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ACCESSION NBR: 9210190413 DOC. DATE: 92/10/09 NOTARIZED: NO DOCKET #
 FACIL: 50-275 Diablo Canyon Nuclear Power Plant, Unit 1, Pacific Ga 05000275
 AUTH. NAME AUTHOR AFFILIATION
 SISK, D.P. Pacific Gas & Electric Co.
 RUEGER, G.M. Pacific Gas & Electric Co.
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 92-018-00: on 920912, plant operators initiated manual trip to prevent inadvertent criticality from inadvertent cooldown due to excessive leakage. Cause of event under investigation. Suppl LER will be issued. W/921009 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 8
 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:

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INTERNAL:	ACNW	2	2	ACRS	2	2
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	NRR/DLPQ/LHFB10	1	1	NRR/DLPQ/LPEB10	1	1
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Pacific Gas and Electric Company

77 Beale Street
San Francisco, CA 94106
415/973-4684

Gregory M. Rueger
Senior Vice President and
General Manager
Nuclear Power Generation

October 9, 1992

PG&E Letter No. DCL-92-217



U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Re: Docket No. 50-275, OL-DPR-80
Diablo Canyon Unit 1
Licensee Event Report 1-92-018-00
Manual Reactor Trip to Prevent Inadvertent Criticality from
Inadvertent Cooldown due to Excessive Steam Leakage

Gentlemen:

Pursuant to 10 CFR 50.73(a)(2)(iv), PG&E is submitting the enclosed Licensee Event Report regarding a manual reactor trip to prevent inadvertent criticality from inadvertent cooldown due to excessive steam leakage.

This event has in no way affected the health and safety of the public.

Sincerely,

A handwritten signature in black ink, appearing to read 'Greg Rueger'. The signature is fluid and cursive, written over a white background.

Gregory M. Rueger

cc: Ann P. Hodgdon
John B. Martin
Philip J. Morrill
Harry Rood
CPUC
Diablo Distribution
INPO

DC1-92-TI-N042

Enclosure

1062S/85K/TDB/2246

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PDR ADOCK 05000275
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10/22/92



LICENSEE EVENT REPORT (LER)

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TITLE (4) **MANUAL REACTOR TRIP TO PREVENT INADVERTENT CRITICALITY FROM INADVERTENT COOLDOWN DUE TO EXCESSIVE STEAM LEAKAGE**

EVENT DATE (6)			LER NUMBER (8)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)			
MON	DAY	YR	YR	SEQUENTIAL NUMBER		REVISION NUMBER	MON	DAY	YR	FACILITY NAMES		DOCKET NUMBER (8)	
09	12	92	92	-	0 1 8	- 0 0	10	09	92			0 5 0 0 0	

OPERATING MODE (9) 2	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (11)	
POWER LEVEL (10) 0 0 0	<input checked="" type="checkbox"/> 10 CFR <u>50.73(b)(2)(iv)</u> <input type="checkbox"/> OTHER _____ (Specify in Abstract below and in text, NRC Form 366A)	

LICENSEE CONTACT FOR THIS LER (12)		TELEPHONE NUMBER	
DAVID P. SISK, SENIOR REGULATORY COMPLIANCE ENGINEER		AREA CODE 805	545-4420

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)										
CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
<input checked="" type="checkbox"/> YES (if yes, complete EXPECTED SUBMISSION DATE) NO		01	31	93

ABSTRACT (16)

On September 12, 1992, at 2318 PDT, with Unit 1 in Mode 2 (Startup) at 0 percent power, plant operators initiated a manual reactor trip. The Unit 1 fifth refueling outage (1R5) was in progress. The main turbine had been manually tripped and removed from service. The reactor had been taken subcritical by inserting control rods. Because of reactor coolant system cooldown, an operator was dispatched to re-latch the main turbine in a manner that would keep the main turbine stop valves closed. When the main turbine was re-latched, an unplanned main turbine acceleration was noted and the main turbine was manually tripped. To prevent inadvertent criticality from inadvertent cooldown due to excessive steam leakage, the reactor was manually tripped. A four-hour, non-emergency report was made in accordance with 10 CFR 50.72(b)(2)(ii) on September 13, 1992, at 0152 PDT.

The root cause for this event is under investigation.

The corrective actions to prevent recurrence will include revising the operating procedures to include verifying that the main turbine computer speed reference resets to 0 RPM prior to re-latching the main turbine.

