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MEMORANDUM FOR: Karl R. Goller, Assistant Director for Operating Reactors, DOR

FROM: Darrell G. Eisenhut, Assistant Director for Operational Technology, DOR

SUBJECT: LIQUID RADWASTE TREATMENT SYSTEM SEISMIC DESIGN (TAR NO. 3675, ORB-4-51) HUMBOLDT BAY UNIT 3

PLANT NAME: Humboldt Bay Unit 3
DOCKET NUMBER: 50-~~313~~ /33
RESPONSIBLE BRANCH: ORB-4
PROJECT MANAGER: Chris Nelson
REQUEST RECEIVED IN EEB: May 21, 1976
REQUESTED COMPLETION DATE: July 30, 1976
REVIEW STATUS: EEB - Complete

REFERENCE: Liquid Radwaste System Analysis for Pacific Gas and Electric Company, Humboldt Bay Power Plant Unit 3, dated February 1976.

By letter dated April 26, 1976, Pacific Gas and Electric Company (PG&E) submitted the report referenced above. In the report, PG&E described possible results of a postulated seismic induced failure of the Humboldt Bay Power Plant Unit 3 (HBPP-3) radwaste facility. The radwaste facility is comprised of the liquid radwaste treatment system and the radwaste building which houses the system. The report was submitted, for our review and approval, to justify PG&E's decision not to designate the radwaste facility Seismic Category I.

We have completed our review and evaluation of the reference cited above. We agree with the report that the resultant exposures from a postulated seismic induced failure of the HBPP-3 radwaste facility are not significant. The possible consequences of the postulated seismic failure of all tanks result in exposures which are very small fractions of the guidelines of 10 CFR Part 100. Radionuclide concentrations in any drinking water supply would be significantly less than those specified in 10 CFR Part 20 for unrestricted areas.

We conclude, because the HBPP-3 radwaste treatment system serves no safety function and because present licensing practice does not require the radwaste facility to be designated Seismic Category I, that the HBPP-3 radwaste facility does not have to be Seismic Category I.

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Present licensing practice requires a new radwaste facility to conform to the minimum seismic requirements in Branch Technical Position (BTP) ETSB No. 11-1 (rev. 1). The seismic design of the present radwaste facility does not meet the minimum seismic requirements in this BTP.

We conclude, however, that the present seismic design of the radwaste facility is acceptable. Our conclusion is based on the small magnitude of the possible consequences of a postulated seismic induced failure of the radwaste facility. We recommend that PG&E consider adding curbs within the radwaste building to a height sufficient to contain the entire liquid inventory within the building. The curbs would retain all spilled radwaste liquid within the building should a seismic event, or any other incident, cause a failure of a liquid systems component, e.g., a tank or a pipe, without major structural damage to the building. The probability of a failure of a liquid system component is greater than the probability of failure of the building.

The detailed evaluation of the postulated seismic induced rupture of the HBPP-3 liquid radwaste treatment system is given in Enclosure #1.

The dilution factor and transit time to the nearest drinking water were provided by HMB/DSE by memo to B. Grimes from L. Hulman dated July 9, 1976. The other dilution factors used have been discussed with HMB/DSE.

Original signed by
Darrell G. Eisenhut

Darrell G. Eisenhut, Assistant Director
for Operational Technology
Division of Operating Reactors

Enclosures:
As stated

cc: V. Stello
R. Reid
C. Nelson
L. Shao
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Retyped per D. Eisenhut
See previous yellow for concurrence

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We conclude, however, that the present seismic design of the radwaste facility is acceptable if curbs are added to the radwaste building to a height sufficient to contain the entire liquid inventory within the building. Our conclusion is based on the small magnitude of the possible consequences of a postulated seismic induced failure of the radwaste facility. The curbs will retain all spilled radwaste liquid within the building should a seismic event, or any other incident, cause a failure of a liquid systems component, e.g., a tank or a pipe, without major structural damage to the building. The probability of a failure of a liquid system component is greater than the probability of failure of the building.

