

January 15, 2013

Mr. Steven E. Sisley  
Licensing/Regulatory Compliance Manager  
EnergySolutions Spent Fuel Division, Inc.  
2105 South Bascom Ave., Suite 230  
Campbell, California 95008

SUBJECT: ACCEPTANCE REVIEW OF RENEWAL APPLICATION TO CERTIFICATE OF COMPLIANCE NO. 1007 FOR THE VENTILATED DRY STORAGE CASK (VSC-24) – SUPPLEMENTAL INFORMATION NEEDED (TAC NO. L24694)

Dear Mr. Sisley:

By letter dated October 12, 2012, EnergySolutions Spent Fuel Division (hereafter "EnergySolutions") submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for renewal of Certificate of Compliance (CoC) No. 1007 for the Ventilated Storage Cask Model No. 24 (hereafter "VSC-24"). The application is publicly available in the Agencywide Documents Access and Management System (ADAMS) using the Accession Number ML12290A139.

In the application, EnergySolutions requested to extend the initial CoC and its amendments for an additional forty (40) years. NRC staff performed an acceptance review of the application to determine if the application contains sufficient technical information in scope and depth to allow the staff to complete the detailed technical review. The staff used the following regulatory documents to perform its acceptance review:

- Spent Fuel Storage and Transportation (SFST) Office Instruction SFST – 14 (OI-14), "Acceptance Review Process" (ML110450435), and
- NUREG-1927, "Standard Review Plan for Renewal of Spent Fuel Dry Storage System Licenses and Certificates of Compliance – Final Report," March 2011.

This letter is to advise EnergySolutions that based on the NRC's acceptance review the application does not contain sufficient technical information. The information needed to continue the NRC's review is described below in the form of requests for supplemental information (RSIs); observations are also provided. As defined in OI-14, "observations" include questions (identified by the NRC staff during the acceptance review) that do not rise to the level of a RSI that needs to be resolved before the requested licensing action could be accepted for review, but may require NRC staff to issue a request for additional information (RAI) during the detailed technical review. EnergySolutions may respond to the observation(s) in response to the RSIs to avoid the need for a RAI on the question(s) during the staff's detailed technical review.

**REQUEST FOR SUPPLEMENTAL INFORMATION****GENERAL**

- RSI-1. Provide justification for the acceptability of the storage of high burnup (HBU) fuel by providing a time-limited aging analyses (TLAA) and aging management program (AMP) to demonstrate that HBU fuel is protected against possible degradation that may lead to gross ruptures for storage periods beyond 20 years and potential operation safety problems during removal from storage. Alternatively, propose a certificate condition that would limit HBU fuel storage in the VSC-24 canisters to no more than 20 years.

The TLAA should address reasonable and known physical or degradation phenomena associated with storage periods from 20 to 60 years, such as embrittlement of cladding from the ductile to brittle transition from hydride reorientation in the radial direction in HBU fuel. The TLAA should systematically address, in part, potential storage conditions and failure modes (e.g., pinching of embrittled cladding) during normal conditions of storage that may potentially strain cladding and lead to gross rupture. The AMP should define specific confirmatory inspection or monitoring of storage for HBU fuel to address conflicting information, uncertainties or indications of the presence of a specific potential aging affect of the fuel. The program may specify inspection and monitoring of HBU fuel within the cask system after 20 years of storage and at periodic intervals (e.g., every 10-20 years) during the renewal period; and may define an alternative, optional program to periodically review and use surrogate confirmatory information from other confirmation programs in the U.S. with similar types of HBU fuel. The applicant may also consider proposing licensing conditions to limit the scope or storage time of HBU fuel during the renewal period to address uncertainties and lack of confirmatory data. This question is applicable to the initial CoC and Amendments 1 through 3, which allow storage of HBU fuel.

This information is needed to determine compliance with 10 CFR 72.240(b)(2).

- RSI-2. Justify why systems under the initial CoC and Amendment 1 can continue to be fabricated. Alternatively, condition the CoC renewal such that new systems cannot be constructed using the initial CoC and Amendment 1.

Amendment 2 was submitted in response to design and fabrication flaws with the cask design in the initial CoC and Amendment 1. Significant, detailed justification may be required to permit construction of new casks under the initial CoC and Amendment 1. Otherwise the CoC will be conditioned to prohibit construction of new systems under the initial CoC and Amendment 1 in accordance with 10 CFR 72.240(e).

This information is needed to determine compliance with 10 CFR 72.236(d) and 72.236(h).

- RSI-3. Provide the results of the remote visual inspection of the lead canister to facilitate the safety evaluation of the renewal application.

The lead canister inspection results were summarized in the CoC renewal application. Additional documentation should be provided to the staff.

This information is needed to determine compliance with 10 CFR 72.240(d) and conformance to Appendix E to NUREG-1927.

RSI-4. Provide further information on the choice of the lead canister.

- a) Section 3.2.2.4 "Lead Cask Inspection" indicates that the lead canister inspection was performed on a canister loaded in June 1999. This canister was fabricated after fabrication/quality control lessons were learned as a result of Confirmatory Action Letter (CAL) 97-7-001 (ML060620420). Prior to the CAL, there were a number of multi-assembly sealed baskets (MSBs) with identified cracks, as described throughout the application (e.g., Section 3.4.3.2, 3.4.3.3, etc.). These canister(s), which have known cracks/flaws, would tend to warrant further examination under a lead canister inspection (and future, periodic inspections). For example, were the cracks/flaws from initial radiographic and ultrasonic testing examinations, performed years earlier, unchanged? An explanation of why canisters with known fabrication/flaw issues were not considered as a lead canister and an explanation of why the submitted lead canister inspection results apply to these canisters should be provided.
- b) Only one lead canister from one site was chosen for detailed observation to justify the conditions of the VSC-24s. Provide supporting documentation demonstrating that each site environment is similar enough that the use of only lead cask from one site is justified.

This information is needed to determine compliance with 10 CFR 72.236(d) and (e) and conformance to Appendix E to NUREG-1927.

RSI-5. Clarify if corrosion on the lead canister was mitigated after inspection.

If the effects of corrosion on the lead canister were mitigated then future lead canister inspections will not be typical of VSC-24s where no corrective actions were taken to mitigate corrosion.

This information is needed to determine compliance with 10 CFR 72.240(d) and conformance to Appendix E to NUREG-1927.

RSI-6. Provide a table and description of the changes made to the VSC-24 system by means other than certificate amendment (e.g., via 10 CFR 72.48). The information should include a brief description of the change, the licensee or CoC holder making the change, and the FSAR revision to which the change was made.

The application discusses some changes made under 10 CFR 72.48; however, it is not clear that all changes made to the storage system by means other than amendment applications (such as changes made under 10 CFR 72.48) have been described. A brief description of the change in a table that includes the requested

information will assist the staff's understanding of the system configurations that are in use and subject to the CoC renewal.

This information is needed to determine compliance with 10 CFR 72.240.

- RSI-7. Clarify Section 3.4.3, to address any issues that occurred during fabrication or use that affect the storage sleeves and MSB basket assembly and the impacts on aging effects.

The application describes in Section 3.4.3 some issues that occurred during fabrication and use of some VSC-24 systems. It is not clear if there were issues (e.g., welding) that affected the storage sleeves and the basket assembly. The application should describe any such issues, including how they were resolved and the impacts on aging effects, as was done for those issues currently described in the application.

This information is needed to determine compliance with 10 CFR 72.240(d).

- RSI-8. For each of the amendments listed in 10 CFR 72.214, revise the renewal application by providing a drawing list similar to that of Section 1.5, "Supplemental Data," of the latest final safety analysis report (FSAR). For applicable drawings, also identify the important-to-safety structures, systems, and components (SSCs) or subcomponents that were added or removed from the storage system through certificate amendment and/or the 10 CFR 72.48 change process.

