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Southern California Edison Company

SAN ONOFRE NUCLEAR GENERATING STATION

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STATION MANAGER

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October 16, 1981

U. S. Nuclear Regulatory Commission
Region V Office
1450 Maria Lane, Suite 210
Walnut Creek, California 94596

Docket No. 50-206
San Onofre - Unit 1

Attention: Mr. R. H. Engelken, Director

Dear Sir:

In our July 2, 1981 letter transmitting Licensee Event Report No. 81-011 it was stated that a special follow-up report addressing the environmental impact of the beach contamination incident would be submitted. The enclosure to this letter constitutes a special follow-up report in accordance with the provisions of Section 5.6.3(d) of Appendix B to Provisional Operating License DPR-13.

Should you require any additional information on this matter, please contact me.

Sincerely,

H B Ray

DDD:0107U/ryh

Enclosure:

cc: U. S. Nuclear Regulatory Commission
Division of Reactor Operations Inspection

L. F. Miller - USNRC Resident Inspector

DESIGNATED ORIGINAL

Certified By D L Blair

81-349

Beach Contamination Incident
San Onofre Nuclear Generating Station

BACKGROUND

Contamination was discovered on May 10, 1981 during a routine radiation survey on the beach west of the SONGS 1 seawall. A radiation level of 200 μR/hr was found on contact with an out of service drainline penetration in the tsunami wall. The drainline had been uncovered during excavation work associated with the construction of an appropriate foundation for a beach walkway running parallel to the Unit 1 tsunami wall. Construction of the beach passageway to connect the northern and southern portions of San Onofre State Beach stems from a SONGS 2 and 3 licensing committment. Radiation levels on the beach directly in front of the drainline ranged up to 90 μR/hr. Background levels on the beach prior to the excavation were approximately 12 μR/hr.

An 18" yard drainline, located approximately 60 feet north of the south guard tower, penetrated the Unit 1 seawall four feet below the present beach elevation. Sample analyses indicated that the sand removed from the drainline contained 3.9 E-4 μCi/g dry weight Cs-137, 3.4 E-5 μCi/g Cs-134, and 5.0 E-6 μCi/g Co-60. The highest concentrations observed in the beach sand were 2.5 E-4 μCi/g Cs-137, 1.2 E-5 μCi/g Cs-134, and 6.6 E-6 μCi/g Co-60. Normal background concentrations observed in control samples from the beach are approximately 6 E-8 μCi/g to 1.2 E-7 μCi/g Cs-137.

Based on the above analyses the beach walkway project was stopped and an extensive sampling and excavation prog[illegible] implemented. Excavation and removal of beach sand occurred down to a depth 13 feet below the normal beach elevation and covered an area extending approximately 25 feet to the west, south, and north of the drainline. A total of 21,900 ft^3 of beach sand have been shipped to the Richland, Washington Burial Site. An additional 75 ft^3 of contaminated boulders still await disposal.

Excavation efforts were terminated at elevation +0 feet when ground water intrusion was encountered. The well system, which was installed at the start of the beach walkway project, had pumped the groundwater elevation down from +6 feet to +0 feet. Residual contamination which remained in the excavation averaged approximately 5 E-7 μCi/g Cs-137, with maximum concentrations not exceeding 5 E-6 μCi/g Cs-137. All direct dose rates measured three feet above the remaining contamination at the bottom of the excavation were less than 5μR/hr above background levels. Backfill operations, when completed using uncontaminated sand, will further reduce any direct radiation levels at the beach surface level. The total activity remaining was estimated to range between 50 and 200 μCi Cs-137.

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BACKGROUND (continued)

During the beach sand removal a series of 4" penetrations in the seawall were uncovered at an elevation approximately four feet below the level of the drainline. It was determined that these penetrations serve as weepholes to equalize hydrostatic pressure on both sides of the tsunami wall. A total of seven of these weepholes were found to contain contaminated material. Contamination in the weepholes resulted from activity in the beach sand migrating into the weepholes. This determination was arrived at from samples starting at the beach and going into the wall indicating that the concentration in the weepholes decreased with depth into the tsunami wall. These seven weepholes and the drainline were subsequently capped with concrete. This plugging effort removed the pathway for additional contaminated material to be transported to the beach from these penetrations in the tsunami wall.

CAUSE AND TIME OF THE RELEASE

Contamination of the storm drain system was the source of the activity in the beach sand. Two pieces of information were used to determine the time of the release. First, a design change to the storm drain system to correct sand blockage of flapgates in the tsuanami wall resulted in capping the 18" south flap gate during the period November 1973 to early 1975. Second, the ratio of Cs-137/Cs-134 observed in the beach sand samples was used to date the time of release. An observed Cs-137/Cs 134 ratio of 17.3, versus a typical ratio of approximately 1.8 in RCS samples dated the release to approximately 1974. Therfore, the release of radioactivity onto the beach occurred no later than early 1975.

A review of station records during the period 1971 to 1975 indicated that there were no abnormal occurrences that resulted in uncontrolled, unmonitored releases of radioactivity into the storm drain system. Therefore, the source of the contamination in the storm drain system is believed to have been due to the chronic flow of small amounts of contaminated liquid from various plant systems which had the potential to interface with the yard drain system.

