

# LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) <b>Diablo Canyon Unit 1</b>	DOCKET NUMBER (2) <b>0 5 0 0 0 2 7 5 1</b>	PAGE (3) <b>1</b> OF <b>6</b>
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TITLE (4) **Technical Specification 3.9.4 Requirement for Containment Closure During Refueling Not Met as a Result of Inadequate Evaluation**

EVENT DATE (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)			
MON	DAY	YR	YR	SEQUENTIAL NUMBER		REVISION NUMBER	MON	DAY	YR	FACILITY NAMES		DOCKET NUMBER (S)	
10	11	95	95	0	1 2	0 1	03	13	96			0 5 0 0 0	
												0 5 0 0 0	

OPERATING MODE (9) **6** THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (11)

POWER LEVEL (10) **0|0|0**

10 CFR 50.73(a)(2)(i)(B) & 50.73(a)(2)(v)(C)  
 OTHER - \_\_\_\_\_  
 (Specify in Abstract below and in text, NRC Form 366A)

LICENSEE CONTACT FOR THIS LER (12) **Don Behnke - Senior Regulatory Services Engineer**

TELEPHONE NUMBER  
AREA CODE **805** NUMBER **545-2629**

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)										
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS	

SUPPLEMENTAL REPORT EXPECTED (14)  YES (If yes, complete EXPECTED SUBMISSION DATE)  NO

EXPECTED SUBMISSION DATE (15)

MONTH	DAY	YEAR

ABSTRACT (16)

Between October 4, 1995, to October 6, 1995, with Unit 1 in Mode 6 (Refueling) and performing core alterations, the Limiting Conditions for Operation of Technical Specification 3.9.4 was not met during the core offload. A closure gap in the main steam isolation valves (MSIVs) combined with manual bypass and drain valves in the open position, provided an open path to the environment via the main steam line header associated piping.

At 1915 PDT on October 11, 1995, a 4-hour, non-emergency notification was made to the NRC in accordance with 10 CFR 50.72(b)(2)(iii)(C).

The root cause of the event was an inadequate evaluation of the MSIVs' seating reliability for containment closure. Immediate corrective actions taken include installation of a positive closure device (gag) for the MSIVs, replacement of the actuator pins, and inspection of the Unit 2 actuator pins.

Corrective actions to prevent recurrence include issuance of work instructions in the administrative tag out clearance point to require the MSIV gags for containment closure and a review of containment closure devices with unique characteristics to assure proper operation.

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I. Plant Conditions

Unit 2 was in Mode 6 (Refueling) at 0 percent power.

II. Description of Event

A. Summary:

Between October 4, 1995, to October 6, 1995, with Unit 1 in Mode 6 (Refueling) and performing core alterations, the Limiting Conditions for Operation of Technical Specification (TS) 3.9.4 was not met during the core offload. A closure gap in the main steam isolation valves (MSIVs)(SB)(FCV) combined with manual bypass (LOV) and drain valves in the open position, provided an open path the environment.

At 1915 PDT on October 11, 1995, a 4-hour, non-emergency notification was made to the NRC in accordance with 10 CFR 50.72(b)(2)(iii)(C).

