

ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9008280385 DOC. DATE: 90/08/24 NOTARIZED: NO DOCKET #
 FACIL: 50-275 Diablo Canyon Nuclear Power Plant, Unit 1, Pacific Ga 05000275
 AUTH. NAME AUTHOR AFFILIATION
 HUG, M.T. Pacific Gas & Electric Co.
 SHIFFER, J.D. Pacific Gas & Electric Co.
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 90-010-00: on 900726, control room post-LOCA habitability design basis potentially exceeded due to leakage.

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

NOTES:

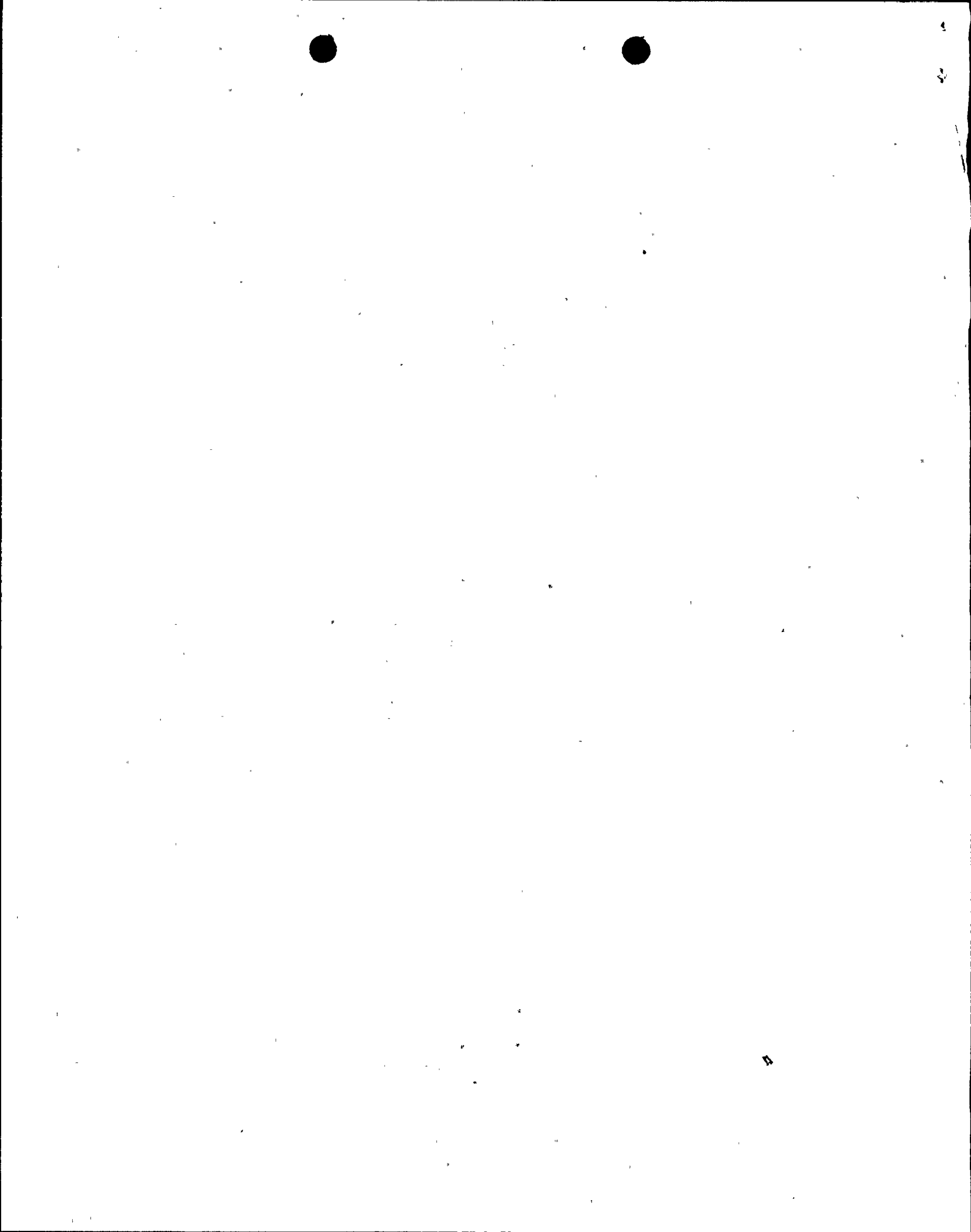
	RECIPIENT ID CODE/NAME	COPIES LTR ENCL	RECIPIENT ID CODE/NAME	COPIES LTR ENCL
	PD5 LA	1 1	PD5 PD	1 1
	ROOD, H	1 1		
INTERNAL:	ACNW	2 2	ACRS	2 2
	AEOD/DOA	1 1	AEOD/DSP/TPAB	1 1
	AEOD/ROAB/DSP	2 2	NRR/DET/ECMB 9H	1 1
	NRR/DET/EMEB9H3	1 1	NRR/DLPQ/LHFB11	1 1
	NRR/DLPQ/LPEB10	1 1	NRR/DOEA/OEAB11	1 1
	NRR/DREP/PRPB11	2 2	NRR/DST/SELB 8D	1 1
	NRR/DST/SICB 7E	1 1	NRR/DST/SPLB8D1	1 1
	NRR/DST/SRXB 8E	1 1	<u>REG FILE</u> 02	1 1
	RES/DSIR/EIB	1 1	RGN5 FILE 01	1 1
EXTERNAL:	EG&G BRYCE, J.H	3 3	L ST LOBBY WARD	1 1
	LPDR	1 1	NRC PDR	1 1
	NSIC MAYS, G	1 1	NSIC MURPHY, G.A	1 1
	NUDOCS FULL TXT	1 1		