A supplemental LER will be issued to the NRC after the investigation has been completed and the root cause and corrective actions to prevent recurrence have been determined.



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I. Plant Conditions

Unit 1 was in Mode 2 (Startup) at 0 percent power.

II. Description of Event

A. Summary:

On September 12, 1992, at 2318 PDT, with Unit 1 in Mode 2 (Startup) at 0 percent power, plant operators initiated a manual reactor trip. The Unit 1 fifth refueling outage (1R5) was in progress. The main turbine (TA)(TRB) had been manually tripped and removed from service. The reactor (AC)(RCT) had been taken subcritical by inserting control rods (AA)(ROD). Because of reactor coolant system (RCS) (AB) cooldown, an operator was dispatched to re-latch the main turbine in a manner that would keep the main turbine stop valves closed. When the main turbine was re-latched, an unplanned main turbine acceleration was noted and the main turbine was manually tripped. To prevent inadvertent criticality from inadvertent cooldown due to excessive steam leakage, the reactor was manually tripped. A four-hour, non-emergency report was made in accordance with 10 CFR 50.72(b)(2)(ii) on September 13, 1992, at 0152 PDT.

B. Background:

To prevent RCS cooldown following a plant shutdown, Diablo Canyon Power Plant (DCPP) standard operating practice has been to re-latch the main turbine with the stop valve equalizing valves closed. Re-latching the main turbine in this manner closes the stop valve trip pilot valves to isolate a main steam leakage path to the condenser.

On a main turbine trip, the DEH/P-2000 computer (IT)(CPU) is designed to receive a contact closure signal from the pressure switch (SB)(PS) (PS-22B Low Auto Stop Oil Pressure) that indicates the main turbine has been tripped. This PS-22B signal is used by the DEH/P-2000 computer to reset the main turbine reference signal to zero revolutions per minute (RPM) and maintain all main turbine valves closed for main turbine coastdown.

Governor valve (GV) (SB)(V) MS-1-FCV-140 had been isolated earlier in the operating cycle due to mechanical vibration problems. The stop valves are located immediately upstream of the GVs and are designed to shut off the steam supply to the main turbine.

At the time of the event, the unit was subcritical with source range detectors indicating approximately 1000 counts per second.



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C. Event Description:

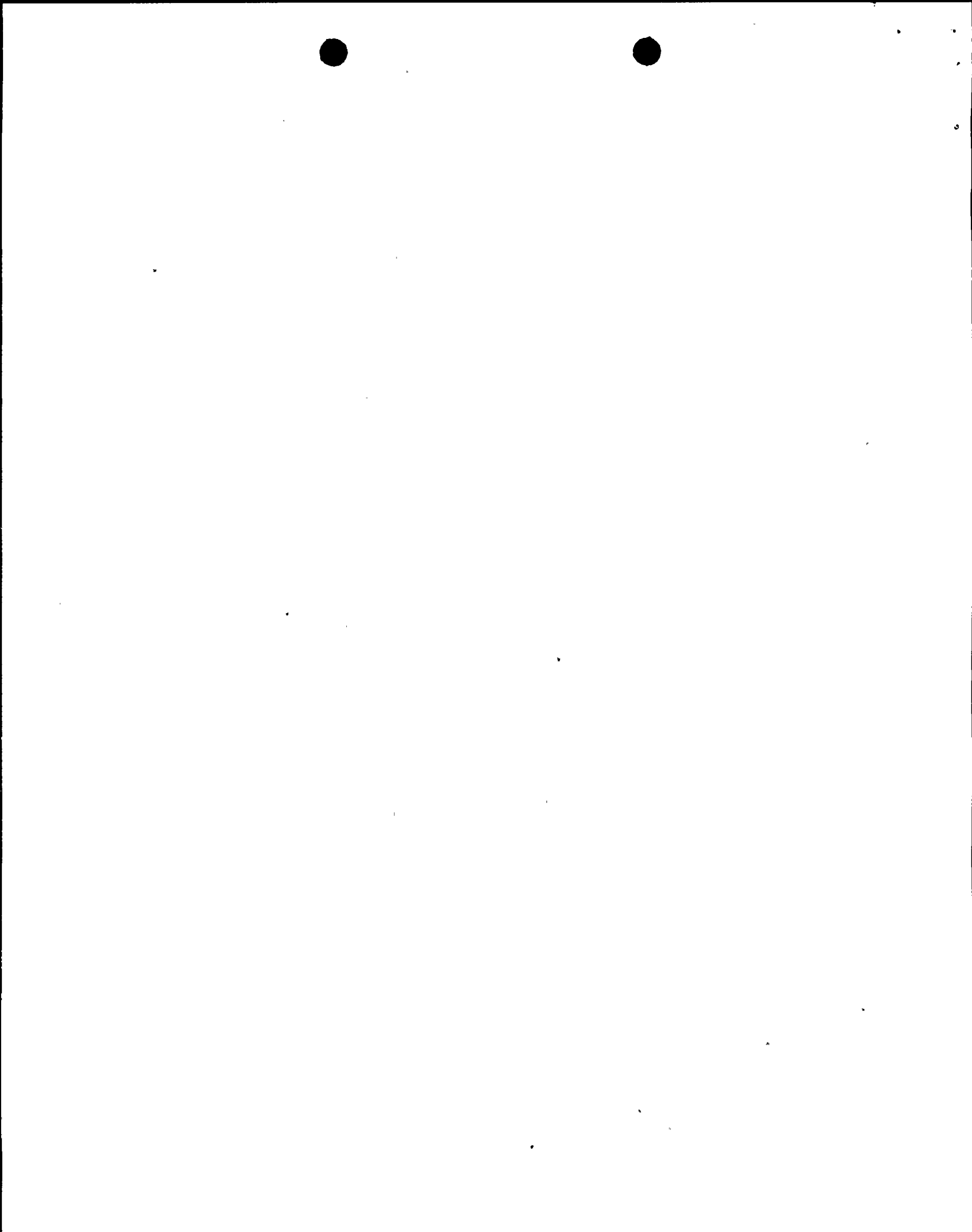
On September 12, 1992, at 2245 PDT, with Unit 1 in Mode 2 (Startup) at 0 percent power, Unit 1 shutdown for IR5 was in progress. The shutdown had proceeded to the point where the main turbine had been tripped for coastdown and all main turbine stop valves and GVs had closed as designed. The reactor control rods were being inserted. Upon the main turbine trip, the DEH/P2000 computer either did not receive or did not respond to the PS-22B signal that reset the main turbine reference speed to 0 RPM. This condition kept the DEH/P2000 in speed control mode, providing a signal to the GVs calling for 1800 RPM demand.

The deficiency in the PS-22B signal to reset the main turbine reference speed caused the DEH/P2000's control system to integrate upward to a maximum speed demand as the main turbine deviated from 1800 RPM during coastdown.

On September 12, 1992, at 2256 PDT, the main turbine was re-latched with the air/oil interface valve isolated in accordance with Operating Procedure (OP) L-5, "Plant Cooldown from Minimum Load to Cold Shutdown." This process closed the equalizing valves around the stop valves to maintain a differential pressure across the stop valves. This differential pressure normally is sufficient to hold the stop valves closed against the actuator opening forces. After the stop valve bypasses have been closed, the main turbine is re-latched. The re-latch closes the main turbine stop valve shaft seal equalizing valves and reduces steam demand to prevent RCS cooldown.

Upon main turbine re-latch, only GV MS-1-FCV-142 responded to the DEH/P2000 control signal, while GVs MS-1-FCV-139 and MS-1-FCV-141 remained closed (MS-1-FCV-140 was previously isolated). The operators in the control room noted that MS-1-FCV-142 had lost its full closed indication and stop valve MS-1-FCV-145 opened completely (MS-1-FCV-142 in response to the DEH/P2000 signal and MS-1-FCV-145 due to steam leakage that equalized the pressure on either side of the valve).

An operator was dispatched to the main turbine to isolate the electrohydraulic (EH) fluid to MS-1-FCV-142. Shortly after the EH fluid was isolated to MS-1-FCV-142, MS-1-FCV-141 responded to the DEH/P-2000 signal and opened in an attempt to return main turbine speed to 1800 RPM and at 2302 PDT, a rapid main turbine acceleration was experienced. The combination of stop valve MS-1-FCV-145 being in an open position and MS-1-FCV-141 opening created a direct path into the main turbine. The main turbine accelerated rapidly to the 103 percent (1854 RPM) GV overspeed controller setpoint, at which point the GVs closed. Operators immediately tripped the main turbine when this condition was recognized. The maximum speed attained of 1870 RPM was well below the overspeed main turbine trip setpoint of 1980 RPM.



