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

November 20, 2018

Mr. Dan Tallman
Manager, Rancho Seco Assets
Sacramento Municipal Utility District
Rancho Seco Nuclear Generating Station
14440 Twin Cities Road
Herald, CA 95638-9799

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR REVIEW OF THE APPLICATION FOR RENEWAL OF THE RANCHO SECO INDEPENDENT SPENT FUEL STORAGE INSTALLATION LICENSE NO. SNM-2510 (CAC/EPID NOS. 001028/L-2018-RNW-0005; 000993/L-2018-LNE-0004)

Dear Mr. Tallman:

By letter dated March 19, 2018, as supplemented on June 25, 2018, and September 26, 2018, the Sacramento Municipal Utility District (SMUD) submitted an application for renewal of the Rancho Seco Independent Spent Fuel Storage Installation, License No. SNM-2510 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18221A281). The submittal of the license renewal application was timely per the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) 72.42(b) and (c). In my letter dated, July 20, 2018, I acknowledged acceptance of your application for a detailed technical review and provided a proposed schedule for U.S. Nuclear Regulatory Commission (NRC) review (ADAMS Accession No. ML18201A455).

In connection with the NRC staff's review, we need the information identified in the enclosed request for additional information (RAI). We request that you provide this information by April 30, 2019. Inform us at your earliest convenience, but no later than March 30, 2019, if you are not able to provide the information by that date. To assist us in re-scheduling your review, you should include a new proposed submittal date and the reasons for the delay. Discussion of the RAIs and RAI response date occurred via teleconference on November 15, 2018.

Please reference Docket No. 72-11 and CAC/EPID No. 001028/L-2018-RNW-0005 in future correspondence related to this request. The NRC staff is available to clarify these questions and, if necessary, to meet and discuss your proposed responses.

If you have any questions regarding this matter, please contact me at (301) 415-7213 or Wendy.Reed@nrc.gov.

Sincerely,

/RA/

Wendy A. Reed, Chemist
Renewals and Materials Branch
Division of Spent Fuel Management
Office of Nuclear Material Safety
and Safeguards

Docket No.: 72-11
License No.: SNM-2510
CAC/EPID Nos.: 001028/L-2018-RNW-0005;
000993/L-2018-LNE-0004

Enclosures:
1. RAI (non-proprietary)
2. RAI (proprietary)

cc: Rancho Seco ISFSI Service List

Rancho Seco ISFSI Service List

cc:

Arlen Orchard, Chief Executive Officer
Sacramento Municipal Utility District
6201 S Street
P.O. Box 15830
Sacramento, CA 95817 1899

Laura Lewis, Chief Legal Officer
Sacramento Municipal Utility District
6201 S Street
P.O. Box 15830
Sacramento, CA 95817 1899

Steve Lins, Deputy General Counsel
Sacramento Municipal Utility District
6201 S Street
P.O. Box 15830
Sacramento, CA 95817 1899

Site Document Control Supervisor
Rancho Seco
14440 Twin Cities Road
Herald, CA 95638 9799

Commissioners' Office
California Energy Commission
1516 Ninth Street (MS 34)
Sacramento, CA 95814 5512

Radiation Program Director
California Radiologic Health Branch
P.O. Box 997414 (MS 7610)
Sacramento, CA 95899 7414

Sacramento County Board of Supervisors
700 H Street, Suite 2450
Sacramento, CA 95814

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR REVIEW OF THE APPLICATION FOR RENEWAL OF THE RANCHO SECO INDEPENDENT SPENT FUEL STORAGE INSTALLATION LICENSE NO. SNM 2510 (CAC/EPID NOS. 001028/L-2018-RNW-0005; 000993/L-2018-LNE-0004), DOCUMENT DATE: November 20, 2018

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ADAMS Accession No.: ML18325A140 LTR & ENCL 1: ML18325A142
Enclosure 2: ML18325A141

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Request for Additional Information
Sacramento Municipal Utility District (SMUD)
Docket No. 72-11
License No. SNM-2510
License Renewal

This request for additional information (RAI) identifies information needed by the U.S. Nuclear Regulatory Commission (NRC) staff in connection with its review of the renewal application. NUREG-1927, Revision 1, "Standard Review Plan for Renewal of Specific Licenses and Certificates of Compliance for Dry Storage of Spent Nuclear Fuel" was used by the staff in its review of the application. The requested information is listed by chapter number and title in the License Renewal Application (LRA).

Each RAI describes information needed by the staff for it to complete its review of the LRA and to determine whether the applicant has demonstrated compliance with the regulatory requirements.

