LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
DIABLO CANYON UNIT 2	0 5 0 0 0 3 2 3	1 OF 6

TITLE (4) UNIT SHUTDOWN REQUIRED DUE TO INOPERABLE HIGH PRESSURE TURBINE STOP VALVE

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 (8)
03	22	92	92	- 0 0 3 -	0 1	03	10	93		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	1
POWER LEVEL (10)	0 9 2

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (11)

_X_ 10 CFR 50.73(a)(2)(i)(A)

___ OTHER - _____

(Specify in Abstract below and in text, NRC Form 366A)

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER AREA CODE	TELEPHONE NUMBER
DAVID P. SISK, SENIOR REGULATORY COMPLIANCE ENGINEER	805	545-4420

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
X	S B	R T V	W 1 2 0	Y					

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
| X | YES (if yes, complete EXPECTED SUBMISSION DATE)	| | NO		06	30	93

ABSTRACT (16)

On March 22, 1992, at 2143 PST with Unit 2 in Mode 1 (Power Operation) at approximately 92 percent power, an Unusual Event was declared and a manual shutdown was commenced in accordance with Technical Specification (TS) 3.3.4.1, "Turbine Overspeed Protection," when it was determined that one high pressure turbine stop valve (FCV-144) was inoperable.

An emergency report was made to the NRC in accordance with 10 CFR 50.72(a)(1)(i).

FCV-144 was disassembled and it was determined that the nut that retains the valve disc to the valve swing arm had disengaged, allowing the valve disc to become separated from the valve swing arm. When the disc separated from the swing arm, it caused a partial blockage of Main Steam Lead 2.

The root cause and corrective actions of this event have not yet been determined. A supplemental LER will be issued to report the root cause and corrective actions.

I. Plant Conditions

Unit 2 was in Mode 1 (Power Operation) at approximately 92 percent power.

II. Description of Event

A. Summary:

On March 22, 1992, at 2143 PST, an Unusual Event (UE) was declared and a manual shutdown was commenced in accordance with Technical Specification (TS) 3.3.4.1, "Turbine Overspeed Protection," when it was determined that one high pressure (HP) turbine stop valve (FCV-144)(SB)(RTV) was inoperable due to a flow restriction.

B. Background:

FCV-144 is a hydraulically-actuated swing check valve provided as part of the turbine overspeed protection system (JJ). FCV-144 protects the HP turbine (SB)(TRB) from overspeed if the associated turbine governor valve (SB)(FCV) downstream of FCV-144 should fail to close when the overspeed trip or the normal trip mechanism operates. Overspeed protection is necessary to preclude turbine rotor failure and associated turbine generated missiles.

TS 3.3.4.1 requires one turbine overspeed protection system to be operable. With one of the HP turbine stop valves inoperable, the valve is required to be returned to operable status within 72 hours or the plant is required to be shut down within 6 hours.

C. Event Description:

On March 22, 1992, at 1240 PST, control room (NA) operators observed a rapid load reduction in power of approximately 10 percent. Investigations were initiated and it was determined that Main Steam Lead 2 had an unidentified flow restriction. An above normal pressure differential was measured across FCV-144, indicating that there was a restriction within the valve.

On March 22, 1992, at 2130 PST, as a result of the investigations, FCV-144 was declared inoperable. A UE was declared at 2143 PST and a manual shutdown to Mode 3 (Hot Shutdown) was commenced.

On March 22, 1992, at 2210 PST, an emergency report was made to the NRC in accordance with 10 CFR 50.72(a)(1)(i).

On March 23, 1992, at 0127 PST, the main steam isolation valves (MSIV)(SB)(V) were closed prior to the unit trip in compliance with TS 3.3.4.1, and the UE was subsequently terminated.

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

None.

E. Dates and Approximate Times for Major Occurrences:

1. March 22, 1992, at 2143 PST: Event/Discovery Date: A UE was declared and a manual shutdown was commenced in accordance with TS 3.3.4.1.

2. March 22, 1992, at 2210 PST: An emergency report was made to the NRC in accordance with 10 CFR 50.72(a)(1)(i).

3. March 23, 1992, at 0136 PST: Unit entered Mode 3. TS 3.3.4.1 exited.

F. Other Systems or Secondary Functions Affected:

None.

G. Method of Discovery:

Control room operators observed a rapid load reduction in power of approximately 10 percent. Investigations were initiated and it was determined that FCV-144 had an unidentified flow restriction.

H. Operators Actions:

Once FCV-144 was determined inoperable, a manual shutdown to Mode 3 was commenced. During the shutdown, the turbine was tripped and the main steam isolation valves were closed prior to separating the generator from the grid. This was done to prevent the possibility of overspeeding the turbine if the turbine governor valve downstream of FCV-144 failed to close.

I. Safety System Responses:

None.

III. Cause of the Event

A. Immediate Cause:

The immediate cause of the event was an unidentified flow restriction in Main Steam Lead number 2. FCV-144 was disassembled and it was determined that the nut that retains the valve disc to the valve swing

arm had disengaged from the disc stem, allowing the valve disc to become separated from the valve swing arm. When the disc separated from the swing arm, it caused a partial blockage of steam flow through Main Steam Lead 2.

B. Root Cause:

The root cause of this event is being investigated. Inspection of the valve parts following disassembly identified no failed components other than the valve nut and disc stem joint. The two postulated modes of failure of this joint are: (1) unscrewing of the nut off the stem; or (2) a failure of the nut/disc stem threaded joint.

(1) Unscrewing of the nut off the stem

The pins that secure the nut from rotation can possibly fall out due to inadequate peening or staking of the retaining nut. Subsequently, unscrewing of the nut from the disc stem could cause separation of the disc from the swing arm. However, investigations do not indicate that FCV-144 failed in this mode.

(2) Failure of the nut/disc stem threaded joint

The physical evidence indicates that the nut was stripped off the disc stem while the pins were still in place. Laboratory testing performed on the failed components, in addition to calculations performed in a "weak link analysis," show that the following two factors likely contributed to the failure of the threaded connection: degraded threads and a higher than usual force acting on the valve disc.

The following scenarios were evaluated to determine the conditions of excessive force.

(i) A combination of excessive clearances and poor thread fit could lead to accelerated thread wear as a result of buffeting of the disc in the steam flow. This wear could significantly reduce the strength of the threaded joint. The buffeting of the disc may have increased if the internal bonnet stop was too high, which may have held the valve disc too close to the steam flow, even though the valve was in its fully open position. Inspection of the internal stop on FCV-144 determined that the valve disc was clearly up out of the steam flow by approximately 1-1/2 inches in the full-open position. However, weakening of the nut/stem connection due to flow-induced buffeting could be a factor in the nut/stem connection failure.

(ii) Improper dash pot adjustment in the hydraulic actuator could cause the hydraulic piston to reach the bottom of its stroke prior to the disc fully seating. Similarly, if there was an obstruction or binding in the hydraulic line of the actuator, the disc could be held up in mid-stream while closing. Under both of these conditions, the disc could be exposed to a full steam differential pressure, which could impart a very large tensile (pull) force on the nut stem threads. This large tensile force might result in stripping of the threaded connection, which may have been weakened either due to buffeting wear or poor manufacturing.

(iii) The valve disc could stick in midstream while closing due to binding of the valve shaft. This could impart an excessive tensile force on the disc nut/stem threads and begin to strip the nut off the stem. Although no physical evidence was specifically identified during the valve disassembly that confirms that the valve shaft binding occurred, the weak link analysis supports this theory. This failure scenario is being investigated further.

The root cause will be determined following additional inspections of the valve and actuator to validate one of the above postulated failure scenarios. These inspections are scheduled to be performed during the Unit 2 fifth refueling outage that started March 5, 1993. A supplemental LER will be issued to report the root cause.

IV. Analysis of the Event

All four HP turbine governor valves were operable during the period that FCV-144 was inoperable. If a turbine overspeed condition had developed, the governor valves would have closed to stop the steam flow to the turbine to mitigate the overspeed condition.

The closing signal to the governor valves would have been provided by one of the following three independent overspeed protection mechanisms:

(1) Overspeed Protection Controller (OPC) at 103 percent overspeed,

(2) Mechanical overspeed trip at 109 percent overspeed, or

(3) Electrical overspeed trip at 111.5 percent overspeed.

Thus, the inoperable HP turbine stop valve did not adversely affect the health and safety of the public.

V. Corrective Actions

A. Immediate Corrective Actions:

1. FCV-144 was disassembled and repaired. The other three HP stop valves on Unit 2 were disassembled and inspected. The nuts on the other three stop valves were either re-peened or verified to meet Westinghouse guidelines.

2. The Unit 1 and Unit 2 stop valves have been stroke tested and are being acoustically monitored to demonstrate their operability.

B. Corrective Actions to Prevent Recurrence:

Corrective actions to prevent recurrence will be determined once the root cause is finalized. They will be submitted in a supplemental LER.

VI. Additional Information

A. Failed Components:

FCV-144, High Pressure Turbine Stop Valve, Manufactured by Westinghouse Electric Corp. Model No. 723-J-119

B. Previous LERs on Similar Problems:

None.