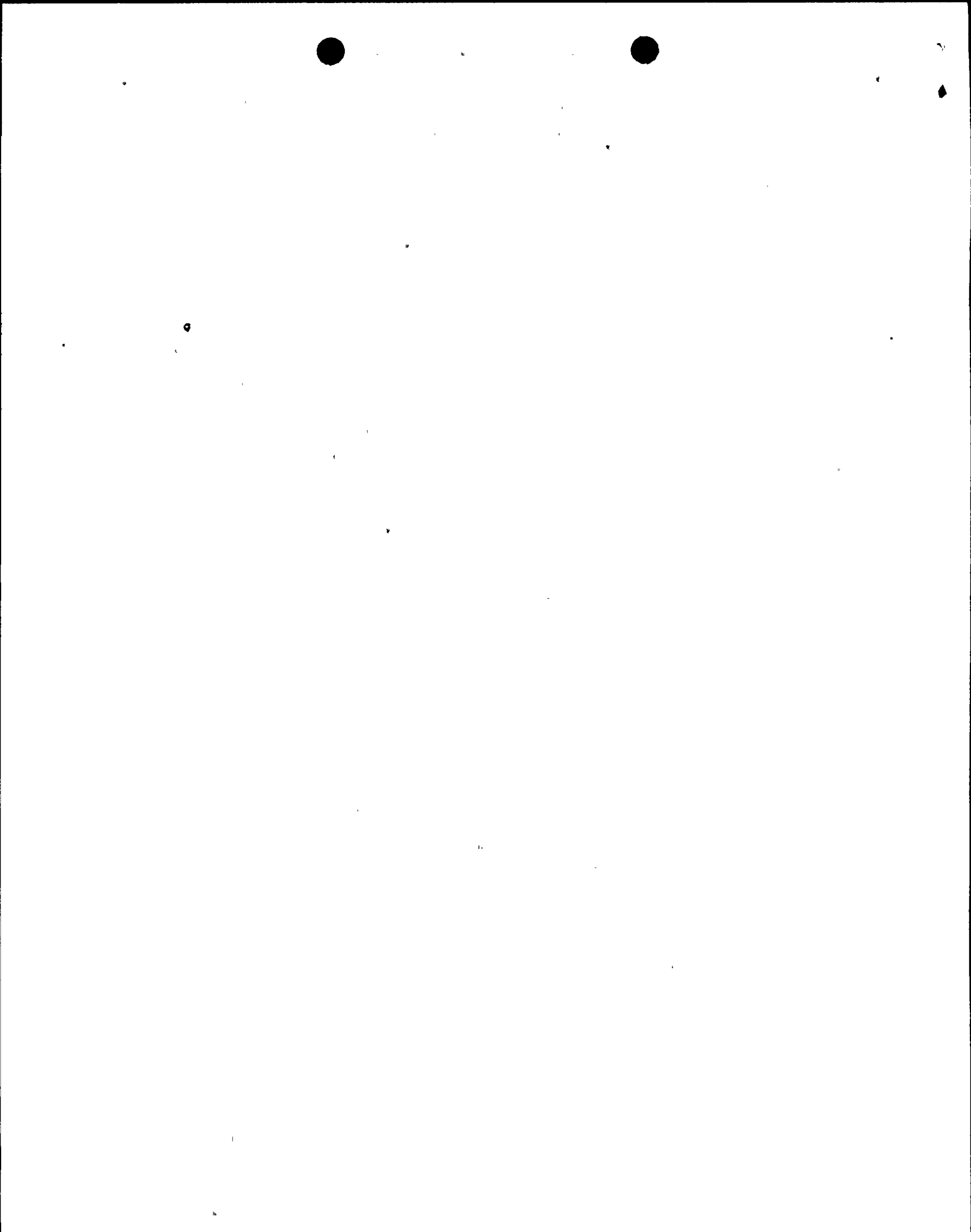
B. Background:

TS 3.9.4 requires that each penetration providing direct access from the containment atmosphere to the outside atmosphere shall be either: 1) closed by an isolation valve, blind flange, or manual valve, or 2) be capable of being closed by an OPERABLE automatic containment ventilation isolation valve, during core alteration.

Administrative Procedure AD8.DC54, "Containment Closure," Attachment 8.1, step 15.d requires that Operating Procedure (OP) B-8D, "Refueling Prerequisites," confirm administrative (clearance) tag out and work restriction programs in effect by review and/or tracking of work orders for all potential containment penetrations. This process was intended to confirm that the MSIVs are providing containment closure in accordance with a computer library clearance point instruction prior to core alterations.