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM P1-37 (EXT. 20079) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

FULL TEXT CONVERSION REQUIRED
 TOTAL NUMBER OF COPIES REQUIRED: LTR 34 ENCL 34

R I D S / A D S



Pacific Gas and Electric Company

77 Beale Street
San Francisco, CA 94106
415/973-4684
TWX 910-372-6587

James D. Shiffer
Senior Vice President and
General Manager
Nuclear Power Generation

August 24, 1990

PG&E Letter No. DCL-90-216



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 1-90-010
Control Room Post-LOCA Habitability Design Basis Potentially
Exceeded Due to Leakage Through a Vibration Induced Crack in
CVCS Piping

Gentlemen:

PG&E is submitting the enclosed Licensee Event Report (LER)
regarding the control room post-LOCA habitability design basis
potentially being exceeded due to leakage through a vibration
induced crack in the CVCS piping.

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

Kindly acknowledge receipt of this material on the enclosed copy of
this letter and return it in the enclosed addressed envelope.

Sincerely,

A handwritten signature in cursive script, appearing to read 'J. D. Shiffer'. The signature is written in dark ink on a white background.

J. D. Shiffer

cc: A. P. Hodgdon
J. B. Martin
P. J. Morrill
P. P. Narbut
H. Rood
CPUC
Diablo Distribution
INPO

Enclosure

DC1-90-MM-N051

3310S/0085K/JHA/2246

00000

9008280385 900824
PDR ADOCK 05000275
S PDC

IE22
11



LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) DIABLO CANYON UNIT 1	DOCKET NUMBER (2) 0151010101 21 71 5	PAGE (3) 11 of 1018
--------------------------------------------------	------------------------------------------------	-------------------------------

TITLE (4) **CONTROL ROOM POST-LOCA HABITABILITY DESIGN BASIS POTENTIALLY EXCEEDED DUE TO LEAKAGE THROUGH A VIBRATION INDUCED CRACK IN POTENTIALLY CVCS PIPING**

EVENT DATA (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES			DOCKET NUMBER (5)
07	26	90	90	010	010	08	24	90				0151010101 1 1
												0151010101 1 1

OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR : (11)	
POWER LEVEL (10) 1,0, 0	X 10 CFR 50.73(a)(2)(i)(B) OTHER (Specify in Abstract below and in text, NRC Form 366A)	

LICENSEE CONTACT FOR THIS LER (12)

MARTIN T. HUG, SENIOR REGULATORY COMPLIANCE ENGINEER	TELEPHONE NUMBER AREA CODE: 805 NUMBER: 595-4005
-------------------------------------------------------------	-------------------------------------------------------------------

COMPLETE ONE LINE FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC

SUPPLEMENTAL REPORT EXPECTED (14)

YES (if yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
-------------------------------------------------	----------------------------------------	-------------------------------	-------	-----	------

ABSTRACT (16)

On July 31, 1990, it was determined that Unit 1 could have potentially operated outside the control room habitability design basis for a post-LOCA recirculation condition due to leakage through a crack in the Unit 1 positive displacement charging pump (PDP) suction piping elbow. A one hour non-emergency report was made to the NRC at 1245 PDT on July 31, 1990, in accordance with 10 CFR 50.72(b)(1)(B).

The crack, which was discovered on July 26, 1990, was observed to be weeping a small amount of water which evaporated immediately. As a compensatory measure, Emergency Procedure E-1.3, "Transfer to Cold Leg Recirculation", was revised on July 28, 1990 to verify that the Auxiliary Building Safeguards Air Filtration system is in the "Safeguards Only" mode during post-LOCA conditions. In this mode, leakage from the PDP room would be filtered prior to its release.

