



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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September 19, 2008

Ross T. Ridenoure
Chief Nuclear Officer
Southern California Edison Company
San Onofre Nuclear Generating Station
P.O. Box 128
San Clemente, California 92674-0128

SUBJECT: NRC INSPECTION REPORT 050-00206/08-014

Dear Mr. Ridenoure:

This refers to the inspection conducted on August 25-28, 2008, at Southern California Edison Company's San Onofre Nuclear Generating Station, Unit 1 facility. This inspection was an examination of activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspection included an examination of selected procedures and representative records, observations of activities, and interviews with personnel. The enclosed report presents the results of this inspection. In summary, the inspector determined that you were conducting decommissioning activities in compliance with regulatory and license requirements.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC's Web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Should you have any questions concerning this inspection, please contact the undersigned at (817) 860-8197 or Mr. Robert Evans, Senior Health Physicist, at (817) 860-8234.

Sincerely,

/RA/

Jack E. Whitten, Chief
Nuclear Materials Safety Branch B

Docket No.: 050-00206
License No.: DPR-13

Enclosure: NRC Inspection Report
050-00206/08-014

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NMSB-B File

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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No: 050-00206

License No: DPR-13

Report No: 050-00206/08-014

Licensee: Southern California Edison Co.
P.O. Box 128
San Clemente, California 92674

Facility: San Onofre Nuclear Generating Station, Unit 1

Location: San Clemente, California

Dates: August 25-28, 2008

Inspector: Robert J. Evans, PE, CHP, Senior Health Physicist
Nuclear Materials Safety Branch B

Approved By: Jack E. Whitten, Chief
Nuclear Materials Safety Branch B

Attachment: Supplemental Inspection Information

ENCLOSURE

EXECUTIVE SUMMARY

San Onofre Nuclear Generating Station, Unit 1 NRC Inspection Report 050-00206/08-014

This inspection was a routine, announced inspection of decommissioning activities being conducted at the San Onofre Nuclear Generating Station, Unit 1 facility. In summary, the licensee was conducting decommissioning activities in compliance with regulatory and license requirements.

Organization, Management, and Cost Controls at Permanently Shutdown Reactors

- The licensee's organizational structure was in compliance with license and procedural requirements. The licensee had sufficient staff for the work in progress (Section 1).

Self-Assessment, Auditing, and Corrective Action at Permanently Shutdown Reactors

- The licensee conducted self-assessments and quality assurance audits in accordance with procedure requirements. The audits were observed to be thorough, and the audit findings were being tracked by the licensee to ensure that corrective actions were completed (Section 2).

Decommissioning Performance and Status Review at Permanently Shutdown Reactors

- The licensee conducted demolition work with an emphasis on industrial and radiological safety. The licensee conducted subsurface dewatering activities in a controlled manner, and the liquid effluent was monitored for radioactivity prior to release (Section 3.2.a).
- Two workers experienced a minor uptake of radioactive material while disassembling Unit 1 smoke detectors. Bioassay results indicated that the workers did not exceed any regulatory limit. Although the respiratory protection controls had been reduced by the licensee, the workers were conducting the work in accordance with approved work instructions. Corrective actions planned include increasing respiratory protection requirements for future work involving similar radionuclides (Section 3.2.b).
- The licensee experienced an unmonitored release of water and sand following the accidental puncture of a pressurized fire water pipe. Based on the licensee's preliminary information, the inspector determined that the incident was not a violation because the amount of radioactivity released to the environment was less than the limits specified in the Offsite Dose Calculation Manual. The licensee plans to formally notify the NRC about the incident in the next annual radioactive effluent release report (Section 3.2.c).

Inspection of Final Surveys at Permanently Shutdown Reactors

- The licensee established and implemented a program for the performance of final characterization surveys at Unit 1. The licensee's staff was conducting the surveys in accordance with site procedures (Section 4.2.a).
- The inspector conducted confirmatory surveys in several survey units. Licensed radioactive material was not identified in these survey units suggesting that the licensee had effectively remediated these areas (Section 4.2.b).

- The licensee continued to evaluate the source of metal radioactive fragments previously identified in soil being used as backfill material (Section 4.2.c).

Radioactive Waste Treatment, and Effluent and Environmental Monitoring

- The effluent and environment monitoring programs were in compliance with license requirements. All required samples had been collected, no sample result exceeded applicable limits, and no adverse trends were identified (Section 5).

