UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 1, 2020

Mr. Charles Langley
Executive Director
Public Watchdogs
7867 Convoy Court
Suite 302
San Diego, CA 92111

SUBJECT: PETITION REQUESTING ENFORCEMENT ACTION UNDER SECTION 2.206 OF TITLE 10 OF THE *CODE OF FEDERAL REGULATIONS* AGAINST SOUTHERN CALIFORNIA EDISON RELATED TO DECOMMISSIONING OPERATIONS AT THE SAN ONOFRE NUCLEAR GENERATING STATION UNITS 2 AND 3

Dear Mr. Langley:

On behalf of the U.S. Nuclear Regulatory Commission (NRC), I am responding to the petition dated February 5, 2020 (Agencywide Documents Access and Management System [ADAMS] Accession No. ML20036E999), submitted by Public Watchdogs pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 2.206 of Subpart B, "Procedure for Imposing Requirements by Order, or for Modification, Suspension, or Revocation of a License, or for Imposing Civil Penalties." The NRC's Executive Director for Operations referred the petition to the Office of Nuclear Material Safety and Safeguards (NMSS) for appropriate review or action.

The Petition Review Board's (PRB) final determination is that the concerns expressed in the petition have previously been evaluated or considered in NRC staff licensing reviews and none of the petition acceptance criteria for 2.206 petitions, which are provided in Directive Handbook (DH) 8.11, Section III.C.1(b)(ii) for Management Directive (MD) 8.11 (ADAMS Accession No. ML18176A147) were met. Accordingly, the PRB's final determination is to not accept the petition for review.

Petition Requests and Underlying Concerns

The petition requested that the NRC order Southern California Edison (SCE) to take the following actions related to the San Onofre Nuclear Generating Station (SONGS) and the associated Independent Spent Fuel Storage Installation (ISFSI):

- immediately halt decommissioning activities at SONGS
- report to the NRC that the SONGS ISFSI is operating in an "unanalyzed condition"
- take immediate action to preclude flooding of the SONGS ISFSI
- suspend all fuel transfer actions from the spent fuel pools to the ISFSI at SONGS
- contact the California Coastal Commission and inform them it is unacceptable to approve the removal of the spent fuel pools from the SONGS site

- redefine the current licensing basis for the SONGS ISFSI
- rescind the emergency planning exemptions granted to SCE in 2015

The petition listed the following specific concerns as a basis for the requested actions listed above:

- Unanalyzed risk and imminent threat resulting in rupture of multiple casks [Holtec multipurpose canister (MPC)-37 canisters] due to thermal shock.
- “Canister integrity and possible rupture due to thermal shock.”
- “Criticality due to the introduction of sea water into the fuel. According to the Holtec Final Safety Evaluation Report (FSAR), criticality may occur with the introduction of non-neutron absorbing water (water without boron).”
- “Salt water inundation. Sea water, with its unknown composition, may introduce additional unanalyzed nuclear interactions due to neutron and gamma flux and possible criticality.”
- “Potential overpressure due to steam formation has not been considered.”
- “No means to detect water level that may accumulate due to condensation or external flooding events.”
- “Inability to retrieve damaged canisters: Canister deformation and radiation levels may prevent removal of the MPC-37s.”
- “Potential landslides.”
- “Lack of Emergency Planning” -and- “No procedures” for Emergency Planning.”
- “Long term and irreversible corrosion.”
- “Major radiation releases to the environment.”

Summary of Staff Action

On February 14, 2020, the NRC informed Public Watchdogs via e-mail (ADAMS Accession No. ML20049A080) that NRC staff reviewed the petition’s immediate action requests in accordance with Section II.B.1 of the Handbook for MD 8.11 and concluded that scenarios described in the petition would not lead to the specific consequences presented in the petition and, therefore, no safety concerns were identified that warranted immediate action.

On February 28, 2020, the NRC informed Public Watchdogs via e-mail (ADAMS Accession No. ML20062F576) that the NRC PRB had screened the requests in the petition and determined that only the specific request for the NRC to direct the California Coastal Commission with respect to its approval of the removal of spent fuel pools at SONGS had screened out of the 2.206 petition process in accordance with Section II.A.2 of the Handbook for MD 8.11 and that the remaining requests in the petition were being evaluated by the PRB.

