



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
611 RYAN PLAZA DRIVE, SUITE 400  
ARLINGTON, TEXAS 76011-4005**

July 5, 2006

EA-06-149  
NMED 060138

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 050-00206/06-011

Dear Mr. Rosenblum:

This refers to the inspection conducted on May 8-11, 2006, at Southern California Edison Company's (SCE) San Onofre Nuclear Generating Station (SONGS), 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. Additional inspection and review was conducted from the NRC Region IV office and a final exit briefing was presented telephonically to members of your staff on June 26, 2006. The enclosed report presents the results of that inspection.

This inspection included a followup on an SCE transportation event reported on February 23, 2006 involving a small quantity of low specific activity (LSA) radioactive material which leaked from its transport container while in transit to a waste disposal site Utah. Proper packaging of radioactive material for transportation on public highways is important to the protection of public health and safety and the environment. Based on the results of this inspection, three apparent violations were identified. The apparent violations involved SCE's failure to: 1) ensure by examination or appropriate tests that the top discharge valve of the package containing licensed material was properly closed and sealed, 2) load both intermodal portable tanks to the required filling density, and 3) maintain, fill, and close the package used for shipment of radioactive material, so that under conditions normally incident to transportation that there will be no identifiable release of hazardous materials to the environment. The NRC recognizes your staff's prompt corrective actions to remediate the spilled radioactive material. These actions, combined with the low specific activity of the material shipped, ensured that there was no significant risk to members of the public in unrestricted areas. However, it is our understanding that a more thorough assessment of the packaging before shipment may have prevented the leakage.

These violations are being considered for escalated enforcement action in accordance with the NRC Enforcement Policy. The current Enforcement Policy is included on the NRC's Web site at [www.nrc.gov](http://www.nrc.gov); select **What We Do, Enforcement**, then **Enforcement Policy**." The circumstances surrounding the apparent violations, the significance of the issues, and the need for lasting and effective corrective actions were discussed with your staff during the final exit briefing. As a result, it may not be necessary to conduct a predecisional enforcement conference in order to enable the NRC to make an enforcement decision. Since the NRC has not made a final determination in this matter, no Notice of Violation is being issued for these inspection findings at this time. In addition, please be advised that the number and characterization of apparent violations described in the enclosed inspection report may change as a result of further NRC review.

In addition, since SONGS-1 has not been the subject of escalated enforcement actions within the last two years, and based on our understanding of your corrective actions to date, a civil penalty may not be warranted in accordance with Section VI.C.2 of the Enforcement Policy. The final decision will be based on your written confirmation to us that corrective actions are implemented and are being taken.

Before the NRC makes its enforcement decision, we are providing you an opportunity to either (1) respond to the apparent violations addressed in this inspection report within 30 days of the date of this letter or (2) request a predecisional enforcement conference. If a conference is held, it will be open for public observation, and the NRC will issue a press release to announce the conference. Please contact Dr. D. Blair Spitzberg at (817) 860-8191 within 7 days of the date of this letter to notify the NRC of your intended response.

If you choose to provide a written response, it should be clearly marked as a "Response to Apparent Violations in Inspection Report 050-00206/06-011; EA-06-149 and should include: (1) the reasons for the apparent violations, or, if contested, the basis for disputing the apparent violations, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate response is not received within the time specified or an extension of time has not been granted by the NRC, the NRC will proceed with its enforcement decision or schedule a predecisional enforcement conference.

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 any) 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 <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.

Southern California Edison Co.

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Should you have any questions concerning this inspection, please contact Dr. D. Blair Spitzberg at (817) 860-8191 or Mr. Robert J. Evans, Senior Health Physicist, at (817) 860-8234.

Sincerely,

*/RA/*

Leonard D. Wert, Director  
Division of Nuclear Materials Safety

Docket No.: 050-00206

License No.: DPR-13

Enclosure:

NRC Inspection Report Number 050-00206/06-011

cc w/enclosures:

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Southern California Edison Co.