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Following this manual trip, the DEH/P2000 computer correctly reset the main turbine speed reference signal to 0 RPM.

On September 12, 1992, at 2318 PDT, the RCS temperature had decreased from 543°F to 535°F and was continuing to cooldown. A manual reactor trip was initiated by licensed control room operators as a conservative measure to prevent the possibility of an inadvertent return to criticality. The unit was stabilized in Mode 3 (Hot Standby).

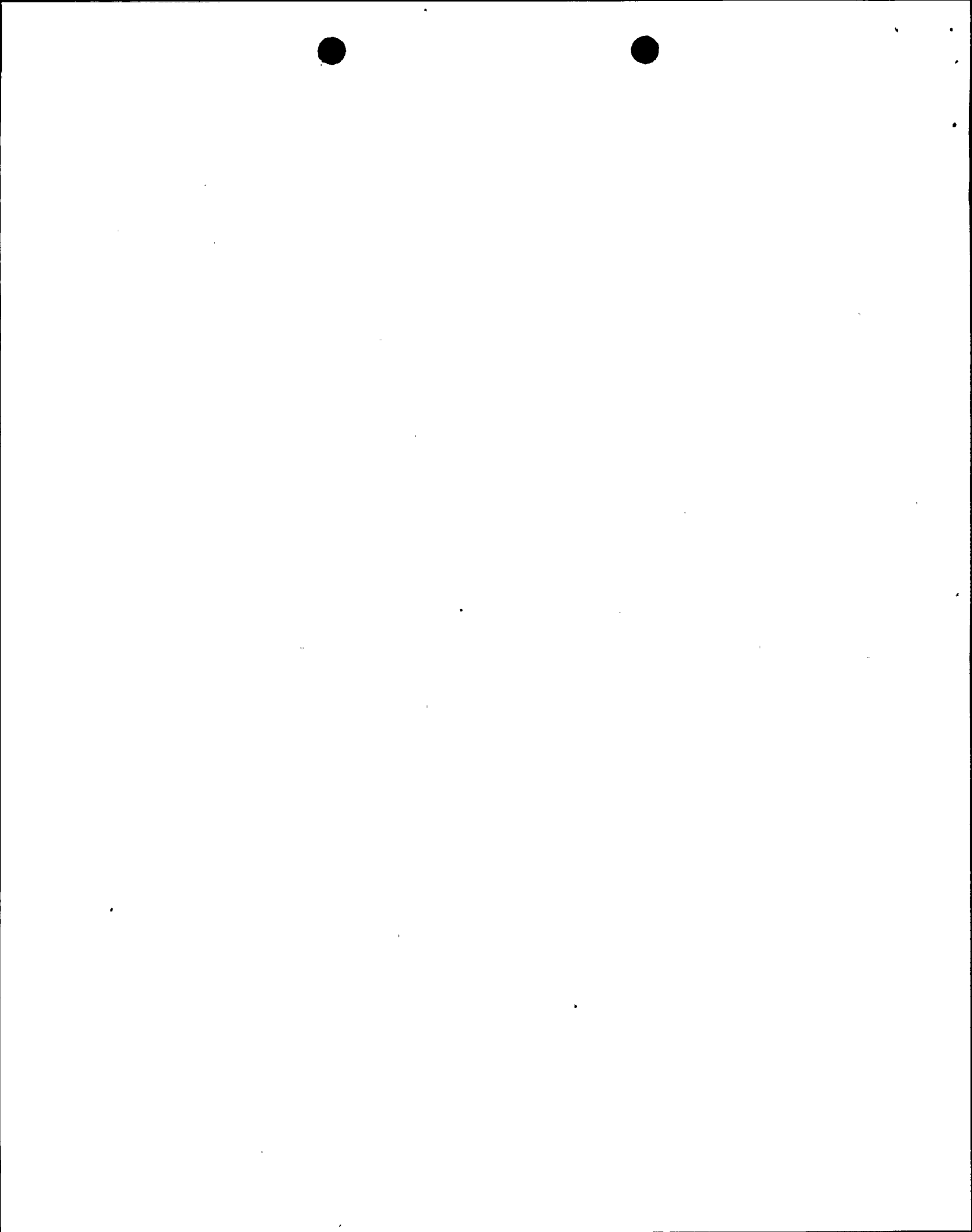
On September 13, 1992, at 0152 PDT, a four-hour, non-emergency report was made in accordance with 10 CFR 50.72(b)(2)(ii) because of the reactor protection system (RPS) actuation. Analysis showed that no return to criticality occurred.