The cause of the crack is considered to be vibration induced high cycle fatigue. The crack was repaired by an ASME Section XI weld repair. Vibration data will be collected and evaluated. Based on the results of the evaluation, an action plan will be developed to address any recommended modifications.



FACILITY NAME (1) DIABLO CANYON UNIT 1	DOCKET NUMBER (2) 0500027590	LER NUMBER (8)			PAGE (3)	
		YEAR 90	SEQUENTIAL NUMBER 010	REVISION NUMBER 00	02	OF 08

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

I. Plant Conditions

Unit 1 was in Mode 1 (Power Operation) at 100 percent power.

II. Description of Event

A. Event:

On July 26, 1990, an NRC Resident Inspector identified a through wall crack on a 4 inch diameter suction piping elbow (CB)(PSF), upstream of the suction stabilizer, on Unit 1 chemical and volume control system (CVCS)(CB) positive displacement pump 1-3 (PDP)(CB)(P). The crack was observed to be weeping a small amount of water, which evaporated immediately upon exposure to air. A preliminary non-destructive visual examination of the crack determined that the crack was 1-5/8 inches long.

The crack was in an unisolable section of the common suction header of the PDP and the centrifugal charging pumps (CCP)(CB)(P). The crack was located at the toe of the weld which attaches a 3/4 inch half coupling to the side of a 4 inch elbow. The 3/4 inch connection is a test pressure instrument tap. The subject elbow is schedule 10S ASTM A403 Grade WP304 stainless steel. The crack extended into the base metal of the elbow.

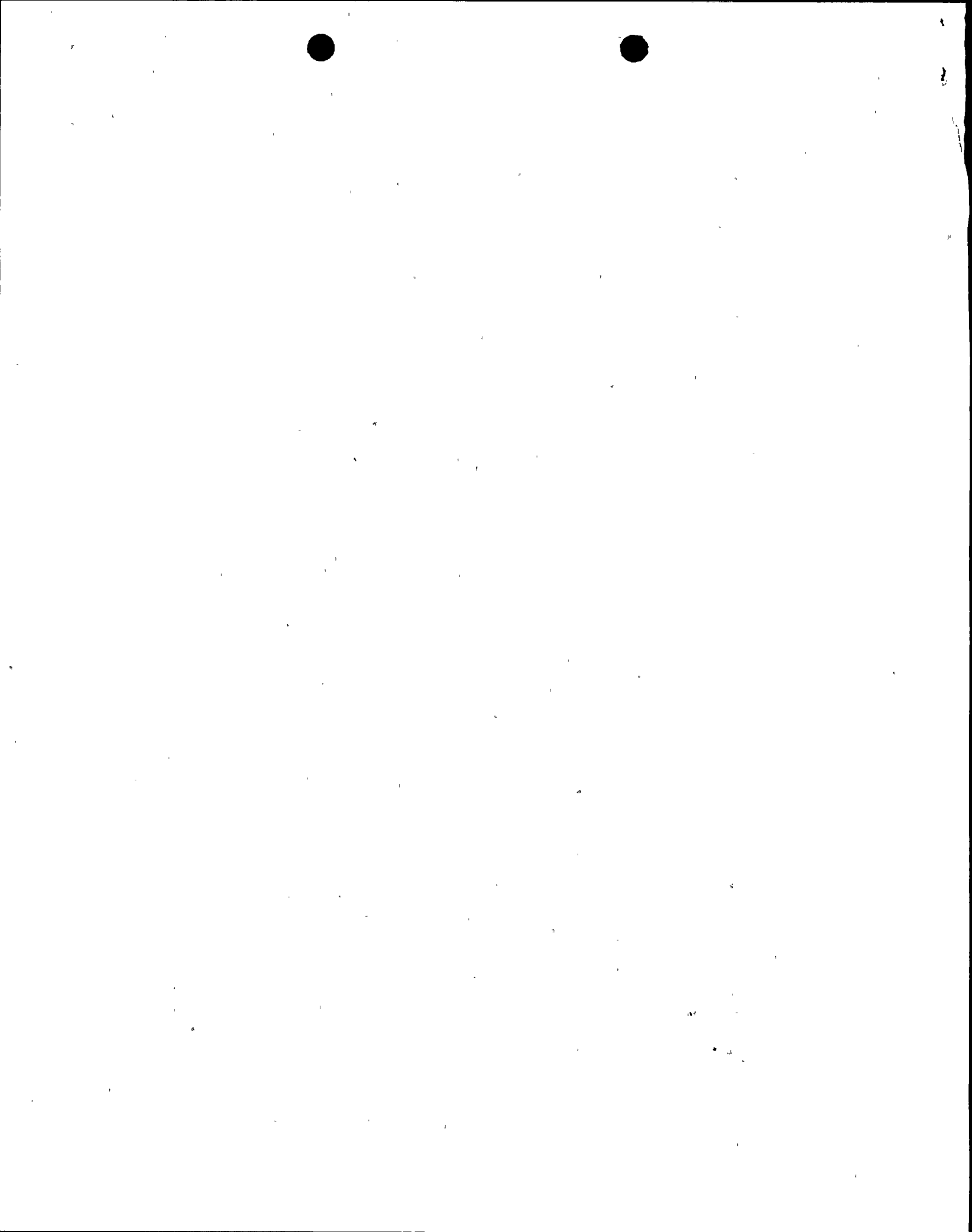
On July 26, 1990, the Unit 1 PDP was declared inoperable and PG&E contacted the NRC to inform them of the Unit 1 condition.