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- FCDB File

SUNSI Review Completed: RJE ADAMS:  Yes  No Initials: RJE  
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**ENCLOSURE**

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket No: 050-00206

License No: DPR-13

Report No: 050-00206/06-011

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: May 8 - 11, 2006 (onsite)  
May 15 - June 26, 2006 (RIV Office followup)

Inspectors: Robert J. Evans, P.E., C.H.P., Senior Health Physicist  
Fuel Cycle & Decommissioning Branch

Beth (Schlapper) Alferink, Health Physicist  
Fuel Cycle & Decommissioning Branch

Approved By: D. Blair Spitzberg, Ph.D., Chief  
Fuel Cycle & Decommissioning Branch

Attachment: Supplemental Inspection Information

## **EXECUTIVE SUMMARY**

### San Onofre Nuclear Generating Station, Unit 1 NRC Inspection Report 050-00206/06-011

This inspection was a routine, announced inspection of decommissioning activities being conducted at San Onofre Nuclear Generating Station, Unit 1 facility. Areas inspected included safety reviews, design changes, and modifications; self-assessments, auditing, and corrective action; decommissioning performance and status review; occupational radiation exposure; and solid radioactive waste management and transportation of radioactive materials.

#### Safety Reviews, Design Changes, and Modifications at Permanently Shutdown Reactors

- The licensee's safety review and design change program was in compliance with 10 CFR 50.59 requirements (Section 1).

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

- The licensee conducted self-assessments and audits in accordance with quality assurance program requirements (Section 2).

#### Decommissioning Performance and Status Review at Permanently Shutdown Reactors

- The licensee was controlling the radiologically restricted area in accordance with regulatory requirements. The licensee took actions to increase the efficiency of containment demolition work including installation of a material handling system and use of super-sacks (Section 3).

#### Occupational Radiation Exposure

- The licensee had an occupational exposure monitoring program that effectively monitored internal and external doses to radiation. No individual exceeded the regulatory limit for total effective dose equivalent exposures during 2005. The licensee's as low as reasonably achievable (ALARA) program was determined to be effective (Section 4).

#### Transportation of Radioactive Materials

- The inspectors reviewed the circumstances associated with the leaking LSA-I bulk liquid radioactive waste shipment transported from SONGS-1 to the Energy Solutions, Clive, Utah facility reported on February 23, 2006. Three apparent violations of NRC and U.S. Department of Transportation regulations 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 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.

Work completed since the previous inspection included segmentation and removal of the three hold-up tanks, removal and disposal of spent fuel pool and component cooling water system support equipment, removal and disposal of components from the radwaste building, installation and testing of the containment material handling system, and backfilling and compacting of soil in the former turbine building area.

Work in progress during the inspection included demolition and removal of concrete from within the containment sphere, removal of the spent fuel pool liner, removal of remaining equipment in the lower level of the radwaste building, decontamination of the radwaste building floors, and installation of electrical and instrumentation connections for the new yard sump. Equipment still in service included two building fans, two radiation monitors and one dilution pump. Further, one temporary dilution saltwater pump remained in service to provide dilution flow for any future liquid discharges to the environment.

Activities planned for the near future include placing the new yard sump into service and implementing Phase II dewatering operations. Phase II dewatering includes three dewatering wells to support demolition of the radwaste and spent fuel buildings. The Phase II dewatering flow rate is designed to be within the capacity of the new sump, approximately 2600 gpm.

## **1 Safety Reviews, Design Changes, and Modifications at Permanently Shutdown Reactors (37801)**

### **1.1 Inspection Scope**

The purpose of this portion of the inspection was to ascertain whether design changes, tests, experiments, and modifications were effectively reviewed, conducted, managed, and controlled during plant decommissioning in accordance with 10 CFR 50.59.

### **1.2 Observations and Findings**

Regulation 10 CFR 50.59 addresses the change control process, a process used by the licensee to determine if a proposed change to the facility, procedures, tests, or experiments is subject to a license amendment and NRC approval. The process is implemented through site procedure SO123-XV-44, "10 CFR 50.59 and 72.48 Program." This procedure provided instructions for both initial screening and subsequent full evaluation, if necessary, of facility or procedure changes to confirm if the

licensee can implement these changes without NRC approval. The program was a common program for the two operating units and the decommissioning unit.

The inspectors reviewed randomly selected 10 CFR 50.59 screens of various facility changes and found that all screens had been completed in accordance with procedural requirements. The screens were independently reviewed by a person other than the preparer. The inspectors found that the screens provided sufficient summary information to explain what was being changed and why. Furthermore, the responses to the screening criteria adequately addressed the criteria questions from a technical perspective. No full 10 CFR 50.59 evaluations had been performed for Unit 1 changes since the last inspection, and the inspectors did not identify any 10 CFR 50.59 screens that should have been processed as full evaluations.

The inspectors noted that the licensee was considering the submittal of a license amendment to decommission and free-release the off-shore cooling water system prior to the 10 CFR Part 50 license termination. The inspectors discussed the proposed action with the licensee, including the timetable for submittal of the radiological survey plan, license amendment package, and supporting documentation to the NRC. The review of any proposed change to the license or partial site release will be conducted by the NRC following formal submittal of the survey plan or license amendment to the NRC.

