U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-344/89-27

Docket No. 50-344

License No. NPF-1

Licensee: Portland General Electric Company
121 S.W. Salmon Street, TB-17
Portland, OR 97204

Facility Name: Trojan

Inspection at: Rainier, Oregon

Inspection conducted: September 8, 1989 - October 20, 1989

Inspectors: R. C. Barr
Senior Resident Inspector

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Approved By: M. M. Mendonca, Chief — 11/2/89 Date Signed
Reactor Projects Section 1

Summary:

Inspection on September 8 - October 20, 1989 (Report 50-344/89-27)

Areas Inspected: A special inspection of the Trojan Nuclear Power Plant. The inspection focused on actions following the licensee's identification that both ECCS subsystems were potentially inoperable while in Mode 1. Inspection procedures 30702, 30703, 71707, 90712, 92700, 92701, and 93702 were used as guidance during the conduct of the inspection.

Results

Apparent programmatic weaknesses associated with administering and controlling plant work activities to ensure safe operation and compliance with technical specifications limiting conditions were identified (Section 7). This resulted in operation in a 72 hour technical specification action without licensee recognition (Section 4).

An apparent weakness in the detail and quality of maintenance work instructions to clearly define the effects of the maintenance on the OPERABILITY of systems, subsystems and components was identified (Section 8).

Two apparent violations for the failure to comply with procedures and identify Limiting Conditions for a maintenance activity were identified (Section 8).

Continuing weaknesses in performing timely, complete engineering evaluations and in root cause corrective actions assessment for potential safety issues were identified (Section 5).

A continuing weakness in shift turnovers was identified (Section 8).

DETAILS

1. Persons Contacted

*D. W. Cockfield, Vice President, Nuclear
#*C. P. Yundt, Plant General Manager
#*T. D. Walt, General Manager, Technical Functions
#*C. K. Seaman, Manager, Nuclear Quality Assurance
#*R. M. Nelson, Manager, Nuclear Safety and Regulation Department
#*A. N. Roller, Manager, Nuclear Plant Engineering
#*D. W. Swan, Manager, Technical Services
#*M. J. Singh, Manager, Plant Modifications
#*J. W. Lentsch, Manager, Personnel Protection
#*A. R. Ankrum, Manager, Nuclear Security
R. E. Susee, Manager, Planning and Scheduling
J. M. Anderson, Manager, Trojan Materials
E. B. James, Outage Manager, Plant Systems Engineering
R. L. Russell, Branch Manager, Operations
D. L. Bennett, Branch Manager, Maintenance
J. A. Benjamin, Supervisor, Quality Audit
G. G. Perrin, Shift Supervisor
T. Andone, Jr., Shift Supervisor
#*W. J. Williams, Regulatory Compliance Engineer
J. D. Guberski, Nuclear Safety and Regulation Department Engineer
J. J. Taylor, PM/EA, Engineer
D. J. Findley, Plant System Engineer
J. P. Fischer, PM/EA Branch Manager
R. R. Rodriguez, Control Operator

The inspectors also discussed inspection related topics 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 meeting on October 10, 1989.
#Denotes those attending the exit meeting on October 20, 1989.

2. Plant Status

On September 8, 1989, the reactor was being operated in Mode 1 at 98% power. On September 15, 1989, the reactor was shutdown to repair a leaking pressurizer safety valve. On October 3, 1989, the reactor was restarted and achieved 97% power on October 4, 1989. The facility operated at 97% power the remainder of the inspection period.

3. Residual Heat Removal (RHR) System Description

To mitigate the consequences of selected Final Safety Analysis Report accident analyses, the Trojan reactor, a four loop Westinghouse design, uses two independent Emergency Core Cooling System (ECCS) subsystems. Each ECCS subsystem consists of centrifugal charging pump (CCP), safety

injection pump (SIP), Residual Heat Removal (RHR) heat exchanger, RHR pump, and a flow path capable of taking suction from the refueling water storage tank (RWST) on a safety injection signal and transferring suction to the containment sump during the recirculation phase of operation.