On July 27, 1990, an ultrasonic (UT) examination of the crack was performed. A crack length of approximately 2-1/2 inches was determined by 25 percent distance amplitude correction (DAC) end points. An additional visual examination was also performed with a 10 power magnifying glass, which confirmed the UT examination results.

On July 27, 1990 a visual inspection of the piping in the immediate area was performed and no additional leaks were identified.

On July 28, 1990, an engineering evaluation was performed which concluded that, under the conditions assumed in the accident analysis, the control room doses due to leakage from the crack may exceed 10 CFR 50, Appendix A limits if the auxiliary building ventilation system was not in the Safeguards Only mode. Therefore, as a compensatory measure, emergency procedure (EP) E-1.3, "Transfer to Cold Leg Recirculation", was revised on July 28, 1990 to include a step that ensures the auxiliary building Safeguards Air Filtration System is in the Safeguards Only mode with an "S" signal during post-LOCA conditions. With the ventilation system in the Safeguards Only mode, all leakage from the PDP room in the auxiliary building would be filtered through charcoal and HEPA filters prior to release.

3310S/0085K



LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) DIABLO CANYON UNIT 1	DOCKET NUMBER (2) 0 5 0 0 0 2 7 5	LER NUMBER (3)			PAGE (2)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		9 0	0 1 0	0 0	0 3	0 8

TEXT (If more space is required, use additional NRC Form 368A's) (17)

An evaluation of the location and orientation of the crack determined that the crack was stable and would not propagate. Based on the crack stability, a projected post-LOCA leak rate was calculated (see Section IV, Analysis).

On July 29, 1990, JCO 90-15 was presented to the PSRC for review and concurrence. The PSRC approved continued operation of Unit 1 with the identified crack until a repair could be made to the weld. On July 30, 1990, this JCO was transmitted to the NRC at their request.

On July 31, 1990, a Technical Review Group (TRG) meeting determined that the leakage from the PDP room area was unfiltered from the time the crack occurred until the revision to EP E-1.3 was issued. The TRG concluded that Unit 1 had been outside the design basis for control room habitability during this period due to the potential for unfiltered post-LOCA release of radioactivity from the auxiliary building. Therefore, a 1 hour non-emergency report in accordance with 10 CFR 50.72(b)(ii)(B) was made at 1245 PDT.

The PDP has been operated intermittently since initial Unit 1 startup. Precise identification of when the crack occurred is not possible. Therefore, the event date is assumed to be the date of discovery of the leak.

An ASME Section XI weld repair was completed on August 1, 1990. Post-weld testing was successfully completed on August 2, 1990 and the PDP charging train was declared operable on August 3, 1990. A comprehensive program for inspection of all piping potentially affected by PDP-induced vibration was implemented. No additional nonconforming conditions have been identified.

