



Portland General Electric Company
Trojan Nuclear Plant
71760 Columbia River Hwy
Rainier, Oregon 97048
(503) 556-3713

November 29, 1989
CPY-316-89

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington DC 20555

Gentlemen:

Licensee Event Report No. 89-21 is attached. This report discusses an event in which the High Head Safety Injection System was inoperable due to a loss of Volume Control Tank isolation capability resulting from a procedural error.

Sincerely,

C. E. Yundt
General Manager
Trojan Nuclear Plant

c: Mr. John B. Martin
Regional Administrator, Region V
US Nuclear Regulatory Commission

Mr. David Stewart-Smith
State of Oregon
Department of Oregon

Mr. R. C. Barr
USNRC Resident Inspector
Trojan Nuclear Plant

8912070301 891129
PDR ADOCK 05000344
S PIC

IE22
1/1

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) <p style="text-align: center;">Trojan Nuclear Plant</p>	DOCKET NUMBER (2) <p style="text-align: center;">0 5 1 0 0 0 3 4 4 1</p>	PAGE (3) <p style="text-align: center;">1 OF 0 5</p>
--	---	---

TITLE (4)
High Head Safety Injection Inoperable on Loss of Volume Control Tank Isolation Capability Due to Procedural Error

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES		
1	0	3	0	8	9	8	9	0	N/A		
				0	2			1	N/A		
					0			0	DOCKET NUMBER(S)		
									0 5 1 0 0 0		
									0 5 1 0 0 0		

OPERATING MODE (9) 1

POWER LEVEL (10) 0 9.7

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)

<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.400(e)	<input type="checkbox"/> 60.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)
<input type="checkbox"/> 20.400(a)(1)(iii)	<input type="checkbox"/> 60.39(a)(1)	<input type="checkbox"/> 60.73(a)(2)(v)	<input type="checkbox"/> 73.71(a)
<input type="checkbox"/> 20.400(a)(1)(ii)	<input type="checkbox"/> 60.39(a)(2)	<input type="checkbox"/> 60.73(a)(2)(vi)	OTHER (Specify in Abstract below and in Text, NRC Form 306A)
<input type="checkbox"/> 20.400(a)(1)(iii)	<input checked="" type="checkbox"/> 60.73(a)(2)(i)	<input type="checkbox"/> 60.73(a)(2)(vii)(A)	
<input type="checkbox"/> 20.400(a)(1)(iv)	<input type="checkbox"/> 60.73(a)(2)(ii)	<input type="checkbox"/> 60.73(a)(2)(vii)(B)	
<input type="checkbox"/> 20.400(a)(1)(v)	<input type="checkbox"/> 60.73(a)(2)(iii)	<input type="checkbox"/> 60.73(a)(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12)

NAME <p style="text-align: center;">Tye Blackburn, PRB Engineer</p>	TELEPHONE NUMBER
	AREA CODE 5 0 3 5 5 6 - 3 7 1 3

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPSDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPSDS

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

During review of procedures an operator trainee discovered that performance of portions of Periodic Operating Test (POT) 2-3 "Safety Injection System Emergency Core Cooling System (ECCS) Valve In Service Test" could render both trains of Centrifugal Charging Pumps (CCP) inoperable if a Safety Injection Signal (SIS) occurred while the POT was in progress. POT 2-3 requires the Volume Control Tank (VCT) isolation valves be bypassed during portions of the test. If a SIS occurred while in this bypassed state the pressure from the VCT hydrogen cover gas could cause the VCT to preferentially provide the CCP suction, with subsequent entrainment of the VCT cover gas in both CCPs. As a result, Trojan Technical Specification (TTS) 3.0.3 "Limiting Condition for Operation and Surveillance Requirements - Applicability," was entered during POT 2-3 since neither the ECCS flow path required by TTS 3.5.2 "ECCS Subsystems - T_{AVE} ≥ 350 degrees F," or TTS 3.1.2.2.b "Flow Paths - Operating," could be depended on to be operable.