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Darrell G. Eisenhut, Assistant Director
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ENCLOSURE 1

SEISMIC DESIGN OF THE HUMBOLDT BAY UNIT 3 LIQUID RADWASTE SYSTEM

Reference: Liquid Radwaste System Analysis for Pacific Gas and Electric Company, Humboldt Bay Power Plant Unit 3, dated February 1976.

By letter dated April 26, 1976, Pacific Gas and Electric Company (PG&E) submitted the report referenced above. In the report, PG&E described possible results of a postulated seismic induced failure of the Humboldt Bay Power Plant Unit 3 (HBPP-3) radwaste facility. The radwaste facility is comprised of the liquid radwaste treatment system and the radwaste building which houses the system. The report was submitted, for our review and approval, to justify PG&E's decision not to designate the radwaste facility Seismic Category I.

The HBPP-3 liquid radwaste treatment system collects, processes, stores and disposes of liquid radwaste generated within the nuclear power plant. Liquid radwaste is collected in building sumps and drain tanks and pumped to the radwaste building for processing, storage and packaging for eventual offsite disposal. The radwaste building completely encloses the high level radwastes, such as the waste concentrator tanks, the spent resin disposal tank, the radwaste demineralizer and the radwaste concentrator, within a reinforced concrete structure. Low level radwastes, such as the three waste receiver tanks and the two waste disposal tanks, are located outside the reinforced concrete structure on a concrete mat surrounded by walls on three sides. The surface drainage in the vicinity of the radwaste building is collected in catch basins which normally drain to the circulating water intake canal. Valves are provided in the catch basin so that contaminated liquids could be pumped into the liquid radwaste treatment system.

The potential result of the postulated seismic induced failure of the HBPP-3 radwaste facility, which we considered, was the release of all liquid waste stored within the facility to the plant environs. All tanks were assumed to be 80% full. The calculation of radionuclide inventories in tanks were at design basis fission product levels, i.e., 100 μci/sec/MWt after 30 minutes delay.

The potential pathways for exposure to the public which we considered were (1) transport through the groundwater into the nearest well, (2) direct runoff into the intake canal and eventual release to the bay and (3) airborne release of radioiodine due to evaporation from unconfined spilled liquid. Direct runoff into the bay was not considered because the radwaste facility is surrounded on three sides by an earthen embankment and natural drainage is into the intake canal. We assumed that direct runoff into the intake canal enters the bay with the only dilution being provided by tidal action, i.e., the circulating water pumps are not operating.

The subsurface hydrology of the site is discussed in the Final Hazards Summary Report, HBPP-3, dated September 1961. There are no surface water supplies in the vicinity of the plant that could be affected by a postulated radwaste spill. Surface waters downgradient of the plant are salt water and not suitable for domestic or municipal supplies. There are several domestic groundwater supplies located east of the plant that draw from shallow aquifers. Information contained in the "Final Hazards Summary Report," on wells in the vicinity of the site, indicates that there is a gradient of about 1 foot per 1000 feet to the east. PG&E has stated that there is probably a groundwater ridge east of the site and we also feel that there is probably a groundwater ridge between the site and wells located east of the plant. In lieu of groundwater data to substantiate the groundwater ridge, we assumed there is a gradient from the site to well No. 8 located 4000 feet east of the site.

The potential consequences of the seismic induced failure of the HBPP-3 radwaste facility are given in Table 1. We agree with the report referenced above that the resultant exposures from a postulated seismic induced failure of the HBPP-3 radwaste facility are not significant for an accident. The possible consequences of the postulated failure result in exposures which are very small fractions of the guidelines of 10 CFR 100. Radionuclide concentrations at any drinking water supply would be significantly less than those specified in 10 CFR Part 20 for unrestricted areas.