On April 20, 2020, the NRC informed Public Watchdogs via e-mail (ADAMS Accession No. ML20119A047) that the PRB had completed its initial assessment of the concerns in the petition and that the PRB evaluated those concerns to determine whether they met the applicable acceptance criteria in NRC’s MD 8.11, “Review Process for 10 CFR 2.206 Petitions,” and its associated DH 8.11, Section III.C.1. The PRB determined that these concerns have previously been evaluated in NRC staff licensing reviews and none of the provisions of DH 8.11, Section III.C.1(b)(ii) applied. Accordingly, the PRB’s determination based on its initial assessment was

to not accept the petition for review. In communications subsequent to the April 20, 2020, e-mail, Public Watchdogs expressed the desire to meet with the PRB to discuss this initial assessment and to provide supplemental information in support of the petition for the PRB to consider.

On June 24, 2020, the PRB held a public teleconference with Public Watchdogs, as requested, for Public Watchdogs to address the PRB regarding the PRB's initial assessment and to provide what Public Watchdogs considered "new" information for the PRB's consideration. Public Watchdogs provided two presentations during the meeting (ADAMS Accession Nos. ML20178A248 and ML20178A249). The transcript for the June 24, 2020, public meeting may be found at ADAMS Accession No. ML20189A115.

On July 15, 2020, Public Watchdogs provided supplemental information to NRC staff in writing via e-mail (ADAMS Accession Nos. ML20198M446 and ML20198M452) which reiterated the information that was provided during the June 24, 2020, public meeting and made reference to a report prepared by Lucius Pitkin, Inc. (LPI) Consulting Engineers (LA192017-R-001 REV. 1) for the California Coastal Commission titled: "Independent Third-Party Review of SONGS Inspection and Maintenance Program for the Holtec On-Site Independent Spent Fuel Storage Installation," dated June 12, 2020. Public Watchdogs indicated that the referenced report was "new" information, as noted in footnote 1 to its July 14, 2020, letter which was attached to its July 15, 2020, e-mail (both found at the ML Nos. listed above). Public Watchdogs' reference to the LPI report is discussed further in the enclosure to this letter.

The PRB reviewed the transcript of the June 24, 2020, public meeting, considered the information presented by Public Watchdogs during that meeting, as well as the original petition and the supplemental information provided via the July 15, 2020, e-mail, in reaching its final determination, as discussed below.

NRC Staff Response to Specific Petition Concerns

In its petition, Public Watchdogs states that it is concerned about the "unanalyzed risk and imminent threat" of the effects of inundation of the SONGS ISFSI with floodwater or burial by debris that would "result in rupture of multiple casks" due to "thermal shock" with the result of "leaving the public at large vulnerable to a radioactive release and permanent dislocation from their residences and livelihood." Also, during the June 24, 2020, public meeting Public Watchdogs stated that: "Flooding of the ISFSI has not been analyzed, at least [not in] an analysis that we have seen as a member of the public."

The consequences of flooding at the SONGS ISFSI were addressed in an NRC letter to Public Watchdogs dated February 26, 2020, (ADAMS Accession No. ML20038A336) on Page 3 under the heading "Flood Analysis," in a response to a previous 2.206 petition.

Holtec International, the Holtec International Storage Module Underground MAXimum Capacity (HI-STORM UMAX or UMAX) system Certificate of Compliance (CoC) holder, provided a flood analysis for the UMAX system in Section 4.6.2.5 of the Final Safety Analysis Report (FSAR) for the Holtec HI-STORM UMAX dry cask storage system (ADAMS Accession No. ML18192B094). While this section was redacted from the public version of the FSAR under 10 CFR 2.390, in response to a proprietary determination by Holtec International, the outcomes of these analyses were not withheld under 10 CFR 2.390 and were presented in the FSAR Tables 4.6.9 and 4.6.10. As part of its assessment, the PRB reviewed the flood analysis in HI-STORM UMAX FSAR Section 4.6.2.5 and determined that the results of the UMAX flood analyses show that the

MPC and its spent fuel contents will remain below accident temperature limits, under both fully and partially flooded conditions. The PRB is able to provide the following synopsis of the flood analysis found in UMAX FSAR Section 4.6.2.5:

> Under a fully flooded condition, heat from the MPC is dissipated by the flood water inside the cavity enclosure container (CEC) and that flood water would provide cooling for the MPC and its spent fuel contents. As water is removed, the CEC becomes partially flooded. The analysis for this partially flooded condition showed that the cooling effect of the water and air in the CEC is sufficient to keep the MPC and its spent fuel contents below accident temperature limits.
>
> The UMAX FSAR Tables 4.6.9 and 4.6.10 present the results of two specific cases for a partially flooded CEC where the flood water is at different heights; up to pedestal height (Case 1), and up to the MPC baseplate (Case 2). Both of these cases partially block air flow through the cut outs located at the lower portion of the divider shell and eliminate or significantly reduce heat transfer from the MPC to the water in the partially flooded CEC. The temperature results reported in FSAR Table 4.6.9 show that, for both cases, the peak cladding temperature remains below the normal condition temperature limit of 400°C and far below the accident condition limit of 570°C. All other component temperatures also remain below the normal condition limits. FSAR Table 4.6.10 shows that the MPC pressure remains below the design/long-term normal pressure limit and well below the accident pressure limits included in FSAR Table 2.3.5.