### 1.3 Conclusions

The licensee's safety review and design change program was in compliance with 10 CFR 50.59 requirements.

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

### 2.1 Inspection Scope

The objective of this portion of the inspection was to evaluate the effectiveness of licensee controls in identifying, resolving, and preventing issues that degrade safety or the quality of decommissioning.

### 2.2 Observations and Findings

The licensee conducted several different types of self-assessments to help to ensure compliance with regulatory requirements and license conditions. The self-assessments included use of onsite review committees, internal reports, and leadership observations. The requirements for some self-assessments are provided in the Quality Assurance (QA) Program Topical Report SCE-1-A, Amendment 22.

The Nuclear Safety Group provided independent review of selected activities and is required by Section 17.2.20.4 of the QA Program Topical Report. The Nuclear Safety Group's quarterly reports for the third and fourth quarters of 2005 were reviewed during the inspection. Unit 1 decommissioning activities reviewed by the Nuclear Safety Group

included conduct of QA surveillances and compliance with 10 CFR 50.59 requirements. No new potential nuclear safety hazards were identified by the committee.

Routine QA audits are required by Section 17.2.18.2 of the QA Program Topical Report. Program areas audited on a biennial basis included Unit 1 license compliance, quality assurance programs, training, corrective action programs, and fire protection. Several recent program audits and surveillances were reviewed, including surveillances of the health physics program. The licensee was found to be conducting these reviews in accordance with QA program requirements, and these reviews provided useful information to licensee management.

The inspectors reviewed the 2006 master audit schedule, and compared the schedule to the required audits specified in the applicable site procedure. All required audits and the audit frequencies were correctly implemented into the 2006 master schedule. In other words, all QA audits had been scheduled and were being completed at the required frequency.

Unit 1 decommissioning project self-assessment reports were developed and issued quarterly. The inspectors reviewed the reports for the fourth quarter of 2005 and the first quarter of 2006. The reports provided critical analyses of performance indicators and trends. The reports documented a reduction in the number of incidents caused by personnel error as a positive trend. Areas for improvement, as noted in the reports, included delays in selected decommissioning projects. In the past few months, the licensee took specific actions to address the delay in the containment demolition work schedule. These actions appear to be successful, and the licensee currently expects to meet the August 2006 projection completion deadline.

The licensee used leadership observations to provide direct oversight of decommissioning activities. The licensee believed that the leadership observation data could be used as a tool for early identification of potentially unsafe behavior trends. The inspectors observed a licensee representative conducting a leadership observation during the inspection. The work being observed was the handling and loading of radioactive material into railcars for shipment to at an out-of-state disposal site. The leadership observation included personnel safety, rigging and health physics activities. The observations were documented in two Leadership Observation Program reports.

### 2.3 Conclusions

The licensee conducted self-assessments and audits in accordance with QA program requirements.

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

#### **3.1 Inspection Scope**

The inspectors 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. Site Tours/Control of Decommissioning Activities**

The inspectors conducted tours of the Unit 1 facility to observe radiological area postings and boundaries. Access to the restricted and contaminated areas was controlled by radiation caution signs, barricades, boundary lines, locked doors, and locked gates. Radiological boundaries were well defined and postings were up-to-date in all areas.

The inspectors conducted independent radiological surveys in the radiologically restricted area using a Ludlum Model 2401-P survey meter (NRC No. 21190G, calibration due date 09/23/06). No abnormal radiological survey results were observed, and all ambient gamma exposure rate measurements were in agreement with posted radiation levels.

Recently, the licensee drained about 70 gallons of residual liquid from the bottom of the spent fuel pool. The liquid was drained into 55-gallon drums and analyzed for radioactive constituents. Radioactive cobalt-60 and cesium-134 and -137 were identified in the liquid. During the inspection, the liquid wastes were still being stored in the Unit 1 restricted area. The licensee has not formally decided how to dispose of the liquid. The licensee had the option of shipping to a waste processor or solidifying and shipping the resulting solid to an offsite disposal site.

Work in progress during the inspection included the physical removal of equipment. Removal of the steel spent fuel pool liner was in progress. Most of the spent fuel pool cooling and cleanup system had been removed with the exception of some system filters. In summary, the licensee continued to make progress in decommissioning of the Unit 1 site.

##### **b. Demolition of Containment**

In recent months, the licensee experienced delays with the demolition of containment. The licensee addressed the delays by changing primary contractors, installing a material handling system, and using super-sacks for loading of concrete debris. Further, the licensee added a second work shift in an effort to reduce the scheduling delay.

