



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
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May 9, 2008

Richard M. Rosenblum  
Chief Nuclear Officer  
Southern California Edison Company  
San Onofre Nuclear Generating Station  
P.O. Box 128  
San Clemente, CA 92674-0128

SUBJECT: NRC INSPECTION REPORT 050-00206/08-009

Dear Mr. Rosenblum:

This refers to the inspection conducted on April 7-10, 2008, at Southern California Edison Company's San Onofre Nuclear Generating Station, Unit 1 facility. This inspection was an examination of decommissioning 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 inspection included the performance of confirmatory radiological surveys. The enclosed report presents the results of the confirmatory survey and the overall results of the inspection. In summary, the inspection 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 Web site at [www.nrc.gov/reading-rm/adams.html](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 Mr. Robert Evans at (817) 860-8234, or the undersigned at (817) 860-8197.

Sincerely,

/RA/

Jack E. Whitten, Chief  
Nuclear Materials Safety Branch B

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

Enclosure: NRC Inspection Report  
050-00206/08-009

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SUNSI Review Completed: RJE ADAMS:  Yes  No Initials: RJE  
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RJEvans	JEWhitten	
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U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket No: 050-00206  
License No: DPR-13  
Report No: 050-00206/08-009  
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: April 7-10, 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 050-00206/08-009

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

#### Self-Assessment, Auditing, and Corrective Actions

- The licensee conducted self-assessments in accordance with site initiatives. These self-assessments were being used to identify and prevent trends that could negatively impact the quality of decommissioning (Section 1).

#### Decommissioning Performance and Status Review

- The licensee conducted demolition work with an emphasis on industrial and radiological safety. Radiation protection controls were effectively implemented and included posting of radiological areas and the establishment of boundaries inside of the Unit 1 industrial area (Section 2).
- The licensee conducted subsurface dewatering activities in a controlled manner, and the liquid effluent was being monitored for radioactivity prior to release (Section 2).
- The inspector conducted independent radiological surveys of equipment staged by the licensee for release from the site. The radioactivity on the equipment surveyed by the inspector was indistinguishable from background levels (Section 2).
- The licensee recently identified a radioactive metal fragment in soil being used as backfill material. The licensee took immediate corrective actions including removal of the soil from the pit being backfilled. Additionally, the licensee modified its backfill procedure to reapply the soil in smaller lifts and to conduct 100-percent surveys of each lift to identify any additional fragments. Several additional fragments were identified. At the conclusion of the onsite inspection, the licensee was conducting an assessment to determine the source of the fragments (Section 2).

#### Occupational Radiation Exposures

- The licensee implemented an occupational exposure program that effectively monitored internal and external doses to radiation. No individual exceeded the regulatory limit for total effective dose equivalent during calendar year (CY) 2007. In addition, the licensee's as low as reasonably achievable (ALARA) program was determined to be effective (Section 3).

#### Inspection of Final Surveys

- The licensee conducted final surveys in accordance with site procedures (Section 4).

- The inspector conducted two confirmatory surveys. The sample results obtained in the confirmatory surveys indicated that the surveyed areas did not contain licensed radioactive material in concentrations distinguishable from background levels (Section 4).

## REPORTS DETAILS

### Summary of Site 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 under the DECON option as stated in its Post Shutdown Decommissioning Activities Report dated December 15, 1998. DECON is defined as the immediate removal and disposal of all radioactivity in excess of levels which would permit the release of the facility for unrestricted use.

Site activities completed since the previous inspection included the removal of the radwaste building foundation and construction of the second Independent Spent Fuel Storage Installation (ISFSI) concrete pad. The original health physics access control point, Building 52, had been demolished. A new radiation protection access control point was installed inside the Unit 1 industrial area entry building. Further, the western side of the site was being excavated and was being prepared for backfilling.

During the inspection, the licensee was in the process of backfilling the area of the former radwaste building foundation. The licensee was also constructing the ISFSI support equipment such as lighting. Future decommissioning activities include excavation of the subsurface storm drains and the former blowdown trench. The licensee plans to complete all field work by October 2008.

### **1 Self Assessment, Auditing, and Corrective Action at Permanently Shutdown Reactors (40801)**

#### **1.1 Inspection Scope**

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

#### **1.2 Observations and Findings**

The licensee conducted several different types of audits and self-assessments to ensure compliance with regulatory requirements and license conditions. One self-assessment that was used by the licensee was the leadership observation program. The licensee used leadership observations to provide direct oversight of decommissioning activities. According to the licensee, leadership observation data is one of many tools that can be used by the licensee's supervisors for early identification of potentially unsafe behavior trends.