Potential sources of contaminated water flowing into the storm drain system include:

1. The refueling water storage tank area:

   There are two basic ways contaminated water can get to the storm drains from this area. First, the North side of the RWST has a cement pit/culvert with a drain which flows directly to the storm drain system. Second, water leaking to the floor/deck area of the RWST can, if in sufficient quantity, flow from the secondary plant and into the storm drain system.

2. The Auxilary Building Roof Drains: If directed to the storm drain system these roof drains would be an additional source of contamination to the storm drain system.

3. Other sources of water: Rainfall washing radioactivity from contaminated areas could drain into the storm drain system.

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MAGNITUDE OF THE RELEASE

The total amount of activity present in the approximately 22,000 ft^3 of contaminated sand and boulders removed from the beach is estimated to be 9.27 mCi. Adding the estimated 0.20 mCi of activity remaining on the beach results in a total activity that was present in the beach sand of 9.47 mCi.

In order to assess the amount of activity originally released to the beach sand, an experiment was conducted to establish the capacity of beach sand for retention of radioactivity. Refueling Tank water of known activity was allowed to percolate at a constant flow rate through a column containing a known quantity of sand from the beach at SONGS Unit 1. The activity of the water discharged from the column was determined at numerous intervals and this data was plotted against total flow through the column to arrive at an activity per gram/flow ratio. Based upon the results of this experiment, a retention factor of 0.80 for Cesium was calculated for the beach sand. The magnitude of the original release was then determined to be 11.84 mCi by taking the ratio 9.47 mCi/0.8.

The observed ratios of Cs-137/Cs-134 (17.3) and Cs-137/Co-60 (80) present in beach sand samples indicated that the activity observed on the beach was due almost entirely to Cs-137. However, at the time of the release both Cs-134 and Co-60 were present in greater amounts. Both the original Cs-134 and Co-60 activites were estimated by taking the Cs-137/Cs-134 ratio of 17.3 and the Cs-137/Co-60 ratio of 80 and correcting these ratios for decay. It was estimated that the original Cs-137/Cs-134 ratio at the time of release was 1.8 and the Cs-137/Co-60 ratio was approximately 40. Therefore, the original activity released to the beach was estimated to be 11.84 mCi Cs-137, 9.47 mCi Cs-134, and 0.30 mCi Co-60. The magnitude of the original release was 21.6 mCi.

RADIOLOGICAL ENVIRONMENTAL IMPACT OF THE RELEASE

Assuming 20% of the Cesium activity released was not retained in the sand, then 2.37 mCi Cs-137, and 1.89 mCi Cs-134 would reach the ocean via the groundwater. If this activity were mixed into an area of about 1/4 square mile by 30 feet deep, and an individual consumes 20kg of fishes from this area, the individual would receive a dose of less than 1 mrem/year using Reg. Guide 1.109 methodology. This dose to an individual is insignificant compared to natural background levels in the area. Therefore, the release of this amount of activity into the environment did not pose a significant hazard to the public health and safety.

An evaluation was also done of the analyses performed on environmental samples collected during the time frame of the release. Beach sand, ocean bottom sediment, kelp, and marine biota samples were reviewed to see whether any significant increases above background levels were observed for either Cesium or Cobalt. No increases above background were observed. Therfore, the environmental impact due to this incident was negligible.

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SIGNIFICANCE OF FUTURE EROSION EXPOSING RESIDUAL ACTIVITY

After the excavated area is backfilled, and the 2" thick asphalt beach walkway is completed the residual contamination will lie buried under approximately 12 feet of material. Radiation levels on the beach are expected to return to background levels at this time. The buried material will not be disturbed by future beach erosion since the beach walkway has a rock erosion barrier incorporated into its design. The rock barrier will extend from 15 feet west of the tsunami wall to at least 35 feet west of the tsunami wall. A minimum 10 foot wide rock barrier will exist west of the buried material to prevent erosion. Therfore, the buried material will not present a health hazard at a later date. Also, routine beach radiation surveys will add assurance that no unexpected risk to the public will occur in the future.

CORRECTIVE ACTIONS TAKEN TO PREVENT RECURRENCE

Several actions have been taken since 1973 which ensure that a similar incident cannot occur:

1. A modified yard drain system was installed in 1974 with a yard drain sump into which the yard drain system now flows. The contents of the sump are routinely analyzed for radioactivity. The contents of the sump are pumped to the inlet of the condenser and ultimately discharge into the ocean via the plant outfall. Thus, the yard drain system cannot now drain onto the beach.

2. The south flap gate drainline was capped with concrete in approximately 1975. Thus, contaminated liquid cannot accidently flow into an out of service yard drainline and flow onto the beach through the south flap gate penetration in the tsunami wall.

3. The south flap gate and the seven contaminated weepholes in the tsunami wall were capped with cement to eliminate any future migration of activity through the tsumani wall.

4. Routine beach radiation surveys are conducted which add assurance that no unexpected risks to the public will occur in the future.

CONCLUSION

Contamination of beach sand west of SONGS 1 occurred prior to 1975 and appears to be a result of chronic flow of small amounts of activity from various plant systems. The release of this amount of activity did not pose any significant hazard to the public health and safety.

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