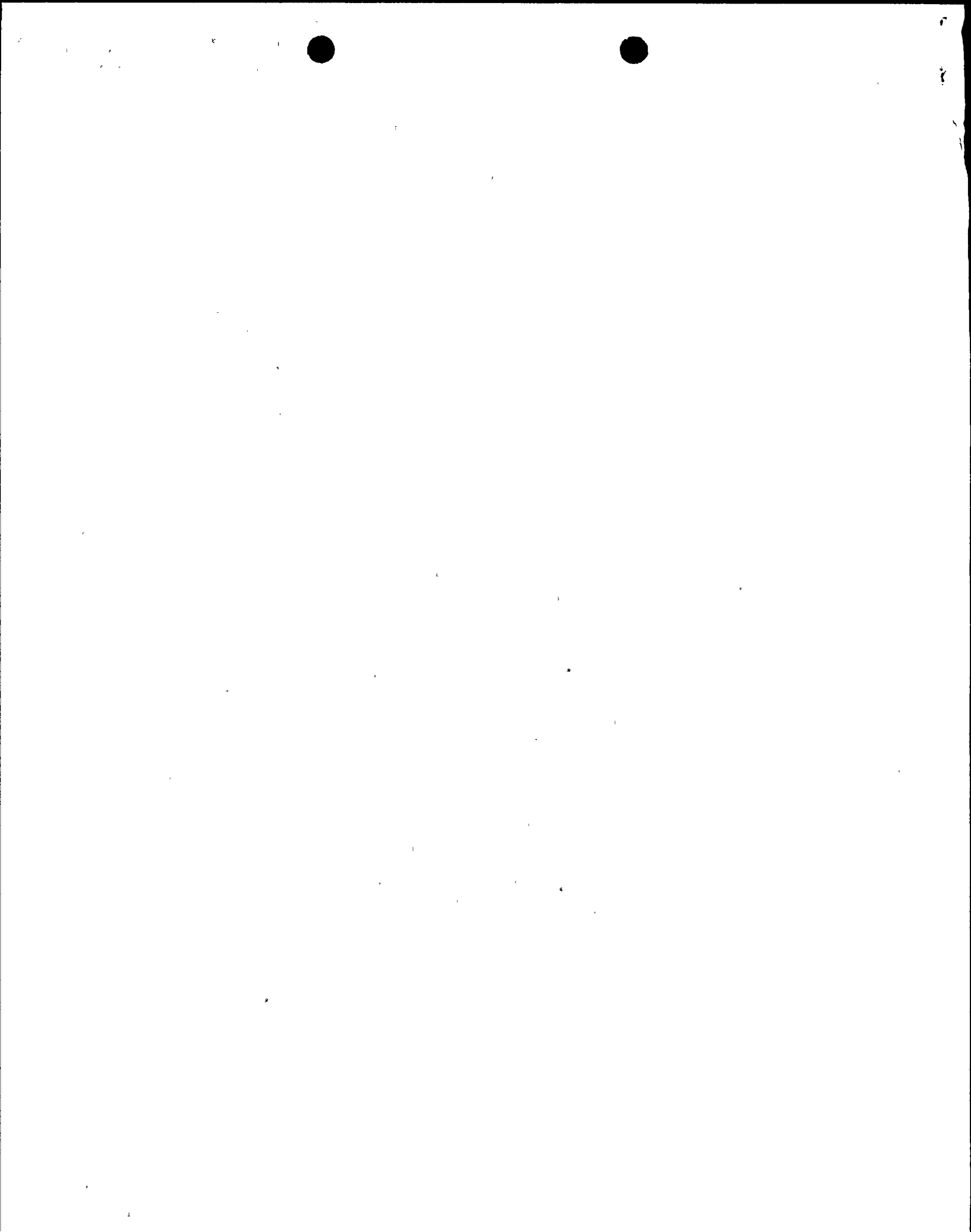
B. Inoperable Structures, Components, or Systems that Contributed to the Event:

None.

C. Dates and Approximate Times for Major Occurrences.

1. July 26, 1990, 1100 PDT: Discovery/event date. Boric acid crystals and moisture were observed near valve CVCS-1-52.
2. July 26, 1990, 1400 PDT: ISI inspects and maps crack.
3. July 26, 1990, 1900 PDT: PDP 1-3 declared inoperable.

3310S/0085K



LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) DIABLO CANYON UNIT 1	DOCKET NUMBER (2) 0 5 0 0 0 2 7 5 9 0	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		0	010	00	04	OF 08

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

4. July 26, 1990, 2130 PDT: PG&E notified the NRC of the Unit 1 condition.
5. July 28, 1990: EP E-1.3 was revised to ensure that auxiliary building ventilation is in Safeguards Only mode during post-LOCA conditions.
6. July 29, 1990: JCO 90-15 is approved by the PSRC for continued operation of Unit 1, pending completion of repairs.
7. July 31, 1990, 1245 PDT: Following determination that the event was reportable, a 1-hour non-emergency report was made in accordance with 10 CFR 50.72(b)(11)(B).
8. August 3, 1990: PDP 1-3 was declared operable following completion of the weld repair.

D. Other Systems or Secondary Functions Affected:

None.

E. Method of Discovery:

On July 26, 1990, an NRC Resident Inspector discovered boric acid crystals and moisture on the surface of Unit 1 CVCS line 44 near valve CVCS-1-52 during a planned visual inspection of the Unit 1 PDP piping.

F. Operator Actions:

None.

G. Safety System Responses:

None.