Therefore, the effects of inundation of the SONGS ISFSI with floodwater and, specifically, the impact of such conditions on the spent fuel canisters, have been evaluated and addressed in the UMAX dry cask storage system FSAR.

Additionally, for a radioactive release that exceeds regulatory safety standards to occur, a breach of a spent fuel canister at the SONGS ISFSI would need to occur. The storage canisters used in the UMAX storage system at the SONGS ISFSI are manufactured from austenitic stainless steels, which are highly resistant to corrosion and not susceptible to thermal shock, therefore, the canisters would remain intact for the water and/or debris flooding accident events postulated in the petition (coverage by debris is expounded upon below). The NRC staff reviewed the FSAR for the UMAX system and found that the system meets all applicable NRC regulations for both structural and thermal aspects of the storage system design. In the NRC safety evaluation report (SER) for the UMAX Storage System (Amendment 0, ADAMS Accession No. ML15093A510), the NRC staff concluded that:

> The applicant has met the requirements of 10 CFR Part 72.236(b). The structures, systems, and components important to safety (SSCs ITS) are designed to accommodate the combined loads of normal or off-normal operating conditions and accidents or natural phenomena events with an adequate margin of safety. Stresses at various locations of the cask for various design loads are determined by analysis. Total stresses for the combined loads of normal, off-normal, accident, and natural phenomena events are acceptable and are found to be within limits of applicable codes, standards, and specifications.

In addition, NRC inspectors reviewed the SCE 10 CFR 72.212 report (which is not available publicly) evaluating the UMAX storage system design and approved the UMAX design for use at the SONGS ISFSI, as documented in NRC inspection report 07200041/2017-001 (ADAMS Accession No. ML18200A400).

The petition cited several specific “areas of concern” (primarily on pages 8 and 9 of the petition), which are provided verbatim below, followed by a discussion of the NRC staff findings and conclusions for each issue reviewed.

1. “Canister integrity and possible rupture due to thermal shock”

Dry storage systems are evaluated for a variety of environmental conditions and natural phenomena including fires, vent blockage, tornadoes, floods, earthquakes, explosions, lightning, and burial under debris in accordance with 10 CFR Part 72, “Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste.” These evaluations are included in Chapter 12 of the FSAR for the Holtec UMAX dry storage system (ADAMS Accession No. ML18192B094).

The storage canisters used in the UMAX storage system at the SONGS ISFSI are manufactured from austenitic stainless steels. NUREG-1536 Revision 1, Section 8.4.16 indicates that metals having a face-centered cubic crystal structure such as austenitic stainless steels remain tough and ductile to very low temperatures. Further, the neutron fluence for dry storage system canisters is insufficient to alter the properties of the austenitic stainless steel materials (Chopra 2015; Gamble 2006; NRC 2007; Sindelar et al., 2011). Therefore, the austenitic stainless steel canisters, which are not susceptible to thermal shock, would remain intact for the accident events postulated in the petition.

Staff findings from the NRC safety evaluation report for the UMAX System address this concern (Amendment 0, ADAMS Accession No. ML15093A510), specifically findings F3.2 (Structural) and F4.4 (Thermal):

> F3.2 The applicant has met the requirements of 10 CFR Part 72.236(b). The SSCs ITS [structures, systems, and components important to safety] are designed to accommodate the combined loads of normal or off-normal operating conditions and accidents or natural phenomena events with an adequate margin of safety. Stresses at various locations of the cask for various design loads are determined by analysis. Total stresses for the combined loads of normal, off-normal, accident, and natural phenomena events are acceptable and are found to be within limits of applicable codes, standards, and specifications.
>
> F4.4 The spent fuel cladding is protected against degradation leading to gross ruptures under off-normal and accident conditions by maintaining cladding temperatures below 1058°F (570°C). Protection of the cladding against degradation is expected to allow ready retrieval of spent fuel for further processing or disposal.