D. Inoperable Structures, Components, or Systems that Contributed to the Event:

To be determined.

E. Dates and Approximate Times for Major Occurrences:

1. September 12, 1992; 2245 PDT: Main turbine was tripped for 1R5. The DEH/P2000 computer did not reset the main turbine reference speed signal to 0 RPM.
2. September 12, 1992; 2256 PDT: Unit 1 main turbine was re-latched to prevent RCS cooldown.
3. September 12, 1992; 2301 PDT: GV MS-1-FCV-142 was isolated and GV MS-1-FCV-141 responded to the 1800 RPM signal.
4. September 12, 1992; 2302 PDT: Main turbine was manually tripped. The DEH/P2000 computer reset the main turbine reference speed to 0 RPM.
5. September 12, 1992; 2318 PDT: Event/Discovery Date. Operators manually tripped the reactor.
6. September 13, 1992; 0152 PDT: A four-hour, non-emergency report was made to the NRC in accordance with 10 CFR 50.72(b)(2)(ii).



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F. Other Systems or Secondary Functions Affected:

None.

G. Method of Discovery:

The event was immediately apparent to plant operators due to alarms and indications received in the control room.

H. Operator Actions:

Operators had re-latched the main turbine in accordance with OP L-5 to reduce secondary system steam demand to limit RCS cooldown. Upon noting the rapid main turbine acceleration, the operators manually tripped the main turbine to avoid an overspeed condition, but the main turbine reached a peak overspeed of 1870 RPM. Operators observed that the RCS temperature was continuing to decrease so a manual reactor trip was initiated to prevent an inadvertent return to criticality. The operators took the appropriate actions to stabilize the plant in Mode 3 when they manually tripped the reactor.

I. Safety System Responses:

1. The reactor trip breakers (AA)(BKR) opened.
2. The control rod drive mechanism (AA)(DRIV) allowed the control rods to drop into the core.

III. Cause of the Event

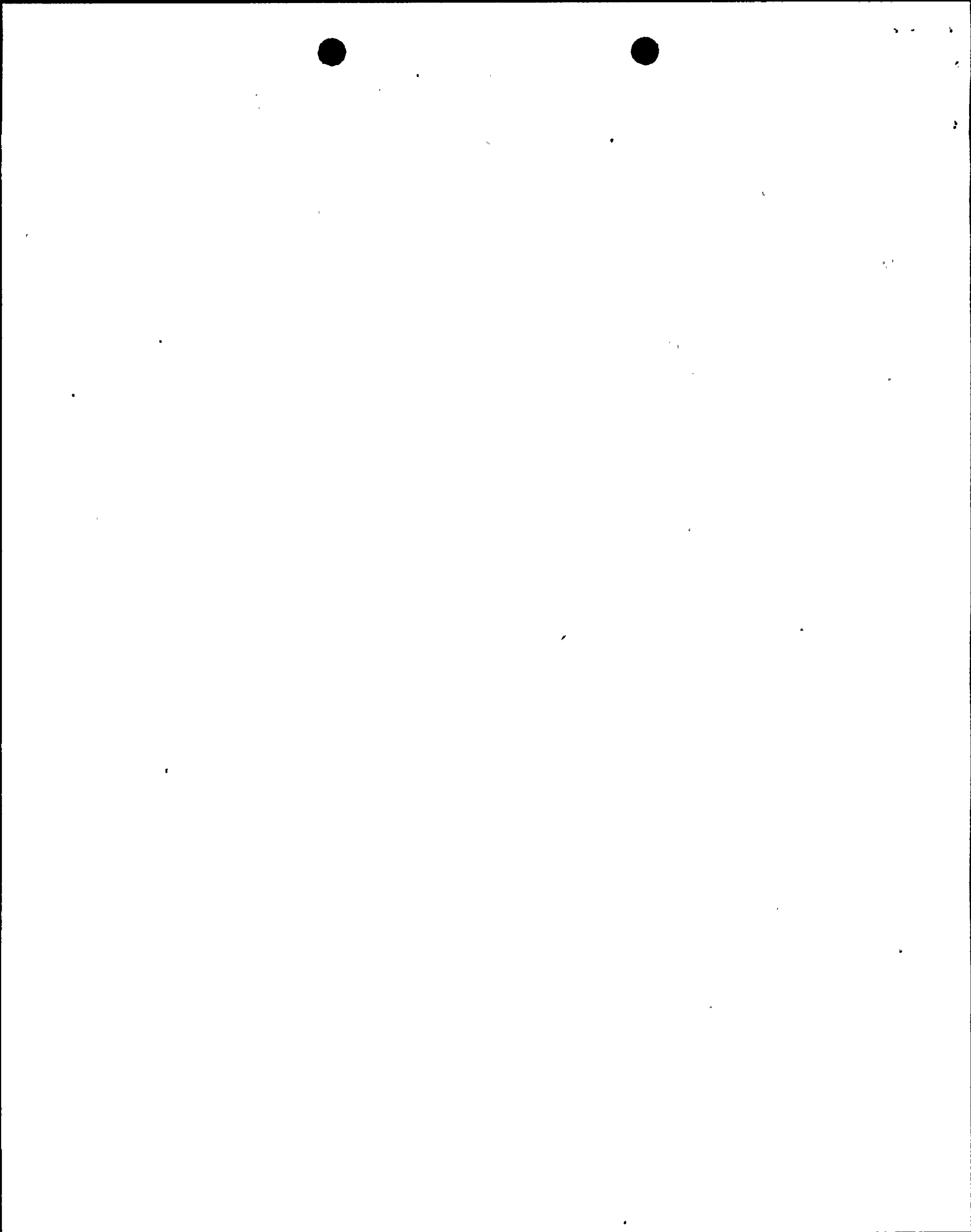
A. Immediate Cause:

The immediate cause of the reactor trip was manual actuation due to RCS cooldown.

B. Root Cause:

The root cause for this event has not yet been determined. This LER will be revised to report the results of the investigation and applicable corrective actions taken as a result of this investigation. Test are ongoing and results to date have not identified the root cause of the incorrect DEH/P-2000 computer reference speed. Test results to date include:

1. DEH/P-2000 computer software and hardware have been extensively tested and no problems were identified.



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2. Restricting orifices in the auto stop oil header have been tested and one restricting orifice had some buildup and was estimated to be between 50 to 75 percent plugged.
3. Auto stop oil pressure switch PS-22B operated erratically, but smoothed out after additional testing.
4. Solenoid valve SV-171 has been inspected and replaced.

In addition, other equipment is under investigation and additional testing is as follows:

1. The servo valves to the GVs will be replaced and the removed servo valves will be analyzed.
2. A special testing device, the Westinghouse EH analyzer, will test the hydraulic cylinders, servo valves, drain check valves, emergency trip check valves, dump valves, isolation valves, and valve test solenoids before Unit 1 is returned to service.
3. Stop valve MS-1-FCV-145 opening following main turbine re-latch is under investigation. To date, because no evidence of stop valve problems has been identified, the equalizing valves for the stop valves will be inspected.
4. EH trip header solenoid valves SV-40, SV-41, and SV-42 will be replaced.

IV. Analysis of the Event

A manual main turbine trip with a subsequent manual reactor trip from 0 percent power is bounded by a previously analyzed condition II event in the Final Safety Analysis Report (FSAR) update. A main turbine design overspeed condition is also addressed in the FSAR at 120 percent of the rated speed (equal to 2160 RPM). For this event, the main turbine speed reached 1870 RPM. A manual reactor trip in response to a manual main turbine trip was a conservative action by the control room operators. All safety-related equipment functioned as designed. Therefore, the health and safety of the public was not adversely affected by this event.

V. Corrective Actions

A. Immediate Corrective Actions:

1. The Unit 1 main turbine and reactor were tripped.



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B. Corrective Actions to Prevent Recurrence:

1. OP L-5 and OP C-3, "Main Unit Turbine," will be revised to include verifying that the main turbine speed reference is set to 0 prior to re-latching the main turbine.
2. This LER will be revised to report the results of the investigation and applicable corrective actions taken as a result of this investigation.

VI. Additional Information

- A. Failed Components:
To be determined.
- B. Previous LERs on Similar Problems:
None.