The ECCS subsystems are designed to automatically start during a design basis Loss of Coolant Accident (LOCA). The RHR pumps take a suction from the RWST and deliver water to the four reactor coolant loop cold legs when reactor coolant system (RCS) pressure decreases below the RHR pumps discharge pressure. Until RCS pressure is less than pump discharge pressure, the discharge flow of pumps is diverted to the pumps' suction via the miniflow recirculation lines to prevent pump damage. In each recirculation line a flow control valve (FCV) opens and diverts flow from the pump discharge to the suction if the respective RHR pump breaker is closed, the FCV selector switch is in auto, and low flow is sensed by its respective miniflow switch. The licensee has estimated that it would take about 10 minutes before damage to the RHR pump would be expected with no discharge flow to the RCS or through the miniflow recirculation line.

For an ECCS subsystem to be considered OPERABLE it must be capable of performing its specified safety-related function(s). Implicit to an ECCS subsystem's operability is the assumption that all necessary attendant instrumentation, controls, normal and emergency power, cooling or seal water, lubrication or other auxiliary equipment that are required to perform their safety function(s) are also capable of performing their rated support functions. Specifically, for the ECCS subsystems to be OPERABLE the support systems of Component Cooling Water (CCW) system, which cools selected ECCS-related equipment, and the Service Water (SW) system, which cools the CCW system and selected ECCS-related equipment, must be OPERABLE. Additionally, for the RHR pumps to be OPERABLE the miniflow recirculation line FCVs must open on low RHR pump flow (less than 805 gpm).

4. Event Chronology (71707, 90712, 92701)

On September 6, 1989, maintenance request (MR) 89-8491 was initiated to change the setpoint of the miniflow switch (FIS-611) for the B RHR miniflow recirculation line. This work was initiated because PGE previously had been notified by Westinghouse that miniflow indicating switches used by Trojan in the RHR miniflow recirculation lines required the switches' setpoints be changed.

On September 8, 1989, at approximately 7:30 am, with the reactor in Mode 1 at 98% power, the dayshift shift supervisor and control operator reviewed MR 89-8491 and authorized performance of this MR that adjusted the FIS setpoint. This review did not recognize that the switch calibration portion of the maintenance rendered the B RHR pump, inoperable and placed the facility in Trojan Technical Specification (T.T.S.) Limiting Condition for Operation 3.5.2.d. The switch calibration began at approximately 9:00 am and completed at 12:00

pm with the switch remaining isolated from the RHR system for subsequent functional testing. (In this configuration, the switch would have indicated no flow and opened the valve to allow RHR miniflow).

At 12:50 pm, on September 8, the A train of service water (SW) was declared inoperable, per Operating Instruction (OI) 8-8, to conduct water treatment to inhibit Asiatic clam infestation. Because the A train of SW was inoperable, the A ECCS subsystem was inoperable.

At approximately 2:00 pm, the craftsman performing the maintenance returned to the control room to obtain permission to perform functional testing; however, the shift supervisor did not want to perform the functional testing by operating the RHR pump. He rather wanted to place the pump breaker in the "test" position to perform functional testing. He also recognized that, because the RHR pump breaker would be in test, the RHR pump would be inoperable, therefore, he deferred the functional testing. Because MR 89-8491 work instructions were not sufficiently detailed, he did not recognize the flow switch was isolated from the RHR system.

At 2:45 pm on September 8, 1989, the swingshift operating crew relieved the dayshift operating crew. At 3:20 pm, the swingshift supervisor recognized, the B RHR pump was potentially inoperable because maintenance was being conducted on the B RHR miniflow switch and the A RHR heat exchanger was inoperable due to the chemical treatment of the A service water system. The shift supervisor took immediate actions to restore the A RHR heat exchanger to operable by returning the A train of service water. At 3:50 pm the A trains of SW, CCW, and the RHR heat exchanger were declared OPERABLE.

At 9:17 pm, maintenance on FCV-611 was completed and B RHR pump was declared OPERABLE.

No violations or deviations were identified.

5. RHR Miniflow Switch Setpoint Change History (30702, 92700, 93702)

On October 15, 1987, PGE received an October 2, 1987, Westinghouse letter (POR-87-607). This letter informed PGE that Westinghouse had revised the setpoints for the Trojan Residual Heat Removal (RHR) pump miniflow switches and provided PGE with the revised setpoints. The letter explained that additional seismic qualification tests had been performed on the Barton Model 288A differential pressure switches, which Trojan uses to measure and control flow in the RHR miniflow recirculation lines. This letter indicated that the switches may exhibit a setpoint drift of 12.55% span vice the originally assumed 2.55% drift during and after a seismic event.

On November 2, 1987, the licensee entered the letter in the Operational Assessment Review (OAR) system (OAR 87-069), the purpose of which is to evaluate operating experiences at other nuclear facilities. OAR 87-069 was screened by the OAR coordinator, categorized as nonsignificant, and assigned a resolution date of February 5, 1988. Additionally, the Manager of Technical Services, Manager of Nuclear Safety Branch, and the

Engineering Supervisor were notified of OAR 87-069 and concluded the setpoint change was not significant. The action date was subsequently changed to December 31, 1988, because the OAR system coordinator and the action engineer believed the issue to not be significant.

On December 21, 1988, the action engineer, during review of the October 2, 1987, Westinghouse letter concerning the setpoint change for Barton 288A miniflow switches, recognized the potential safety significance of the issue and alerted PGE management. A nonconformance report (NCR-88-621) was issued. During the NCR evaluation, the licensee recognized that the RHR pumps could potentially be rendered inoperable due to the setpoint shift that the miniflow switch may experience during and after a seismic event. As a result, the licensee took short term compensatory measures by deviating procedures to alert operators to the potential impact on RHR pump operability due to miniflow switch setpoint drift during and after a seismic event.

On December 23, 1988, event report 88-179 was initiated to evaluate the weaknesses in the OAR system that allowed a safety significant issue to be overlooked. The event report concluded the root cause of the event was "the issue was deferred without a proper understanding of the issue or verification that it was in fact not urgent" and that "this was due to the apparent nonsignificant priority of the OAR and the wording of the Westinghouse letter itself..." The event report was completed on March 13, 1989. The event report included two immediate corrective actions and five long term corrective actions. One of the long term corrective actions was for the cognizant branch manager to approve the significance category, however, in this case the cognizant branch manager had reviewed the OAR and did not disagree with the assigned significance. Also, the event report did not address the involvement of the other reviewers and their contribution to assigning the OAR as nonsignificant. This OAR review reemphasized weaknesses that have been identified in the licensee's root cause/corrective action assessment efforts.

On January 5, 1989, PGE and Westinghouse conducted a telephone conference call to discuss the safety significance of the setpoint drift of the Barton 288A miniflow switches. They concluded there was no safety significance. At PGE's request, Westinghouse provided, via letter NS-OPLS-OPL-II-89-028 dated January 13, 1989, a justification for continued operation (JCO). The Westinghouse JCO concluded, based on long and short term analysis, that the switches utilizing the unrevised setpoints did not present a safety problem. As part of Plant Setpoint Change (PSC) 89-02, PGE performed a 50.59 Safety Evaluation to ensure safety was not affected as a result of the change. The evaluation included a review of the Westinghouse JCO. On subsequent review of the Westinghouse JCO, the inspectors determined on October 3, 1989 that the PGE safety evaluation did not record that one of the original Westinghouse assumptions for the JCO was incorrect, i.e., the miniflow flow valves were assumed to be open. After substantial research, PGE stated that they had recognized that the Westinghouse assumption was in error, but it was not recorded because the setpoints were in the process of being changed and that short term corrective actions had already been taken to alert the operators to the consequences of a seismic event on the miniflow switches. This approach was an example of incomplete

engineering evaluations since the Westinghouse JCO was used in determining reportability.

On January 21, 1989, the setpoints of the miniflow switches were changed to the values Westinghouse recommended in the October 2, 1987 letter.

During a review in April, licensee engineers recognized that the instrument inaccuracies assumed by Westinghouse (2.55%) for the Barton 288A flow switches were different from the instrument inaccuracies assumed at Trojan, therefore, the setpoints of the flow switches would again require changing.

On June 13, 1989, the licensee drafted justification for continued operation 89-08, "JCO-Residual Heat Removal Minimum Flow Valves." They addressed the following concerns: the existing switch setpoints for miniflow did not include all sources of instrument uncertainty; the RHR low-flow alarm/annunciator would be present anytime miniflow valves were open and could, therefore, distract operators; and the miniflow valves with the January 13, 1989, revised setpoints could undergo cycling and possible failure. During the approval process, the JCO was revised to delete the later concerns. The JCO was approved on July 10, 1989.

The JCO was effective for 60 days-until September 8, 1989. Sixty days was chosen "to allow for orderly and deliberate review of the Plant Setpoint Change (PSC) and time to complete the work." The JCO noted that "the setpoint change can be accomplished during a routine train outage without disrupting plant operations." The JCO was revised to extend the effective date by 30 days on September 8, 1989 because the setpoint change would not be implemented by September 8.

The initial PGE evaluation indicated that the miniflow control valve would never have opened with the unrevised (old) setpoints. The inspectors considered this a significant safety concern that needed resolution. As a result PGE contacted Westinghouse for additional information. Westinghouse concluded the valve would have opened because the 12.55% instrument span drift referred to by Westinghouse in the October 2, 1987 letter was a conservative assumption and the actual drift of the PGE miniflow switches was approximately 5%, therefore, no safety issue existed at Trojan.

No violations or deviations were identified.

6. Miniflow Design Concerns (92701, 93702)

On October 26, 1987, Westinghouse notified PGE (letter POR-87-615) of "RHR Pump Mini Flow Design Concerns." The letter noted the miniflow line ensures the RHR pump does not overheat or vibrate when the discharge line is closed or when reactor coolant system (RCS) pressure exceeds RHR pump shutoff head during the Emergency Core Cooling System (ECCS) injection phase. The two concerns identified in the letter were (1) a potential problem involving parallel pump operation through a common miniflow recirculation line, and (2) pump inlet flow breakdown caused by low flow operation. The licensee entered this letter in the OAR system as OAR-87-73.

On November 23, 1987, the licensee received NRC Information Notice 87-59, "Potential RHR Pump Loss," that notified all nuclear facility owners of the concerns raised in the Westinghouse letter. The Notice was added to OAR-87-73.

On November 30, 1987, Westinghouse, via letter POR-87-542, notified PGE that the preliminary Westinghouse review of Trojan's design indicated Trojan was not affected by the concerns described in Westinghouse letter POR-87-615. The letter also recommended each utility review it's particular design for applicability.

On February 6, 1989, PGE received NRC Information Notice 89-08, "Pump Damage Caused By Low-Flow Operations." The Notice alerted utilities to potential problems that may result from operation of centrifugal pumps at low flows. The Notice was added to OAR 87-73.

On May 5, 1988, NRC Bulletin 88-04, "Potential Safety-Related Pump Loss," was issued to nuclear utilities. The Bulletin requested licensees investigate and correct the miniflow design concerns described in NRC Information Notice 87-59. PGE provided a partial response that included a Justification for Continued Operation to the Bulletin on July 18, 1988. PGE committed to provide an updated response when pump vendor information on minimum flow was received. An initial due date for the update response was March 1, 1989, which was subsequently changed to January 15, 1990, because the initial due date had been erroneously dropped from the PGE commitment tracking system.

On March 6, 1989, the licensee developed an action plan for responding to the long term corrective actions identified as part of PGE's response to NRC concerns in (a) Bulletin 80-8, (b) Bulletin 88-04, and (c) Notice 87-59. One of the actions in the plan evaluated the impact of the setpoints on all Barton 288A instruments used at Trojan. The action plan is currently in progress.

No violations or deviations were identified.

7. Maintenance Request Processing and Work Authorization (92701, 93702)

Trojan Administrative Order (AO) 3-9, "Maintenance Requests," Revision 32, dated August 1, 1989, establishes the administrative controls for initiating, planning, performing and documenting maintenance work. At Trojan any individual may initiate a maintenance request (MR). After a MR is initiated for plant equipment, it is processed through the shift supervisor who performs the following: verifies the MRs validity, accuracy and completeness; enters the applicable technical specification and the number of any Limiting Condition imposed; specifies the load work group; and determines priority. The shift supervisor then forwards the MR to the MR coordinator for tracking purposes.

The MR coordinator forwards the work request to the planner who drafts the work instructions and initiates, if required, a safety related outage worksheet. The work instructions are required to be of "sufficient detail to enable qualified individuals to perform specified actions

without direct supervision." The MR is then forwarded to other departments for appropriate input and review.

The MR is then returned to the cognizant work group supervisor to review the work instructions for the following: correct quality classification; affect on plant safety and reliability; and adequate consideration of requirements of codes, standards, regulatory guides, and PGE Quality Assurance Program. The cognizant work group supervisor then forwards the MR to the maintenance activity scheduler who coordinates the start of the maintenance activity with Plant Operations. When the work scheduled date occurs, the scheduler provides the MR to the work craft supervisor who distributes the work to the craftsman. The craftsman then takes the MR to the control room and obtains the shift supervisor's authorization to start work.

Prior to the shift supervisor authorizing a maintenance request on safety-related equipment, he reviews the MR and the associated work instructions for affect on equipment/system operability. This review is performed in accordance with AO-3-14, "Control of Safety Related Equipment Outages," Revision 22, dated June 21, 1989; the purpose of which is to describe the method for planning safety-related equipment outages. If the shift supervisor determines the maintenance renders equipment inoperable, the shift supervisor assesses impact on plant safety, completes the safety-related equipment outage worksheet, and, if appropriate, authorizes the craftsman to perform the maintenance if plant conditions support the work.

No violations or deviations were identified.

8. Event Follow-up (30702, 92701, 93702)

On September 6, 1989, to implement plant setpoint change 89-002 on miniflow switch FIS-611, MR 89-8491 was initiated by the cognizant plant system engineer. Per AO-3-9, this engineer completed the appropriate sections of the MR and forwarded the MR to the shift supervisor. The shift supervisor completed assigned sections of the MR. However, for the Technical Specification/Limitation block he noted that T.T.S. 3.5.2 applied but failed to note that Limiting Condition for Operation 3.5.2.d applied. This is an apparent violation of AO-3-9 (50-344/89-27-01).

In subsequent conversations, this shift supervisor stated he thought the Technical Specification/Limitation block met Technical Specification or limitation, instead of and limitation. He also stated that the purpose of that block was to identify to the planner and scheduler any special considerations that must be taken into account when planning or scheduling a maintenance activity. Had the Technical Specification/Limitation block been properly filled out, the shift supervisor that authorized the work may have concluded that the B RHR pump was inoperable during the performance of the maintenance.

Next, the NRC went to the maintenance planner who developed MR 89-8491 work instructions. The inspector discussed MR 89-8491, its work instructions and the work package contents with the planner. He stated that he received the MR on September 6 and planned it the same day

because it was a rush (Priority 1) request. He stated that he recognized that T.T.S. 3.5.2. and Limiting Condition for Operation 3.5.2.d applied, and that the B RHR pump would be inoperable for portions of the maintenance. He also noted that because the B RHR pump would be affected by the maintenance, he initiated a safety-related equipment outage worksheet and included it with the work package. The inspector noted the first step of the work request provided the option for the shift supervisor to establish a clearance to isolate the flow indicating switch and that generally clearances are required to set work boundaries. The inspector asked the planner if optional clearances were a standard practice. The planner indicated that plant operations always had the final say on establishing clearances, and for this maintenance he wanted to provide maximum flexibility since he did not know exactly what plant conditions would be at the time the maintenance was performed.

Because MR 89-8491 work instructions did not specifically identify when the B RHR pump would be inoperable or that electrical leads would be lifted, the inspector discussed the detail of work instructions with the planner. The planner stated that at Trojan, plant operations determines operability and that the level of detail of work instructions for the instrument technician craftsman is not detailed to provide the craftsman maximum flexibility in performing maintenance. Because MR 89-8491 did not require a post maintenance test (PMT), the inspector discussed PMTs with the planner. He noted that in the work instructions a functional test was included. The inspector noted the details of how to conduct the functional test were not specific and the planner agreed. The planner also noted that additional maintenance on the flow indicating switch was performed after the functional test and that a PMT should have been prescribed. He also noted that a PMT had been performed even though a PMT was not required.

On September 7 processing of the MR was completed, and the MR was scheduled to be worked on September 8, 1989. At approximately 7:30 am on September 8, 1989, MR 89-8491 was reviewed by both the control operator and the shift supervisor. Per AO-3-14, they discussed the MR's impact on RHR pump operability. They reviewed the technical specifications and the definition of OPERABLE. They concluded (incorrectly) that the RHR pump would remain operable throughout the work activity and FCV-611 could be operated manually, if required, to establish a miniflow recirculation path. They did consider the requirement for the system to automatically function during a design basis LOCA but did not consider implementing a compensatory action of stationing a qualified operator at the valve to immediately open the valve if required. Since they concluded the RHR pump's operability was not affected, they did not fill out the safety-related outage worksheet that was provided with the MR package. They also did not question why the safety related outage worksheet was with the package. This is an apparent violation (50-344/89-27-02).

The inspector discussed with the control operator and the assistant shift supervisor their review of MR 89-8491. The control operator stated, that he and the shift supervisor reviewed the MR and concluded the B RHR pump would not be inoperable because the technical specification did not specifically include FIS-511 and the MR work instructions did not identify the B RHR pump would be inoperable due to lifting electrical

leads to conduct the calibration of FIS-611. With respect to the safety-related equipment outage worksheet, the assistant shift supervisor and two other shift supervisors noted that frequently MRs have the worksheets included and, in fact, the equipment is not inoperable. They also stated that, even though the equipment is not made inoperable by the proposed maintenance, they complete the worksheet and file it. The inspector confirmed this practice by reviewing the safety-related equipment outage worksheet notebook. The control operator stated, if he had recognized that the calibration of FIS-611 had made the B RHR pump inoperable, he would not have allowed the calibration to be performed. The inspector noted that in January 1989 when FIS-611 was calibrated, that the B RHR pump was declared inoperable, and that the same control operator released the work.

At 12:50 pm, the A SW system was removed from service to conduct chemical treatment. This rendered the A RHR heat exchanger and the A ECCS subsystem inoperable. However, the B ECCS subsystem was operable because when FIS-611, as isolated, would sense less than 805 gpm flow and FCV-611 would open on a safety injection signal and provide recirculation flow for the B RHR pump. The operators, however, did not recognize this at the time of authorizing the maintenance or when it was discovered that work on both ECCS subsystems was in progress.

At approximately 2:45 pm shift change occurred. Prior to assuming shift responsibility, the on-coming shift supervisor reviewed plant logs, reviewed the safety-related equipment outage notebook and discussed with his off-going shift supervisor maintenance in progress. The on-coming shift supervisor remembered discussing the maintenance on FIS-611 but did not recall if the off-going shift supervisor stated the B RHR train was affected. The maintenance of FIS-611 was not included on the shift supervisor turnover sheet.

At 3:20 pm, the craftsman performing the maintenance returned to the control room to obtain permission to perform the functional test for FIS-611. At that time the shift supervisor realized that FIS-611 was the B RHR pump miniflow switch that was being worked and that potentially both ECCS subsystems were inoperable.

As soon as the shift supervisor recognized that both trains of RHR were inoperable, he declared the facility to be in T.T.S. 3.0.3, reported the event to the NRC via the Emergency Notification System (ENS), and initiated event report (ER) 89-154. Subsequently, the licensee also decided to perform a Human Performance Evaluation System (HPES) review for this event.

As part of the event report process, the licensee conducted two critiques-the purpose of which were to establish a sequence of events, immediate corrective actions and follow-up responsibilities. The first critique, September 8 at 5:00 pm, established the following two corrective actions: only work scheduled on the Plan-of-the-Day would be allowed to be performed, and a formal policy statement would be issued. The licensee concluded the immediate corrective actions were required because (1) work was being performed that was not scheduled on the Plan-of-the-Day, consequently, the operating crews were having difficulty

tracking/evaluating the impact of the work in progress, and (2) all plant personnel needed to be immediately apprised of the change in conducting routine day-to-day operation. The second critique, September 9, 1989, established the following two additional corrective actions: actions were taken to hold the shift supervisor, assistant shift supervisor and control operator accountable for their actions; and lessons learned briefings were held with all on-shift operating crews.

On September 15, 1989, the event evaluation on ER 89-154 which included a re-evaluation of ER 88-179 was completed and presented to the Plant Review Board (PRB). ER 89-154 concluded there were two primary causes and eight contributing causes for the event. The primary causes were (1) personnel error in determining operability and (2) inadequate administrative controls. Administrative controls were a problem in that multiple challenges were presented to the operating crews in the form of work requests that could render two redundant safety systems simultaneously inoperable. The event report recommended fourteen corrective actions. A weakness in work control, identified in the Event Report, was the shift supervisor or the control operator made the only operability determination prior to work being authorized, and this represented a situation where one individual could make a safety decision that was not previously evaluated. As a corrective action, the Event Report recommended a second operability determination be made prior to authorizing work performance. At the conclusion of the inspection period, the Plant Manager was reviewing the proposed actions for assignment and action due dates.

The inspectors attended the critiques and reviewed the event report. The critiques were generally effective in identifying event chronology, identifying immediate corrective actions and assigning appropriate follow-up actions. The event report was timely, and generally thorough and complete. To date, ER 89-154 has been the most timely and thorough event evaluation the licensee has performed.

Generally, ER 89-154 identified the event causes and recommended appropriate actions. The event report did not address the failure of MR reviews conducted by various departments as a weakness. The failure of these reviews to evaluate RHR pump operability and quality of work instructions represents missed opportunities.

The event report also did not discuss the quality of the maintenance work instructions. The work instructions left Plant Operations an option to establish a clearance for isolating the flow indicating switch. The MR did not require a post maintenance test (PMT); however, the work instructions appeared to include a PMT. The work instructions had FIS-611 isolated, drained and vented, then calibrated. The instructions were not specific enough to indicate that electrical leads would be lifted and, as a result, the B RHR pump would be inoperable.

Further, the event report identified that the shift turnover for this event was not adequate; however, no actions were proposed to improve the shift relief process. The relieving shift supervisor is not required to review the authorized work or the work in progress. The licensee could

have improved their event report evaluation by considering that the relieving shift supervisor review in-progress work.

Additionally, the inspectors reviewed ER 88-179 to understand its potential contribution to this event. During the inspectors' review of the January 13, 1989 Westinghouse JCO, the inspectors identified the following two potential concerns: Westinghouse seismic testing performed on Barton flow switch model 581A assumed Barton Model 288A were of similar design, and, as previously discussed, Westinghouse assumed that the miniflow recirculation flow control valve were open vice shut. When the inspectors requested support documentation to validate these assumptions, the licensee could not provide that information. The inspectors noted that the Westinghouse JCO had been the basis for reportability and was considered in the safety evaluation for plant setpoint change 89-002. After evaluating the inspectors concerns, the licensee initially concluded that the RHR pump would have been inoperable had a seismic event occurred. However, after conferring with Westinghouse and obtaining the appropriate justifying documentation, it appeared the recirculation flow control valve would have operated using unrevised setpoints. The review of the Westinghouse JCO provides another example of inadequate 50.59 evaluation and poor engineering work.

Two violations were identified.

9. Exit Interview (30703)

The Inspectors met with the licensee representatives denoted in paragraph 1 on October 10, and October 20, 1989 and with licensee management throughout the inspection period. In these meetings, the Inspectors summarized the scope and findings of the inspection activities. The inspectors noted, that while the shift supervisor erred in determining operability of the RHR system, the work control system does not afford an appropriate second check to prevent a single individual's error from compromising safety. Additionally, an integrated effort may have resulted in the setpoint change being conducted during the outage when only one train of RHR would be required.