This area of concern was further highlighted by the petitioner during the June 24, 2020, public meeting, as documented in the transcript, (ADAMS Accession No. ML20189A115). Specifically, pages 26-28 of the transcript contain several statements made by Public Watchdogs regarding thermal cycling of the MPCs as a result of a tsunami or other flooding events. On page 27 of the transcript, the petitioner states that the effects of rapid cooling and rapid heat-up on MPC structural integrity have not been analyzed. The petitioner appears to suggest that rapid heating and cooling of the MPC (as described by petitioner) will cause thermal fatigue.

The UMAX FSAR addresses fatigue from rapid temperature changes and significant pressure changes and concludes that the amplitude of the cyclic stresses remains orders of magnitude

below the cask material's endurance limit. In addition, the UMAX FSAR Table 3.1.10 states that because fatigue is not a credible source of failure in a passive system with gradual temperature changes, the cumulative damage factor from fatigue is not computed for HI-STORM UMAX components (the NRC staff notes that the MPCs for the UMAX system are incorporated by reference from the HI-STORM FW (Holtec International Storage Module Flood and Wind) system (ADAMS Accession No. ML19177A171) and that Section 3.1.2.5 addresses fatigue from rapid temperature changes and significant pressure changes).

Fatigue of the MPC in the UMAX storage system is addressed in UMAX FSAR Section 3.1.2.5, where stresses from temperature changes and significant pressure changes are compared to the Endurance Limit for stainless steel (the material used in the MPC) according to the American Society of Mechanical Engineers (ASME) Code, Section III, Div. 1, Appendices, Table I.9.2. For thermal stresses the UMAX FSAR concludes "the amplitude of the cyclic stresses, to the extent that they are developed, remains orders of magnitude below the cask material's Endurance Limit." For pressure related changes the UMAX FSAR concludes "the amplitude of stress from the pressure cycling (due to the changes in the ambient conditions) is quite small and well below the Endurance Limit of the stainless steel material." The UMAX FSAR Table 3.1.10 states that because fatigue is not a credible source of failure in a passive system with gradual temperature changes, the cumulative damage factor from fatigue is not computed for HI-STORM UMAX components[1].

The MPC-37 included in the HI-STORM FW system and incorporated by reference into the UMAX system FSAR is designed and constructed in accordance with the 2007 ASME Boiler and Pressure Vessel (B&PV) Code Section III, Subsection NB for Class 1 components with the exceptions listed in CoC 72-1032 Appendix B Table 3-1 (ADAMS Accession No. ML17214A043). The requirements in ASME B&PV Code Section III NB-3222.4(d), "Analysis for Cyclic Operation - Components Not Requiring Analysis for Cyclic Service," considers possible sources of fatigue including temperature differences from startup and shutdown operations and temperature differences occurring during normal service. The temperature related inputs to the fatigue assessment in ASME B&PV Code Section III NB-3222.4(d) are specific to normal operation.

Floods are considered in UMAX FSAR Section 4.6.2 "Accident Events," which is consistent with the guidance provided in NUREG-1536, Revision 1, Chapter 12. Any flooding event caused by a tsunami or other natural phenomena would not be considered within the range of normal conditions. NUREG-1536, Revision 1 Section 12.1 states, "Normal conditions are the intended operations, planned events, and environmental conditions, that are known or reasonably expected to occur with high frequency during storage operations." NUREG-1536, Revision 1, Chapter 12 explicitly states, "The effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches, with severity frequencies consistent with Design Event III and IV (ANSI/ANS 2000), are considered to be design-basis accident events, in addition to design-basis man-made events."

[1] The staff notes that the MPCs for the UMAX system are incorporated by reference from the HI-STORM FW system (ADAMS Accession No. ML19177A171). The fatigue analysis for the HI-STORM FW system, including the MPC-37, is addressed in HI-STORM FW FSAR Section 3.1.2.5 and addresses fatigue from rapid temperature changes and significant pressure changes. Like the UMAX FSAR, HI-STORM FW FSAR Table 3.1.10 states that because fatigue is not a credible source of failure in a passive system with gradual temperature changes, the cumulative damage factor from fatigue is not computed for HI-STORM FW components.

The acceptance criteria for the evaluation of accident events, described in NUREG-1536 Revision 1 Section 12.4, include criteria for controlled area boundary dose, subcriticality control, confinement, recovery and retrievability of stored radioactive material, and identification of instruments and control systems that must remain operational under accident conditions. The staff notes that because the HI-STORM UMAX system is completely passive, there are no instrument or control systems required for safe operation. The HI-STORM UMAX FSAR Section 12.2.4 addresses a flood accident and the analysis includes an evaluation of effects on structural, thermal, criticality, confinement, and radiation protection performance on the HI-STORM UMAX system. Therefore, the NRC staff concludes that the UMAX system appropriately considered the effects of floods as part of the accident analyses.