Chapter 2 – Scoping Evaluation

RAI 2-1

Provide information on sources of the safety classification for the Fuel Only (FO), Fuel with Control Components (FC), and Failed Fuel (FF) dry shielded canister (DSC) subcomponents in Table 2-6 and for the transfer cask subcomponents in Table 2-8 of the LRA, and revise Table 2-6 and Table 2-8 and modify the LRA as described below, as appropriate.

Table 2-6 and Table 2-8 of the LRA provide the scoping evaluation results for the DSCs and transfer cask, in which the safety classification of each of subcomponents and the source drawings are identified; however, the staff is unable to identify documentation that shows safety classification of the subcomponents.

If the resolution of this RAI causes a subcomponent to be added to the scope of renewal, an aging management review and aging management activities for this subcomponent should be provided.

This information is needed to determine compliance with 10 CFR 72.24(c) and 72.42(a).

RAI 2-2

Proprietary – see Enclosure 2

RAI 2-3

Proprietary – see Enclosure 2

RAI 2-4

Provide additional information to address the potential for aging of the canister internals and the canister contents as a result of loss of the inert environment.

The canisters in service at Rancho Seco have a specified leak rate that is greater than the 'leak tight' criteria in ANSI N14.5. Over time, the loss of helium is expected to occur and the potential ingress of air may result in an internal environment that is not completely inert. Provide an analysis to show that the loss of helium and ingress of oxygen is not sufficient to significantly alter the inert environment inside the DSCs that is credited for preventing aging of the canister internals and contents. Alternatively, address the potential aging effects for the canister internals and contents and revise the LRA accordingly.

This information is needed to determine compliance with 10 CFR 72.24(c) and 72.42(a).

RAI 2-5

Justify how fuel transfer equipment originally used for retrievability is no longer classified as Important to Safety (ITS) and thus outside the scope of the renewal.

Section 2.3.2.1 of the renewal application states in part:

"*The fuel transfer and auxiliary equipment are NITS items and their failure would not prevent fulfilment of any intended function supporting storage operations. The auxiliary equipment used to retrieve the DSCs from the HSMs is subject to standard maintenance and repair prior to use. Hence, the fuel transfer and auxiliary equipment does not meet scoping Criterion 2 and, therefore, are not in the scope of renewal."*

However, Table 3-11 of the original licensing basis (i.e., Final Safety Analysis Report) states that transfer related equipment such as the cask, cask lifting yoke, and lifting yoke extensions are ITS. Justify how these ITS components are no longer ITS, and why they are not within the scope of the renewal when they are needed to satisfy retrievability. Provide any time-limited aging analysis (TLAA) calculations for these components and update the FSAR as necessary.

This information is necessary to determine compliance with 10 CFR 72.122(h)(5) and 72.122(l).

RAI 2-6

Clarify the difference between all three canisters designs deployed at Rancho Seco as it relates to fatigue analyses.

Section 2.4.1 of the FSAR indicates that there are 3 versions of the NUHOMS-24P DCS design: (1) Fuel Only (FO), (2) Fuel with Control Components (FC), and (3) Failed Fuel (FF); however, the fatigue analysis in TN Calculation 502917-0201 Revision 1 of Enclosure 7 to DPG-18-114 does not distinguish between the 3 designs and is only referred to generically as the NUHOMS-24P. Clarify if the three versions of the canister affect the fatigue results and update the FSAR as appropriate.

This information is necessary to determine compliance with 10 CFR 72.122(l).

RAI 2-7

Revise both the scoping evaluation and aging management sections of the LRA to include the greater than Class C (GTCC) DSC basket or provide justification for not including the GTCC DSC basket.

Appendix C, Section 4.2.4.2 of the Rancho Seco FSAR identifies that the GTCC DSC utilizes a basket, and Appendix C, Section 7.3.1.2 of the Rancho Seco FSAR states that the shielding analysis accurately modeled "…the GTCC waste within the container." From the description in Section 7.3.1.2, it appears that the GTCC basket is credited in the shielding analysis for the GTCC waste. If the GTCC basket is credited in the shielding analysis, the applicant should update both the scoping evaluation and aging management sections of the LRA. Otherwise, the applicant should justify not including the GTCC DSC basket.

This information is needed to determine compliance with 10 CFR 72.42(a).

RAI 2-8

Proprietary – see Enclosure 2

Chapter 3 – Aging Management Review

RAI 3-1

Clarify how cracking due to thermal fatigue is managed in the aging management review results for the GTCC DSC and transfer cask subcomponents, and revise Table 3-6 and Table 3-10 of the LRA, as appropriate.