The MSIVs are designed to close under steam flow conditions from maximum flow rate to less than 5 percent of rated flow. The actuator is installed to provide a large opening force at the valve full open position. The actuator holds the check valve style disk in the open position against a back stop just out of the main flow path during power operation. Upon receipt of a closure signal, the actuator motive force (air) is vented and a closing air applied allowing the valve disk to drop by weight and actuator applied force into the steam flow path. Once the valve disk is approximately 10 percent from the full open position, it is within the steam flow path and forced closed primarily by the frictional and differential pressure forces acting on the valve disk.

The actuator is not designed to apply large closing forces to the disk at or near the full closed position. This is due to the near vertical disk to seat relationship (no weight assist) and the smaller angle of actuator force application on the actuating arm.



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Because PG&E may schedule steam generator (SG) upper internal inspections that require opening the secondary side of the SGs to the containment atmosphere proper closure of the MSIVs is required for containment closure. This shutdown closure may occur early in the refueling outage sequence following MSIV closure with low steam line differential pressures across the valve. Therefore, the seat to seat closure via the actuator forces alone requires high seating reliability of the MSIVs for those conditions that the valve and actuator are not optimally designed.

**C. Event Description:**

During a 1988 maintenance requirement review, PG&E determined that the vendor recommended monthly actuator pin lubrication was excessive based upon Diablo Canyon and industry performance standards for this type of valve. The lubrication work order was changed to 'as required' by test or inspection of the valves.

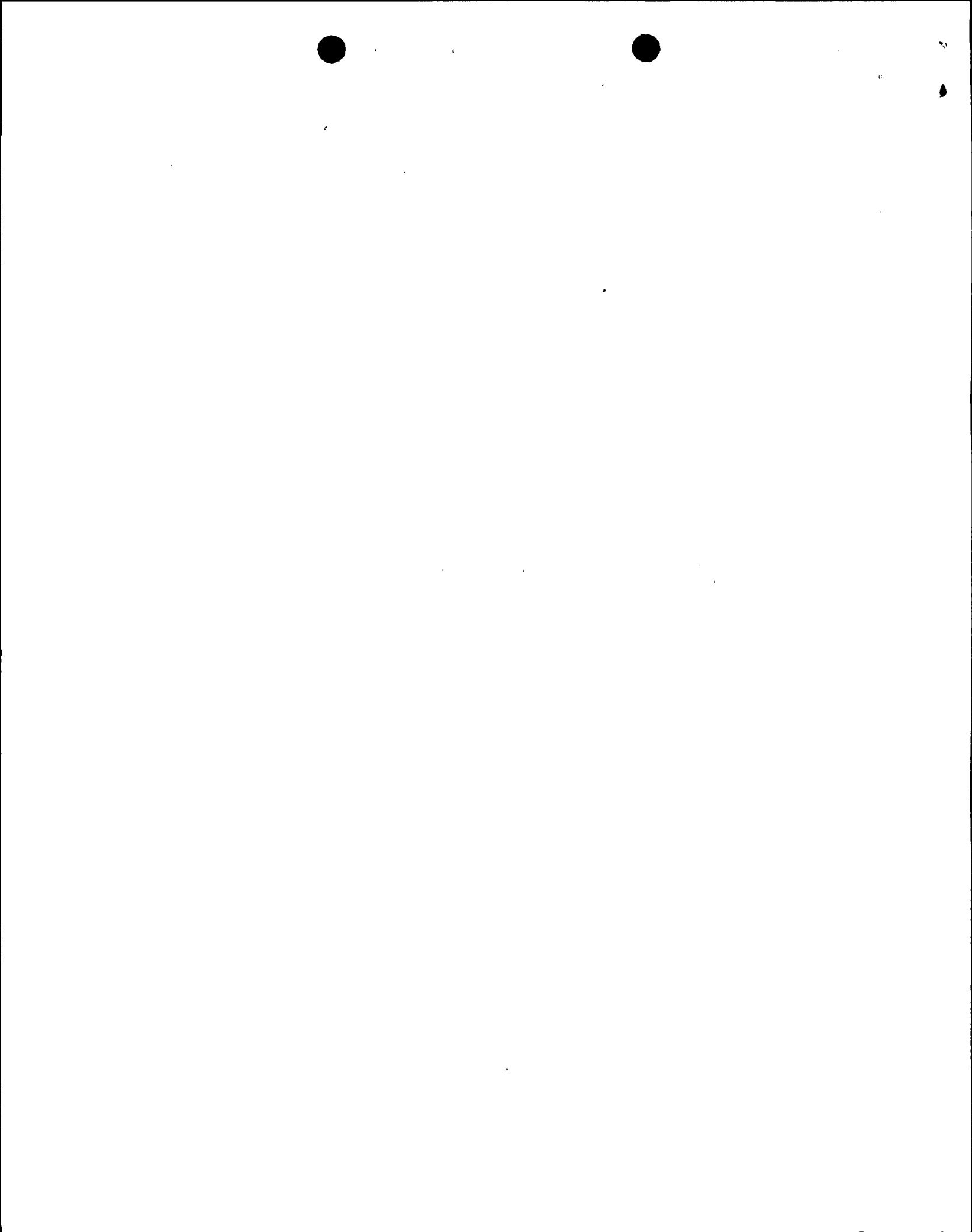
During 1993, an internal inspection of the MSIVs identified that the MSIVs did not achieve seat to seat closure due to an internal misalignment of the disk locating pins. This internal misalignment did not affect the seating required for closure with steam flow due to the self aligning characteristics of the disk with the large forces applied and the affected valves had not been relied upon for containment closure. However, this event identified that the MSIVs could appear to be closed with actuator action only but the valve could be partially open. Therefore, following corrective maintenance the MSIV's seating reliability was demonstrated by actuator stroke testing.