Present licensing practice requires the radwaste facility to meet the requirements of Standard Review Plan (SRP) 15.7.3, "Postulated Radioactive Releases Due to Liquid-Containing Tank Failures." Tanks and associated components outside containment containing liquids are acceptable if their failure does not result in radionuclide concentrations in unrestricted areas in excess of the limits specified in 10 CFR Part 20 at (1) the nearest potable water supply and (2) the nearest surface water supply. In our review of the possible consequences of the postulated seismic induced failure of the HBPP-3 radwaste facility, we calculated the radionuclide concentrations at the nearest water supply, Well No. 8. There are no surface supplies in the vicinity of the plant that could be affected by a radwaste spill. The review included, as required in SRP 15.7.3, the calculation of radionuclide inventories at design basis fission product levels, the mitigating effects of plant design and the effect of site geology and hydrology. The postulated failure does not result in radionuclide concentrations in unrestricted drinking water supplies in excess of the limits specified in 10 CFR Part 20. We conclude, therefore, that the provisions in the licensee's design to mitigate the effects of tank and component failures involving contaminated liquids are acceptable.

We conclude, because the HBPP-3 radwaste treatment serves no safety function and because present licensing practice does not require the radwaste facility to be designated Seismic Category I, that the HBPP-3 radwaste facility does not have to be Seismic Category I.

Present licensing practice requires a new radwaste facility to conform to the minimum seismic requirements in Branch Technical Position (BTP) ETSB No. 11-1 (rev. 1), "Design Guidance for Radioactive Waste Management Systems Installed in Light-Water-Cooled Nuclear Power Reactor Plants." The minimum seismic requirements in the BTP for the liquid radwaste system are that the foundation and adjacent walls of the structures housing the radwaste system should be designed to the seismic criteria in Section V of the BTP to a height sufficient to contain the liquid inventory within the radwaste building. The seismic design of the present radwaste building does not meet the minimum seismic requirements in this BTP.

We conclude, however, that the present seismic design of the radwaste facility is acceptable. Our conclusion is based on the small magnitude of the possible consequences of a postulated seismic induced failure of the radwaste facility. The possible consequences of a postulated seismic induced failure of the radwaste facility are sufficiently small in magnitude to accept the differences between the present seismic design of the HBPP-3 radwaste facility and the minimum requirements of BTP ETSB No. 11-1 (Rev. 1).

We recommend that PG&E consider adding curbs within the radwaste building to a height sufficient to contain the entire liquid inventory within the building. The curbs would retain all spilled radwaste liquid within the building should a seismic event, or any other event, cause a failure of a liquid systems component, e.g., a tank or a pipe, without major structural damage to the building. The probability of a failure of a liquid system component is greater than the probability of failure of the building.

TABLE 1

Potential Consequences of the Postulated
Seismic Induced Failure of the HBPP-3 Radwaste Failure

Pathway	Potential Consequence*
Transport thru groundwater to well No. 8	Concentrations in water supply in unrestricted areas are less than 10% of the limits specified in 10 CFR Part 20.
Direct runoff into intake canal	2 hour immersion exposure is less than 50 mrem whole body in the bay.
Airborne release of radioiodine	Site exclusion boundary exposure is less than 200 mrem thyroid.

*The sources of parameters used to determine the prtential consequences are given in Table 2.

Table 2

Sources of Parameters Used to Determine the Potential Consequences Given in Table 1

Parameter	Source
Concentrations in tanks	Gale Code printout using NUREG 0016 parameters plus design basis fission product levels
Site Hydrology	Transit time to Well No. 8 = 486 years Dilution to Well No. 8 = 10^4
Dilution of concentrated waste tank by mixing low level and high level wastes	5
Dilution of liquid wastes entering the intake canal	2
Dilution of effluent by tidal action	50 (Final Hazards Summary Report, dated September 1961)
Atmospheric Dispersion Factor to Site Exclusion Boundary	3×10^{-4} sec/m^3
Partition factor for iodine between air and liquid	10
Dose Conversion factor for immersion	ORNL-4101, K.E. Conser et. al., March 1967, Appendix III