



UNITED STATES  
ATOMIC ENERGY COMMISSION  
WASHINGTON, D.C. 20545

DNB

RECEIVED  
AUG 11 1972  
LAW DEPARTMENT

August 8, 1972

Docket No. 50-206

Southern California Edison Company  
ATTN: Mr. Jack B. Moore, Vice President  
2244 Walnut Grove Avenue  
P. O. Box 800  
Rosemead, California 91770

Gentlemen:

FLOODING OF CRITICAL EQUIPMENT

A failure of an expansion bellows in the circulating water line which serves the main condenser recently occurred at Quad-Cities Unit 1. The resultant flooding caused degradation of some of the engineered safety features. Interim corrective action has been taken and more permanent corrective measures are planned at Quad-Cities 1 and 2 to prevent recurrence. A copy of the abnormal occurrence report filed by Commonwealth Edison for this event is enclosed.

You are requested to review your facilities to determine (1) whether failure of any equipment which does not meet the criteria of Class I seismic construction, particularly the circulating water system, could cause flooding sufficient to adversely affect the performance of engineered safety systems, and (2) whether failure of any equipment could cause flooding such that common mode failure of redundant safety related equipment would result. The integrity of barriers to protect critical equipment from flood waters should be assumed only when the barrier meets the seismic requirements for Class I structures. If your review determines that engineered safety features could be so affected, provide your plans and schedule for corrective action together with the justification for continued operation of your facility pending completion of the corrective action.

ATTORNEY GENERAL'S OFFICE

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Southern California Edison Company - 2 -

August 8, 1972

The results of your review are requested within sixty days. This information should be provided with one signed original and thirty-nine additional copies.

Sincerely,

*for Dennis L. Zeman*  
Donald J. Skovholt  
Assistant Director  
for Operating Reactors  
Directorate of Licensing

Enclosure:  
CE ltr dtd 6/17/72

cc: Rollin F. Woodbury, Vice President  
and General Counsel  
Southern California Edison Company  
P. O. Box 800  
Rosemead, California 91770

Chickering & Gregory, General Counsel  
ATTN: C. Hayden Ames, Esquire  
San Diego Gas & Electric Company  
111 Sutter Street  
San Francisco, California 94104

FAP-72-110

June 17, 1972

Mr. Edward J. Bloch, Acting Director  
Directorate of Licensing  
U. S. Atomic Energy Commission  
Washington, D. C. 20545

Reference: License DRP-20 - Quad Cities Nuclear Power  
Station Unit 1 - Appendix A  
Section 6.6.A.3 and 6.6.B.3

Dear Mr. Bloch:

The purpose of this letter is to inform you of an abnormal occurrence on Unit 1 at Quad Cities Nuclear Power Station June 9, 1972, at 5:05 p.m. This occurrence was reported by telegram on June 10, 1972.

DESCRIPTION OF INCIDENT

Due to problems experienced with the main condenser flow reversing valves drifting out of position, a modification was approved to provide for mechanical blocking of these valves. On June 9, 1972 the condenser circulating water flow was to be reversed in order to move all 8 valves to the opposite position to complete the modification. After the pins had been removed from some of the valves it became necessary to start the hydraulic unit in order to move the valves which had drifted against several of the pins preventing their removal. The hydraulic system had recently been filled with clean oil, however, and thus required venting of the headers to remove entrapped air. As this air was being vented by loosening a hydraulic fitting, one of the 10 foot butterfly valves on the northeast water box slammed closed. Three circulating water pumps were in operation at the time with flow in the North direction. The shock from this rapid closure caused a rupture of the rubber expansion joint located about 16 feet above the valve at the bottom water box connection. River water from the circulating water system began flooding the condensate pump room in the Turbine Building basement (El. 547'). The basement eventually filled to a depth of 15 feet, 6 inches (El. 562'6")

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IMMEDIATE CORRECTIVE ACTION

The men working in the condensate pump room evacuated the area and reported the situation to the control room. The operator immediately shutdown all circulating water pumps which automatically closes the pump discharge valves. The supply breakers on all major electrical equipment in the area were racked out of service within about 6 minutes of the start of flooding. The Unit 1 circulating water discharge head works gates were also closed and the ice melting gate was opened to prevent backflow to the condenser and lower the discharge pool level.