Report Details

Summary of Plant Status

San Onofre Nuclear Generating Station, Unit 1, was permanently shut down during November 1992 and was permanently defueled by March 1993. The unit remained in SAFSTOR until June 1999 when decommissioning was initiated. At the time of this inspection, the licensee was conducting decommissioning activities in accordance with its Post Shutdown Decommissioning Activities Report dated December 15, 1998.

Site activities completed since the previous inspection included the demolition of the remaining portions of the radwaste building walls. Work in progress during the inspection included excavating contaminated subsurface components and soils followed by backfilling, compacting, and radiologically surveying these excavated areas. The components being excavated included underground pipes and drain lines. In addition, the licensee was in the process of constructing the second set of Independent Spent Fuel Storage Installation modules in the footprint of the former Unit 1 facility. The licensee was also preparing sections of the Unit 1 footprint for future use as a laydown yard for the Units 2/3 steam generators. The licensee plans to replace the steam generators during future refueling outages.

1 Organization, Management, and Cost Controls at Permanently Shutdown Reactors (36801)

1.1 Inspection Scope

The inspector reviewed the licensee's organizational structure to ensure that the licensee had sufficient staff and managerial oversight for the work in progress.

1.2 Observations and Findings

The organizational structure requirements are provided in the Unit 1 Technical Specifications, Defueled Safety Analysis Report, and Topical Quality Assurance Manual. In addition, organizational responsibilities are provided in the Site Radiological Characterization Plan. The responsible corporate official was the vice president - engineering & technical services. Reporting to this vice president were the projects manager and the Unit 1 decommissioning manager. Reporting to the Unit 1 decommissioning manager were the various functional supervisors and managers including the Unit 1 health physics decommissioning project manager. Reporting to the health physics manager were the various supervisors responsible for shipping, packaging, and decommissioning support activities.

The inspector compared the actual organizational structure to the required structures, and the inspector concluded that all management positions had been filled. In addition, the inspector concluded that sufficient staff was available for the work in progress. The licensee had sufficient staff for the occupational safety, quality assurance, and health physics functions.

1.3 Conclusion

The licensee's organizational structure was in compliance with license and procedural requirements. The licensee had sufficient staff for the work in progress.

2 Self-Assessment, Auditing, and Corrective Action at Permanently Shutdown Reactors (40801)

2.1 Inspection Scope

The inspector evaluated the effectiveness of the licensee in identifying, resolving, and preventing issues that degrade safety or the quality of decommissioning.

2.2 Observations and Findings

The licensee conducted different types of audits and self-assessments to ensure compliance with regulatory requirements and license conditions. The self-assessments included quality assurance (QA) audits and leadership observations. The inspector reviewed selected QA audits and leadership observations involving Unit 1 activities.

Routine QA audits are required to be conducted to ensure compliance with regulatory requirements and license conditions. The audit program is described in Section 17.2.18.2 of the QA Program Topical Report SCE-1-A. This section also specifies the program areas to be audited and the frequency for conducting the audits. To ensure that audits are completed in a timely manner, the licensee maintained a schedule for the audits. The inspector reviewed the audits conducted during 2007-2008 and the audits planned for the near future. The required audits had been completed, were currently in progress, or were scheduled to be completed in a timely manner.

The inspector reviewed selected QA audits that were recently completed including the license compliance and radiation protection audits. The audits were observed to be thorough, and audit findings were being tracked to ensure that corrective actions were completed.

The licensee used QA surveillances to supplement the audits. For recent Unit 1 activities, the licensee chose to use leadership observations in lieu of surveillances. Leadership observations were used to provide direct oversight of decommissioning activities. For example, one leadership observation was being conducted on a recently completed comprehensive ground record program book. The purpose of the observation was to ensure that the book met current NRC guidance and licensee procedure requirements.

The inspector discussed one leadership observation with the licensee involving sample retention requirements. An auditor noted that the licensee had not established a protocol for retention of radiological samples collected during the final characterization survey of Unit 1. The licensee had not established a procedure to control how long the samples will be stored, how the samples will be physically stored (metal or plastic containers), and where the samples will be stored. The long-term retention of these samples may be necessary to support Unit 1 license termination activities during future phases of site decommissioning.