2. “Criticality due to the introduction of sea water into the fuel. According to the Holtec FSAR, criticality may occur with the introduction of non-neutron absorbing water (water without boron).”

As the UMAX system fuel canister (MPC) will not be breached or exhibit leakage under any accident scenario discussed in the UMAX FSAR, the staff does not consider a criticality caused by inundation of the canister by saltwater to be a credible event. The criticality safety analyses performed for the Holtec HI-STORM FW storage system to demonstrate compliance with the regulatory requirements in 10 CFR 72.124, as indicated in the Chapter 6 of the FSAR (ADAMS Accession No. ML17179A444), were applied to the UMAX storage system. In that analysis, the MPC within the storage system was flooded with borated water and, as an added conservatism, the annulus between the MPC and the HI-STORM UMAX overpack was also flooded with water. Though this provided the maximum amount of moderation possible to promote criticality for the assessment, the assessment concluded that the MPC would remain subcritical ($K_{eff}<0.95$).

3. “Salt water inundation. Sea water, with its unknown composition, may introduce additional unanalyzed nuclear interactions due to neutron and gamma flux and possible criticality.”

This concern has been addressed by the criticality evaluations previously performed and submitted by the vendor and reviewed by the NRC staff. The NRC staff approved the use of the UMAX ISFSI design for the SONGS site as documented in NRC inspection report 07200041/2017-001.

4. “Potential overpressure due to steam formation has not been considered.”

Public Watchdogs postulated two scenarios for the potential for over pressurization of the UMAX storage system, the first by steam formation in the Vertical Ventilated Module (VVM) as a result of a tsunami or flood event that inundates the SONGS ISFSI and the second from burial by debris and the subsequent loss of heat removal from the MPC stored in the UMAX system. The risk of over pressurization was ruled out in both scenarios.

Steam over pressurization in the VVM caused by the boiling of water, if it were to occur, would be relieved through the closure lid vents. As described in the UMAX FSAR the VVM is not a pressure vessel since it is open to the environment. Nevertheless, the MPC is designed to withstand an accident with an external pressure of 55 psi (379 kPa) as stated in UMAX FSAR Table 2.3.5 and consistent with the design bases flood height of 125 feet shown on UMAX FSAR Table 2.3.1

Burial by debris is analyzed in UMAX FSAR Section 4.6.2.4, and the temperatures of UMAX system components that result from potential burial are reported in Table 4.6.10 of the FSAR. The results reported in Table 4.6.10 would not lead to an over pressurization of the MPC.

5. “No means to detect water level that may accumulate due to condensation or external flooding events.”

The UMAX system design includes a CEC, a cylindrical vessel with a closed bottom and an opening at the top to allow for ventilation, but otherwise has no penetrations or other openings.

Thus, water from flooding events has no path for subsurface intrusion into the interior space of the CEC. Additionally, the storage pad is designed to ensure that rain or runoff water would not enter the CEC. Finally, any small quantities of water that could possibly enter the CEC would be removed by evaporation from heat transfer from the canister. The UMAX UFSAR Section 12.2.4.3, Flood Accident Corrective Action, describes actions to be taken in the event of a flood event.

6. “Inability to retrieve damaged canisters: Canister deformation and radiation levels may prevent removal of the MPC-37s.”

The UMAX system is robustly engineered and evaluated to maintain canister retrievability under all credible postulated accident scenarios. The subgrade concrete VVM contains a CEC that holds the MPC. The VVM is a robustly designed reinforced concrete structure that with the CEC ensures the safety functions provided by the MPC are retained under all off normal and accident conditions.

As described in the UMAX FSAR Section 12.2, only limited damage to the UMAX components will occur in the event of a design-basis accident, including a flood event or any other natural phenomena at the SONGS site such as fires, tornadoes, earthquakes, explosions, lightning, or burial under debris leading to vent blockage. The system remains subcritical and fuel and MPC component temperatures remain below allowable temperature limits and MPC pressures remain below allowable values for all postulated accident scenarios. Because damage to the UMAX components is limited for all design-basis accidents and the structural, thermal, criticality control, confinement, and radiation protection safety functions of the system are maintained, MPC retrievability is assured.

7. “Potential landslides.”

The potential for landslides has been addressed by both the cask system vendor (burial by debris) and the licensee for the SONGS site and does not present a safety issue for the ISFSI. Specifically, burial by debris is analyzed in UMAX FSAR Section 4.6.2.4. Further, the potential for burial of the UMAX storage system under debris was analyzed in the SCE 72.212 evaluation report (which is not publicly available) and it was determined that such a scenario is not a credible event. The NRC staff approved the use of the UMAX ISFSI design for the SONGS site as documented in NRC inspection report 07200041/2017-001.