III. Cause of the Event

A. Immediate Cause:

Leakage from the CVCS system resulted from a crack in the PDP suction piping.

3310S/0085K



FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (3)				PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		0	010	00			

DIABLO CANYON UNIT 1

0 5 0 0 0 2 7 5 9 0 0 1 0 0 0 0 5 OF 0 8

TEXT (If more space is required, use additional NRC Form 366A's) (17)

B. Root Cause:

High cycle fatigue is considered to be the cause of the crack. This is based on the location of the crack, its geometry, and the past operation of the PDP which induces vibration.

Intergranular stress corrosion cracking (IGSCC) was determined to not be a cause. If the crack was the result of IGSCC, the crack would be expected to follow a path consistent with the heat affected zone of the weld. This would correspond to a circumferential crack around the toe of the weld. However, the existing crack initiated at the toe of the weld and extended in both directions into the base metal tangential to the circumference of the weld in the 190 degree to 265 degree area.

C. Contributory Cause:

The test pressure instrument tap was cantilevered perpendicular to the piping elbow without sufficient restraining support. This configuration contributed to the high-cycle fatigue failure because the tap was excited by the hydraulic and mechanical pulsations of the PDP.

IV. Analysis of the Event

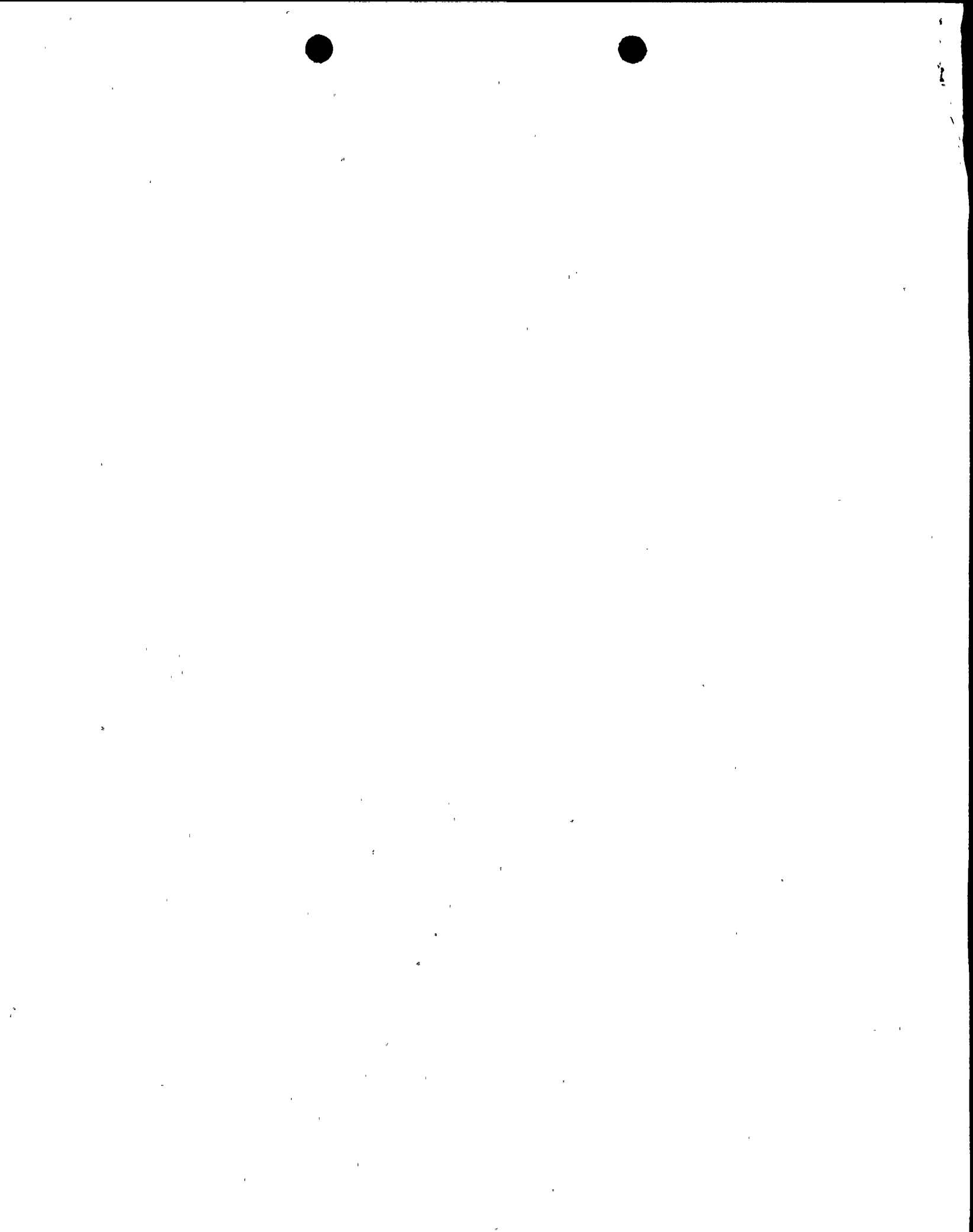
The crack was in an unisolable section of the common suction header of the PDP and the CCPs. The crack was evaluated for its affect on the operability of the PDP and the CCPs.

