



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
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December 2, 2004

Mr. Harold B. Ray, Executive Vice President  
Southern California Edison Co.  
San Onofre Nuclear Generating Station  
P.O. Box 128  
San Clemente, California 92674-0128

SUBJECT: NRC INSPECTION REPORT 050-00206/04-016

Dear Mr. Ray:

An NRC inspection was conducted on November 1-4, 2004, at your 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 that inspection. 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 any) will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Please note that on October 25, 2004, the NRC suspended public access to ADAMS, and initiated an additional security review of publicly available documents to ensure that potentially sensitive information is removed from the ADAMS database accessible through the NRC's web site. Interested members of the public may obtain copies of the referenced documents for review and/or copying by contacting the Public Document Room pending resumption of public access to ADAMS. The NRC Public Document Room is located at NRC Headquarters in Rockville, MD, and can be contacted at 800-397-4209 or 301-415-4737 or [pdr@nrc.gov](mailto:pdr@nrc.gov).

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

Sincerely,

**/RA/ Charles L. Cain for**

D. Blair Spitzberg, Ph.D., Chief  
Fuel Cycle and Decommissioning Branch

Southern California Edison Co.

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Docket No.: 050-00206

License No.: DPR-13

Enclosure:

NRC Inspection Report

050-00206/04-016

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**ENCLOSURE**

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket No: 050-00206

License No: DPR-13

Report No: 050-00206/04-016

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: November 1-4, 2004

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

Accompanied By: Beth A. Schlapper, Inspector-in-Training  
Fuel Cycle & Decommissioning Branch

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

Attachment: Supplemental Inspection Information

ADAMS Entry: IR05000206-04-016 on 11/1/2004-11/4/2004; Southern California Edison Co., San Onofre Nuclear Generating Station; Unit 1. Decommissioning Report. No Violations.

## EXECUTIVE SUMMARY

### San Onofre Nuclear Generating Station, Unit 1 NRC Inspection Report 050-00206/04-016

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; maintenance and surveillance; decommissioning performance and status review; and solid radioactive waste management and transportation of radioactive materials. Overall, the licensee was conducting decommissioning in accordance with regulatory and procedural requirements.

#### 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. The 10 CFR 50.59 screens and engineering change packages that were reviewed provided sufficient technical detail of the proposed change. All document conclusions were consistent with regulatory requirements and the status of decommissioning (Section 1.2).

#### Maintenance and Surveillance at Permanently Shutdown Reactors

- The daily radiation monitor channel check surveillance procedure confirmed that all license-required monitoring equipment was in service. The monitor setpoints were confirmed to be correctly set in accordance with Offsite Dose Calculation Manual, Defuel Safety Analysis Report, and licensee-approved procedural requirements (Section 2.2.a).
- The licensee installed a submersible pump in the spent fuel pool to allow drain-down of the pool. Maintenance personnel installed the equipment in accordance with construction work order guidance, and operations procedures had been updated to include the new flowpath. Health physics personnel provided oversight to help ensure that worker exposure to radioactivity was limited (Section 2.2.b).

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

- The radiologically restricted area was adequately controlled. Postings, signs, and radiological boundaries were in compliance with regulatory requirements. Industrial safety controls were in place during demolition of the sphere enclosure building (Section 3.2.a).
- The inspector attempted to confirm that all special nuclear material had been removed from the Unit 1 spent fuel pool. No missing spent fuel or special nuclear material was identified by either the NRC or the licensee (Section 3.2.b).
- The inspector conducted confirmatory surveys of the turbine building floor. Contamination was identified in the northeastern corner of the building, suggesting that

additional remediation would be necessary. The licensee continued to remediate and survey the building with the goal of free-releasing the structure by April 2005 (Section 3.2.c).

Solid Radioactive Waste Management and Transportation of Radioactive Materials

- The Unit 1 staff was conducting the radioactive waste shipment program in accordance with approved site procedures and with the new NRC and U.S. Department of Transportation requirements (Section 4).

## 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 release of the facility for unrestricted use.

Since the previous inspection, the licensee removed all spent fuel and Greater Than Class C (GTCC) wastes from the spent fuel pool (SFP). The licensee removed the remainder of the spent fuel from the Unit 1 SFP and placed the fuel into the 14<sup>th</sup> dry storage canister on August 22, 2004. On September 2, 2004, the 15<sup>th</sup> dry storage canister was loaded with 14 GTCC waste containers. The dry storage canister with the GTCC wastes was transferred to the onsite Independent Spent Fuel Storage Installation (ISFSI) on September 10, 2004. Effective September 24, 2004, the licensee downgraded the security of the Unit 1 SFP to industrial-level security.

