

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos.: 50-206/93-15, 50-361/93-15, 50-362/93-15  
License Nos.: DPR-13, NPF-10, NPF-15  
Licensee: Southern California Edison Company (SCE)  
Irvine Operations Center  
23 Parker Street  
Irvine, California 92718  
Facility Name: San Onofre Nuclear Generating Station (SONGS)  
Units 1, 2 and 3  
Inspection at: SONGS Site, San Diego County, California  
Inspection Conducted: June 7-18, 1993

Inspector: *L.C. Carson II* 7/8/93  
L.C. Carson II, Reactor Radiation Specialist Date Signed  
Approved by: *J.H. Reese* 7/8/93  
J.H. Reese, Chief Date Signed  
Facilities Radiological Protection Branch

Inspection Summary:

Areas Inspected: This routine announced inspection covered the licensee's Unit 2 Cycle 7 (U2C7) refueling outage radiation protection activities. Inspection procedures 83729, 83750, 84750, 86750, and 92701 were used.

Results: The licensee's radiation protection activities during the initial stages of the U2C7 outage were adequate for meeting safety objectives. No violations or deviations were identified.

## DETAILS

### 1. Persons Contacted

#### SCE Personnel

- \*D. Warnock, Assistant HP Manager
- \*J. Fee, Assistant HP Manager (Acting Manager Site HP)
- \*B. Katz, Nuclear Safety Manager
- \*S. Schoefield, Supervisor of HP Engineering
- \*S. Enright, Supervisor HP/Radioactive Material Control (RMC)
- \*J. Barrow, HP General Foreman
  - S. Eichenberger, HP Planner
  - T. Adler, HP Supervisor Units 2/3
- \*A. Talley, HP Supervisor Unit 1
  - D. Corbett, ALARA Engineer
- \*P. Chang, Effluents Supervisor
- \*R. Wood, ALARA Supervisor
- \*S. Sewell, Dosimetry Supervisor
- \*G. Gibson, On-site Nuclear Licensing
- \*R. Giroux, On-site Nuclear Licensing
- \*M. Farr, On-site Licensing Engineer

#### Others

- \*C. Caldwell, NRC Senior Resident Inspector

(\*) Denotes those individuals who were at the exit meeting on June 18, 1993. Additional licensee personnel were contacted and present at the exit meeting, but are not reflected in the above listing.

### 2. Followup (92701)

- a. Item 50-206/91-10-06 (Closed): This unresolved item concerned the release of potentially contaminated oil offsite, and the lower limit of detection (LLD) used to measure beta radiation in oil. NRC Inspection Report 50-206/91-31 further discussed this matter, and established that the licensee's LLDs for releasing oil should be measured to environmental LLDs.

The inspector noted that the following licensee corrective actions addressed regulatory concerns regarding oil surveys and LLDs:

- \* Oil processing operations were terminated in April 1991.
- \* Procedure S0123-VII-8.2.11, "Release of Liquid, Sludges, Slurries and Sand to Unrestricted Areas," set guidelines for releasing non-contaminated oil that included counting 4-liter oil samples for 4,100 seconds to ensure that environmental LLDs were met.

This matter is closed, because NRC Inspection Reports 50-206/91-10 and 50-206/91-31 regarding waste oil processing ultimately resulted in

appropriate licensee corrective actions. The inspector had no further question regarding this matter.

3. Occupational Exposure and Occupational Exposure During Extended Outages (83729 and 83750)

a. Audits and Appraisals

Discussions were held with quality assurance (QA) personnel responsible for performing audits and surveys of the licensee's radiation protection program. The inspector reviewed the following QA documents:

- \* DRAFT Audit Report SCES-318-93
- \* The 1993 Site QA Surveillance Schedule
- \* QA Action Plan: Unit 2 Cycle 7 (U2C7) Refueling Outage
- \* QA Surveillance findings two weeks into the U2C7 outage

QA's audit, surveillances, and plans were adequately detailed and in depth. No violations or deviations were identified.

b. Training on Teletector Radiation Survey Techniques

Discussions were held with HP management on the effectiveness of health physics technicians' (HPTs) use of Eberline, Model 6112 Teletectors during radiation surveys of intense radiation point sources of different sizes. The inspector was concerned that measurements of intense radiation point sources varied greatly depending on the HPTs training in proper use of Teletectors. Teletector accuracy was  $\pm 30\%$  for general area radiation surveys, but the accuracy could be affected by the radiation source size and detector orientation. Licensee management considered that measuring and recording radiation survey data from intense radiation hot spots, hot particles, and sources were done generally for information purposes. The inspector emphasized that under 10 CFR 20.201 and 20.401 the licensee was responsible for assuring that HPTs perform and record reasonable radiation surveys and evaluations.