The containment debris consists of concrete rubble and metal waste. The licensee recently installed a material handling system to facilitate removal of debris from the

containment sphere. During March 2006, the licensee began using 22,000-pound capacity super-sacks for concrete rubble. The licensee continued to use intermodal containers for the metal debris. Heavy equipment was used to demolish the containment interior. The debris was loaded into either super-sacks or intermodals.

The inspectors observed the licensee conducting containment demolition and loading of debris into transport containers. The licensee conducted these operations in an orderly fashion with an emphasis on safety. The material handling system was used to efficiently move the super-sacks and intermodals into and out of containment. Once removed from containment, the debris in super-sacks was loaded directly into rail cars for shipment to a waste disposal facility located in Utah. Intermodals were loaded on rail cars or shipped to Utah via truck.

### 3.3 Conclusions

The licensee was controlling the radiologically restricted area in accordance with regulatory requirements. The licensee took actions to increase the efficiency of containment demolition work including installation of a material handling system and use of super-sacks.

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

### 4.1 Inspection Scope

The inspectors reviewed occupational radiation exposures for calendar year 2005 to verify whether they met the limits specified in 10 CFR Part 20. This review focused on the licensee's internal and external occupational radiation exposure monitoring programs as well as the ALARA program.

### 4.2 Observations and Findings

Occupational exposures consisted of both external and internal exposures. To measure external exposures, plant personnel entering the radiologically restricted areas were assigned both thermoluminescent dosimeters (TLDs) and direct reading electronic dosimeters. The licensee maintained records of external exposures based on electronic dosimeters until the TLD results were available. Whole body counting and in vitro bioassays were used to detect the presence of radioactive material in the body. An internal exposure assessment was conducted if a whole body count or a bioassay identified internal deposition of radioactive material. Internal doses, if any, were assigned as part of the internal exposure assessment process.

The inspectors reviewed the Unit 1 occupational exposure records for 2005. The licensee issued dosimetry to measure for both gamma and neutron doses during 2005. Neutron doses were anticipated because of spent fuel handling operations.

During 2005, 1591 TLDs were issued to measure gamma doses, down slightly from 2004 (1623 TLDs). Of that number, 198 individuals received a measurable gamma dose. The combined total effective dose equivalent for all individuals with a measurable

gamma dose was 20.624 person-rem, up from 2004 (14 person-rem) and down from 2003 (34 person-rem). In addition, workers were monitored for neutron doses. During 2005, 30 individuals received a measurable neutron dose. The total neutron dose was 0.884 person-rem, slightly lower than the collective neutron dose for 2004 (1.168 person-rem).

During 2005, the highest total effective dose equivalent to an individual working in Unit 1 was 0.63 rem, up from 2004 (0.494 rem). The highest neutron dose for 2005 was 0.059 rem. No individual exceeded the regulatory limit of 5 rem. The reduction in collective doses was a result of a reduction in the source term (amount of radioactive material present in Unit 1) and improvements in both job planning and ALARA practices.

During 2005, there were four personnel contamination events. None of these contamination events resulted in assignment of internal doses to an individual. Therefore, there were no internal exposures to Unit 1 personnel in 2005, down from four individuals in 2004.

The inspectors reviewed the licensee's ALARA program. Overall, the licensee had a strong ALARA program in place for Unit 1. Performance indicators were tracked and evaluated, including ALARA exposure goals. The exposure goal for 2005 was 21.5 person-rem. The ALARA goal for 2006 is 25.5 person-rem based on the work activities planned for the calendar year. The three work projects with the highest potential for exposure are fuel storage building liner removal, radwaste systems and remediation and health physics functions.

The inspectors noted that the licensee conducted an assessment of electronic dosimeter results versus TLD results. The licensee conducted this assessment using industry-sponsored guidance.

#### 4.3 Conclusions

The licensee had an occupational exposure monitoring program that effectively monitored internal and external doses to radiation. No individual exceeded the regulatory limit for total effective dose equivalent exposures during 2005. The licensee's ALARA program was determined to be effective.

### **5 Transportation of Radioactive Materials (86750)**

#### 5.1 Inspection Scope

The purpose of this portion of the inspection effort was to followup on the NRC Event Notification regarding the leaking low specific activity (LSA)-1 bulk liquid radioactive waste shipment reported on February 23, 2006, and to determine whether the licensee properly packaged and shipped the radioactive materials involved and to determine whether transportation activities were conducted in compliance with applicable NRC and U.S. Department of Transportation regulations.