The CCPs were considered to be operable throughout this event because the technical specification leak rate limit of 10 gpm for identified leakage was not exceeded.

The PDP is not a technical specification component. However, to meet 10 CFR 50 Appendix R requirements, the FSAR Update takes credit for the PDP as one of the alternative and dedicated shutdown capabilities and as being capable of maintaining the reactor coolant level within the level indication in the pressurizer. There is no fire barrier between the two CCPs; hence, the PDP provides shutdown capabilities should a fire occur in the CCP room. As a result of the crack, administrative controls to limit operation of the PDP were established. These controls included not operating the PDP during normal plant operation to minimize potential damage to the pipe. The PDP was and will be maintained operable and can be used to meet the 10 CFR 50 Appendix R requirements.

The leak rate through the crack, assuming post-LOCA recirculation conditions, was calculated to be approximately 0.37 gpm. The leak rate for other identified auxiliary building leakage during post-LOCA condition was calculated in accordance with STP M-87, "Operational Leakage Inventory of Systems Outside Containment that are Part of the ECCS Post-LOCA Recirculation Flow Path," and determined to be 0.01 gpm. Therefore, the total post-LOCA recirculation equivalent unfiltered leakage is calculated to be 0.38 gpm.

3310S/0085K



FACILITY NAME (1) DIABLO CANYON UNIT 1	DOCKET NUMBER (2) 0500027590	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		90	010	00	06	08

TEXT (If more space is required, use additional NRC Form 308A's) (17)

The maximum allowable leak rates for the limiting post-LOCA dose consequences have been calculated as follows:

- Case 1. 0.94 gpm for filtered leakage with control room operator dose (10 CFR 50) being limiting.
- Case 2. 0.10 gpm for unfiltered leakage with control room operator dose (10 CFR 50) being limiting.
- Case 3. 0.38 gpm for unfiltered leakage with Site boundary dose (10 CFR 100) being limiting.

Case 1. Filtered Leakage Path:

Emergency Procedure E-1.3 was revised on July 28, 1990 to include a step that verifies the Auxiliary Building Safeguards Air Filtration System is in the Safeguards Only mode with an "S" signal during post-LOCA conditions. With the ventilation system in this mode, all post-LOCA leakage from the PDP room in the auxiliary building would be filtered through charcoal and HEPA filters prior to release. Since the calculated leak rate of 0.38 gpm is less than the maximum allowable leak rate of 0.94 gpm, continued operation of Unit 1 was justified until the crack was repaired.