The inspector discussed the leadership observation program with the licensee. The inspector learned that the licensee had recently transitioned from the old leadership observation program to a new site-wide leadership engagement initiative. The leadership engagement initiative was a different method for documenting and discussing observations. The site-wide initiative ensured engagement between supervision and the workers. The program stipulated that the supervisor concentrate on positive performance, two-way communications, and timely feedback. The supervisor was

required by the program to document the interactions in a weekly logbook. The licensee would then collect these weekly logbook entries for identification of trends.

At the time of the inspection, the licensee had just fully implemented the program, and the newly-collected information was being analyzed for possible trends. Licensee supervision indicated they were confident that the program would be successful, in part, since the workers appeared to be more receptive to the coaching activity because of the new emphasis on positive behaviors and employee work activities. The inspector concluded that leadership observations helped the licensee ensure that field activities were being conducted in a safe and timely manner.

### 1.3 Conclusions

The licensee conducted self-assessments in accordance with site initiatives. These self-assessments were being used to identify and prevent trends that could negatively impact the quality of decommissioning activities at the site.

## **2 Decommissioning Performance and Status Review at Permanently Shutdown Reactors (71801)**

### 2.1 Inspection Scope

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

### 2.2 Observations and Findings

During site tours, the inspector observed decommissioning activities in progress. The work activities included backfilling of the former radwaste building foundation area and packaging of radioactive material for shipment offsite to a radioactive waste licensee. Industrial safety and radiation protection controls were evident. Safety representatives were continuously present during work activities. The inspector concluded that radiological controls met regulatory requirements and conditions of the license.

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.

Since the previous inspection, conducted in November 2007, the licensee continued to sample the dewatering well discharge fluid at least weekly, although the licensee commenced monthly sampling during February 2008. The water samples obtained by the licensee were analyzed for total gamma activity and tritium concentrations. The inspector reviewed the sample results for samples collected since November 2007. The sample results did not exceed the minimum detectable concentrations (MDCs) of the sampling equipment.

The inspector conducted surveys of equipment staged for free-release from the site. The surveys were conducted using an Eberline E-600 survey meter with alpha-beta probe (NRC No. 063473, calibration due date of 01/14/09). The equipment surveyed



included electrical wiring, rubber trash cans, polyvinyl chloride piping, plastic bags, metal, and a plastic faceshield. The inspector collected background measurements and calculated a MDC for the survey meter. None of the sample results exceeded the MDC of the meter indicating that radioactive contamination, if any existed on the items being surveyed, was indistinguishable from background levels.

During mid-March 2008, the licensee discovered a small radioactive metal fragment in the soil being backfilled into the former radwaste building foundation pit. The licensee identified the radioactive fragment during a routine radiological survey of the sixth layer of compacted soil. The licensee analyzed the material onsite and determined that it contained approximately 129 microcuries of cobalt-60. In response to the radioactive fragment discovery, the licensee issued Action Request 080300830 to formulate short and long term corrective actions. To locate any other radioactive fragments, the licensee elected to excavate the six layers of soil that were previously installed, and the licensee began replacing the soil in smaller lifts of about 10-inches in thickness. The licensee also elected to conduct 100-percent radiological scans of the compacted soil between each lift.

At the time of the inspection, the licensee was installing lifts 13-15. The licensee maintained radiological records for each lift. The licensee identified and reclaimed an additional 10 discrete particles during backfilling operations. As part of its assessment, the licensee will attempt to identify the source of the particles and will try to determine whether any previous work activity may have been impacted. In addition, the licensee submitted the first metal fragment to an offsite laboratory for further analysis, in part, to help identify the source of the material. The licensee's long term corrective actions will be documented and tracked through the Action Request process. The NRC will review the licensee's long-term corrective actions, taken in response to the discovery of the radioactive metal fragments, during a future inspection.

### 2.3 Conclusions

The licensee conducted demolition work with an emphasis on industrial and radiological safety. Radiation protection controls were effectively implemented and included posting of radiological areas and the establishment of boundaries inside of the Unit 1 industrial area. The licensee conducted subsurface dewatering activities in a controlled manner, and the liquid effluent was being monitored for radioactivity prior to release. The inspector conducted independent radiological surveys of equipment staged by the licensee for release from the site. The radioactivity on the equipment surveyed by the inspector was indistinguishable from background levels.

The licensee recently identified a radioactive metal fragment in soil being used as backfill material. The licensee took immediate corrective actions including removal of the soil from the pit being backfilled. Additionally, the licensee modified its backfill procedure to reapply the soil in smaller lifts and to conduct 100-percent surveys of each lift to identify any additional fragments. Several additional fragments were identified. At the conclusion of the onsite inspection, the licensee was conducting an assessment to determine the source of the fragments.

### **3 Occupational Radiation Exposure (83750)**

#### **3.1 Inspection Scope**

The inspector reviewed occupational radiation exposures for CY 2007 to verify compliance with 10 CFR Part 20 limitations. The inspector also reviewed the implementation of the licensee's ALARA program.

#### **3.2 Observations and Findings**

Occupational radiation exposures consisted of both external and internal exposures. The licensee monitored occupational exposures and maintained records of Unit 1 exposures. The inspector reviewed the occupational exposure records for CY 2007. During CY 2007, 509 thermoluminescent dosimeters (TLDs) were issued to individuals to measure external gamma dose. The number of individuals monitored was down significantly from CY 2006 when 1470 individuals were monitored. The combined total effective dose equivalent for all individuals monitored with a measurable gamma dose was 0.417 person-rems. The combined total effective dose equivalent for CY 2007 was also down significantly from CY 2006 when the total dose was 17.396 person-rems.

The occupational exposure records reviewed by the inspector indicated the highest total effective dose equivalent to an individual working in Unit 1 during CY 2007 was 0.059 rems. No individual exceeded the regulatory limit of 5 rems. The reduction in collective doses from previous years was a result of the elimination of the source term (amount of radioactive material present) in Unit 1 and improvement in both job planning and ALARA practices.

During CY 2007, there were 10 personnel contamination events. The most significant was the spilling of contaminated water on clothing. This event occurred during April 2007. A follow-up radiological survey of the work area was conducted by the licensee, and the contaminated clothing was subsequently disposed of as radioactive waste. None of the 10 contamination events resulted in the assignment of internal doses to any individual. Review of occupation exposure records by the inspector indicated that there were no internal exposures assigned to Unit 1 personnel in CY 2007, and all assigned doses were from external sources of radiation.

The inspector reviewed the licensee's ALARA program. Overall, the inspector determined that the licensee had a strong ALARA program in place at Unit 1. Performance indicators established by the licensee were tracked and evaluated including ALARA exposure goals. The exposure goal for CY 2007 was 0.549 person-rems. Actual exposures, based on TLD readings, were 0.417 person-rems. The technicians who provided health physics support work were the individuals who received the most doses. The ALARA goal for CY 2008 is 0.035 person-rems based on planned work activities planned for the year. At the time of the inspection, Unit 1 workers had received a collective dose of 0.008 person-rems.

#### **3.3 Conclusions**

The licensee implemented an occupational exposure program that effectively monitored internal and external doses to radiation. No individual exceeded the regulatory limit for

total effective dose equivalent during CY 2007. In addition, the licensee's ALARA program was determined to be effective.

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

##### **4.1 Inspection Scope**

The inspector conducted a review of the licensee's site characterization survey activities. The inspector also conducted confirmatory surveys in the former radwaste building and containment sphere foundation areas to independently assess the radiological conditions of these areas.

##### **4.2 Observations and Findings**

###### **a. Review of Final Characterization Survey Activities**

In recent months, the licensee developed a Site Radiological Characterization Plan (Plan). This Plan describes the approach to design, implement, evaluate, and document radiological surveys of structures and soils. The Plan is a consolidation of previous documents, memorandums, guidelines, and plans into one document. The Plan provides instructions for final characterization surveys that are consistent with the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), NUREG-1575. The Plan supplements the Comprehensive Ground Record program. The Comprehensive Ground Record is a decommissioning survey data retention system that provides control of sample and survey data. The inspector reviewed the Plan and determined that the document will help ensure that the licensee's final characterization survey program is consistent with MARSSIM guidance.

The inspector conducted a review of final status survey activities in progress. At the time of the inspection, the licensee was in the process of backfilling the former radwaste building foundation area. The work activities consisted of screening of onsite soils, installing approximately 10-inch lifts, compacting the soil, and then performing a radiological survey of the compacted soil. The licensee conducted the final characterization surveys using instructions provided for each work activity. The inspector reviewed the work in progress and compared the work to the most recent work instructions. The final characterization confirmatory surveys consisted of background measurements, collection of soil samples, scan surveys, and static surveys at each soil sample point. The inspector observed the performance of confirmatory surveys in several lifts, including the licensee using a global positioning system to accurately delineate each lift elevation and to specifically identify soil sample locations. In summary, the inspector noted that the field work was being conducted in accordance with directions provided in the survey instructions.

The inspector reviewed the soil sampling data for the first 13 lifts. The licensee elected to use the NRC's generic screening criteria as the site-specific derived concentration guideline levels. The generic screening levels are 11 picocuries per gram for cesium-137 and 3.8 picocuries per gram for cobalt-60. The licensee's data indicated that all soil sample results were less than 1-picocuries per gram for both cesium-137 and cobalt-60.

b. NRC Confirmatory Surveys

The inspector conducted confirmatory surveys in two areas, the former radwaste building foundation excavation area and a portion of the former containment foundation. The confirmatory survey consisted of measurements of concrete contamination levels and ambient gamma radiation levels.

Ambient gamma radiation levels were measured in the former radwaste building foundation area using a Ludlum Model 19 microRoentgen survey meter (calibrated to radium-226 with a calibration due date of 02/14/09). With a background of 14  $\mu\text{R/hr}$ , the measurements ranged from 14-30  $\mu\text{R/hr}$ . The inspector observed several isolated deposits of clay-like soils that exhibited slightly elevated exposure rates. The licensee had previously identified these clay-like soils and had determined that these soils contained small amounts of naturally occurring radioactive material.

The licensee conducted a characterization survey of portions of the concrete foundation for the former sphere enclosure building. This survey was performed to identify any area that may be problematic for the final characterization survey. The licensee conducted the survey with an emphasis on the exposed edges of the foundation. At the same time, the inspector conducted ambient gamma exposure rates of the top and side surfaces of the concrete. The gamma exposure rates ranged from a background measurement of 14  $\mu\text{R/hr}$  to 30  $\mu\text{R/hr}$  at one discrete location. This discrete location was identified by the licensee during the performance of its characterization survey. The licensee subsequently remediated this area to remove the previously identified surface contamination.

The inspector also conducted surface contamination surveys of the concrete using an Eberline E-600 survey meter (NRC No. 063473, calibration due date of 01/14/09) coupled to an SHP-380AB alpha-beta probe. Prior to conducting the confirmatory survey, the inspector collected background measurements in the north industrial area (270 counts per minute) and calculated a MDC for the survey meter. The inspector collected 21 measurements for beta particulate activity. Only one sample point, at 850 counts per minute, exceeded the MDC of the survey meter. This sample point was the same previously identified point that was discussed above. Following remediation, the inspector conducted three additional sample measurements at this location, and all three measurements were below the MDC of the survey meter.

4.3 Conclusions

The licensee was conducting final surveys in accordance with site procedures. The inspector conducted two confirmatory surveys, and the final sample results indicated that the surveyed areas did not contain licensed radioactive material in concentrations distinguishable from background levels.

**5 Exit Meeting**

The inspector reviewed the scope and findings of the inspection during an exit meeting that was conducted at the conclusion of the onsite inspection on April 10, 2008. The licensee did not identify as proprietary any information provided to, or reviewed, by the inspector.



## SUPPLEMENTAL INSPECTION INFORMATION

### **PARTIAL LIST OF PERSONS CONTACTED**

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### **INSPECTION PROCEDURES USED**

IP 40801 Self Assessment, Auditing, and Corrective Action at Permanently Shutdown Reactors  
IP 71801 Decommissioning Performance and Status Review at Permanently Shutdown Reactors  
IP 83750 Occupational Radiation Exposure  
IP 83801 Inspection of Final Surveys at Permanently Shutdown Reactors

### **ITEMS OPENED, CLOSED, AND DISCUSSED**

#### Open

None

#### Closed

None

#### Discussed

None

### **LIST OF ACRONYMS AND ABBREVIATIONS USED**

ALARA As Low As Reasonably Achievable  
CY calendar year  
CFR Code of Federal Regulations  
ISFSI Independent Spent Fuel Storage Installation  
IP Inspection Procedure  
 $\mu\text{R/hr}$  microRoentgens per hour  
MDC minimum detectable concentration  
MARSSIM Multi-Agency Radiation Survey and Site Investigation Manual (NUREG-1575)  
SONGS San Onofre Nuclear Generating Station  
TLD thermoluminescent dosimeter