2.3 Conclusions

The licensee conducted self-assessments and QA audits in accordance with procedure requirements. The audits were observed to be thorough, and the audit findings were being tracked by the licensee to ensure that corrective actions were completed.

3 Decommissioning Performance and Status Review at Permanently Shutdown Reactors (71801)

3.1 Inspection Scope

The inspector evaluated whether the licensee and its contracted workforce were conducting decommissioning activities in accordance with license and regulatory requirements.

3.2 Observations and Findings

a. Decommissioning Performance

During site tours, the inspector observed decommissioning activities in progress. The work included excavation of subsurface piping and drain lines. Industrial safety and radiation protection controls were evident. Safety representatives and health physics personnel were continuously present during work activities. The inspector concluded that the radiological controls in place at the time of the inspection met procedure and regulatory requirements.

The inspector conducted a review of occupational exposures to radioactive sources. Occupational doses remained low during the first quarter of 2008. Actual total exposures were 0.008 person-rems, a value below the As Low As Reasonably Achievable goal of 0.012 person-rems. Occupational doses continue to decrease as the licensee continues to remove radioactive material from the Unit 1 site.

The licensee continued to conduct dewatering operations to support subsurface excavations below the groundwater table. At the time of the inspection, the licensee was operating four dewatering pumps. The discharge of these four pumps was being routed to the north industrial area yard sump for release through the Units 2/3 outfalls.

The licensee continued to sample the dewatering well discharge fluid on a routine basis. The water samples were analyzed for total gamma activity and tritium concentrations. The inspector reviewed the sample results for 2008. With two minor exceptions, the sample results did not identify any radioactivity in concentrations greater than the minimum detectable concentrations of the sampling equipment.

Two water samples collected during early-June 2008 slightly exceeded the minimum detectable concentrations of the sampling equipment. The samples were collected from dewatering well No. 12, and each sample contained tritium in concentrations just above the detection limit of the measurement equipment. Well No. 12 is located west of the former containment building. The two water samples contained tritium in concentrations of less than or equal to 4 picocuries of tritium per liter of water.

Although the shallow groundwater in the vicinity of the Unit 1 site is not considered a source of drinking water, these two water sample results were well below the 20,000 picocuries per liter limit specified by the U.S. Environmental Protection Agency for tritium in drinking water. In addition, dewatering well discharged is diluted by water in both the North Industrial area sump and the Units 2/3 outfalls prior to release to the environment.

b. Uptake During Commercial Smoke Detector Disassembly

On May 16, 2008, two workers experienced a minor uptake of radioactive material while disassembling a number of commercial smoke detectors removed from the former Unit 1 plant. The two workers were disassembling the smoke detectors for shipment in accordance with manufacturer's instructions. During the disassembly process, the workers experienced an uptake of americium-241. The americium-241 apparently became loose, then airborne, because of long-term corrosion within the smoke detectors. The licensee concluded that the workers most likely inhaled the americium-241 while spraying a fixating agent on corroded smoke detectors.

The problem was identified by the licensee through routine air sampling, although radiological surveys of the workers' faces and dust masks did not identify any removable contamination. The air sample indicated an equivalent of 35 derived air concentrations. The licensee elected to collect bioassay samples from the two individuals. Radioactivity was identified in the bioassay samples. The licensee conducted an evaluation of the bioassay samples and concluded that one individual had received an internal dose of 40 millirems, while the second individual received an internal dose of 3 millirems. These doses were less than the licensee's action level of 500 millirems committed effective dose equivalent and less than the NRC's annual regulatory limit of 5,000 millirems committed effective dose equivalent.

As a result of the incident, the licensee initiated a formal review. The licensee determined that the workers were conducting work in accordance with procedural requirements, although the licensee had recently reduced the respiratory protection requirements because previous work had been successfully completed without incident. One proposed corrective action was to strengthen the respiratory protection requirements for all work involving alpha-particulate radionuclides such as americium-241. The inspector concluded that the incident was not a violation of licensee's procedures, and determined that the incident was not reportable to the NRC because the regulatory limits specified in 10 CFR Part 20 had not been exceeded.

c. Breach of Fire Water Piping

On August 8, 2008, the licensee accidentally struck a pressurized fire water line inside of the Unit 1 industrial area, resulting in the unmonitored release of water and sand to the environment. The 8-inch fire water line was punctured while the licensee was trying to remove a storm drainpipe in the vicinity of the line. The fire water line was punctured when an excavator hammer accidentally struck the line. The punctured line resulted in a temporary reduction in firewater pressure. Sand and water were released offsite through the sewage treatment plant discharge piping. One sand sample collected from the sewage treatment plant after the incident measured about 3 picocuries per gram of cesium-137. Although the sample did not exceed the decommissioning derived concentration guideline level of 11 picocuries of cesium-137 per gram of sand, the effluent release was considered an unmonitored release. The release was subsequently diluted by the circulating water discharge effluent in the Units 2/3 outfall.

The volume of material released and the activity of the material was estimated by the licensee. Based on these estimates, the licensee concluded that the Offsite Dose Calculation Manual (ODCM) limits were not exceeded. The inspector reviewed the preliminary data and determined that the incident was not a violation of the ODCM. The

licensee issued an internal evaluation report to document the incident. The licensee also proposed corrective actions to prevent recurrence. At the time of the inspection, the licensee had not completed its analysis of the incident. Based on preliminary information, the incident is expected to be reported to the NRC in the next annual radioactive effluent release report.

3.3 Conclusions

The licensee conducted demolition work with an emphasis on industrial and radiological safety. The licensee conducted subsurface dewatering activities in a controlled manner, and the liquid effluent was monitored for radioactivity prior to release.

Two workers experienced a minor uptake of radioactive material while disassembling Unit 1 smoke detectors. Bioassay results indicated that the workers did not exceed any regulatory limit. Although the respiratory protection controls had been reduced by the licensee, the workers were conducting the work in accordance with approved work instructions. Corrective actions planned include increasing respiratory protection requirements for future work involving similar radionuclides.

The licensee experienced an unmonitored release of water and sand following the accidental puncture of a pressurized fire water pipe. Based on the licensee's preliminary information, the inspector concluded that the incident was not a violation because the amount of radioactivity released to the environment was less than the limits specified in the ODCM. The licensee plans to formally notify the NRC about the incident in the next annual radioactive effluent release report.

4 **Inspection of Final Surveys at Permanently Shutdown Reactors (83801)**

4.1 Inspection Scope

The inspector verified that radiological measurements, surveys, and related documentation were being conducted by the licensee in accordance with site procedures and NRC guidance documents.

4.2 Observations and Findings

a. Review of Site Radiological Characterization Plan

The inspector reviewed the Site Radiological Characterization Plan for consistency with NRC decommissioning guidance documents. The purpose of the Plan was to describe the licensee's approach to design, implement, evaluate, and document radiological surveys within the Unit 1 footprint. The Plan was in general agreement with NRC guidance documents.

The inspector also discussed the programs for cross-comparison and hard-to-detect radionuclides with licensee representatives. The Site Radiological Characterization Plan states that a number of biased and systematic samples will be submitted offsite for cross-laboratory and hard-to-detect radionuclide comparison. The inspector confirmed that the licensee had submitted a number of samples for analysis, but the licensee's review of the sample results was not complete. At the time of the inspection, the

licensee had submitted 32 samples for cross-laboratory analysis and 9 samples for hard-to-detect radionuclide analysis.

The inspector also reviewed four final characterization survey plans for work in progress during the inspection. In general, the survey plans were developed using the instructions provided in the Site Radiological Characterization Plan. The inspector also observed field crews adhering to the guidance provided in the survey plans.

b. Confirmatory Surveys

The inspector conducted confirmatory surveys in four survey units located in the northern, western, and southwestern sections of the Unit 1 industrial area. The surveys consisted of measurement of ambient gamma exposure rates. The surveys were conducted using a Ludlum Model 19 microRoentgen meter (NRC No. 015544, calibrated to radium-226, calibration due date of 02/14/09). With a background of about 11 microRoentgens per hour ($\mu\text{R/hr}$), the survey measurements ranged from 11 to 21 $\mu\text{R/hr}$. The highest exposure rates were measured on clayey soils. The licensee has previously identified these soils as native soils containing naturally occurring radioactive material. Licensed radioactive material was not identified during the confirmatory surveys suggesting that the licensee had effectively remediated these areas.

c. Radioactive Fragments in Backfill Material

During March 2008, the licensee discovered a small, metal fragment in soil being used as backfill material. The material was identified as containing cobalt-60. Upon discovery of this fragment, the licensee formulated short and long-term corrective actions. As one corrective action, the licensee began compacting the onsite soil in 10-inch lifts and conducting 100% radiological scans of the compacted soil between each lift. The licensee subsequently identified and reclaimed over 10 discrete fragments. As part of the assessment process, pieces of the fragments were submitted for offsite analysis. The licensee submitted the fragments for analysis, in part, to help identify the source of the fragments.