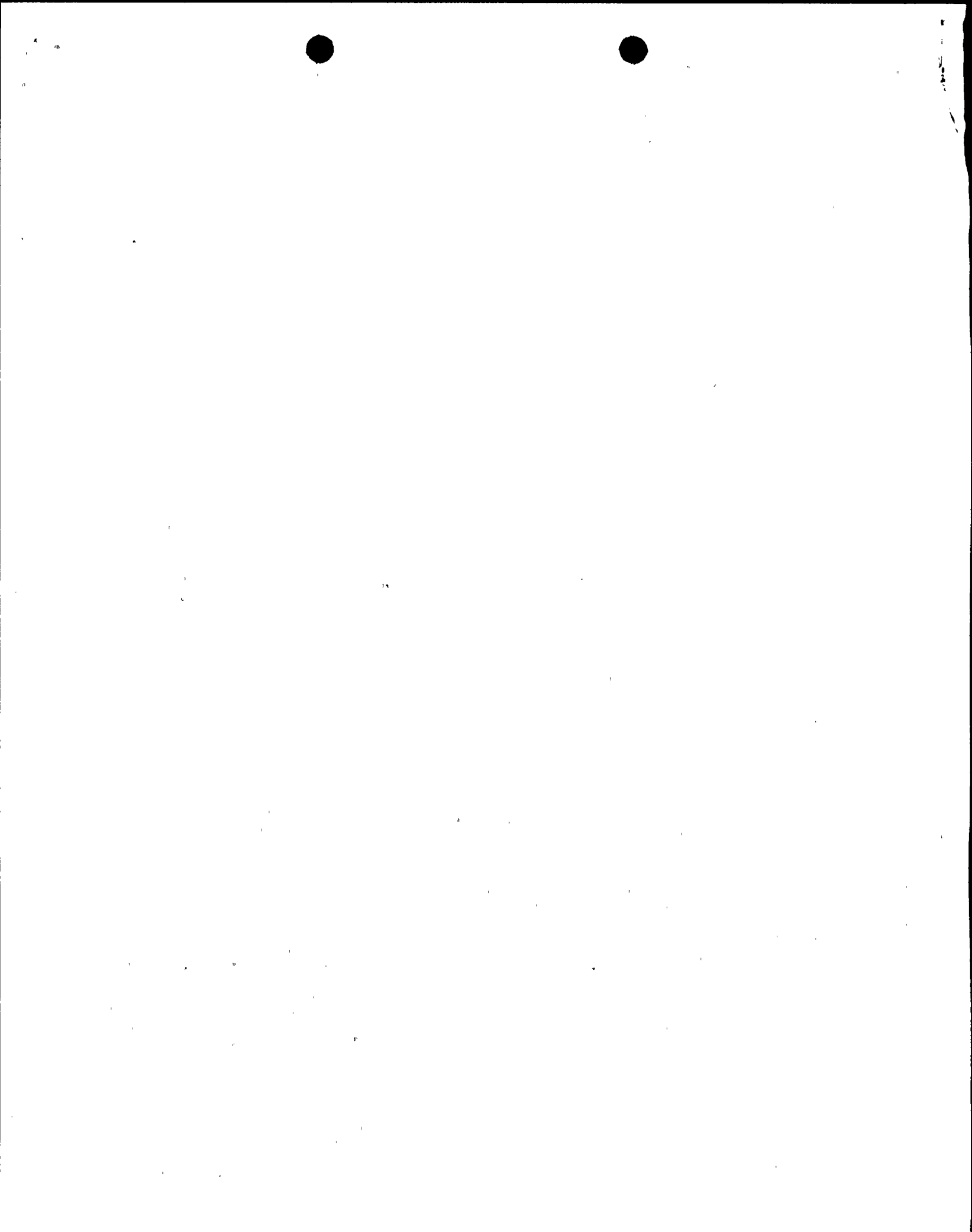
Cases 2 and 3. Unfiltered Leakage Path:

From the time the crack occurred until July 28, 1990, post-LOCA leakage from the PDP room would have been unfiltered, requiring analysis of two dose limits.

- The total post-LOCA recirculation loop leak rate of 0.38 gpm would have exceeded the 0.10 gpm maximum allowable leak rate for the control room operator dose. Had a LOCA occurred, the area and plant vent radiation alarms would have alerted operators to utilize the available self-contained breathing apparatus, thus preventing receipt of an unacceptable dose.
- The 0.38 gpm total post-LOCA recirculation loop leak rate would not have exceeded the 0.38 gpm maximum allowable leak rate for the Site boundary dose limit.

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

3310S/0085K



LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

E (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
3LO CANYON UNIT 1	0 5 0 0 0 2 7 5 9 0	0 1 0	0 0	0 7	OF 0 8	

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

RY COM
3150-01
PAGE (3)
OF 0

Corrective Actions

A. Immediate Corrective Actions:

1. Emergency Procedure E-1.3 has been revised to include a step to ensure the Auxiliary Building ventilation system is in the Safeguards Only mode with an "S" signal during post-LOCA conditions.
2. A Shift Order was issued on July 27, 1990 to provide the following compensatory measures until a weld repair was completed on August 3, 1990.
 - a. Continue the periodic surveillance on the crack in the PDP suction line.
 - b. Establish an hourly fire watch in the CCP rooms to verify that doors between the CCP and PDP rooms are closed.
 - c. Maintain operable the smoke detection equipment in the CCP and PDP rooms.
 - d. Maintain operable the automatic wet pipe sprinkler protection in the CCP and PDP rooms.
 - e. Maintain operable the manual fire fighting equipment in the CCP and PDP rooms area.
 - f. Restrict any maintenance activities in the CCP rooms which would have the potential to cause a fire.
3. An additional Shift Order was issued to maintain the PDP under an administrative tagout to the Shift Foreman and specified that the PDP not be used unless there are no other pumps available and the PDP is required to safely shut down the Unit.

B. Corrective Actions to Prevent Recurrence:

1. The crack in the suction header piping of the Unit 1 PDP was permanently repaired using an ASME Section XI weld repair.
2. Additional supports are being added to the Units 1 and 2 PDP piping. To determine if further modifications are necessary, a vibration analysis will be performed consisting of the following steps:

