



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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August 4, 2020

Mr. Doug Bauder
Vice President and Chief Nuclear Officer
Southern California Edison Company
San Onofre Nuclear Generating Station
P.O. Box 128
San Clemente, CA 92674-0128

SUBJECT: San Onofre Nuclear Generating Station Independent Spent Fuel Storage
Installation (ISFSI) - NRC Inspection Report 05000206/2020006;
05000361/2020006; 05000362/2020006; AND 07200041/2020002

Dear Mr. Bauder:

This letter refers to the U.S. Nuclear Regulatory Commission's (NRC's) unannounced inspections conducted from April through June 2020 of the dry cask storage activities associated with your Independent Spent Fuel Storage Installation (ISFSI). The NRC inspectors discussed the results of this inspection with you and other members of your staff during a final telephonic exit meeting conducted on July 7, 2020. The inspection results are documented in the enclosure to this letter.

The inspections examined 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. Within these areas, the inspections consisted of selected examination of procedures and representative records, observations of dry cask storage operations, observations of site meetings, and interviews with personnel. Specifically, the inspection reviewed compliance with the requirements specified in the Holtec International HI-STORM UMAX Certificate of Compliance (CoC) No. 1040 and the associated Technical Specifications, the HI-STORM UMAX Final Safety Analysis Report (FSAR), and Title 10 of the Code of Federal Regulations (CFR) Part 72, Part 50, and Part 20. Within the scope of the inspection, no violations were identified and a response to this letter is not required.

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

If you have any questions regarding this inspection report, please contact Lee Brookhart at 817-200-1549, or the undersigned at 817-200-1249.

Sincerely,

Gregory G. Warnick, Chief
Reactor Inspection Branch
Division of Nuclear Materials Safety

Docket Nos.: 50-206; 50-361; 50-362; 72-041
License Nos.: DPR-13; NPF-10; NPF-15

Enclosure:
Inspection Report 05000206/2020006;
05000361/2020006; 05000362/2020006;
and 07200041/2020002

SAN ONOFRE NUCLEAR GENERATING STATION INDEPENDENT SPENT FUEL STORAGE
 INSTALLATION (ISFSI) - NRC INSPECTION REPORT 05000206/2020006;
 05000361/2020006; 05000362/2020006; AND 07200041/2020002 DATED – August 4, 2020

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U.S. NUCLEAR REGULATORY COMMISSION REGION IV

Docket Nos.: 50-206; 50-361; 50-362; 72-041

License Nos.: DPR-13; NPF-10; NPF-15

Report No.: 05000206/2020006; 05000361/2020006; 05000362/2020006; and
07200041/2020002

Enterprise Identifier: I-2020-006-0059; I-2020-002-0071

Licensee: Southern California Edison Company

Facility: San Onofre Nuclear Generating Station

Location: San Clemente, CA 92674-02

Inspection Dates: On-site: May 20-22 and June 23, 2020

Exit Meeting Date: July 7, 2020

Inspectors: L. Brookhart, Senior ISFSI Inspector
Reactor Inspection Branch
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Approved By: Greg Warnick, Chief
Reactor Inspection Branch
Division of Nuclear Materials Safety, Region IV

Enclosure

EXECUTIVE SUMMARY

NRC Inspection Report 050000206/2020006; 05000361/2020006; 05000362/2020006; and 07200041/2020002

On May 20-22 and June 23, 2020, the U.S. Nuclear Regulatory Commission (NRC) performed two unannounced on-site inspections of dry fuel storage activities of the Independent Spent Fuel Storage Installation (ISFSI) at the decommissioning San Onofre Nuclear Generating Station (SONGS) in San Clemente, California. Additionally, the inspectors performed remote inspections during April through June 2020, due to the COVID-19 pandemic stay-at-home orders in effect across much of the country. The remote inspections included live camera monitoring of spent fuel loading activities by NRC inspectors. The on-site inspections were augmented through in-office review of the licensee's condition reports, records, procedures, design change evaluation reports, and other materials gathered and provided prior to and after the on-site portion of the inspections through June 30, 2020. The scope of the inspections was to evaluate and review the licensee's actions and performance of dry cask loading operations after the resumption of fuel transfer operations following the extended stoppage in loading due to the August 3, 2018, canister misalignment incident.