Section 2.2.1, "Description of SSC," of the renewal application notes that the VSC-24 storage system components are provided in Chapter 1 of the FSAR, Revision 8, dated April 2009. Given that when the NRC renews a CoC, all amendments to that CoC are renewed (response to Question W, 8878 Federal Register/Vol. 76, No. 32), it is imperative for the applicant to submit lists of drawings for all approved amendments to facilitate staff review of the completeness of the SSCs and subcomponents considered by the applicant for the scoping review.

This information is needed to determine compliance with 10 CFR 72.240.

- RSI-9. Provide a clear description of the certification basis for the initial CoC and each amendment to the CoC.

CoC renewals include the initial CoC and each CoC amendment. All are treated as separate approved systems though they are listed under the same CoC and docket number. Thus, each has a separate basis for certification. The certification basis for the initial CoC and for each CoC amendment includes the version of the FSAR (including the revision(s) of the drawings) associated with the initial, or amended CoC. Also, as indicated by the guidance in Section 1.3 of NUREG-1927, the certification basis for each amendment (and the initial CoC) is the edition of 10 CFR Part 72 that was in effect at the time of approval. The applicant should provide a clear description of the certification basis for the initial CoC and each CoC amendment to be included in the CoC renewal. The description should address the FSAR version and any supplements and the edition of 10 CFR Part 72 in effect at

the time of approval. The description should identify differences between the FSAR and the effective edition of Part 72 for each CoC amendment and the FSAR and the effective edition of Part 72 for the initial CoC or preceding CoC amendment(s). The revision(s) of the drawings for the initial CoC and for each amendment should also be provided. The description should also discuss the potential impacts of these differences on the TLAAs and AMPs. The TLAAs and AMPs should address the components of the in-scope SSCs that appear in any of the revised drawings, as appropriate.

This information is needed to determine compliance with 10 CFR 72.240.

## **AGING MANAGEMENT**

- RSI-10. Provide the data for the dose rate surveys described in Section 3.2.2.3 of the application.

The application provides a general description of the surveys that have been performed and some conclusions drawn by the applicant from those surveys. The applicant should provide the data in a form appropriate for the staff to do an independent evaluation of the surveys and the applicant's conclusions (e.g., a table and graph for each general licensee). The data should include the survey results for both near the systems and at the controlled area/site boundary and list results for gamma and neutron measurements.

This information is needed to determine compliance with 10 CFR 72.240.

- RSI-11. Provide the helium leakage evaluation that justifies the VSC-24 storage canister will have a 60 year lifetime.

Table A-1 provides a summary of FSAR changes that often indicate an increase in design lifetime to 60 years (i.e., satisfy 10 CFR Part 72 requirements). The MSB Helium Leakage Evaluation described in Section 3.3.3.1 of the application should be provided.

This information is needed to determine compliance with 10 CFR 72.236(g).

- RSI-12. Confirm that all loaded canisters currently meet 10 CFR Part 72 confinement, fuel integrity and subcritical requirements.

Section 3.4.3.2 and Section 3.4.3.3 indicate that multiple VSC-24 canisters had cracks/flaws. According to Section 3.4.3.3, MSB-04 canister, for example, currently has a known flaw(s) in the seam weld but that crack-growth analyses have indicated that "cracks in the longitudinal seal weld of MSB-04 will not prevent it from performing its intended functions (primarily confinement) during the extended storage period." Considering the delayed period of finding the flaw in MSB-04 (as discussed further in OBS-4 below), the application should confirm that all loaded canisters currently satisfy, and are projected to satisfy, the 10 CFR Part 72 confinement, fuel integrity and subcritical (i.e., prevent water intrusion) requirements.

This information is needed to determine compliance with 10 CFR 72.236(c), (d), (e) and (g).

## **OBSERVATIONS**

- OBS-1. Address the potential for spent fuel cladding degradation by zinc fumes inside the multi-assembly sealed basket (MSB) VSC-24.

NUREG/CR-6732, "Zinc-Zircaloy Interaction in Dry Storage Casks" discusses the potential for cladding degradation due to zinc fumes.

This information is needed to determine compliance with 10 CFR 72.240(d).

- OBS-2. Clarify how additional concrete degradation mechanisms besides defects wider than ½-inch or ¼-inch deep (as described in the Technical Specification 1.3.2) will be addressed under the aging management program such as an industry consensus standard (e.g., American Concrete Institute Code Requirements 349).

Other concrete degradation mechanisms should be evaluated such as alkali-silica reactions or alkali-carbonate reactions which exhibit map-cracking.

This information is needed to determine compliance with 10 CFR 72.240(c)(3).

- OBS-3. Justify why crevice corrosion at the bottom of the MSB was not considered in the lead cask inspection.

Crevice corrosion is an accelerated form of corrosion which should be considered if there is a credible way for water to enter the Ventilated Concrete Cask (VCC).

This information is needed to determine compliance with 10 CFR 72.240(d).

- OBS-4. Provide discussions for the differences in explanations of crack/flaw formation found in Section 3.4.3.2 and Section 3.4.3.3.

Section 3.4.3.2 "MSB Closure Weld Cracks" states that "... the delay time for the onset of hydrogen-induced cracking (deemed the only credible type of delayed cracking) is only a matter of hours; shorter than the time period between placement of the weld and weld inspections. No other (longer-term) mechanisms for delayed cracking or crack growth were identified." However, Section 3.4.3.3 "Palisades MSB-04 Shell Seam Weld RT Indications" describes the situation where multiple cracks/flaws were found in MSB-04 after a much longer time period. Confirm that the timing and methodology of MSB inspections can detect cracks/flaws, whether due to hydrogen-induced cracking or by other mechanisms. The reasons for the inconsistent explanations found in Section 3.4.3.2 and Section 3.4.3.3 should be provided.

This information is needed to determine compliance with 10 CFR 72.236(d) and (e).

OBS-5. Include the following SSC components in Tables 4 through 6 of the application, or justify why they do not need to be scoped in:

- a) bolts described in Drawing No. MSB-24-002, Sheet 1, top view and Note 9
- b) coating described in:
  - Drawing No. VCC-24-008, Note 2;
  - Drawing No. VCC-24-001, Note 2; and
  - Drawing No. VCC-24-002, Note 2
- c) lead plug in Drawing No. MTC-24-009 (Item No. 3)
- d) items in Drawing No. MTC-24-010

This information is needed to determine compliance with 10 CFR 72.240.

OBS-6. Update TLAAs of fatigue cracking based upon identified cracks in the VSC-24 systems. Confirm the adequacy of the provided TLAAs and provide significant justification for why the crack growth evaluation listed in Section 3.3.3.6 is bounding.

The CoC Renewal Application cites a fatigue analysis for a bounding 1-inch long by ½-inch deep subsurface flaw at the Palisades nuclear generating station (Section 3.3.3.6). Confirmatory Action Letter 97-7-001 (ML060620420) notes significantly longer cracks in VSC-24 systems at different sites.

This information is needed to determine compliance with 72.236(d).

In order to schedule our technical review, this information should be provided by February 1, 2013. If the information described is not received by this date, the application will not be accepted for review. This letter confirms our phone call on January 10, 2013, with respect to the supplemental information needed and the date for your submittal.

If you have any questions regarding this matter, please contact me at (301) 492-3562.

Sincerely,

**/RA/**

Pamela Longmire, Ph.D., Project Manager  
Division of Spent Fuel Storage and Transportation  
Office of Nuclear Material Safety  
and Safeguards

Docket No.: 72-1007  
TAC No.: L24694

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Pamela Longmire, Ph.D., Project Manager  
 Division of Spent Fuel Storage and Transportation  
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