8. “Lack of Emergency Planning” -and- “No procedures.”

SCE is required to have an EP program through license termination for the SONGS site (10 CFR 50.47). The NRC has determined that the requirements for an emergency plan have been addressed (note SECY paper excerpt below) and adequate provisions are in place to

initiate protective actions in the unlikely event of a loss of inventory in the spent fuel pool. A release from the SONGS ISFSI would also be covered under these emergency preparedness provisions.

From SECY-14-0144 "REQUEST BY SOUTHERN CALIFORNIA EDISON FOR EXEMPTIONS FROM CERTAIN EMERGENCY PLANNING REQUIREMENTS" (ADAMS Accession No. ML14251A554)

> The staff reviewed SCE's exemption request against the requirements in 10 CFR 50.47, Appendix E to 10 CFR Part 50 and 10 CFR 72.32, "Emergency Plan." The review considered the status of the facility, which is permanently shut down and defueled, and the low likelihood of any credible accident resulting in radiological releases requiring offsite protective measures. The staff based its evaluation of the SCE request for exemptions from EP [emergency planning] requirements on the site-specific analyses provided by SCE. The staff verified SCE's analyses and its calculations. The analysis provides reasonable assurance that in granting the requested exemption to SCE: (1) an offsite radiological release will not exceed the EPA PAGs [protective action guidelines] at the site boundary for a DBA [design-basis-accident]; and; (2) in the unlikely event of a beyond DBA resulting in a loss of all SFP cooling, there is sufficient time to initiate appropriate mitigating actions and, if a release is projected to occur, there is sufficient time for offsite agencies to take protective actions using a CEMP [comprehensive emergency management plan] to protect the health and safety of the public.

9. "Long term and irreversible corrosion."

Long-term and irreversible corrosion are not a concern because the UMAX UFSAR includes corrective action for floods that considers the risk of corrosion from long-term exposure to floodwaters. The corrective actions to restore the system to a normal configuration include the removal of floodwater and any debris deposited by the receding water.

In addition, the staff notes that all of the UMAX canisters at SONGS use a 5/8 inch thick wall canister to provide for additional potential corrosion allowance and laser peened welds. Further, the staff notes that the maximum depth of scratches from canister downloading operations do not penetrate through the depth of the laser peened canister surfaces which include all the seam welds and heat affected zones to provide a layer of compressive stress relief of 0.080 inch depth (Page 34 of the NRC Supplemental Inspection Report (ADAMS Accession No. ML19190A217)). As such, the presence of scratches from downloading operations will not lead to premature degradation of the canisters.

10. "Major radiation releases to the environment."

Accidents that could lead to a release to the environment are routinely analyzed in the storage system or ISFSI safety analysis reports to determine the possible consequences. The consequences of accidents involving dry storage systems are low and are not comparable to

consequences of major nuclear accidents, such as the Chernobyl disaster. The canisters stored in the UMAX storage system are leaktight and the quantity of radioactive nuclides potentially released to the environment under all conditions, including accidents, satisfies the regulatory requirements of 10 CFR 72.104(a) and 10 CFR 72.106(b).

In the letter attached to Public Watchdogs' e-mail of July 15, 2020, Public Watchdogs re-iterated concerns raised in the petition and provided supplemental information related to those concerns (ADAMS Accession No. ML20198M446). The concerns highlighted in the supplemental information submitted have been addressed above; however, in order to provide additional insight and clarification on the issues from the LPI Consulting Engineers report including the UMAX MPC shell temperature and the potential for vent blockage from flooding, the NRC staff has provided an enclosure to this letter.

In conclusion, the NRC staff remains confident that there is reasonable assurance that public health and safety is protected and that measures are in place to ensure that fuel is stored in accordance with the requirements of the SONGS license and with the certificate of compliance for the Holtec UMAX system and that other licensing requirements are maintained.

Having considered the results of NRC's evaluation of the UMAX system, inspection reports, SCE evaluations, the petition itself, and the supplemental information Public Watchdogs provided, the PRB's final determination is that all the concerns identified in the petition that were not screened out fail to meet the acceptance criteria in MD 8.11, Section III.C.1(b), because the issues raised in the petition have been "the subject of a facility-specific or generic NRC staff review," and none of the circumstances in Section III.C.1(b)(ii) of MD 8.11 apply. The NMSS Office Director was briefed on and supported this determination.