Representative samples were taken of the water in the basement prior to and during the pump out and the activity was found to be typical of river background. Temporary pumps and hoses were set up within a few hours. One pump was lined up to skim the oil film from the surface and discharge to the oil separator. The remaining pumps discharged directly to the canal just below the weir and upstream of the composite canal sampler. Samples were also taken at least hourly throughout the discharge period. The station standard laboratory procedures were used to count these samples. The results are shown in Table 1. These samples confirmed that the activity level remained at the river background level and well below the maximum allowable Technical Specification limit for concentration in the discharge canal.

DAMAGE ASSESSMENT AND REPAIR STATUS

The following equipment was damaged as a result of the occurrence:

- 4 RHRS Service Water Pumps
- 2 Diesel-Generator Cooling Water Pumps (#1 and 1/2)
- 4 Condensate - Condensate Booster Pumps
- 3 Condensate Transfer Pumps
- Seismic Detector
- 4 Equipment and Floor Drain Sump Pumps
- Hypochlorite System Analyzer and Sample Pump
- Circulating water valve hydraulic power unit.

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The 1/2 diesel, one condensate transfer pump, and seismic detector were returned to service prior to the Unit 2 startup on June 12, 1972. Instrumentation subjected to the flooding consists primarily of condensate system pressure gauges and transmitters. These instruments are being cleaned and re-calibrated. All electrical motors, with the exception of one RHR service water pump were removed for drying and should be re-installed by June 16, 1972. The motors are being mugged in the shop and again following installation of power cables. Operational testing and control checks will be completed prior to startup. Flow rate tests will also be conducted on the RHR service water pumps. The estimated date for completion of repairs and testing is June 17, 1972.

One RHR service water pump motor requires re-winding. Wiring for the motor is being flown in from Schenectady, New York to the General Electric Company Service Shop in Chicago, where the coils will be wound. Installation in the motor will then be performed at the General Electric shop in the Quad-Cities. All work is proceeding on a 24 hour a day basis and it is estimated that this service water pump will be tested and returned to service on June 19, 1972.

#### EVALUATION OF OCCURRENCE AND CORRECTIVE ACTION

At the time of the occurrence the Unit 1 reactor was in the hot shutdown mode at 50 psig and 281°F. The reactor was in the eighth day of a planned maintenance outage. The Residual Heat Removal System (RHR) was not required for decay heat and was not in service.

The Unit 2 reactor was in the startup mode at 22 Mwt holding 250 psig with a search for condenser air leakage in progress. Immediately following the occurrence all control rods were inserted.

Safety related systems rendered inoperable by the flooding consisted of the Nos. 1 and 1/2 diesel generator and the Unit 1 containment cooling mode of the RHR System.

The occurrence was discussed with Messrs. D. Honeycutt and D. Boyd of Perion III Compliance at the station on June 10, 1972. The sample records were reviewed along with the immediate and planned corrective action. It was concluded that no uncontrolled release of radioactivity was made to the environment as a result of the occurrence.



Corrective action being taken to prevent a repetition of the occurrence includes a new maintenance procedure for venting the circulating water valve hydraulic system. This procedure requires that all butterfly valves will have their lock pins in place prior to venting. Another new procedure has been written to prescribe operator action required during flooding of the condensate pump room. The response to the occurrence by operators on shift without any procedure was deemed excellent by station management.

The interim corrective measures to be performed prior to Unit 1 startup are as follows:

1. The door to the condenser hotwell area will be sealed and made water tight.
2. Two 4' x 4' ventilation opening that connect the area under the condenser with the condensate pump room will be sealed off with steel plate.
3. A level alarm will be installed under the condenser that will annunciate in the control room.

The two drain sumps located in the condensate pump room already contain high high alarms which indicate abnormal water level in this room. These two alarms annunciate in the control room. These interim corrective measures are also being installed on Unit 2 since it was shutdown for a scheduled outage on June 15, 1972. This work will be completed prior to the Unit 2 startup on June 17, 1972.

The final corrective measures to be performed during our next scheduled outage on each unit are as follows:

1. Replace the existing sealed door with a water tight bulkhead door.
2. Extend the ventilation openings to a level that would preclude flooding.
3. Install two alarms at different levels to indicate flooding under the condenser.

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4. Install a very high level trip for the circulating water pumps, under the condenser.
5. Investigate and install if feasible a steel guard bellows around each of the four existing rubber expansion joint bellows.
6. One additional alarm will be installed in the condensate pump room as a back up to the existing sump pump alarms. This alarm will also annunciate in the control room.

Items 1 and 2 above will meet Class I seismic criteria. Items 3 and 4 will meet the IEEE-279 criteria.

The Station Review Board reviewed this occurrence and approved startup of each unit based on the interim and final measures described above. Due to the unusual nature of this occurrence, the Station Review Board requested the Nuclear Review Board (NRB) to review the occurrence and the corrective measures. The NRB reviewed this occurrence on June 16 & 17, 1972 and concurred with the SRB action.

A final report on this occurrence will be submitted within 30 days.

Very truly yours,

COMMONWEALTH EDISON COMPANY  
Quad Cities Nuclear Power Station



F. A. Palmer  
Superintendent

FAP/zm

TABLE I

<u>Sample Date Time</u>	<u>Beta Activity uci/ml</u>	<u>Alpha Activity uci/ml</u>	<u>Change in Water Level</u>
1. 6/9 1750	$5.0 \times 10^{-8}$	$2.5 \times 10^{-9}$	0 ft.
2. 6/9 1750	$< 1.3 \times 10^{-10}$	$1.3 \times 10^{-9}$	0
3. 6/9 1750	$2.2 \times 10^{-8}$	$2.5 \times 10^{-9}$	0
4. 6/9 1750	$1.8 \times 10^{-8}$	$2.5 \times 10^{-9}$	0
5. 6/9 1750	$3.0 \times 10^{-8}$	$5.0 \times 10^{-9}$	0
6. 6/9 1750	$4.0 \times 10^{-8}$	$1.3 \times 10^{-9}$	0
7. 6/10 0030	$1.1 \times 10^{-8}$	$2.5 \times 10^{-9}$	1
8. 6/10 0115	$2.3 \times 10^{-8}$	$< 1.3 \times 10^{-9}$	1.5
9. 6/10 0215	$3.3 \times 10^{-8}$	$2.5 \times 10^{-9}$	2.5
10. 6/10 0315	$3.8 \times 10^{-8}$	$3.7 \times 10^{-9}$	3.5
11. 6/10 0415	$2.5 \times 10^{-8}$	$3.7 \times 10^{-9}$	4.5
12. 6/10 0540	$4.0 \times 10^{-8}$	$6.3 \times 10^{-9}$	5.5
13. 6/10 0640	$2.1 \times 10^{-8}$	$3.7 \times 10^{-9}$	7.5
14. 6/10 0720	$6.3 \times 10^{-8}$	$1.3 \times 10^{-9}$	9.5
15. 6/10 0840	$1.8 \times 10^{-8}$	$< 1.3 \times 10^{-9}$	11.5
16. 6/10 0930	$1.1 \times 10^{-8}$	$< 1.3 \times 10^{-9}$	13.75
17. 6/10 1030	$4.2 \times 10^{-8}$	$< 1.3 \times 10^{-9}$	14.75
Composite over entire discharge period	$4.8 \times 10^{-8}$ $4.4 \times 10^{-8}$	$1.9 \times 10^{-9}$ $1.9 \times 10^{-9}$	<hr/> <hr/>

NOTE: All gamma scans showed no significant photo peaks.

24 HOUR RIVER COMPOSITE SAMPLES

<u>Sample</u>	<u>Date</u>	<u>Beta uci/ml</u>	<u>Alpha uci/ml</u>
Inlet	6/9-6/10	$8.1 \times 10^{-9}$	$2.5 \times 10^{-9}$
Outlet	6/9-6/10	$1.3 \times 10^{-8}$	$1.25 \times 10^{-9}$
Inlet	6/10-6/11	$3.4 \times 10^{-8}$	$3.1 \times 10^{-9}$
Outlet	6/10-6/11	$2.8 \times 10^{-8}$	$1.9 \times 10^{-9}$

RADIATION SURVEY (Log Book Entry)

Date: 6/10      Time: 1140      Location: Turb. Bldg. 547'

RESULTS: < 1 mr/hr @ surface  
< 100 cpm/ft<sup>2</sup> smearable