During the onsite inspection, the licensee was in the process of draining the SFP and preparing to clean the SFP walls and storage racks. In containment, the licensee was preparing for demolition of the reactor service crane. Remediation activities and radiological surveys were in progress in the Turbine Building. Further, the licensee was receiving and installing additional storage modules at the onsite ISFSI.

## **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," Revision 7. This procedure provided instructions for both initial screening and subsequent full evaluation (if necessary) of facility or procedure changes to confirm that the licensee can implement the changes without NRC approval. The program is a common program for the two operating units and the decommissioned unit.



The inspector reviewed 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 inspector found that the screens provided a sufficient summary to explain what was being changed and why. Furthermore, the responses to the screening criteria adequately addressed the criteria questions from a technical perspective. The screening forms reviewed included requests to:

- Reposition valves in the oily waste separator drain line to the reheater pit sump (the equipment has since been permanently removed from service),
- Install a new 480-volt power panel to support Unit 1 containment demolition activities,
- Remove portions of the electrical, domestic water, and fire water systems to support turbine building demolition,
- Reduce the frequency of the area radiation monitor channel checks from twice daily to once per day, and
- Remove the reheater pit sump radiation monitoring system from service.

One full 10 CFR 72.48 evaluation (Action Request 040800618) was reviewed involving the inclusion of a small amount of foreign material into a dry storage canister. A small piece of foreign material, most likely a paint chip, was affixed to a spent fuel assembly. The foreign material was accepted as is, and the spent fuel assembly was subsequently loaded into a dry storage canister. The evaluation determined that the foreign material would have no impact on the safety function of the dry storage container.

One design review program error was identified by the licensee during June 2004. A design engineer issued an engineering change package prior to completing the associated 10 CFR 50.59 screening form, contrary to procedural requirements. Corrective actions include issuance of Action Request 040500364-51 for trending purposes. The licensee's assessment concluded that the incident was a result of human error and had low safety significance. The inspector concluded that the incident was an isolated occurrence and was not indicative of a negative performance trend.

### 1.3 Conclusions

The licensee's safety review and design change program was in compliance with 10 CFR 50.59 requirements. The 10 CFR 50.59 screens and engineering change packages that were reviewed provided sufficient technical detail of the proposed change. All document conclusions were consistent with regulatory requirements and the status of decommissioning.

## **2 Maintenance and Surveillance at Permanently Shutdown Reactors (62801)**

### **2.1 Inspection Scope**

The inspector observed the performance of selected maintenance and surveillance activities to verify if structures, systems, and components were being maintained in compliance with permanently defueled technical specifications and procedural requirements.

### **2.2 Observations and Findings**

#### **a. Radiation Monitor Channel Checks**

The licensee utilized six radiation monitors, three area radiation monitors and three effluent monitors. The three area radiation monitors provided local and remote indication of high area ambient radiation levels. The area radiation monitors were located in the control room, radwaste building, and SFP area. The licensee also utilized three effluent monitors, the liquid radwaste effluent monitor, the yard sump liquid effluent monitor, and the wide range gaseous effluent monitor.

The inspector observed the licensee conducting a daily radiation monitor channel check using guidance provided in Surveillance Operating Instruction SO1-12.1-7, Revision 16, "Daily Radiation Monitoring Channel Checks." The inspector observed the licensee conducting the daily surveillance procedure and confirmed that each monitor's setpoint was consistent with procedural requirements. All monitors appeared fully functional as demonstrated by up-to-date instrument calibration stickers and energized lights being present at each monitor.

The inspector conducted a review of the monitor alarm setpoints to ensure that the setpoints were in agreement with design basis document requirements. The area radiation monitor alarm setpoints are provided in the Defueled Safety Analysis Report, Table 5-5, "Area Radiation Monitoring System." The inspector confirmed that the setpoints provided in the calibration procedures were in agreement with the setpoints provided in the Defueled Safety Analysis Report for all three area radiation monitors.