The primary cause was an inadequate review of a revision to POT 2-3 in November 22, 1976, which changed the procedure to test with the VCT isolation valves bypassed. The reasons for bypassing the VCT isolation valves were not well understood. Corrective actions will be to revise this particular procedure and to thoroughly review other test procedures.

There was no effect on the public health or safety.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Trojan Nuclear Plant	DOCKET NUMBER (2) 0 5 0 0 0 3 4 4	LER NUMBER (6)			PAGE (3)	
		YEAR 8 9	SEQUENTIAL NUMBER 0 2	REVISION NUMBER 1		
						0 2 OF 0 5

TEXT (if more space is required, use additional NRC Form 388A's) (17)

DESCRIPTION OF OCCURRENCE

On October 30, 1989, at approximately 1800 while in Mode 1 (Power Operations) with Reactor Coolant System (RCS) conditions of 2240 psig and 584 degrees F, an operator trainee discovered that performance of portions of Periodic Operating Test (POT) 2-3 "Safety Injection System Emergency Core Cooling System (ECCS) Valve In Service Test (IST)" could render both trains of Centrifugal Charging Pumps (CCP) inoperable if a Safety Injection Signal (SIS) occurred while the POT was in progress. POT 2-3 requires the Volume Control Tank (VCT) isolation valves (MO-112B and MO-112C) be bypassed during portions of the test. While in this bypassed state, if an SIS occurred, the VCT could remain lined up to the CCPs and could preferentially provide suction that would otherwise be provided from the Refueling Water Storage Tank (RWST). If the VCT hydrogen cover gas pressure is high enough, hydrogen could be entrained into both CCPs and render them inoperable. As a result Trojan Technical Specification (TTS) 3.0.3 "Limiting Condition for Operation and Surveillance Requirements - Applicability," was entered during POT 2-3 since neither ECCS flow path required by TTS 3.5.2 "ECCS Subsystems - T_{AVE} ≥ 350 degrees F," or TTS 3.1.2.2.b "Flow Paths - Operating," could be depended on to be operable. TTS 3.0.3 was exited after completion of the bypass steps (approximately 15-30 minutes) of POT 2-3.

As shown on the attached figure, there are two normally open valves in series (MO-112B and MO-112C) on the outlet of the VCT that supply the normal suction for the CCPs. Valve 8484 is normally locked closed and valve 8482 is normally open to provide a flow path for the Reactor Coolant Pump (RCP) Seal Water Return Heat Exchanger. Normally closed valves MO-112D and MO-112E are arranged in parallel and can be aligned to supply suction to the CCPs from the RWST. A SIS will cause MO-112D and MO-112E to open to align the charging pump suction to the RWST. A SIS also causes MO-112B and MO-112C to close after MO-112D and MO-112E are open to isolate the VCT from the charging pumps suction. During performance of POT 2-3, valve 8484 is opened to provide a bypass path around the VCT isolation valves. This condition allows MO-112B and MO-112C to be time cycled with CCP suction provided from the VCT. If the test were done without bypassing MO-112B and MO-112C the CCP suction would be from the Borated RWST, and could cause unwanted boration of the RCS. Bypassing the VCT isolation valves also defeats the capability to isolate the VCT if a SIS occurs.

A detailed analysis was performed by Nuclear Plant Engineering (NPE) to determine if the dynamic flow and pressure conditions that occur at the suction of the CCP's during a SIS with the VCT isolation valves bypassed would in fact prevent check valve 8546 from opening and result in draining of the VCT with subsequent CCP entrainment of the VCT cover gas. These calculations are documented in calculation TM-349. The calculation examined conditions during a Large Break Loss-of-Coolant Accident (LOCA), a Main Steam Line Break, and a small break LOCA. The calculations demonstrated in the case of a small break LOCA and low initial VCT pressure, the CCPs could operate for up to two

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Trojan Nuclear Plant	DOCKET NUMBER (2) 0 5 0 0 0 3 4 4 8 9	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
			0 2 1	0 0	0 3	OF 0 5

TEXT (If more space is required, use additional NRC Form 388A's) (17)

hours before gas entrainment would occur. However, for a Large Break LOCA, with an initial VCT pressure of 15 to 40 psig, and with other expected initial conditions, the CCPs would only be operable for 1 - 19 minutes. Similar results were obtained for a Main Steam Line Break. In summary, in almost all the proposed scenarios the CCPs could be rendered inoperable within 19 minutes.