Thank you for bringing these concerns to the attention of the NRC.

References

Chopra, O.K. "Effects of Thermal Aging and Neutron Irradiation on Crack Growth Rate and Fracture Toughness of Cast Stainless Steels and Austenitic Stainless Steel Welds," NUREG/CR-7185, ANL-14/10, July 2015.

Gamble, R. "BWRVIP-100-A: BWR Vessel and Internal Project, Updated Assessment of the Fracture Toughness of Irradiated Stainless Steel for BWR Core Shrouds." EPRI-1013396. Palo Alto, California: Electric Power Research Institute. 2006.

Sindelar, R.L. A.J. Duncan, M.E. Dupont, P.-S. Lam, M.R. Louthan, Jr., T.E. Skidmore, "Materials Aging Issues and Aging Management for Extended Storage and Transportation of Spent Nuclear Fuel," NUREG/CR-7116, SRNL-STI-2011-00005, NRC ADAMS Accession No. ML11321A182, November 2011.

NRC, “Probabilistic Fracture Mechanics—Models, Parameters, and Uncertainty Treatment Used in FAVOR Version 04.1,” NUREG-1807, NRC ADAMS Accession No. ML072010411, June 2007.

Sincerely,

Kevin Williams

Digitally signed by Kevin Williams
Date: 2020.09.01 17:26:27 -04'00'

Kevin Williams, Director
Division of Materials Safety, Security, State, and Tribal Programs
Office of Nuclear Material Safety and Safeguards

Docket Nos.: 50-361 and 50-362;
72-0041 and 72-1040

Enclosure:
Discussion of MPC Shell Temperature and Vent Blockage from Flooding

cc: Public Watchdogs
7867 Convoy Cr #302
San Diego, CA 92111
SONGS Listserv

SUBJECT: PETITION REQUESTING ENFORCEMENT ACTION UNDER SECTION 2.206 OF TITLE 10 OF THE *CODE OF FEDERAL REGULATIONS* AGAINST SOUTHERN CALIFORNIA EDISON RELATED TO DECOMMISSIONING OPERATIONS AT THE SAN ONOFRE NUCLEAR GENERATING STATION UNITS 2 AND 3 DATE: September 1, 2020

**DISTRIBUTION**: OEDO-20-00053
PUBLIC
RidsEdoMailCenter Resource
RidsOgcMailCenter Resource
RidsOpaMail Resource
RidsOcaMail Resource
RidsRgnIVMailCenter Resource
Darrell Roberts, DEDO
AAverbach, OGC
ASnyder, NMSS

**ADAMS Accession No.: ML20036E926**

| OFFICE | NMSS/DFM | NRR | NMSS/DUWP | NMSS/DFM |
|---|---|---|---|---|
| NAME | CBajwa | PBuckberg | MDoell | JWoodfield |
| DATE | 8/10/2020 | 8/4/2020 | 8/4/2020 | 8/4/2020 |
| OFFICE | R-IV | NMSS/DFM | NMSS/MSST | NMSS/DFM |
| NAME | SAnderson | LHamdam | SHoliday | DDunn |
| DATE | 8/4/2020 | 8/4/2020 | 8/17/2020 | 8/7/2020 |
| OFFICE | OGC | NMSS/MSST | Tech Ed | NMSS |
| NAME | RCarpenter | KWilliams | LMoorin | JLubinski |
| DATE | 8/13/2020 | 8/7/2020 | 8/20/2020 | 9/1/2020 |
| OFFICE | NMSS/MSST | | | |
| NAME | KWilliams | | | |
| DATE | 9/1/2020 | | | |

**OFFICIAL RECORD COPY**

**Discussion of MPC Shell Temperature and Vent Blockage from Flooding**

The results shown in UMAX Final Safety Analysis Report (FSAR) Table 4.4.2 are for a design basis heat load as noted in the Table 4.4.2 caption. The description of the analysis and the results shown in UMAX FSAR Table 4.4.2 are described in UMAX FSAR Section 4.4.4.1 "Evaluation of HI-STORM UMAX Standard Design Module" subsection i. "Maximum Temperatures" which states:

> A comprehensive set of thermal analyses of all candidate "thermal configurations" (meaning the combination of canister type, regionalized loading pattern and fuel type that may produce highest fuel cladding temperature) were performed using the FLUENT model described in Section 4.4.1 to quantify their thermal margins under long term storage conditions. Thermal analyses of the following cases are performed:
>
> A. Multipurpose canister (MPC)-37 with short, standard and long fuel and MPC-89 under conditions described in Table 4.1.1*.
>
> B. Docket # 72-1014: MPC-32 under two extreme regionalized loading scenarios (X=0.5 and X=3) described in Table 4.1.1.
>
> The maximum spatial values of the computed temperatures of the fuel cladding, the fuel basket material, the divider shell, the closure lid concrete, the MPC lid, the MPC shell and the average air outlet for all cases are summarized in Table 4.4.2. The governing case is that of MPC-37 with short fuel under heat load chart 1. The following conclusions are reached from the solution data:
>
> a. The peak cladding temperature (PCT) is below the temperature limit set forth in NUREG-1536 [4.0.1] and interim staff guidance (ISG)-11 [4.0.2].
>
> b. The maximum temperatures of all MPC and Vertical Ventilated Module (VVM) constituent parts are below their respective limits set down in Table 2.3.7. It is therefore concluded that the HI-STORM UMAX system provides a thermally acceptable storage environment for the eligible MPCs listed in Table 1.2.1 and that the governing thermal configuration corresponds to the case of MPC-37 with short fuel (Heat Load Chart 1): All other thermal configurations yield a lower PCT result.

Actual MPC shell temperatures for MPCs loaded at San Onofre Nuclear Generating Station (SONGS) will depend on the fuel loading parameters including maximum heat load. MPCs at SONGS which were loaded below the design basis heat load will have lower component temperatures.

Analysis results for temperatures and pressures under partial flooded scenarios are included in the UMAX FSAR Table 4.6.9 and Table 4.6.10 and show that the maximum component temperatures and MPC pressures remain below accident temperature and pressure limits. While UMAX FSAR Section 4.6.2.5 was redacted, case descriptions for the results described in UMAX FSAR Section 4.6.2.5 applicable to UMAX FSAR Table 4.6.9 and Table 4.6.10 are included in Table 4.6.9 Note 1 which states:

> Case 1 and Case 2 are defined in Section 4.6.2.5 as flood events of different heights to block air flow up to pedestal height and MPC baseplate respectively.

In addition, Holtec UMAX FSAR Revision 5 (ML18192B094) Section 1.2.2a. The Cavity Enclosure Container (CEC) states:

> The Divider Shell, as its name implies, is a vertical cylindrical shell concentrically situated in the CEC that divides the CEC into an inlet flow downcomer and an outlet flow passage. The Divider Shell divides the radial space between the MPC and the CEC cavity into two annuli. The bottom end of the Divider Shell has cutouts to enable movement of air from the downcomer to the up-flow region around the MPC. The cutouts in the Divider Shell are sufficiently tall to ensure that if the cavity were to be filled with water, the bottom region of the MPC would be submerged for several inches. This design feature is important to ensure adequate thermal performance of the system if flood water would stop air flow. The Divider Shell is not attached to the CEC which allows its convenient removal for decommissioning or for any in-service maintenance that may be required.

Thus, partial flooding that blocks airflow is analyzed in the UMAX FSAR and the results in the FSAR show that the maximum component temperatures and pressures are not exceeded. As for system recovery after a flood event, the MPC and the VVM including the CEC are not damaged as a result of a flood event. This enables the removal of the MPC if necessary and removal of the divider shell to facilitate cleanup or removal of debris from the CEC.

In Public Watchdogs' July 14 letter attached to its July 15 e-mail, Public Watchdog states:

> The information publicized by SCE [Southern California Edison] is contrary to SONG's [sic] licensing basis. As a result, the Commission and its contractor, LPI [Lucius Pitkin, Inc.], are the recipients of misleading information contained within the LPI report to the CCC [California Coastal Commission]. These are the exact words from the LPI report "SCE indicated that the maximum temperature is approximately 225°F." By LPI's own admission, the report is based on grotesquely inaccurate information. As a result, LPI's conclusions and recommendations are also in error.

The staff notes that the 225°F temperature is a response to a question from LPI on the maximum MPC temperature. The question and response are included on page 75 of the LPI report. SCE's response indicates that this is a measured temperature. The temperature referenced by Public Watchdogs is a maximum canister temperature for a design basis heat load analysis in the FSAR, while the temperature stated by SCE is a measured value of the MPCs at SONGS obtained during inspections in March/April of 2019 and reflects the actual loading parameters and environmental conditions at the SONGS ISFSI. The Public Watchdogs statement that "the report is based on grossly inaccurate information" is unfounded. LPI made several recommendations to SCE regarding SCE's Inspection and Maintenance Plan (IMP) and the analysis of canister scratch depths from downloading operations. As indicated in the responses to LPI, SCE accepted the recommendations and revised the IMP and the scratch depth analysis.