LRA Section 3.4.4.2 states that cracking of the DSC pressure boundary subcomponents due to thermal fatigue is an aging effect managed via a TLAA. However, TLAA is not identified for the outer top cover plate of the GTCC DSC, a pressure boundary subcomponent, in Table 3-6. LRA Section 3.7.4.2 states that cracking of the transfer cask subcomponents due to thermal fatigue is an aging effect managed via a TLAA. However, it does not appear that any TLAA aging management activities are identified in Table 3-10.

This information is needed to determine compliance with 10 CFR 72.42(a).

RAI 3-2

Proprietary – see Enclosure 2

RAI 3-3

Provide missing analysis to show that change in material properties due to thermal aging of carbon steel for the DSC basket assembly subcomponents is not an aging effect requiring management, and revise the LRA, as appropriate.

LRA Section 3.4.2 and Table 3-2 indicate that both carbon steel and stainless steel are used to construct the DSC basket assembly subcomponents. However, Section 3.4.4.2 only provided analysis and conclusion of change in material properties due to thermal aging of stainless steel for the DSC basket assembly subcomponents. The analysis and conclusion on carbon steel as the other material is missing.

This information is needed to determine compliance with 10 CFR 72.42(a).

RAI 3-4

Justify why concrete degradation due to salt scaling is not included as an aging effect/mechanism for the HSM and basemat concrete, and modify the LRA as described below, as appropriate.

LRA Section 3.5.4 does not address aging effects due to salt scaling in the HSM concrete. The staff notes that salt scaling is defined as superficial damage caused by freezing a saline solution on the surface of a concrete body. The damage is progressive and consists of the removal of small chips or flakes of material. Similar to freeze and thaw damage, salt scaling takes place when concrete is exposed to freezing temperatures, moisture, and dissolved salts.

Justify that concrete degradation due to salt scaling is not credible. Alternatively, include this aging mechanism in the aging management review and revise the HSM AMP, Basemat AMP, and FSAR supplement in Appendix C, as appropriate, to address this aging mechanism.

This information is needed to determine compliance with 10 CFR 72.42(a).

RAI 3-5

Provide details on the aging management review of the below-grade concrete basemat that is exposed to an underground environment, and revise LRA Section 3.6, Basemat AMP, and FSAR supplement in Appendix C, as appropriate.

LRA Section 3.6.3 states that the below-grade portions of the basemat are in an underground environment and could be exposed to a groundwater/soil environment. However, the LRA does not specifically address aging mechanisms and effects for the concrete basemat exposed to an underground environment, nor does it provide aging management activities for managing aging mechanisms and effects for the below-grade concrete.

This information is needed to determine compliance with 10 CFR 72.42(a).

RAI 3-6

Provide information on the service environment for the transfer cask plugs, and revise Table 3-10 of the LRA, as appropriate.

LRA Table 3-10 summarizes the AMR results for the in-scope subcomponents of the transfer cask; however, the service environment for the plugs (Drawing NUH-05-4001, Item 18) is missing from the table.

This information is needed to determine compliance with 10 CFR 72.42(a).

RAI 3-7

Proprietary – see Enclosure 2

RAI 3-8

Resolve the discrepancy in various sections of the LRA regarding the assessment on cracking due to SCC for transfer cask subcomponents, and revise the LRA, as appropriate.

LRA Section 3.7.4.2 discussed SCC of transfer cask subcomponents as an aging mechanism. However, the discussion is not complete and no conclusion is given on the assessment. Cracking due to SCC is not included in Section 3.7.4.5 as an aging effect requiring management but is included in the Transfer Cask AMP in Appendix B.5.

This information is needed to determine compliance with 10 CFR 72.42(a).

Appendix A - Time-Limited Aging Analysis (TLAA) and Other Supporting Analyses for the Rancho Seco ISFSI

RAI A-1

Proprietary – see Enclosure 2

Appendix B – Aging Management Program

RAI B-1

Resolve the discrepancy in Section 3.5.4.2 and the HSM and Basemat AMPs of the LRA regarding whether loss of material and change in material properties due to microbiological degradation are aging effects requiring management for HSM concrete and basemat, and revise the LRA, as appropriate.

LRA Section 3.5.4.2 states that microbiological degradation is an applicable concrete aging mechanism. However, loss of material and change in material properties due to microbiological degradation are not included in the HSM AMP in Appendix B.4.3 and the Basemat AMP in Appendix B.6.3.