At the time of this inspection, the licensee had not finalized its investigation of the issue. The preliminary information indicated that the metal fragments were circular shaped components, most likely constructed from stainless steel. The fragments appeared to exhibit severe corrosion. The analyzed fragments were speculated to be either a corroded washer or residual material from the cutting of a pipe. The licensee suspects that the material originated from the former holdup tank room sump. The licensee continues to install site soils in 10-inch lifts to ensure identification of any remaining radioactive metal fragments in site soils being used as backfill material.

4.3 Conclusions

The licensee established and implemented a program for the performance of final characterization surveys at Unit 1. The licensee's staff was conducting the surveys in accordance with site procedures. The inspector conducted confirmatory surveys in several survey units. Licensed radioactive material was not identified in these survey units suggesting that the licensee had effectively remediated these areas. The licensee continued to evaluate the source of metal radioactive fragments previously identified in soil being used as backfill material.

5 Radioactive Waste Treatment, and Effluent and Environmental Monitoring (84750)

5.1 Inspection Scope

The inspector reviewed the licensee's program to control, monitor, and quantify releases of radioactive materials to the environment in liquid, gaseous, and particulate forms.

5.2 Observations and Findings

a. Effluent Monitoring

Section D6.8.4.a of Technical Specifications states that a radioactive effluent control program shall be established, implemented, and maintained. The methodology used to monitor, sample, and analyze the liquid and gaseous effluents is provided in the site-wide ODCM. The inspector compared the program requirements specified in the ODCM to the sample results as documented in the licensee's 2007 Annual Radioactive Effluent Release Report dated April 30, 2008.

As documented in the annual report, monitored effluents included shipment of radioactive wastes and dewatering well discharges. Both gaseous and liquid effluent releases were permanently suspended in 2006. The liquid radiation monitor associated with the North Industrial area sump is now maintained as a component of Units 2/3.

Included in the annual report was a special description of the April 2007 Eurotainer spill that occurred onsite. This spill was previously reviewed as part of the routine NRC inspection program and is documented in NRC Inspection Report 050-00206/07-011 dated May 24, 2007. The spill did not result in a release to the environment in excess of the ODCM limits.

b. Environmental Monitoring

Section D6.8.4.b of Technical Specifications states that a radiological environmental monitoring program shall be established, implemented, and maintained. Program requirements are contained in the ODCM. The inspector compared the ODCM requirements with the information provided in the licensee's site-wide 2007 annual radiological environmental operating report dated May 13, 2008.

Similar to previous years, cesium-137 was detected in four soil samples, and iodine-131 was detected in three kelp samples. The licensee concluded that the cesium-137 in the samples may be attributable to residual fallout from previous nuclear weapons testing and nuclear accidents, while the iodine-131 is probably attributable to sewer releases of medical radioisotopes. In addition, the report documents that no station-related radionuclides were detected in drinking water samples collected during 2007. In summary, no environmental monitoring sample result exceeded the applicable regulatory limit.

5.3 Conclusions

The effluent and environment monitoring programs were in compliance with license requirements. All required samples had been collected, no sample result exceeded applicable limits, and no adverse trends were identified.

6 Exit Meeting Summary

The inspector presented the results of the inspection to members of licensee management at the exit meeting conducted on August 28, 2008. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspector.

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T. Yackle, Director, Operations

INSPECTION PROCEDURES USED

36801 Organization, Management, and Cost Controls at Permanently Shutdown Reactors
40801 Self-Assessment, Auditing, and Corrective Action at Permanently Shutdown Reactors
71801 Decommissioning Performance and Status Review at Permanently Shutdown Reactors
83801 Inspection of Final Surveys at Permanently Shutdown Reactors
84750 Radioactive Waste Treatment, and Effluent and Environmental Monitoring

ITEMS OPENED AND CLOSED

Opened

None

Closed

None

Discussed

None

LIST OF ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
IP	Inspection Procedure
µR/hr	microRoentgens per hour
ODCM	Offsite Dose Calculation Manual
QA	quality assurance