#### 5.2 Observations and Findings

As a followup to an NRC Event Notification (EN # 42370) reported on February 23, 2006, the inspectors reviewed the circumstances and events surrounding the leaking LSA-1 bulk liquid radioactive waste shipment from the SONGS facility to Energy Solutions of Clive, Utah, for processing and disposal.

During the Unit 1 decommissioning process, SONGS generated radioactive liquids that required offsite treatment and disposal. SONGS contracted with Energy Solutions of Clive, Utah, to provide a portable tank that met the specifications of 49 CFR 172.101 under the proper shipping name and description of, Radioactive material, low specific activity, N.O.S. Column #7 special provisions T5. The tank supplied was documented by Energy Solutions to meet these requirements including all pressure testing. Energy Solutions also subcontracted with Triad Trucking as the carrier of the shipment from the SONGS facility to Energy Solutions.

#### 5.2.a Summary of Event

On February 22, 2006, SONGS loaded LSA-I bulk liquid radioactive waste into two intermodal (IM) portable tanks, each tank having a capacity of 6,340 gallons. Triad Trucking, the carrier, requested that SONGS load the portable tanks with 4500 gallons of liquid because of a concern, by the carrier, that if loaded to greater than 4500 gallons, the truck would exceed applicable DOT weight restrictions.

10 CFR 71.5(a) requires that a licensee who transports licensed material outside the site of usage, as specified in the NRC license, or where transport is on public highways, or who delivers licensed material to a carrier for transport, shall comply with the applicable requirements of the DOT regulations in 49 CFR parts 107, 171 through 180, and 390 through 397, appropriate to the mode of transport. In particular, 49 CFR 173.32(f)(5) requires, in part, that an IM portable tank having a volume greater than 7,500 L (1,980 gallons) may not be loaded to a filling density of more than 20% and less than 80% by volume. (The intermodal portable tanks did not contain partitions or surge plates which would make this requirement not applicable.) However, SONGS loaded each of the two IM portable tanks with 4,500.7 gallons (17.037 m<sup>3</sup>). Based on the 6,340 gallon capacity of each tank, this represents a filling density of 71% by volume which does not comply with the 80% filling density specified in 49 CFR 173.32(f)(5). This failure was identified as an apparent violation of 10 CFR 71.5(a) and 49 CFR 173.32 (APV 050-00206/06-02).

The driver of one of the two shipments (later to be found leaking) performed walk-around inspections of the truck and portable tank twice at vehicle scales in Ontario, California and at a fuel stop north of Las Vegas, Nevada, as required by 49 CFR 392.9. The driver did not observe any leakage of the package during these inspections. On February 22, 2006 at 10:00PM (MST), at the truck stop in Parowan, Utah, the driver again performed the walk-around inspection and observed wetness beneath the truck. The driver then moved the truck from the gasoline pumping area to a remote area of the parking lot. The driver notified the carrier's terminal manager who arrived onsite at 1:00AM (MST) on February 23, 2006. The manager identified the location of the leak as the tank discharge compartment, removed the Energy Solutions security seal, and stopped the leak by releasing pressure on the tank. The terminal manager contacted Energy Solutions and the SONGS Fire Department (the designated emergency contact

on the shipping papers) at 3:30AM (PST) on February 23, 2006. No problems were reported with the second portable tank shipment.

In order to stop the leak from the portable tank, the terminal manager had to climb the access ladders to the top of the tank and open the top discharge valve compartment. These areas had liquid low-level radioactive waste present on them. Because of this, there was personnel contamination on the terminal manager during the initial response to stop the leak of radioactive liquid from the tanker. The personnel contamination was limited to the manager's clothing and not the underlying skin.

During transport activities, the concentration of radioactive material permitted in an LSA-I bulk liquid package is so low that were leakage to occur, it is highly unlikely to result in a significant radiation exposure to a member of the public. However, in this case the leak resulted in some low-level contamination that could be safely removed. At 12:50 PM (PST) on February 23, 2006, SONGS staff arrived at the truck stop to perform radiological surveys. The surveys identified two distinct areas of low-level contamination on the ground, one at the gasoline pumps and the second at the area where the truck had been relocated. Both areas were roped off and subsequently decontaminated to background levels. SONGS estimated that approximately 5-gallons of liquid or approximately 0.08 milliCuries total activity leaked from the portable tank.