This information is needed to determine compliance with 10 CFR 72.42(a).

RAI B-2

For the HSM Aging Management Program, provide additional information to address the following inconsistencies:

1. Justify that the proposed inspection frequency in the HSM AMP in Appendix B.4 and in the Basemat AMP in Appendix B.6 is adequate for ensuring that aging effects of the HSM and basemat concrete will be addressed before a loss of intended function or propose an alternate frequency, and revise the HSM AMP, Basemat AMP, and FSAR supplement in Appendix C, as appropriate.

   LRA Section B.4.5 of the HSM AMP and Section B.6.5 of the Basemat AMP, “Detection of Aging Effects,” state that performance of the baseline AMP visual inspection will be no later than two years after the period of extended operation commencement, with follow-on inspections at a frequency of 10 ± 2 years. If preceding inspection acceptance criteria have been exceeded or the trending from previous inspections is indeterminate, the interval between inspections is decreased to 5 ± 1 years. LRA Section B.4.5(4) also states that the 10 year inspection interval is consistent with the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME B&PV code) Section XI

Subarticle IWA-2430 and justified based on the benign environmental conditions inside the HSM observed during the pre-application inspection.

The NRC staff note that American Concrete Institute (ACI) ACI 349.3R and NUREG-1927, Revision 1 recommend a frequency of visual inspections of at least once every 5 years for above-grade (both readily accessible and normally inaccessible) areas and at least once every 10 years for below-grade (underground) areas. In addition, the staff note that the ASME B&PV code Section XI Subarticle IWA-2430 (2013 version) specifically refers to inservice examinations and system pressure tests required by Section XI Subsections IWB, IWC, IWD, IWE, and inservice examinations and tests of Section XI Subsection IWF. Inservice inspection requirements for concrete containment components are addressed in ASME B&PV code Section XI Subsection IWL. Article IWL-2000 references ACI 201.1R and ACI 349.3R, which are also referenced in the HSM Aging management Program. Subarticle IWL-2410 includes inservice inspection intervals that are consistent with ACI-349-3R. Finally, the staff note that while the pre-application inspection found that the exterior and interior of the HSM and the DSC support structure did not show significant indications of aging, the pre-application inspection was limited to the interior components in one HSM.

2. Provide additional information to explain why the HSM Aging Management Program does not include periodic radiation surveys to verify that there are no aging effects that affect the important to safety function of the HSM concrete structure.

   The HSM Aging Management Program relies on visual inspection of accessible and non-accessible areas and the acceptance criteria of ACI 349.3R. Inspection of non-accessible areas in periodic inspections is limited to a sampling of the HSM modules in service at the Rancho Seco ISFSI. Aging effects in non-accessible areas of HSM interiors that are not periodically inspected may result in reduced concrete shielding effectiveness and increases to worker dose. Periodic radiation surveys included as part of the HSM Aging Management Program would provide assurance that no aging effects that reduced shielding effectiveness has occurred in HSMs that were subjected to only an exterior inspection.

3. Resolve the discrepancy in Sections B.4.5(4) and B.4.5(7) of the HSM AMP and Table B-2 in Appendix B regarding the proposed inspection frequency, and revise the LRA, as appropriate.

   LRA Section B.4.5(4) of the HSM AMP, “Detection of Aging Effects,” states that performance of the baseline AMP visual inspection will be no later than two years after the period of extended operation commencement, with follow-on inspections at a frequency of 10 ± 2 years. If preceding inspection acceptance criteria have been exceeded or the trending from previous inspections is indeterminate, the interval between the sheltered environment HSM component inspections is decreased to 5 ± 1 year. LRA Section B.4.5(4) does not address decreased inspection intervals for external surfaces.

   LRA Section B.4.5(7) of the HSM AMP, “Corrective Actions,” also states that for sheltered environment SSCs, confirmed aging effects within accessible locations require expanded remote visual inspections within inaccessible locations. However, decreased inspection intervals of 5 ± 1 year are proposed for the HSM internal and external

surfaces (including accessible, normally non-accessible, and inaccessible areas) in LRA Table B-2 in Appendix B.

This information is needed to determine compliance with 10 CFR 72.24(e) and 72.42(a).

RAI B-3

Resolve inconsistency regarding whether CISCC is an aging effect requiring management, and revise the LRA, as appropriate.