The Offsite Dose Calculation Manual (ODCM) provided the methodology for calculating the alarm setpoints for the effluent radiation monitors. The inspectors confirmed that each effluent monitor alarm setpoint was in agreement with the licensee's ODCM calculated setpoints as documented in the licensee's "Radmonitor Setpoint Transmittal" document on file in the Unit 1 control room.

#### **b. Installation of a Submersible Pump in the SFP**

The licensee removed all spent fuel and GTCC wastes from the SFP by September 2, 2004. The licensee began draining the 440,000-gallon SFP on October 22, 2004. The fluid was transferred to the west radwaste holdup tank for temporary storage.

Ultimately, the SFP fluid will be free-released to the environment using the liquid effluent discharge permit process.

Pool level prior to draining was elevation 40-foot, 5.5-inches. The licensee suspended draining the SFP when the pool level reached 38-feet, 9-inches. The current, permanently installed equipment would not allow draining of the pool below this elevation. This physical restraint was designed to prevent accidental siphoning of pool water with spent fuel in the pool.

The licensee issued a design change request via Action Request 040500369 to install a submersible pump to drain the remainder of the SFP. The inspector reviewed the design change and noted that the use of a submersible pump added a new flow-path for drain-down of the SFP. The inspector discussed the proposed change with plant operators. The operators appeared knowledgeable of the revised flowpath. The inspector also noted that Revision 20 to Operating Instruction SO1-4-18, "Spent Fuel Pool System Operation," included the new operating requirements.

The inspector reviewed the associated construction work orders and observed the work in progress. The craft workers appeared knowledgeable of the task being performed. Housekeeping and tool control were appropriate for the work in progress. The inspector noted excellent health physics coverage during the performance of the work. Health physics personnel closely monitored the work in progress to control exposure to loose radioactive contamination that may be present in the work area.

### 2.3 Conclusions

The daily radiation monitor channel check surveillance procedure confirmed that all license-required monitoring equipment was in service. The monitor setpoints were confirmed to be correctly set in accordance with ODCM, Defuel Safety Analysis Report, and licensee-approved procedural requirements.

The licensee installed a submersible pump in the spent fuel pool to allow drain-down of the pool. Maintenance personnel installed the equipment in accordance with construction work order guidance, and operations procedures had been updated to include the new flowpath. Health physics personnel provided oversight to help ensure that worker exposure to radioactivity was limited.

## **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. Site Tours/Control of Decommissioning Activities

The inspector conducted tours of the Unit 1 facility to observe radiological area postings and boundaries. Access to the restricted and contaminated areas was being controlled by radiation caution signs, barricades, boundary lines, locked doors, and gates. Radiological boundaries were well defined and postings were up-to-date in all areas. The inspector also toured the interior of the containment sphere, an area that was undergoing demolition during the inspection. Radiological health and occupational safety controls were in place to protect site workers.

During site tours, the inspector observed the material condition of the clean protective clothing laundry. The inspector noted that the clean laundry included a number of used rubber gloves with holes in the gloves. This potential problem was pointed out to the licensee. The licensee elected to replace all used gloves of this type with new gloves.

The inspector conducted a review of an incident that occurred since the previous inspection. On October 5, 2004, a contract worker opened a high radiation area barrier at the Unit 1 equipment hatch without health physics approval. The employee moved the barrier to allow equipment to be moved out of containment. Approximately 25 minutes later, a decommissioning project manager noted the discrepancy and notified health physics personnel. Health physics personnel responded immediately by placing the barrier back in place, coaching the contract worker, and notifying supervision. Corrective actions taken included issuance of an Action Request and Apparent Cause Evaluation. The licensee's preliminary assessment concluded that no unauthorized entries were made into the area and no individual received a measurable radiation exposure because of the boundary discrepancy. The inspector concluded that the incident demonstrated that licensee personnel, including the project manager who discovered the boundary discrepancy and health physics personnel who responded to the incident, were cognizant of work conditions, recognized an improper activity, and were quick to respond to the incident when it was discovered.

#### b. Verification of Removal of Spent Fuel From Unit 1 SFP

By letter dated September 3, 2004, the licensee certified that all special nuclear material as spent fuel had been permanently removed from the SFP. The inspector attempted to confirm that all spent fuel had been removed from the Unit 1 SFP. The inspection focused on three areas of fuel accountability: the licensee's response to NRC Information Notice 2004-12, "Spent Fuel Rod Accountability;" the licensee's audit of spent fuel material control and accounting; and performance of NRC Temporary Instruction 2515/154, "Spent Fuel Material Control and Accounting at Nuclear Power Plants."

