the required minimum number of armed guards and individuals authorized to direc security activities were on site.

The inspectors conducted routine inspections of selected activities of the licensee's radiological protection program. A sampling of radiation work permits (RWP) was reviewed for completeness and adequacy of information. During the course of inspection activities and periodic tours of plant areas, the inspectors verified proper use of personnel monitoring equipment, observed individuals leaving the radiation controlled area and signing out on appropriate RWP's, and observed the posting of radiation areas and contaminated areas. Posted radiation levels at locations within the fuel and auxiliary buildings were verified using both NRC and licensee portable survey meters.

The inspectors verified the operability of selected engineered safety features. This was done by direct visual verification of the correct position of valves, availability of power, cooling water supply, system integrity and general condition of equipment, as applicable.

No violations or deviations were identified.

4. Maintenance (62703)

Service Water Transfer Switch (Q-108C)

On December 11, 1990, the inspector observed maintenance activities on the Service Water transfer switch which is used to power the swing Service Water (SW) pump from either the A or B vital buses. The swing pump is a 100% capacity pump that is interlocked to prevent interconnecting vital busses.

The licensee initiated the following Maintenance Requests (MRs) for work on the SW transfer switch and documented these MRs to be worked using the Plan-of-the-Day: MR89-2141 - replacement of a terminal block; MR90-4443 - local light indication not lit; and MR90-0839 - difficulty in operating the transfer switch.

During the conduct of the maintenance, the inspector observed that the craftsmen followed personnel safety practices and maintenance was performed in accordance with the MR work instructions.

MR89-2141, terminal block replacement, was not performed. The MR was written on March 1, 1989, when it was discovered that the terminal block was cracked between two terminal points. Replacement of the terminal block using MR89-2141 was attempted on November 6, 1989. The maintenance however was not completed because the replacement terminal block provided to the craftsman would not fit the installed configuration.

The deficiency was documented in Non-Conformance Report (NCR) 90-020 (January 24, 1990) and referred to NCR89-311. An engineering evaluation was performed to justify using the existing terminal block until an acceptable replacement was obtained. On December 11, 1990, MR89-2141 was again placed on the Plan-of-the-Day and scheduled to work. When the craftsman went to the parts warehouse to obtain the replacement terminal board, the warehouse did not have the correct quality class terminal board; therefore, the work was deferred. MR89-2141 had been scheduled by the work control center personnel; however, they did not realize that the replacement terminal board was not in stock as a quality class component.

Additional research by the inspector disclosed the proper, qualified part had been procured but had not been dedicated to this task and had been used for another maintenance task. The inspector found that the part had been used in MR90-6752 (completed July 16, 1990) as a replacement in one of the control room panels in a non-quality related application.

MR90-4443 was initiated to investigate why the local panel power available indication failed. The indicating light would not illuminate when the swing pump was energized on the A train. The craftsmen verified that the installed light bulb was good. Craftsmen determined that a ceramic dropping resistor connected to the light had failed open. The resistor was replaced and the light indication functioned as expected.

MR90-0839 investigated the transfer switch's difficult operation. The craftsmen determined the switch's mechanical linkage required adjustment because the locking blade and locking pin were not engaging correctly. The electrician performed the necessary adjustments. During the adjustments, he concluded that when the locking blade moved, the locking pin would drag on the blade surface and become cocked. The craftsman experienced difficulty in inserting the pin into the slot in the locking blade because the mechanism was worn and clearances were tight. The craftsman documented his concerns in a Request For Evaluation (RFE). The electrician suggested modifying the design to install a bushing for the pin so the pin would be able to move directly into the slot. The adjustments permitted satisfactory short term operation of the transfer switch and the RFE is presently under evaluation.

No violations or deviations were identified.

5. Followup of Open Items (92701)

Unresolved Item 50-344/90-06-02, (Closed), "Changes to Vendor Approved Recommendations." The inspector, while conducting inspection on Preventative Maintenance (PM) activities on the Motor Control Centers (MCCs), identified that MCC preventative maintenance was being performed every three years vice the vendor recommended interval of twice a year. The inspector noted that the licensee initially conducted the PMs twice yearly, then went to a yearly inspection, and then to once every three years. At of the end of that reporting period, the licensee was not able to provide a documented evaluation that justified the change in frequency for the performance of the PM. During the inspection, the licensee stated that the present MCC PM schedule appeared adequate since few problems had been found with the PMs performed at that frequency. The licensee also

stated that the vendor recommendations may have been conservative since the vendor may have sold MCCs to customers that used the MCCs in harsher environments (i.e, outdoors) than Trojan. This followup item was generated to verify appropriate administrative controls were in place to evaluate deviations from vendor recommendations.

The licensee, to determine if the current MCC PM frequencies were appropriate, performed a search of the Maintenance Evaluation and Trending System (METS) for recorded failures. The licensee also reviewed maintenance requests (since 1985) that recorded equipment failures. The search did not identify failures related to the increases in PM frequency.

As a result of not having proceduralized administrative controls for evaluating deviations from the vendor recommendation, the licensee plans to upgrade the PM program to make Preventive Maintenance changes with a PM Change Request (PMCR). The procedure change was being reviewed at the conclusion of this reporting period. Based on the licensee's action to formally document the justification for deviating from vendor recommendation via the PMCR, this unresolved item is closed.

No violations or deviations were identified.

6. Follow-up of Licensee Event Reports (92700, 92701, 93702)

LER 86-03, Revision 2, (Closed), "Residual Heat Removal (RHR) System Inoperable Due to Misunderstanding of Design Basis." This revised LER provided further information with respect to additional RHR system discrepancies identified during followup of the original event (November 14, 1986). The original event, the closure of RHR valve 8809A while maintenance was being performed on the B train of RHR, resulted in the inability of the automatic engineered safety features to adequately cool the core had a design basis accident occurred. The licensee was cited with a Severity Level III violation and assessed a $50,000 civil penalty.

In this revision of LER 86-03, the licensee identified a potential for RHR pump runout during post accident recirculation phases and incorrect environmental qualification of 11 ECCS valves. The licensee concluded the causes of these deficiencies were errors in the original design and inadequate design review. As corrective actions, the licensee determined that sufficient net positive suction head was available for RHR pump operation even though RHR pump flow was greater than original flow values documented in the Final Safety Analysis Report (FSAR). The licensee changed procedures and the FSAR to document the higher accepted flow values. The licensee replaced the valve operators of the eleven valves identified as not having appropriate equipment qualification.

The resident inspectors verified that the licensee changed the procedures identified in the revision of the LER as requiring change. Additionally, the inspectors verified that the eleven valve operators, which had not been environmentally qualified, were replaced with operators of appropriate qualifications. The inspectors verified that the FSAR was updated to properly describe RHR system operation during a design basis

loss of coolant accident. The LER is closed based on the licensee corrective actions.

LER 90-31, Revision 1, (Closed), "Inadequate Test Procedure Results n Failure To Document Status of Component Cooling Water Valves for Technical Specification Surveillance." This revised LER provided additional information associated with long term corrective actions committed to in the original LER. The licensee committed to review surveillance procedures related to Engineered Safety Features Actuation System (ESFAS) output relays and actuation devices to verify no other instances existed where the repositioning of valves upon receiving an ESFAS signal was not properly documented. The licensee's review found no discrepancies.

The inspectors verified the scope of procedures reviewed and determined that all appropriate procedures had been examined. This LER is closed based on the licensee corrective actions.

LER 90-34, Revision 0, (Closed), "Incorrect Feedwater Pump Protective Instrument Adjustment Leads to Pump Trip Followed by Reactor Trip and Auxiliary Feedwater Actuation." This LER described an automatic reactor shutdown on low steam generator water level that resulted from the B main feedwater pump (MFP) tripping on high thrust bearing wear. Subsequently, the licensee determined that the MFP thrust bearing wear indicator was not correctly adjusted as a result of a communication error between the licensee's system engineering organization and the MFP vendor. Initial NRC inspection of this event was documented in report 50-344/90-29. Further followup was required to evaluate the appropriateness of the licensed reactor operator disabling the automatic operation of the steam dumps, which are designed to bypass steam to the main condensor on high steam system pressure as a result of a loss of load, in an attempt to maintain a balance between feedwater flow and steam flow.

The LER did not fully address the above issue, however, followup inspection identified the licensee had conducted further evaluation. The inspectors reviewed procedures and found no procedure that required steam dump closure during a loss of main feedwater event. Additionally, it appeared the main steam safety valves opened on high secondary pressure as a result of closing the steam dumps. Based on a discussion with the shift supervisor who directed that the steam dumps be placed in manual, the inspector concluded the action was taken to potentially avert an automatic reactor shutdown on low steam generator water level. However, the effects of closing the steam dumps actually lowers steam generator water level due to the phenomena called "shrink." While the licensee concluded the correct response was to leave the steam dumps in automatic, Operations' Management determined that the shift supervisor actions of having the steam dumps placed in manual was within his authority. The inspectors verified operators had been trained both in the classroom and on the simulator on the expected operation of the steam dumps.

The licensee, with assistance from Westinghouse, the reactor vendor, is evaluating the response of the reactor for this and similar events, to determine if modifications are needed to system response characteristics

of the power operated relief valves or the steam dumps. This LER is closed based on the licensee corrective actions.

No violations or deviations were identified.

7. TI 2515/105, (Open), "Inspection of Licensee Activities in Reference to Bulletin 88-04, Potential Safety-Related Pump Loss."

This Temporary Instruction (TI) was issued to verify the satisfactory implementation of NRC Bulletin (NRCB) 88-04. The Bulletin (issued May 5, 1988) requested licensees to investigate and correct the following potential miniflow design concerns: the possibility of dead-heading one or more pumps in systems with a common miniflow recirculation line, and assess whether the capacity of the installed miniflow recirculation line was adequate for even one pump in operation. These NRC concerns had previously been provided to licensees as information only via Information Notice (IN) 87-59, "Potential RHR Pump Loss," dated November 17, 1987. To evaluate the applicability of these concerns at Trojan, PGE implemented Action Plan 89-005, "Safety Related Pump Minimum Flow."

Inspection associated with PGE's actions in response to the bulletin were discussed in inspection report 50-344/90-29. In this report, it was noted that PGE's actions with respect to this bulletin were slow, in that the Bulletin response was 70 days after receipt of the Bulletin (60 day response stated), and the Information Notice (IN 87-59 issued November 11, 1987) associated with this Bulletin was evaluated eighteen months following the IN's receipt. The initial PGE response to the bulletin committed to respond to long term actions at a future date after obtaining pump vendor information. The licensee did not adequately track the required action and discovered in September 1989, that the followup response had not been sent. The licensee then committed to respond to the NRC by January 15, 1990. After having been granted an additional extension, PGE responded on February 27, 1990. In this response PGE stated that there could be problems with the RHR pumps and would evaluate the system following a test on the system. Additionally, PGE's February 27, 1990 response to the NRC stated that the evaluation of the Auxiliary Feedwater (AFW), Containment Spray (CS), and Residual Heat Removal (RHR) systems would be performed within 60 days of the receipt of the vendor information. The evaluation was not performed on the AFW pumps within the 60 days mentioned in the licensee's letter, but 102 days later (August 22, 1990). The long term evaluation was completed on November 5, 1990.

The inspection performed during this period evaluated PGE's long term actions associated with the February 1990 response. This inspection also identified PGE's response to be slow and incomplete. PGE's actions associated with this bulletin suggests that PGE may not fully appreciate the safety significance of the issue. The following paragraphs document the findings of this inspection.

Bulletin Action Item 1 requested licensees to determine if there were any safety-related pumps with a piping configuration that could lead to a strong pump/weak pump interaction. The licensee concluded the High Head Charging pumps (CCPs), Safety Injection (SI) pumps, RHR pumps, Boric Acid Transfer pumps (BATPs), Containment Spray pumps (CS), and Auxiliary

Feedwater (AFW) pumps had the configuration to potentially have this type of interaction.

By field walkdowns, procedure review and drawing review, the inspector verified the licensee's assumptions, and therefore confirmed the licensee's conclusion that due to administrative controls, orificing, check valve configuration and procedural operating constraints, only the RHR pumps required a detailed evaluation.

Bulletin Action Item 2 stated that if a licensee were to determine that they had a situation similar to that described in NRCB 88-04, a system evaluation on the flow division should be performed to determine if one pump is stronger than the other, and how much the weaker pump discharge pressure can degrade to where the stronger pump would cause the weaker pump to run dead-headed. These evaluations were to take into consideration items such as the following: the as-built system resistance for the installed equipment; the head versus flow characteristics of the installed pumps including actual test data; the effect of instrument error and reading error; and the worst case allowances for pump deviations as allowed by the ASME Section XI code.

The licensee did not perform this evaluation on the RHR system as stated in bulletin item 2 because they concluded an equivalent means of obtaining this data would be through a Temporary Plant Test (TPT-337) that would determine the amount of interaction the pumps have with one another. The results of TPT-337 indicated that the A train pump was the weaker pump; however, the test did not determine when dead heading of the weaker pump would occur. In-Service test (IST) results indicated that either pump running separately on recirculation has a flow of 600 gallons per minute (gpm), which the licensee considered acceptable. With both pumps running and their respective output allowed to interact with each other, the flow for the A train pump went to 300 gpm and the B train pump went to 900 gpm.

The inspector's review of the manufacturer's head versus flow curves confirmed the test data was what the manufacturer would have predicted. Additionally the inspector determined that the licensee's evaluation did not consider the manufacturer's allowed degradation of the pumps. The IST code allows total pump differential pressure to degrade 7% before actions are required to be taken. On the basis of the manufacturers pump head curves, if the weaker pump declined this amount, the pump would run dead-headed which would result in pump failure. This 7% error does not take instrument measurement uncertainty into account.

The licensee has not yet determined exactly at what point the weaker pump could degrade until it would fail as a result of inadequate miniflow. The vendor does not recommend flow below 100 gpm, and the time allowed for flow between 100 and 300 gpm should be limited to 30 minutes. Due to the low discharge pressure of the RHR pumps, the RHR pumps would be the last to inject into the Reactor Coolant System (RCS) during a Safety Injection (SI). If there was a Small Break Loss of Coolant Accident (SBLOCA), the amount of time before the RHR system would inject could be greater than 30 minutes. Taking the vendor recommendations into consideration, the licensee revised the Emergency Instructions (EIs)

to secure one RHR pump if the conditions do not permit the RHR pumps to inject. Due to the potential of the pumps operating with inadequate recirculation flow for greater than 30 minutes, it was noted in PGE memo MWH-0650-90M in June 1990 to include precautions in procedures; however, these changes which were to have been completed by December 31, 1990, had not yet been accomplished. The cognizant reviewing licensing engineer believed this to be of low probability since both pumps are run for approximately the same amounts of time, and the degradation rate is low and should be the same.

Bulletin Item 3 requested the licensee to perform evaluations on the adequacy of the minimum flow recirculation line capacity for normal and accident conditions. The Bulletin noted that this item should include the effects of cumulative operating time and the particular accident scenario which would give the largest time spent in this mode. The inspector was not able to find any licensee documentation to show that this item had been completely addressed. The inspector discussed bulletin item 3 with the cognizant licensing engineer, who stated that he did perform an informal evaluation but had not retained it. The evaluation indicated no changes to current practices were required.

With respect to bulletin item 3, the inspector reviewed recent IST data for the RHR, SI, CS, BAT and High Head injection pumps. The licensee was within the required surveillance intervals and the reference values allowed by the IST code. The inspector attempted to look at the pump head curves for the ECCS pump. Only one pump head curve was identified for the CS pump. In discussions with the licensee, the inspector determined that only one pump head curve had been required by the original purchase order for the CS pumps and that the pump head curve was not the actual pump head curve, but one which was generic to that size of pump. This raised concern that sufficient information was not available to ensure both CS pumps would inject the required flow at the required pressure. To resolve the concern, PGE provided the inspector with test results from preoperational tests that showed both pumps delivered the required flow at the required pressure.

Bulletin Action Item 4 requested a written response within 60 days of the receipt of the Bulletin which summarized the problems and systems affected, identified short term and long term modifications to plant procedures or hardware that are or will be implemented, identified a schedule for long term resolution of this bulletin, and provided a Justification for Continued Operation (JCO) in particular with regard to the Emergency Core Cooling System. As noted previously, the licensee's initial response was late (70 days) and did not identify a schedule for the long term resolution of this bulletin. Subsequently, a schedule was provided.

Bulletin Action Item 5 requested a written response within 30 days of the completion of the long term actions. The long term actions have not been completed.

Summarizing this inspection, minimum flow lines for safety-related pumps were determined to have been sized adequately; bulletin item 2 was not adequately evaluated for the RHR pumps although a test was performed to

quantify the magnitude of the interaction; bulletin item 3 was not documented as being performed.

TI2515/105 remains open pending the licensee addressing of all NRC Bulletin 88-04 recommendations.

8. Exit Interview (30703)

The inspectors met with the licensee representatives denoted in paragraph 1 on January 25, 1991, and with licensee management throughout the inspection period. In these meetings the inspectors summarized the scope and findings of the inspection activities.