The Event was reported to the NRC via an Emergency Notification System (ENS) Red Phone report on October 31, 1989, in accordance with 10 CFR 50.72 (b)(2)(iii).

A similar event involving loss of VCT isolation capability was discussed in Licensee Event Report 88-27 and its May 8, 1989 revision. During that event the VCT isolation capability was lost due to improperly performed maintenance to valves MO-112B and MO-112C. The corrective actions addressed the problems with work controls and instructions, and are not applicable to this event.

CAUSE OF OCCURRENCE

The primary cause was an inadequate review of a revision to POT 2-3 in November 22, 1976, which changed the procedure to test with the VCT isolation valves bypassed. The reasons for bypassing the VCT isolation valves were not well understood. Corrective actions will be to fix this specific case and to thoroughly research the test procedures for similar circumstances.

The primary cause was the November 22, 1976, revision to POT 2-3 (revision 4), which changed the procedure to test with the VCT isolation valves bypassed. This revision was inadequately reviewed and the technical justification was poorly documented. A detailed evaluation of what would happen if a SIS occurred in conjunction with the steps of POT 2-3 was not performed for the original procedure change.

CORRECTIVE ACTIONS

1. The applicable sections of POT 2-3 will not be performed until the procedure is corrected or the periodicity requirement relieved to allow performance only in cold shutdown.
2. The basis for testing of VCT and RWST isolation valves MO-112B, C, D, and E will be evaluated to determine if testing can be changed from quarterly schedule in Modes 1-4 to cold shutdown in Modes 5 and 6.
3. The Nuclear Steam Supply System vendor will be contacted to resolve if their generic surveillance procedures address simultaneous testing and SIS generation.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Trojan Nuclear Plant	DOCKET NUMBER (2) 0 5 0 0 9 3 4 4 8 9	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
			0 2 1	0 0	0 4	OF 0 5

TEXT (if more space is required, use additional NRC Form 306A's) (17)

4. A review of all POTs will be performed to determine if entry into TTS 3.0.3 will occur when the POT is being run. This review is to be performed by a team made up of a member from Operations, Surveillance Test Engineering (STE) and Plant System Engineering (PSE). The scope of this review is to be defined by Nuclear Safety and Regulation Department (NSRD) investigation into the licensing requirements on this issue (see corrective action 3).
5. A review of valves that are tested in a similar manner as POT 2-3 will be performed to determine if there are others besides MO-112 B, C, D and E that should have their testing frequency changed to cold shutdown.
6. A review of past Operational Assessment Reviews was completed. Several reviews were found that dealt with the potential for gas binding or gas entrainment events, but all dealt with system or design failures. None dealt with procedural problems leading to gas entrainment or gas binding events.

SIGNIFICANCE OF OCCURRENCE

This surveillance methodology defeated the ability to isolate the suction of the CCP's from the VCT in the event a SIS occurred during the performance of POT 2-3. This misaligned suction could result in draining of the VCT and loss of both trains of CCP's due to gas entrainment and gas binding. The total amount of time the VCT outlet isolation valves were bypassed was anywhere from 15 to 30 minutes each quarter when POT 2-3 was run. There has never been a SIS when this POT was being run so there was no effect on the public health or safety.

FACILITY NAME (1)

DOCKET NUMBER (2)

LER NUMBER (3)

PAGE (3)

Trojan Nuclear Plant

0 5 0 0 0 3 4 4 8 9 - 0 2 1 - 0 0 0 5 OF 0 5

TEXT (If more space is required, use additional NRC Form 300A's) (17)

CHARGING OVERVIEW