Information Notice 2004-12 was issued on June 25, 2004. The licensee conducted a review of this Information Notice through Action Request 040700024. The Action Request concluded that the spent fuel rod accountability and material control program

was satisfactory based on a review of procedures and internal audit results. No additional actions were deemed necessary based on the licensee's internal review.

The licensee conducted an independent quality assurance surveillance of the nuclear material accountability program during June 2004. The surveillance determined that spent fuel material, including fuel rods removed from their parent assemblies, were being tracked, accounted for and periodically inventoried. The lead auditor concluded that the accountability program was satisfactory.

The NRC resident inspectors conducted a review of the licensee's special nuclear material accountability program using the guidance provided in Temporary Instruction 2515/154. The results of this review were submitted to NRC headquarters and had not been published by the end of the onsite inspection. With regards to Unit 1, there was one partial fuel rod in the Unit 1 SFP. The fuel rod fell out of host assembly A06 during its removal in 1971. This partial fuel rod was recently placed in Dry Storage Cannister No. 015 which is stored in ISFSI Advance Horizontal Storage Module No. 011.

As of November 4, 2004, the licensee was preparing to remove all remaining items from the Unit 1 SFP, including the spent fuel storage racks and all debris from the bottom of the pool. Based on radiation surveys of the racks and accessible areas under the racks, no debris containing special nuclear material has been identified. The licensee does not expect to find loose fuel pellets or fuel debris in the Unit 1 SFP during the decommissioning of the pool.

There are 270 SONGS-1 fuel assemblies in storage at GE-Morris in Morris, Illinois. The spent fuel was created during the first few cycles of Unit 1 operation during the 1970's. Based on the licensee's paperwork, all assemblies shipped to Morris were intact fuel assemblies.

In summary, no missing Unit 1 spent fuel or special nuclear material was identified by either the NRC or the licensee. The licensee believes that all residual fuel fragments have been removed from the Unit 1 SFP. If any fragments are identified, depending on amount identified, the fragments may be disposed as radwaste or transferred to the ISFSI during loading of Units 2 or 3 fuel into dry storage canisters.

c. Radiological Survey of Unit 1 Turbine Building Floor

The licensee originally planned to release the turbine building structure by November 2004, but due to delays caused by weather and a lack of manpower, the release date has been delayed until April 2005. At the time of the inspection, remediation of the turbine building floor, elevation 8-foot, 6-inch level, was supposed to have been complete. The building floor had been final surveyed and third-party confirmatory surveys were in progress.

The inspector conducted radiological surveys of the turbine building to verify if the structure still contained residual radioactive contamination. The surveys were conducted using an Eberline E600 meter with SHP380AB alpha/beta probe (NRC No. 079977) with a calibration due date of March 24, 2005. The inspector obtained

background readings from different locations around the Unit 1 site, including measurement of ambient air and building material surfaces. The eleven background measurements ranged from 168 cpm (ambient air inside the turbine building) to 320 cpm (unimpacted concrete in the turbine building) with an average value of 244 cpm.

The inspector surveyed portions of the turbine building floor. Thirty-two 1-minute count rate measurements were taken ranging from 228 cpm (southwestern corner of building) to 598 cpm (northeastern corner of building) with an average of 368 cpm. Localized drain readings ranged from 1,160 cpm in the east-center portion of the building to 4,410 cpm in the northeastern corner of the building. The licensee's contractor and the licensee both confirmed the unexpected contamination in the northeastern corner of the building. At the conclusion of the onsite inspection, the licensee was still investigating the cause of the unexpected contamination, but it appeared likely that the area would require further remediation.

The licensee's strategy for free-releasing the turbine building included leaving the subsurface sumps and drains in place. The licensee planned to pump grout into the sumps and drains to permanently seal any residual contamination that may be present. The licensee plans to eventually conduct a radiological assessment of the residual contamination using the processes discussed in NUREG-1575, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)."

The licensee's plans for the in-ground sumps and drains were reviewed. The licensee had developed a position paper which provided reference exposure rate values using a benchmark contamination level of 1 becquerel per cubic centimeter. The inspector discussed this position paper with the licensee. The licensee had not collected as-found radiological measurements for incorporation into the position paper, but the licensee plans to collect this information prior to grouting the drains and sumps.

