

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-344/85-22

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: July 22-26, 1985

Inspectors:

*Albert Young Jr. for*  
K. Ivey, Reactor Inspector

*8-6-85*

Date Signed

Consultants:

*Albert Young Jr. for*  
R. White, Project Manager  
Nuclear System Safety Program, LLNL

*8-6-85*

Date Signed

*Albert Young Jr. for*  
W. Wade, Project Manager  
Mechanical Engineering Department, EG&G

*8-6-85*

Date Signed

Approved by:

*Albert Young Jr.*  
T. Young, Jr., Chief, Engineering Section

*8-6-85*

Date Signed

Summary:

Inspection during the period of July 22-26, 1985 (Report No. 50-344/85-22)

Areas Inspected: An unannounced, safety inspection by an NRC regional based inspector and two NRC consultants for the follow-up of Generic Letter 83-28, "Required Actions Based on Generic Implications of Salem ATWS Events", and TI 2515/64 Rev. 1, "Near-Term Inspection Followup to Generic Letter 83-28".

The inspection involved 35 hours by one NRC inspector and 70 hours by two NRC consultants on module nos. 30703, 92704B, and 25564B.

Results: No violations or deviations were identified.

## DETAILS

### 1. Persons Contacted

- \*A. Olmstead, Manager, Nuclear Quality Assurance
- \*J. Reid, Manager, Plant Services
- \*D. Keuter, Manager, Technical Services
- \*D. Swan, Maintenance Supervisor
- \*M. Snook, Quality Assurance Supervisor
- R. Steele, Manager, Nuclear Plant Engineering
- \*W. Bennett, Control and Electrical Supervisor
- G. Stein, Mechanical Maintenance Supervisor
- \*D. Pearson, Nuclear Safety and Regulation Department
- J. Clawson, Material Control
- O. Scheel, Mechanical Maintenance Foreman
- M. Hoffman, Branch Manager, On-site Nuclear Engineering
- E. Curtis, QA/QC Specialist
- M. Shubin, Electrical Engineer

\*Denotes those individuals attending the exit meeting on July 26, 1985.

In addition, Mr. S. Richards (NRC Senior Resident Inspector) and Mr. H. Mooney of the Oregon Department of Energy attended the exit meeting.

### 2. Background

In February 1983, during startup of the Salem Nuclear Power Station Unit 1, the Westinghouse Type DB-50 reactor trip system (RTS) circuit breakers twice failed to open automatically upon receipt of a valid trip signal. The failure to trip was attributed to a binding within the undervoltage trip attachment (UVTA) located inside the breaker cubicle. Due to the failures at Salem and similar failures at other plants, and as a result of its investigations and reviews of the failures, the NRC Office of Nuclear Reactor Regulation issued Generic Letter (GL) 83-28 to all licensees and applicants on July 8, 1983. This letter required all affected utilities to furnish the status of current conformance to the Generic Letter and their plans and schedules for any needed improvements. Four of the items in GL 83-28 are identified for Region-Based post-implementation review. They are:

- ° Item 3.1 Post-Maintenance Testing (Reactor Trip System Components)
- ° Item 3.2 Post-Maintenance Testing (All Other Safety-Related Components)

The inspection is to address the adequacy and completeness of the Post-Maintenance Testing (including modifications) of safety-related components.

- ° Item 4.1 Reactor Trip System Reliability (Vendor Related Modifications)

° Item 4.5.1 Reactor Trip System Reliability (System Functional Testing)

The inspection is to ensure that vendor-recommended modifications and RTS changes are completed in PWRs and that on-line functional testing of the RTS diverse trip features is performed on all LWRs.

On February 2, 1984, the NRC Office of Inspection and Enforcement issued Temporary Instruction (TI) 2515/64, "Near-Term Inspection Followup to Generic Letter 83-28", for Region-Based inspection to identify immediate licensee actions to various items in GL 83-28 and associated licensee programs that were in place. Revision 1 to the TI was subsequently issued April 4, 1985. Items from the TI to be inspected by the regions are identified as follows:

- ° Equipment Classification (Response to Items 2.1 and 2.2.1 of GL 83-28)
- ° Vendor Interface (Response to Items 2.1 and 2.2.2 of GL 83-28)
- ° Post Maintenance Testing (Response to Items 3.1 and 3.2 of GL 83-28)
- ° RTS Reliability (Response to Items 4.2 and 4.5.1 of GL 83-28)

3. General

The licensee's initial response to GL 83-28 was submitted by letter on November 4, 1983.