HP engineering evaluated a Teletector's response to intense radiation sources of various sizes as a function of the distance from the detector. The inspector examined the results of HP engineering's Teletector response evaluation. HP engineering found that a one-inch distance between the actual detector and a discrete point source could reduce the dose rate measurement by a factor of 10,000. The licensee also revealed that a number of HPTs did not satisfactorily consider the source to detector distance effect on survey results. HP management reviewed Teletector training and procedure S0123-VII-5.2.1 for Teletector operations and calibrations. Based on HP engineering's findings, the inspector was informed that enhancements to the Teletector

procedure and HP training would occur soon. The inspector had no further concerns in this area.

c. Changes

A new procedure was put in place in June 1993. Procedure S0123-VII-7.18, "Planning Jobs and Controlling Substantial Personnel Radiation Exposure," was developed to control worker's exposure to high radiation sources by placing special emphasis in the following areas:

- \* Planning Jobs
- \* Tailboard Job Briefings
- \* HP Job Coverage
- \* Restarting Work Once Stopped
- \* Critical Work Steps
- \* Using a Radiation Work Request Flowchart

Procedure S0123-VII-7.18 was developed in response to an unplanned extremity exposure of a worker in February 1993. Guidance from NRC Enforcement Manual, Supplement IV, Section C.4, "Substantial Potential for Exposure in Excess of 10 CFR Part 20," was included in the procedure.

The inspector examined Radiation Exposure Permit (REP) 23088, which HP developed using procedure S0123-VII-7.18. REP 23088 allowed work on a Unit 2 system where the estimated potential exposure was 6.0 person-rem, and identified critical radiological work steps in accordance with procedure S0123-VII-7.18. The inspector had no concerns with this new procedure.

d. External and Internal Exposure Control

The inspector observed radiological work controls inside the Unit 2 Containment Building for the following jobs:

- \* Reactor vessel head removal
- \* Fuel transfer tube flange removal
- \* In-core instrument (ICI) cut-up
- \* Pressurizer instrument tap nozzle repair

HPTs maintained adequate control over workers, performed radiation surveys, and collected contamination smears and air samples. Additionally, the licensee used equipment such as video cameras, remote radiation survey meters, and portable continuous air monitors to augment routine HP coverage. Based on the inspector's observations of work in the reactor cavity area, it was concluded that external and internal exposure control practices were adequate.

e. Surveys, Contamination Controls, and Control of Radioactive Material

(1) Surveys

(a) Radiation Protection During the Hydrogen Peroxide Injection

HP's efforts to control personnel exposures and track dose rates during the hydrogen peroxide injection were reviewed by the inspector. The hydrogen peroxide injection was performed to lower dose rates of reactor systems during the U2C7 outage. Special instructions given to the HP staff on May 24, 1993, emphasized that normal radiation surveys, postings, and plant radiological conditions could be changed by transient radiation conditions. HP operations established the following controls:

- \* Areas normally posted as Radiation Areas were posted as High Radiation Areas, and some areas that were not normally posted were posted as Radiation Areas.
- \* Operations was required to notify HP when the plant was in the shutdown cooling (SDC) mode, which was the mode of operation used during the hydrogen peroxide injection.
- \* HP surveys in affected areas were performed each shift for a seven day period.

HP engineering installed five radiation detectors along SDC system piping to measure and record dose rate changes at 15 minute intervals during the hydrogen peroxide injection. On June 6, 1993, dose rates in the Containment Building on the 17 feet level were 117 to 383 millirem/hour between 8:37 AM and 9:52 AM, and in the Safety Equipment Building on the 15 feet level dose rates were 33 to 352 millirem/hr between 4:57 AM and 9:12 AM.

The inspector concluded that the licensee satisfactorily performed radiation surveys, posted radiation areas, and controlled access during the hydrogen peroxide injection and SDC operations.

(2) Contamination Controls(a) Clean Trash Sorting

The inspector observed an HPT operating the waste sorting table and waste bag monitor. The waste sorting table had 18 plastic scintillation detectors that could reliably detect radioactivity (RDA) down to 3.77 nanoCuries (nCi) per trash bag. However, the inspector observed that the sorting table detected 2 nCi on one bag. HP re-verified the positive counts, and moved the contaminated bag to the solid radwaste container. Sorted trash was placed into a bag and counted by a waste bag monitor which had an RDA of 68 nCi. The inspector examined the quality control and background charts for the bag monitor and sorting table.

A SONGS position paper "Clean Trash Sorting Systems," dated May 6, 1992, was reviewed by the inspector, and further discussed with HP engineering.

Based on the inspector's review of the position paper, observations of the clean trash sorting operation, and discussions with HP engineering, it was concluded that the licensee's program was sound and showed a reasonable effort to detect potential radioactivity before it could be released. The inspector had no concerns in this area.

(b) Personnel Contamination Prevention

The inspector observed personnel working in contaminated areas and performing contamination surveys using "Friskers" and installed personnel monitors (IPM-8s). The licensee's Personal Contamination Incidents Reports, Noble Gas/Contamination, and Material Release Logbooks were reviewed by the inspector. The Logbooks were satisfactorily maintained, and no concerns were identified. During tours in the Containment Building the inspector noted effective contamination control practices around hot particle control zones, and particularly around and in the refueling cavity and pressurizer. An individual who reached into a hot particle zone at the reactor head storage area was promptly corrected by the refueling supervisor and HP.