For additional discussions and evaluations of the August 3, 2018, incident, see the NRC Special Inspection Report 072-00041/2018-001 and NRC Supplemental Inspection Report 072-00041/2018-002 (NRC's Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML18341A172 and ML19190A217, respectively). For information related to the previous quarters' resumption of fuel loading inspection activities, see NRC Inspection Report 07200041/2019-001; NRC Inspection Report 07200041/2019-002; and NRC Inspection Report 07200041/2020-001 (ADAMS Accession Nos. ML19316A762, ML20049G943, and ML20119A876, respectively).

Operation of an Independent Spent Fuel Storage Installation, Inspection Procedure (IP) 60855

- The inspectors completed two unannounced on-site inspections of the licensee's continued fuel loading operations as well as remote inspection via the licensee's camera surveillance system. The inspections were timed such that risk-significant activities were observed. Specifically, the inspectors evaluated and observed selected critical tasks associated with the licensee's spent fuel loading, processing, and downloading operations associated with multiple canisters during the inspection quarter. The inspectors noted that the corrective actions taken in response to the August 2018 incident remained effective. The licensee continues to implement successful programs related to training, procedures, equipment maintenance, and oversight to ensure safe and compliant downloading operations. The inspectors observed that the status of the canisters during downloading operations were constantly monitored and properly handled to avoid possible misalignment issues. No findings were identified during the inspection period. (Section 1.2)

Review of 10 CFR 72.48 Evaluations, IP 60857

- The inspectors reviewed a sample of 10 CFR 72.48 screenings that had been performed within the inspection period. No findings were identified through the selected sample review. (Section 2.2)

REPORT DETAILS

Summary of Facility Status

The San Onofre Nuclear Generating Station (SONGS) Independent Spent Fuel Storage Installation (ISFSI) consists of two ISFSI designs located adjacent to each other: the Orano Transnuclear (TN) Nutech Horizontal Modular Storage (NUHOMS) system and the Holtec International Storage Module Underground Maximum Capacity (HI-STORM UMAX) system. The TN ISFSI contains a total of 63 advanced horizontal storage modules (AHSMs) on the NUHOMS ISFSI pad. Fifty-one of the AHSMs are loaded with the stainless-steel dry shielded canisters (DSCs). Spent fuel from all three reactors are stored in 50 of the AHSMs. Greater-than-Class-C (GTCC) waste from the Unit 1 reactor decommissioning project was stored in the 51st module. The twelve empty AHSMs will be available for storage of additional GTCC waste from decommissioning the Units 2 and 3 reactors and spent fuel pools. The 24PT1-DSCs (Unit 1 fuel) are loaded and maintained under Amendment 0 of Certificate of Compliance (CoC) No. 72-1029 and the 24PT4-DSCs (Units 2 and 3 fuel) are loaded and maintained under Amendment 1 of CoC No. 72-1029. Both CoC amendments were being maintained under NUHOMS Final Safety Analysis Report (FSAR), Revision 5.

The HI-STORM UMAX ISFSI portion was designed to hold 75 Holtec multi-purpose canisters (MPCs). The Holtec MPC-37 canister design can hold 37 pressurized water reactor fuel assemblies in accordance with UMAX CoC No. 72-1040, Amendment 2; HI-STORM UMAX FSAR, Revision 4; and the HI-STORM Flood and Wind (FW) FSAR, Revision 5. Dry cask storage operations had resumed in July 2019, after an 11-month safety stand-down in operations following an August 3, 2018, canister misalignment incident at the UMAX ISFSI. At the end of the inspection period, the licensee had loaded 68 canisters into the UMAX ISFSI (the 68th canister was placed at the ISFSI on July 2, 2020). As of July 2, 2020, the licensee had only five canisters left to load with spent fuel. The total number of canisters with spent fuel that are planned to be placed at the UMAX ISFSI is 73. One Cavity Enclosure Container (CEC) will be left empty and one CEC contains a test canister with heating elements that will be used for aging management studies.