During 1994, the MSIV actuation tests by actuator operation alone were reviewed by outage scheduling personnel and found acceptable for use as a containment closure boundary.

On October 4, 1995, at 0248 PDT, plant operators were notified by the containment coordinator that containment closure for refueling was complete. At this time, the MSIVs were used as part of the containment boundary due to the removal of the SG manways to allow inspection access to the upper internals.

On October 4, 1995, at 2211 PDT, Unit 1 core offload commenced. A discharge permit was in effect at this time and containment ventilation fans (VA)(FAN) were running with the plant vent radiation monitor (VL)(MON) in operation. The containment ventilation fans maintain the pressure inside containment below ambient atmospheric pressure to prevent uncontrolled airborne out-flow from containment in the event of an accident. The plant vent radiation monitor provides a containment ventilation isolation function if monitored containment ventilation exhaust activity exceeds acceptable limits.

On October 6, 1995, at 1130 PDT, Unit 1 core was fully offloaded to the spent fuel pool in the fuel handling building.



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On October 9, 1995, Engineering Services personnel discovered that MSIV (FCV-41) had a visible, approximately 1 and 1/2 inch gap in the lower portion of its 26 inch diameter sealing area as observed by video probe inspection. The valve was confirmed to be capable of full closure with manual application of approximately 50 lbs. force.

On October 10, 1995, Engineering Services management was advised of the MSIV partially open condition of MSIVs (FCV-41 and 42) and an impact evaluation was initiated.

On October 11, 1995, at 1715 PDT, a plant walkdown confirmed that open MSIV vent and drain line manually operated valves downstream of the MSIVs had been open to the atmosphere on October 4th through 6th. A 4-hour, non-emergency notification in accordance with 10 CFR 50.72(b)(2)(iii)(C), was made to the NRC at 1915 PDT.

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

None.

**E. Dates and Approximate Times for Major Occurrences:**

1.     October 4, 1995, at 2211 PDT:     Event date. Unit 1 core offload commenced.
2.     October 6, 1995, at 1130 PDT:     Unit 1 core offloading completed.
3.     October 11, 1995, at 1715 PDT:     Discovery date. PG&E review of the valve status during core offload determined TS 3.9.4 was not met during core alterations (offloading).
4.     October 11, 1995, at 1915 PDT:     A 4-hour, non-emergency report was made in accordance with 10 CFR 50.72(b)(2)(iii)(C).