On February 24, 2006, SONGS staff commenced remediation of the truck stop, including removal of asphalt and underlying soil. The asphalt and soil was disposed of as low-level waste at Energy Solutions. The highest level of contamination located on the ground in the remote parking area was 33,000 net-counts per minute ( $\beta$ ,  $\gamma$ ) using direct frisk; the measured dose rate in this same area was 0.4 mrem/hr at 1-foot from ground surface or 1 mrem/hr on contact with the ground surface. This measured dose rate is less than the radiation dose limit from external sources for individual members of the public of 2 mrem/hr in any unrestricted area as specified in 10 CFR 20.1301(a)(2).

On February 24, 2006, SONGS and the Utah Division of Radiation Control performed direct frisk surveys of the highway exit ramp prior to the truck stop, and the stop sign area located on this exit ramp. This area was deemed the area with the highest potential for contamination prior to the truck stop. These surveys showed no detectable activity above background. Also, on February 24, 2006, the portable tank was decontaminated and sent to Energy Solutions without incident following removal of the valve that was determined to be leaking. The valve was replaced with a blind flange, and the original valve and bolts were packaged inside the discharge pump cover and security sealed by SONGS personnel. In addition, Energy Solutions, the waste disposal site, indicated that the volume of liquid removed from the transportation package when it was emptied was in close agreement with the initial volume shipped, further indicating that the leakage volume was small. The NRC believes that this information, combined with the prior vehicle checks showing no leakage in California and Nevada, provides a sufficient basis to conclude that little or no leakage occurred prior to the truck's arrival at the truck stop in Parowan, Utah.

Remediation was completed by SONGS on February 26, 2006 and the Utah Division of Radiation Control completed a sample and survey review on February 27, 2006. Backfilling, compaction and concrete pour at the truck stop were completed on March 1,



2006.

10 CFR 71.5(a) requires that a licensee who transports licensed material outside the site of usage, as specified in the NRC license, or where transport is on public highways, or who delivers licensed material to a carrier for transport, shall comply with the applicable requirements of the DOT regulations in 49 CFR parts 107, 171 through 180, and 390 through 397, appropriate to the mode of transport. In particular, 49 CFR 173.24 (b) requires, in part, that each package used for the shipment of hazardous materials be designed, constructed, maintained, filled, its contents so limited, and closed, so that under conditions normally incident to transportation that there will be no identifiable release of hazardous materials to the environment. SONGS failed to use a package that was maintained, filled and closed, so that under conditions normally incident to transportation there was no identifiable release of hazardous materials to the environment. This failure was identified as an apparent violation of 10 CFR 71.5(a) and 49 CFR 173.24 (APV 050-00206/06-03).

#### 5.2.b Package Description

The package used for this LSA-1 bulk liquid radioactive waste shipment was a Eurotainer LOGU 164060-1 with no bottom penetrations procured by SONGS through a contract with Energy Solutions. Although the portable tank was originally manufactured with bottom openings, these had been previously welded shut per DOT instructions and the pressure test was performed on February 5, 2005 following these bottom welds. The next pressure test was due May 19, 2006. The Eurotainer LOGU 164060-1 was designed with a standpipe that extended from the discharge valve to the bottom of the tank. Compressed air at 25 psi is used to remove the contents of the tank. Energy Solutions maintains two different designs of discharge valves on the Eurotainers at the Clive, Utah, facility with different lengths of fasteners, dependent on the design. To release the containers for unrestricted use after a shipment, the containers must be decontaminated. Decontamination requires disassembly of the valve and removal of the valve and standpipe from the tank. Energy Solutions records indicate that the LOGU 164060-1 tank was released to the unrestricted area of the site in September 2005. No additional pressure or leak tests were performed.

#### 5.2.c Cause of Event

SONGS-1 performed a root cause evaluation, with input from Energy Solutions, for the valve assembly pressure boundary issue. Energy Solutions determined that at some time following the last unloading of material at the Clive facility that occurred on April 25, 2005, two of the bolts for the discharge valve assembly at the top of the tank were replaced with longer bolts (3.5 inch). The longer bolts bottomed out on the standpipe mount, resulting in a condition such that after the tank was filled with liquid, there was leakage at the valve body/gasket interface after the slight (<3 psi) atmospheric pressure change from sea level at the SONGS facility to approximately 6,000 feet at the Parowan, Utah, truck stop. The cause of the event was a seal deficiency as a result of using bolts that were not acceptable per the design drawings provided by the tank manufacturer, Eurotainer. Namely, two 3 inch bolts, the correct size, and two 3.5 inch bolts (incorrect size) were used to secure the valve to the standpipe. The 3.5 inch bolts bottomed out in the valve assembly when torque was applied, and therefore did not

provide an adequate seal for the gasket.