1. Operation of an Independent Spent Fuel Storage Installation (IP 60855)

1.1 Inspection Scope

The inspectors performed a review of the licensee's ISFSI activities to verify compliance with requirements of the Holtec UMAX CoC No. 72-1040, Amendment 2; HI-STORM UMAX FSAR, Revision 4; and the HI-STORM Flood and Wind (FW) FSAR, Revision 5. The inspectors reviewed selected procedures, corrective action reports, and records to verify ISFSI operations were compliant with the license Technical Specifications and the Holtec UMAX FSAR.

1.2 Observations and Findings

Loading Operations

The inspection included two unannounced on-site visits. The inspectors evaluated and observed the critical tasks associated with the licensee's training, spent fuel loading, processing, and downloading operations. Additionally, the inspection included remote monitoring of the licensee's operations through SCE's surveillance camera system.

In the month of April, SCE, gave inspectors access to all the surveillance cameras that the licensee uses to observe the spent fuel loading campaign. The camera system included eight cameras in each spent fuel building and two additional cameras overlooking the UMAX ISFSI pad. This remote access was provided to the NRC to support a remote inspection due to COVID-19 pandemic stay-at-home orders. The inspectors were able to, on an unannounced basis, observe critical activities in a remote capability. The licensee allowed the inspectors to continue to have access to the camera system throughout the inspection period, allowing inspectors to remotely observe loading activities in each spent fuel building. During the remote inspections, inspectors would request information of activities they observed, follow the procedures while observing, and conduct routine discussions with the licensee's staff.

The unannounced remote and on-site inspection dates were as follows:

| Remote/On-site inspections | MPC Canister No. |
|-----------------------------------|----------------------------|
| Remote: April 27 - June 30, 2020 | MPC #60 - #68 |
| On-site: May 20-22, 2020 | MPC #63 |
| On-site: June 23, 2020 | Dry run Training Exercises |

On May 20-22, 2020, an inspector was on site to observe the downloading activities associated with canister #63. The licensee completed the download at 3:27 am on May 21, 2020. The inspector observed the licensee's continued implementation of previous improvement changes related to the downloading process that were in effect during the last NRC inspection. The inspector noted the licensee's use of cameras mounted on the mating device and a video display to assist centering the MPC, ensured that the canisters were traveling in a downward motion. The additional cameras allowed the ability to inspect for foreign material within the interference areas and verification that the MPCs were lowered below the mating device drawer. The licensee has continued to refine their downloading process and procedures, such that there were no under load alarms and no trial and error adjustments required for downloading of canister #63.

On June 11, 2020, the licensee removed all fuel from the Unit 2 pool and placed the final canister containing fuel from Unit 2 into the UMAX ISFSI. On June 23, 2020, an inspector was on-site to observe the licensee's dry run qualification exercises for additional personnel attempting to qualify to operate the Vertical Cask Transporter (VCT). The inspector also observed installation of temperature monitoring equipment onto various UMAX closure lid vents at the ISFSI pad. The inspector walked down the Unit 2 spent fuel building pool area to inspect the Unit 2 pool's contents to independently verify the spent fuel had been removed from the Unit's pool.

No findings were identified during the remote or on-site inspections of the licensee's loading activities.

Corrective Action Program

NRC inspectors performed a review of SCE's Corrective Action Program (CAP) associated with ISFSI operations, including the cask handling cranes. The inspectors reviewed a sample set of Action Requests (ARs) generated since the last inspection

period which ended March 31, 2019. Several ARs were selected by the inspectors for further review. The inspectors noted that the ARs covered a broad range of issues that were identified during ISFSI operations, and that the licensee's corrective actions related to downloading alignment issues continued to be effective and complied with Procedure HPP-2464-400, "MPC Transfer at SONGS."

Specific issues that inspectors took additional time to review included:

Crane Human Performance Issue

On May 6, 2020, SCE personnel contacted NRC inspectors to inform the inspectors of a crane human performance issue that occurred late May 5, 2020 in the Unit 3 fuel building. The licensee described, that while placing the HI-TRAC transfer cask (with an empty canister) into the spent fuel pool's cask loading pit area the crane operator over traveled in the downward direction with the over-head crane's hook. As the transfer cask was being set at the bottom of the loading pit, the crew had inadvertently continued to lower the lift yoke and crane block/hook further than what was required. This resulted in the lift yoke beginning to tilt within the pool (approximated 10-20 degrees from vertical) and caused the crane's load block reeving and ropes to become somewhat slack. No contact was reported by the licensee of the rigging equipment (lifting yoke or crane load block) to the outside of the transfer cask nor the cask loading pit's inner liner.