The inspector had no further concerns in this area.

(3) Facility Tours

The inspector performed independent radiation measurements during Units 1, 2 and 3 operations. These measurements were taken with an NRC ion chamber survey instrument (Serial No. 8985, calibration due September 12, 1993). Radiation postings were conspicuous and alerted workers to the area radiological conditions. The inspector toured the radwaste storage areas, and noted that packaged radwaste containers were positioned to minimize area dose rates.

The inspector concluded that the licensee's radiation protection program met its safety objectives during the U2C7 refueling outage. No violations or deviations were identified.

4. Radioactive Waste Treatment, and Effluent and Environmental Monitoring (84750)

(a) Unit 2 and 3 Waste Water

Unit 2 and 3 waste water systems were inspected for compliance with 10 CFR 20.106 limits on radioactive releases to unrestricted areas and the Updated Final Safety Analysis Report (USFAR) Chapter 11 system description. The inspector found various hoses temporarily routed between Unit 2 and 3 Turbine Building sumps, and from the Unit 3 Containment Building tendon gallery sump to non-radioactive and radioactive yard drains. These findings were discussed with an HP manager and effluents supervisor. HP management reported that the hoses were installed in accordance with the SONGS temporary modification and housekeeping procedures. The hoses in the Turbine Building sumps provided seal water to pumps, and drainage for systems. The effluents supervisor reported that hoses and pumps were installed in the tendon gallery sump to remove groundwater that had seeped in. Groundwater was monitored for radioactivity because it could be processed as liquid radioactive waste. No radioactivity had been detected. A Design Change Package (DCP) that the inspector reviewed will be implemented in 1994 to reduce the ground water in-leakage.

The inspector had no further concerns in this area.

(b) Unit 3 Steam Generator Tube Leak Monitoring

In May 1993 the licensee reported increasing radioactivity being measured by the air ejector radiation monitor RE-3-7870. Based on further radiochemistry sample analysis, the licensee determined that a Unit 3 steam generator tube leak existed. Discussions were held between the inspector and the Unit 2/3 chemistry supervisor on the methods being used to quantify the steam generator tube leak rate. The inspector examined the following:

- \* S0123-III-2.22.23, "Steam Generator Tube Leak Procedure"
- \* RE-3-7870 Radioactivity Data Trend from May-June 1993
- \* Unit 3 Primary to Secondary Leak Rate Trend May-June 1993
- \* Chemistry Data for Leak Rate Determination June 1993

The inspector compared the primary to secondary system (Reactor Coolant to Steam generator) leakage limits and radioactivity limits found in Technical Specification (TS) 3.4.5.2(c) and TS 3.7.1.4 to the existing tube leakage data.

At the time of this inspection, the peak radioactivity measured by RE-3-7870 was  $6.5E-3$  microCuries/cubic centimeter ( $\mu\text{Ci/cc}$ ). Applying the methods in procedure S0123-III-2.22.23, the average steam generator tube leak rate was 12 gallon/day (GPD). Licensee methods for calculating the steam generator leak rates compared Xe-133 and Xe-135 concentrations detected in the secondary steam jet air ejector system to the primary reactor coolant system.

Based on the inspector's review of the data, method, and procedure it was concluded that the licensee was in compliance with TS 3.4.5.2(c), TS 3.7.1.4, and procedure S0123-III-2.22.23. The inspector had no further concerns in this area. No violations or deviations were identified.

5. Solid Radwaste Management and Transportation of Radioactive Materials (86750)

On May 26, 1993, the NRC amended the Certificate of Compliance (CofC) No. 9208, to revision 6 for the Model No. 10-142 solid radwaste (SRW) shipping package. A specific change to CofC No. 9208 was to limit shipping transuranic materials to Type A quantities, and incorporate 10 CFR 71.53 limits on the amount of fissile material that could be packaged for shipment in a Model 10-142 container. The inspector verified that SONGS received the latest CofC No. 9208, and made procedure changes where applicable. No shipments of SRW had transuranic and fissile material in excess of Type A quantities and 10 CFR 71.53 limits. Nor had SONGS shipped SRW in Model 10-142 shipping packages in 1993. SRW shipments in 1992 made under CofC No. 9208, Revision 5 were reviewed by the inspector to determine compliance with the limitation on the quantity of fissile material that could be packaged.

The inspector concluded that the licensee was in possession of the latest CofC for Model 10-142 SRW containers, and the appropriate procedures were being used. The inspector had no further concerns in this area. No violations or deviations were identified in this area.

6. Exit Meeting

The inspector met with the licensee representatives denoted in Section 1 at the conclusion of the inspection on June 18, 1993. The scope and findings of the inspection were summarized. No violations or deviations

were identified. At the conclusion of the meeting, the licensee did not identify as proprietary any material provided to or examined by the inspector.