10 CFR 71.5(a) requires that a licensee who transports licensed material outside the site of usage, as specified in the NRC license, or where transport is on public highways, or who delivers licensed material to a carrier for transport, shall comply with the applicable requirements of the DOT regulations in 49 CFR parts 107, 171 through 180, and 390 through 397, appropriate to the mode of transport. In particular, 49 CFR 173.475 requires, in part, that before each shipment of any Class 7 (radioactive) materials package, the offeror must ensure by examination or appropriate tests, that the packaging is proper for the contents to be shipped. In addition, 49 CFR 173.475(f) requires, in part, that each closure, valve, or other opening of the containment system through which the radioactive content might escape is properly closed and sealed. Prior to the shipment of liquid radioactive LSA material on February 22, 2006, SONGS failed to ensure by examination or appropriate tests that the top discharge valve of a package containing licensed material was properly closed and sealed. As described in Section 5.2.d below, contractor performance deficiencies contributed to the event. The gasket was not properly seated due to incorrect bolt sizes, and due to the incorrect bolt sizes on the top discharge valve assembly, the package was therefore not properly closed and sealed. This failure was identified as an apparent violation of 10 CFR 71.5(a) and 49 CFR 173.475 (APV 050-00206/06-01).

#### 5.2.d Contractor Performance Issues

During NRC's review of this transportation incident, the following potential performance deficiencies were identified, associated with Energy Solutions (Energy Solutions is not an NRC licensee):

SONGS personnel were not informed that decontamination and maintenance activities were performed on the Eurotainer LOGU 164060-1 subsequent to the pressure test performed on February 5, 2005. Any removal of the standpipe or valve assembly during decontamination and maintenance would invalidate the pressure and leak tests performed on the tank and would require retesting to verify pressure boundary integrity. The Energy Solutions root cause evaluation states that there were four containers scheduled for decontamination and subsequent unrestricted release in September 2005. The containers, including the LOGO 164060-1, were removed from the restricted area on September 30, 2005.

The Eurotainer LOGU 164060-1 supplied to SONGS, as part of the contracting process, required the vendor to provide a portable tank that met the specifications of 49 CFR 172.101 under the proper shipping name and description of, Radioactive material, low specific activity, N.O.S. Column #7 special provisions T5. The tank supplied was documented by Energy Solutions to meet these requirements including all pressure testing. The Eurotainer LOGU 164060-1 supplied to SONGS was not capable of fulfilling its designed function within the contract specifications and requirements.

The substitution of bolts is not clarified in the Energy Solutions root cause evaluation, but the evaluation does state that the tank did not leak during its last use. Energy Solutions security sealed the tank prior to it leaving the Clive, UT facility, and the seal was intact when it arrived at the SONGS facility. SONGS retained Energy Solutions

personnel to perform inspections on the container, and therefore did not remove the security seal for the discharge valve compartment. This security seal was not removed until Parowan, Utah, when it was discovered that the tank was leaking. The valve and associated bolts were bagged at the truck stop by SONGS personnel and placed within the discharge valve assembly cover. A security seal was then placed on this cover by SONGS personnel prior to the tank departing Parowan, Utah, for the Energy Solutions facility in Clive, Utah. The Energy Solutions root cause analysis proposed corrective actions included disassembly of all containers at the Clive facility to verify bolt size/length configuration in accordance with the manufacturer's drawings and perform pressure tests on the tanks. This root cause analysis was provided to SONGS for inclusion in their root cause evaluation for the package pressure boundary issue.

### 5.3 Conclusions

Three apparent violations of NRC and DOT regulations were identified while reviewing the leaking LSA-I bulk liquid radioactive waste shipment transported from SONGS-1 to Energy Solutions of Clive, UT that occurred February 22 to 23, 2006. The three apparent violations are summarized below.

Although it was determined that actual health and safety consequences to the public due to the leaking tank were minimal and there was limited disruption of the use of the truck stop in Parowan, Utah, due to the event, the NRC and U.S. Department of Transportation are concerned about the breach of the package and the subsequent loss of contents in the public right-of-way. The regulations in 10 CFR 71.5 and 49 CFR are in place to ensure that there are not performance deficiencies that could lead to a breach of package and an uncontrolled loss of contents when shipping liquid radioactive waste.

10 CFR 71.5(a) requires that a licensee who transports licensed material outside the site of usage, as specified in the NRC license, or where transport is on public highways, or who delivers licensed material to a carrier for transport, shall comply with the applicable requirements of the DOT regulations in 49 CFR parts 107, 171 through 180, and 390 through 397, appropriate to the mode of transport.