Once the crew became aware of the issue, the lowering operations were stopped and the crew took immediate corrective actions to place all equipment in a safe condition. The crane operator raised the load block to re-gain tension with the crane's ropes and the lift yoke was disengaged from the transfer cask. As the crew withdrew the crane's load block from the pool some damage was noted. A section of the metal guard (a trip plate) around the load block had become bent and one of the wire rope sections had moved outside its normal reeved position. The licensee took actions to move the crane/rigging away from the cask loading pit area, make notifications, and initiated a condition report.

The inspectors worked with the licensee to review and understand all site corrective actions. The licensee took immediate actions to remove the lift yoke and place the yoke and crane in a tagged-out work status. The licensee performed stand-down meetings, conducted human performance evaluations, and fitness-for-duty assessments on the personnel involved. A workorder was initiated to repair the bent trip plate on the crane's load block and fully inspect the lift yoke and crane for additional damage. Corrective actions included a full ANSI N14.7 quarterly inspection and functional test on the lift yoke and full ASME B30.2 quarterly inspection and functional test on the over-head crane. Additionally, the licensee had the crane vendor, Whiting, conduct a full-length wire rope inspection on the wire rope and participate in crane's ASME B30.2 quarterly inspection. The licensee satisfactorily answered all questions from the inspectors and the inspectors noted that the licensee's corrective actions were appropriate for the issue. The licensee was able to perform the repairs to the crane and the crane and lift yoke successfully passed all inspections and functional tests to be returned to service.

Corrosion Noted on a Waste Container in Unit 2

In 1991, SCE performed a cleanup of Unit 2 and Unit 3 spent fuel pools. The cleanup involved vacuuming up small fuel detritus and various foreign materials from within the

spent fuel pools. The licensee used a fine stainless-steel mesh (40 micron) bag to act as the vacuum filter during the cleaning activities. At the end of the cleanup activities, several of the stainless-steel mesh vacuum filter bags were collected in each unit. The licensee placed these stainless-steel vacuum filter bags inside designated waste containers (called TR-4 in Unit 2 and TR-5 in Unit 3) in the spent fuel pools. Each of the TR-4/5 waste containers are approximately eight inches square and 15 feet long and were designed with small pencil-sized holes to permit spent fuel pool water to completely cover the contents inside. The stainless-steel mesh vacuum filter bags filled up about five of the 15 feet of the waste containers.

On May 28, 2020, during preparations for loading the final MPC in Unit 2, corrosion products were observed on the exterior surface and trailing out of the drain holes of the TR-4 waste container (which contained the debris from the vacuum filters) during movement of the waste container from one location to another within the spent fuel pool. Unit 3 has a corresponding waste container TR-5 which also contained the debris from the vacuum filters and exhibited similar corrosion. However, none of the other waste containers in the pools that were not filled with vacuum filters exhibited any corrosion.

The licensee stopped work to determine the source and cause of the corrosion on TR-4 and TR-5 containers as required by their CAP. A visual and chemical analysis was performed and documented in an engineering evaluation. The evaluation concluded that the corrosion products are comprised of Chromium, Iron, and Nickel. Those elements are major constituents of the stainless-steel mesh vacuum filter bags that are housed in TR-4 and TR-5 containers. The report further determined that the stainless-steel vacuum filter bags were corroding because of the high acidic environment (normal for a spent fuel pool) coupled with the air-starved environment and stagnant water flow within the TR-4 and TR-5 waste receptacles.

The licensee completed a regulatory analysis to ensure the TR-4 and TR-5, and their contents were compatible with the MPC and would not adversely affect any design function. The review found that the TR-4/5 contents, including the corrosion products, were acceptable for placement in the Part 72 licensed canister.