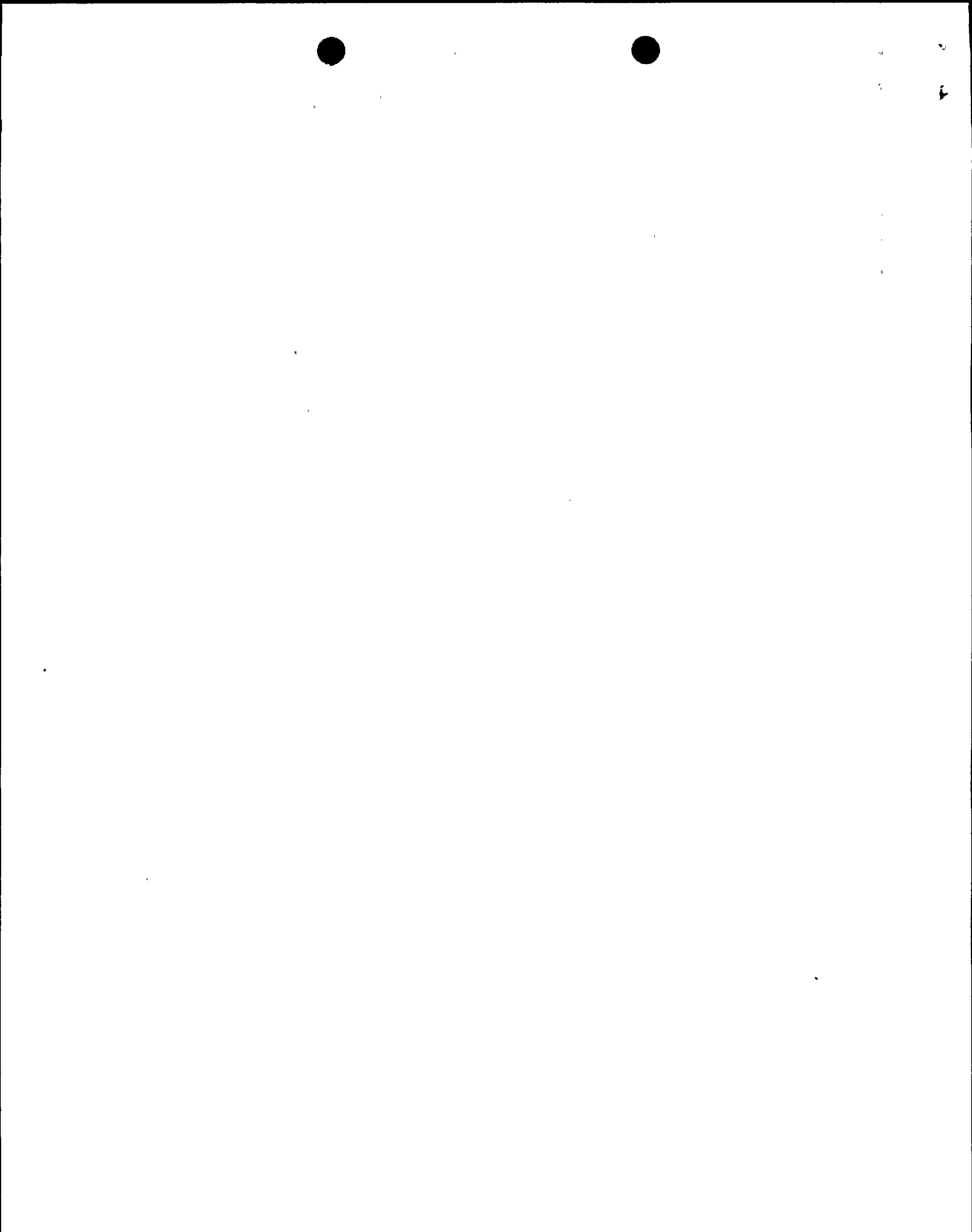
**F. Other Systems or Secondary Functions Affected:**

None.