Trojan utilizes the Westinghouse Reactor Trip System (RTS) Design and Westinghouse (W) DB-50 reactor trip breakers (RTBs). This design consists of two RTBs (see figure 1) and two bypass breakers to allow for testing of the RTBs. The reactor trip system uses sensors which monitor various plant parameters to feed analog circuitry consisting of two to four redundant channels. The RTS also contains the digital logic circuitry necessary to automatically open the RTBs. The digital circuitry consists of two redundant logic trains which receive inputs from the analog protection channels. Each of the two trains is capable of opening a separate and independent RTB to scram the plant (i.e., remove power from the rod drive power supply and release the control rods into the core by gravity).

The RTB's utilize both an undervoltage trip attachment (UVTA) and a shunt trip device. Automatic actuation of the shunt trip was added in response to GL 83-28. A trip signal (manual or automatic) interrupts power to the UVTA and simultaneously applies power to the shunt trip device. During a loss of power or low voltage condition, the UVTAs would trip the breakers to scram the plant.

4. Item 3.1 Post-Maintenance Testing (Reactor Trip System Components)

GL 83-28 Requirements:

Licensees and applicants shall submit the results of their review of test and maintenance procedures and Technical Specifications to assure that post-maintenance operability testing of safety-related components in the reactor trip system is required to be conducted and that the testing demonstrates that the equipment is capable of performing its safety functions before being returned to service.

Licensees and applicants shall also submit the results of their check of vendor and engineering recommendations to ensure that any appropriate test guidance is included in the test and maintenance procedures or the Technical Specifications, where required.

Findings:

Administrative controls assure that post-maintenance operability testing of all safety-related equipment is conducted. Administrative Order (AO) 3-9, "Maintenance Retests", states that, "Determination of proper equipment performance may be performed in accordance with an approved permanent procedure; an approved temporary procedure; or an installation check, where the characteristic to be verified can be checked by a qualified craftsman without detailed procedures, detailed acceptance criteria, or technical assistance." Examples of installation checks as listed in AO-3-9 include:

- ° Electrical circuits, controls, and relay settings are correct.
- ° Instrumentation is calibrated and in service as required.
- ° Limit switches, interlocks, and stops are properly adjusted and set.

The work group supervisor is responsible for ensuring that installation checks in post-maintenance testing are appropriate. All safety-related components in the reactor trip system are required to be tested to verify operability prior to their return to service following maintenance per AO-3-9.

In their responses, the licensee committed to a review to verify that testing procedures adequately test the capability of all safety-related components in the Solid State Protection System (SSPS) and reactor trip breakers (RTBs). The licensee had not initiated this review and had committed to a December 31, 1985 completion date. This item will be reviewed further in a future NRC inspection (85-22-01). The licensee also committed to revise AO-3-9 to provide for a senior reactor operator (SRO) to review Maintenance Requests (MRs) and discuss the work performed with the maintenance personnel to ensure that required testing is adequately specified on the MR. This change is in-process and will be inspected at a future date (85-22-02).

In their initial response, the licensee stated, "We have received copies of all applicable Technical Bulletins and Data Letters from Westinghouse. Our review of these confirms that our test and maintenance procedures for

the reactor trip system satisfy the requirements." The inspectors held discussions with personnel and reviewed memorandums to determine the extent of the review. The inspectors concluded that the review performed by the licensee on the applicable vendor information satisfied the requirement of Generic Letter 83-28.

No violations or deviations were identified.

5. Item 3.2 Post-Maintenance Testing (All Other Safety-Related Components)

GL 83-28 Requirements:

Licensees and applicants shall submit a report documenting the extending of test and maintenance procedures and Technical Specifications review to assure that post-maintenance operability testing of all safety-related equipment is required to be conducted and that the testing demonstrates that the equipment is capable of performing its safety functions before being returned to service.

Licensees and applicants shall also submit the results of their check of vendor and engineering recommendations to ensure that any appropriate test guidance is included in the test and maintenance procedures or the Technical Specifications where required.

Findings:

Post-maintenance testing is performed on all safety-related components in the same manner as for reactor trip system components (as detailed in paragraph 5).