LRA Section 3.4.4.2 (Pages 3-67 and 3-68) states that the potential for CISCC is minimal and cracking due to CISCC is not an aging effect requiring management. LRA Section B.3.3 states, "the potential for chloride aerosols leading to chloride accumulation on ISFSI components at Rancho Seco is very low and that enhanced monitoring for CISCC is not warranted." However, LRA Section B3.5, Subsection 6.3 (Flaw Evaluation) refers to a review of industry operating experience (OE) on the consequences of through-wall CISCC.

This information is necessary to assure compliance with 10 CFR 72.42(a).

RAI B-4

Resolve inconsistency regarding whether loss of material due to wear of transfer cask subcomponents is an aging effect requiring management, and revise the LRA, as appropriate.

LRA Section 3.7.4.2 states that loss of material due to wear of transfer cask subcomponents is not an aging effect requiring management. However, loss of material due to wear is in LRA Sections B.5.3 and B.5.5 of the Transfer Cask AMP. The inconsistency needs to be resolved.

This information is necessary to assure compliance with 10 CFR 72.42(a).

RAI B-5

Address the following for the transfer cask in the Transfer Cask AMP in Appendix B.5 and in other sections of the LRA, as appropriate:

1. Clarify if the Transfer Cask AMP in Appendix B.5 specifically addresses the aging management activities associated with the transfer cask serving as a pressure boundary for a leaking dry shield canister (including handling and storage) and accounts for the effects of the transfer cask's use as a transportation package. Revise the Transfer Cask AMP, and FSAR supplement in Appendix C, as appropriate.

   If the Transfer Cask will continue to be potentially used as a pressure boundary for a DSC and/or if the Transfer Cask will potentially be used as a transportation package in the period of extended operation covered by the LRA, provide the following information:
   a) identify where the Transfer Cask will be stored while serving as a pressure boundary for a leaking DSC
   b) revise both the Transfer Cask AMP in Appendix B.5 and the FSAR supplement in Appendix C, as appropriate; and
   c) update calculations provided in support of the LRA as necessary.

LRA Section B.5.2, Environment, identifies only a sheltered environment for the Transfer Cask AMP. LRA Section B.5.5.4 states the following:

The TC cask was used at SMUD during fuel loading and transfer operations that concluded in August 2002 for all DSCs except the GTCC canister, which concluded in 2006. All of the DSCs are in storage in the HSMs and the TC will only be used when the DSCs are to be retrieved from the HSMs for offsite shipment. Therefore, pre-service inspections are more appropriate for the TC at SMUD.

In addition, LRA Section A.2.2.1, Atmospheric to Service Pressure Cycle, states:
For on-site vertical storage conditions the cask is designed to serve as a pressure boundary during vertical storage of a leaking DSC.

The staff notes that the Transfer Cask AMP does not describe how the range of past and possible future operational environments for the transfer cask are considered including the potential role of the transfer cask to store a leaking DSC (if such an event were to occur) or as a transportation package. Specifically, the staff notes that the aging management review does not appear to consider either (1) aging effects such as exposure to radiation, (2) combustible gas generation in the neutron shield material of the transfer cask due to radiolysis, or (3) boron depletion of the neutron shield for these potential operations

The applicant needs to provide, as necessary, both additional and clarifying information relative to the potential future uses of the Transfer Cask as well as updated calculations, AMPs, TLAAs and FSAR pages, which reflect the potential future uses of the Transfer Cask, as allowed by the licensee's design basis (the FSAR) and the cask's 10 CFR Part 71 certificate of compliance.

2. Justify the exclusion of the fill and drain ports' cover plates from the aging management review for the transfer cask. For any use of the transfer cask during the period of extended operations, it seems that these ports would be radiation streaming paths for exposing personnel and the cover plates would be important to mitigate radiation exposure from these ports.

3. Modify the transfer cask AMP's element 3 to address the interfacing surfaces of the trunnions and the transfer cask and the sealing surfaces of the transfer cask and the cask's lid.

   The trunnions are removable from the transfer cask and any operations that remove the trunnions or that reattach the trunnions to the transfer cask could be a source of wearing and degradation of these components at these surfaces. It is not clear that the AMP addresses these interfacing surfaces for the trunnions and transfer cask or for the cask and cask lid sealing surfaces.

4. Clarify the transfer casks AMP's element 4 to describe what constitutes 'prior to use' for inspections of the transfer cask.

   There should be an appropriate limit on how far in advance of a loading/unloading campaign the inspections may be done and still be considered to meet the 'prior to use' criterion. For example, this may be something like: "Inspections done within a year prior

to the campaign are considered to meet ‘prior to use’ but inspections done more than a year in advance of the campaign are not.”

This information is necessary to assure compliance with 10 CFR 72.42(a) and (b).