**G. Method of Discovery:**

PG&E engineering personnel during the scheduled performance of internal inspection of the MSIVs identified that FCV-41 and 42 did not fully close as required.

**H. Operator Actions:**





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None.

I. Safety System Responses:

None required.

III. Cause of the Event

A. Immediate Cause:

The immediate cause of this event was inadequate closure of the MSIVs due to corrosion product buildup on the closure mechanism attachment pin that increased the required closing force near the full closed position. The material degradation of the MSIV closure actuator pins, combined with no differential steam pressure to assist closure, allowed the MSIVs to operate normally from the full open position, but not achieve full seat to seat closure.

B. Root Cause:

The root cause of the event was an inadequate evaluation of the MSIVs' seating reliability for containment closure. The use of the MSIVs for a containment boundary during refueling was accepted based upon testing performed on a smooth performing actuator without a closing force margin.

IV. Analysis of the Event

The primary safety function of the MSIVs to close during power operation was not adversely impacted by the corrosion build up on the actuator pins identified during this event. The actuator is arranged to apply a large closing force during the initial valve movement from the full open (against the valve backstop) position. The closing forces include the valve disk weight, frictional steam flow forces, and the differential pressure during closure to assure full valve closure. During this event, the valve operated normally except near the full closed position; therefore, there were no adverse affects on the valve for steam line isolation.

An analysis of the consequences of an accident during core offload was previously performed (reference LER 2-93-003) based on the estimated flow rate out of containment under post-accident conditions with an open pathway to the atmosphere. The estimate of the flow rate included an assumed difference between the inside containment atmosphere and ambient temperatures throughout the postulated event and resulted in a calculated leak rate of 34 cubic feet per minute. This result was combined with the design basis fuel handling accident source term and meteorological assumptions to calculate postulated site boundary doses estimates.

The resulting dose estimates were less than 10 percent of the 10 CFR 100 limits. The opening evaluated for the previous case was larger that that postulated during this event. Consequently, the analysis of the postulated fuel handling accident with the MSIV pathway



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that occurred in this event, would result in a site boundary dose less than 10 percent of the 10CFR100 limits.

Thus, the health and safety of the public were not adversely affected by this event.

**V. Corrective Actions**

**A. Immediate Corrective Actions:**

1. A positive MSIV closure positioning device (gag) was installed for all MSIVs.
2. The administrative clearance tag out clearance point was revised to require the installation of the MSIV positive closure device (gag) when the MSIVs are relied upon to provide containment refueling integrity.
3. The Unit 1 MSIV actuator pins were replaced and the Unit 2 MSIV actuator pins were visually inspected for evidence of corrosion.

**B. Corrective Actions to Prevent Recurrence:**

1. The library clearance work instruction of the administrative tag out and clearance process was revised to require the installation of the MSIV positive closure device (gag) when the MSIVs are relied upon to provide containment refueling integrity.
2. A review of containment closure devices with unique or unusual closure characteristics will be performed to assure proper operation during refueling conditions.

**VI. Additional Information**

**A. Failed Components:**

None.

**B. Previous Similar Events:**

Licensee Event Report 2-93-003-00, "Technical Specification 3.9.4 Requirement for Containment Closure During Refueling Core Offload Not Met Due to Personnel Error," identified a condition where inadequate bolting of the containment equipment hatch resulted in an open pathway to the environment. The corrective actions for this event included procedural revisions to include independent verification of containment closure activities and departmental level meetings to emphasize management expectations regarding procedural adherence. The corrective actions for this event did not prevent the above event because the verification method used was not effective in verifying physical position of the MSIVs at full closure.



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