In their initial response, the licensee committed to review all Westinghouse Bulletins and Letters not in their files. The inspectors reviewed documentation and held discussions with personnel to conclude that this review was completed. The licensee identified two bulletins that were not previously reviewed. They are:

- ° NSD-TB-77-11, "Westinghouse Solid State Protection System (SSPS) Periodic Testing of Safety Injection (SI) Reset Timing Circuitry"
- ° NSD-TB-78-2, "Westinghouse Control Rod Drive Mechanism (CRDM) - Coil Polarity Tests"

The licensee evaluated the bulletins in accordance with the Operating Experience Review Program (NUREG-0737, Item I.C.5) and concluded that current procedures addressed the issues and no changes were required.

The licensee stated that, "past experience and existing programs provide reasonable assurance that significant problems which might have existed have already been identified." Thus, the licensee has no plans to extend the review for other safety-related components beyond the scope of that already performed (i.e. Westinghouse). This response appears to be deficient in that it excludes from re-review, all safety-related equipment not provided by Westinghouse. This response is undergoing review by the NRC Office of Nuclear Regulation and will require further

followup in this area following a determination of the adequacy of this response (Open Item 85-22-03).

No violations or deviations were identified.

6. Item 4.1 RTS Reliability (Vendor-Related Modifications)

GL 83-28 Requirement

All vendor-recommended reactor trip breaker modifications shall be reviewed to verify that either: (1) each modification has been implemented; or (2) a written evaluation of the technical reasons for not implementing a modification exists.

Findings:

The licensee stated that all vendor recommendations have been reviewed and implemented as appropriate. A review of the maintenance requests (MRs) for the reactor trip breakers revealed that the modifications were completed as recommended by the latest vendor-issued bulletin. MR 85-2100 was used to implement the latest modifications, which included installation of the reactor trip breaker shunt trip device so that it would activate from the automatic reactor protection system. In addition to the completed forms, an interoffice communication dated July 8, 1985 (D. Swann to M. Hoffman), provided formal notification that this modification had been completed.

No violations or deviations were identified.

7. Item 4.5.1 RTS Reliability (System Functional Testing)

GL 83-28 Requirement

On-line functional testing of the reactor trip system, including independent testing of the diverse trip features, shall be performed on all plants.

Findings

Surveillance testing of the reactor trip system is performed using Periodic Instrument and Control Test (PICT) 10-1, "Reactor Protection System". This surveillance is conducted monthly in modes 1, 2, 3, and 4. Each train is tested every month. The procedures allow for verification of both the undervoltage trip and the automatic shunt trip, independently. A data sheet is used to record the "as found" and "as left" condition of the trip features. The inspectors concluded that the surveillance program satisfied the requirements of GL 83-28.

No violations or deviations were identified.



8. TI 2515/64 Rev. 1 (Closed), "Near-Term Inspection Followup to Generic Letter 83-28"

This TI was written to provide near-term followup on the licensee's response to GL 83-28 in the areas of equipment classification, vendor interface, post-maintenance testing, and RTS reliability. Post-maintenance testing and RTS reliability are documented elsewhere in this report. The emphasis of the inspection is on immediate actions taken by the licensee in response to GL 83-28 and on licensee programs that are in place.

The inspectors held discussions with licensee personnel and reviewed associated procedures and correspondence to obtain the following findings:

° Equipment Classification

The licensee's document, "Seismic and Quality Classification of Nuclear Plant Structures, Systems, and Components", contains a listing (Table VII) of safety-related systems and their major components. This list is the licensee's "Q-list". The inspectors reviewed this list for proper classification of the reactor trip and auxiliary feedwater systems components and found them to be correct.

AO-12-1, "Quality-Related Procurement Document and Control", defines the manner in which procurement documents are prepared, reviewed, approved, and controlled for "quality-related" procurement. The terms "quality-related" and "safety-related" are considered to be synonymous. A related document, AO-12-2, "Determination of Quality Requirements," which defines the method used to determine the appropriate quality level applicable to quality (safety) related systems or equipment, was reviewed, as was AO-5-1, "Plant Modifications," which provides guidelines for accomplishing plant modifications to quality-related systems. These documents, in addition to others in the AO 12 series, provide guidelines for procurement of quality-related materials and services.

The Material Control Supervisor (MCS) at Trojan is responsible for ensuring that materials or services for safety-related components are procured in accordance with established procedures. Interviews revealed that Materials/Services Requests are initiated on PGE Form 0196 (Oct. 83). This form includes blocks for designation of Q- or non-Q class and a quality assurance code. The completed forms must be reviewed by the Quality Assurance Supervisor prior to placing a purchase requisition. The MCS refers to control copies of the following documents to determine the adequacy of the materials/services requests.