1. 49 CFR 173.475 requires, in part, that before each shipment of any Class 7 (radioactive) materials package, the offeror must ensure by examination or appropriate tests, that the packaging is proper for the contents to be shipped. In addition, 49 CFR 173.475(f) requires, in part, that each closure, valve, or other opening of the containment system through which the radioactive content might escape is properly closed and sealed.

Prior to the shipment of liquid radioactive LSA material on February 22, 2006, SONGS did not ensure by examination or appropriate tests that the top discharge valve of a package containing licensed material was properly closed and sealed. The gasket was not properly seated due to incorrect bolt sizes, and due to the incorrect bolt sizes on the top discharge valve assembly, the package was therefore not properly closed and sealed. This failure was identified as an apparent violation of 10 CFR 71.5(a) and 49 CFR 173.475 (APV 050-00206/06-01).

2. 49 CFR 173.32(f)(5) requires, in part, that an IM portable tank having a volume greater than 7,500 L (1,980 gallons) may not be loaded to a filling density of more than 20% and less than 80% by volume.

On February 22, 2006, the licensee failed to load two IM portable tanks with a volume greater than 7,500 L to a filling density of more than 20% and less than 80% by volume and offered these portable tanks for shipment. Specifically, the licensee loaded two IM portable tanks with a capacity of 6,340 gallons with 4,500.7 gallons (17.037m<sup>3</sup>) for a filling density of 71% by volume. This failure was identified as an apparent violation of 10 CFR 71.5(a) and 49 CFR 173.32 (APV 050-00206/06-02).

3. 49 CFR 173.24 (b) requires, in part, that each package used for the shipment of hazardous materials be designed, constructed, maintained, filled, its contents so limited, and closed, so that under conditions normally incident to transportation that there will be no identifiable release of hazardous materials to the environment.

On February 22, 2006, SONGS used a package that was not maintained, filled and closed, so that under conditions normally incident to transportation that there will be no identifiable release of hazardous materials to the environment. On February 23, 2006, SONGS was notified by the carrier that under conditions normally incident to transportation, that there was a leak of hazardous materials to the environment. This failure was identified as an apparent violation of 10 CFR 71.5(a) and 49 CFR 173.24 (APV 050-00206/06-03).

## **6 Exit Meeting Summary**

The inspectors presented the preliminary inspection results to members of licensee management at the exit meeting on May 11, 2006. The final exit briefing was presented telephonically to the licensee on June 26, 2006. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspectors.

## ATTACHMENT

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

#### Licensee

D. Axline, Licensing Engineer, Nuclear Regulatory Affairs  
D. Breig, Station Manager  
J. Brooks, Engineer, Unit 1 Health Physics  
B. Katz, Vice President, Nuclear Oversight and Regulatory Affairs  
M. Kirby, Unit 1 Operations Supervisor  
C. McAndrews, Manager, Nuclear Oversight  
D. Pilmer, Project Manager, Nuclear Regulatory Affairs  
A. Scherer, Manager, Nuclear Regulatory Affairs  
J. Sills, Project Manager, Unit 1 Health Physics  
S. Enright, LLRW Manager, Unit 1 Decommissioning

### **INSPECTION PROCEDURES USED**

37801 Safety Reviews, Design Changes, and Modifications 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  
83750 Occupational Radiation Exposure  
86750 Solid Radioactive Waste Management and Transportation of Radioactive Materials

### **ITEMS OPENED AND CLOSED**

#### Opened

APV 050-00206/06-01	An apparent violation involving the licensee's failure to ensure by examination or appropriate tests that the top discharge valve of a package containing licensed material was properly closed and sealed.
APV 050-00206/06-02	An apparent violation involving the licensee's failure to load two IM portable tanks with a volume greater than 7,500 L to a filling density of more than 20% and less than 80% by volume and offer these portable tanks for shipment.
APV 050-00206/06-03	An apparent violation involving the licensee using a package that was not maintained, filled and closed, so that under conditions normally incident to transportation that there was no identifiable release of hazardous materials to the environment.

Closed

None

Discussed

None

### LIST OF ACRONYMS

ALARA	As Low As Reasonably Achievable
APV	Apparent Violation
CFR	Code of Federal Regulations
cpm	counts per minute
DOT	United States Department of Transportation
dpm/100cm <sup>2</sup>	disintegrations per minute per 100-square centimeters
IM	intermodal
LSA	Low Specific Activity
MST	Mountain Standard Time
PST	Pacific Standard Time
QA	quality assurance
TLDS	thermoluminescent dosimeters