In summary, the inspector confirmed that the licensee continued to make progress with the remediation of the turbine building structure, but the structure was not ready to be free released. Additional surveys of the building structure will be conducted by the NRC during future inspections.

### 3.3 Conclusions

The radiologically restricted area was adequately controlled. Postings, signs, and radiological boundaries were in compliance with regulatory requirements. Industrial safety controls were in place during demolition of the sphere enclosure building. The inspector attempted to confirm that all special nuclear material had been removed from the Unit 1 SFP. No missing spent fuel or special nuclear material was identified by either the NRC or the licensee. The inspector conducted confirmatory surveys of the turbine building floor. Contamination was identified in the northeastern corner of the building, suggesting that additional remediation would be necessary. The licensee continued to remediate and survey the building with the goal of free-releasing the structure by April 2005.

#### **4 Solid Radioactive Waste Management and Transportation of Radioactive Materials (86750)**

4.1 The purposes of this portion of the inspection effort were to determine whether the licensee properly processed, packaged, stored, and shipped radioactive materials, and to determine whether transportation activities were being conducted in compliance with applicable NRC and U.S. Department of Transportation regulations.

#### 4.2 Observations and Findings

The inspector reviewed the licensee's packaging, shipment, and disposal of two Low Specific Activity, Class A wastes in industrial packages. The inspector reviewed the waste classification plans and confirmed that the classifications were in agreement with regulatory requirements. The inspector conducted a confirmatory survey of the shipment using a Ludlum Model 2401-P survey meter (NRC No. 016296G with a calibration due date of November 5, 2004). The inspector's survey results of the shipment were directly comparable to the licensee's survey results. The inspector also reviewed the shipping papers. The documents included a bill of lading, waste disposal shipping manifest, emergency instructions, driver instructions, and radiological survey. The inspector concluded that the shipping papers met the requirements of 10 CFR 71.5, Transportation of Licensed Material.

The inspector reviewed the waste manifest records for a recent shipment of Class C wastes to a disposal site in South Carolina. The wastes included irradiated fuel assembly hardware. The material was shipped in a shipping cask liner for protection during transport. The wastes were shipped on October 19, 2004, and arrived at the disposal site six days later. The shipping papers met the requirements of 10 CFR 71.5.

The inspector compared the Low Specific Activity and Class C waste shipping papers to the procedural requirements provided in the licensee's Health Physics Procedure SO123-VII-8.2, Revision 20, "Shipment of Radioactive Material." The inspector confirmed that the shipments were manifested and conducted in accordance with the procedural guidance.

On October 1, 2004, new U.S. Department of Transportation and 10 CFR Part 71 regulations went into effect. The inspector confirmed that the licensee had incorporated the new regulations into its radioactive material shipment program. Action Request 040101652 was issued during January 2004 to assess the final rule for changes to the U.S. Department of Transportation rules (69 Federal Register 3632). Action Request 040101648 assessed the final rule for changes to NRC's 10 CFR Part 71 regulations (69 Federal Register 3698). The changes were incorporated into Revision 20 of Health Physics Procedure SO123-VII-8.2.

4.3 Conclusions

The Unit 1 staff was conducting the radioactive waste shipment program in accordance with approved site procedures and with the new NRC and U.S. Department of Transportation requirements.

**5 Exit Meeting Summary**

The inspector presented the inspection results to members of licensee management at the exit meeting on November 4, 2004. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspector.



## ATTACHMENT

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

#### Licensee

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M. McBrearty, Engineer, Nuclear Regulatory Affairs  
J. Morales, Dry Storage Manager  
D. Nunn, Vice President, Engineering & Technical Services  
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### **INSPECTION PROCEDURES USED**

37801	Safety Reviews, Design Changes, and Modifications at Permanently Shutdown Reactors
62801	Maintenance and Surveillance at Permanently Shutdown Reactors
71801	Decommissioning Performance and Status Review at Permanently Shutdown Reactors
86750	Solid Radioactive Waste Management and Transportation of Radioactive Materials

### **ITEMS OPENED AND CLOSED**

#### Opened

None

#### Closed

None

#### Discussed

None

### **LIST OF ACRONYMS USED**

cpm	counts per minute
GTCC	Greater Than Class C
ISFSI	Independent Spent Fuel Storage Installation
ODCM	Offsite Dose Calculation Manual
SFP	spent fuel pool