- a. Trojan Project Standard Technical Specification Instrumentation List (1981 Rev).
- b. Trojan Nuclear Plant Environmental Technical Inspection (ETS) Monitor and Control Items (1981).

- c. Seismic and Quality Classification of Trojan Nuclear Plant Structures, Systems, and Components.
- d. Drawing Index for Fire Protection System
- e. Quality Group Drawings -- P.I.D. -- Mechanical Series

The inspectors determined from discussions that the knowledge and training of the individuals responsible for designating safety classifications and those preparing and implementing the procedures and controls established for activities impacting safety-related components was good. In addition, several examples of completed maintenance activities on the reactor trip and auxiliary feedwater systems, among others, were inspected and found to be in conformance with procedures.

A review of AO-2-2, "Monitoring of Plant Activities," verified that provisions have been made for planned periodic audits of activities that impact safety-related equipment. This procedure specifies that such audits of designated activities and records be conducted over the period of 1 year. These audits are intended to assess the degree of implementation and the effectiveness of management policies, as well as to improve the effectiveness of managers and supervisors.

AO-9-4, "Operating Experience Review Program (OERP)," specifies plant actions required to complete the reviews and requirements for the timely implementation of corrective actions for adverse operating experiences.

The stated purpose of AO-9-4 is to improve plant safety and reliability and to support the overall OERP program. This program includes provisions which permit trend analyses of in-house experience, as well as industry-wide experience, using the INPO SEE-IN program and information from the NRC, vendors, and consultants.

No violations or deviations were identified.

#### o Vendor Interface

The vendor interface program is implemented by the Nuclear Plant Engineering (NPE) group. Nuclear Division Procedure (NDP) 100-3, "Updating Technical Manuals" and Administrative Order (AO) 9-4, "Operating Experience Review Program", are used to control the updating of vendor information.

NDP 100-3 establishes both the process by which nuclear power plant technical manuals are revised and time limits for completing revisions. The licensee stated that NPE completes an engineering evaluation, prepares a revision package, and distributes copies to all those who have controlled technical manuals when revision or updating is required. AO-9-4 provides instructions to ensure that technical information and other pertinent items are implemented in a



timely manner. Although the procedure is referenced as part of vendor information updating, it is primarily used for acting on operating experiences. Vendor information changes and distribution changes are included in the program to provide a means of review and control.

The inspectors reviewed several technical manuals to verify that the procedures for updating vendor information were being implemented. The following manuals were reviewed:

- ° "Auxiliary Steam Generator Feedwater Pump Diesel Engine Drive," M12-55.
- ° "Auxiliary Steam Generator Feedwater Pump Turbine Drive," M12-61.
- ° "Auxiliary Steam Generator Feedwater Pump P102A and P102B, Bingham-Willamette Co.," M12-54.
- ° Copes-Vulcan Service Manual, "Installation, Operation and Maintenance Instructions.

The licensee stated that the program for updating manuals includes licensee-established procedures for handling those situations in which vendors have gone out of business or are no longer available. The procedure involves review by NPE and establishment of procedures if necessary. Maintenance procedure (MP) 1-5, "Reactor Trip and Bypass Breakers," provides the requirements for preventative maintenance and surveillance of the reactor trip breakers. This document provides a step-by-step procedure outlining the maintenance process, including the required sign-off points. The document also provides a test data record. This procedure includes the surveillance required for the latest vendor-recommended modifications. Trending on the reactor trip breaker is provided by the recorded test data provided by P 1-5, which does give a history of the breaker surveillance items.

A task force from NPE is currently reviewing all safety-related technical manuals for accuracy and consistency. These manuals are being updated as necessary; control copies are being checked for accuracy; and the overall system for page numbering and organization is being streamlined. This technical manual review is scheduled for completion by July of 1987.

The inspectors discussed the licensee's actions with regard to IE Information Notice 85-18, "Failures of Undervoltage Output Circuit Boards in the Westinghouse-Designed Solid State Protection System", and reviewed the Operational Assessment Review (OAR 85-40). The review concluded that the current revision of Periodic Instrument and Control Test (PICT) 10-1 provides adequate preventative maintenance. In addition, maintenance personnel had received training to familiarize them with the potential problems.

No violations or deviations were identified.

9. Exit Meeting

On July 26, 1985, an exit meeting was held with the licensee representatives identified in paragraph 1. The scope and findings of the inspection, as noted in this report, were discussed.