The NRC independently reviewed the licensee's operational actions, engineering evaluation, and the regulatory analysis for the TR-4/5 waste containers. In consultation with NRC Nuclear Material Safety and Safeguard (NMSS) materials experts, the NRC concluded there was no safety concern regarding the corrosion products for TR-4/5. The NRC independently confirmed the likely cause of the corrosion was the stainless-steel vacuum filter bags. Further, the NRC did not object with the licensee's plans to load after a review of the evaluations and analyses. The NRC concluded that once actions are taken to completely devoid all moisture from the canister it would assure that the corrosion process would be arrested and preclude any further degradation while stored in the canister. The normal drying process in accordance with license requirements ensures all moisture is removed from the canister. The licensee performed additional actions to run the drying operations for an extended time period as a conservative action when either TR-4/5 were placed into a canister and processed.

The inspectors concluded that the licensee had taken conservative and appropriate corrective actions on all condition reports reviewed by the inspectors during the inspection period. Based on the range and types of problems identified, the licensee continued to demonstrate a low threshold for placing issues into its CAP. The actions

taken for the resolution of the issues were appropriate to address the problems that were identified. No significant trends were identified during the review of the CAP at SONGS. No findings were identified related to the ARs reviewed.

1.3 Conclusions

The inspectors completed two unannounced on-site inspections of the licensee's continued fuel loading operations as well as remote inspection via the licensee's camera surveillance system. The inspections were timed such that risk-significant activities were observed. Specifically, the inspectors evaluated and observed selected critical tasks associated with the licensee's spent fuel loading, processing, and downloading operations associated with multiple canisters during the inspection quarter. The inspectors noted that the corrective actions taken in response to the August 2018 incident remained effective. The licensee continues to implement successful programs related to training, procedures, equipment maintenance, and oversight to ensure safe and compliant downloading operations. The inspectors observed that the status of the canisters during downloading operations were constantly monitored and properly handled to avoid possible misalignment issues. No findings were identified during the inspection period.

2 Review of 10 CFR 72.48 Evaluations (IP 60857)

2.1 Inspection Scope

The licensee's 10 CFR 72.48 screenings and evaluations performed since the NRC's last ISFSI inspection were reviewed to determine compliance with regulatory requirements.

2.2 Observations and Findings

The licensee performed several procedure revisions and some equipment or process changes under the 10 CFR 72.48 process since the last inspection. The inspectors reviewed the 10 CFR 72.48 screenings for those procedure changes and design change packages made within the ISFSI program. None of the screenings led to a full 10 CFR 72.48 safety evaluation. All screenings were determined to be adequately evaluated.

2.3 Conclusions

The inspectors reviewed a sample of the licensee's required safety screenings and evaluations that had been performed within the inspection period. No findings were identified during the selected sample review.

3 Exit Meeting Summary

On July 7, 2020, the inspectors presented the final inspection results to Mr. Doug Bauder, Vice President and Chief Nuclear Officer, Southern California Edison, and other members of the licensee's staff.

SUPPLEMENTAL INSPECTION INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

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M. Morgan, Regulatory and Oversight
M. Orewyler, Senior ISFSI Manager
J. Smith, Project Manager, Holtec
K. Wilson, Engineer

INSPECTION PROCEDURES USED

IP 60855 Operation of an Independent Spent Fuel Storage Installation
IP 60857 Review of 10 CFR 72.48 Evaluations

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

None

Closed

None

LIST OF ACRONYMS USED

| | |
|---------------|--|
| ADAMS | Agencywide Documents Access and Management System |
| AHSM | Advanced Horizontal Storage Modules |
| AR | SCE Action Request |
| CAP | Corrective Action Program |
| CFR | <i>Code of Federal Regulations</i> |
| CoC | Certificate of Compliance |
| DSC | Dry Shielded Canisters |
| GTCC | Greater-than-Class-C |
| FSAR | Final Safety Analysis Report |
| HI-STORM FW | Holtec International Storage Module Underground Flood and Wind |
| HI-STORM UMAX | Holtec International Storage Module Underground Maximum Capacity |
| IP | Inspection Procedure |
| ISFSI | Independent Spent Fuel Storage Installation |
| NRC | U.S. Nuclear Regulatory Commission |
| NUHOMS | Nuclear Horizontal Modular Storage |
| MPC | Multi-purpose canister |
| SCE | Southern California Edison |
| SONGS | San Onofre Nuclear Generating Station |
| TN | Orano Transnuclear |
| VCT | Vertical Cask Transporter |