



November 4, 2013
ES/NRC 13-023
Docket No. 71-9204

ATTN: Document Control Desk
Director, Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Response to Request for Additional Information for Review of the Model No. 10-160B Package Amendment Request (TAC No. L24770)

Reference: Letter from J. Vera (NRC) to S. Sisley (EnergySolutions), "Request for Additional Information for Review of the Model No. 10-160B Package Amendment Request," October 8, 2013, ADAMS Accession Number ML13282A643.

Dear Sir or Madam:

By the referenced letter, NRC requested that EnergySolutions (ES) provide additional information needed for NRC staff to complete their review of the application to amend Certificate of Compliance (CoC) No. 9204 for the 10-160B Shipping Cask. ES hereby provides the additional information requested by NRC in the referenced letter, as described in Enclosure 1. Enclosure 2 contains one (1) paper copy of the non-public version of the revised 10-160B Safety Analysis Report (SAR) that contains security-related sensitive information that should be withheld under 10 CFR 2.390. Enclosure 3 contains one (1) paper copy of the public version of the revised 10-160B SAR in which all security-related information is redacted. A summary of changes included in the 10-160B SAR is provided in Attachment 1 of this letter.

Should you or any member of your staff have questions, please contact the undersigned at (408) 558-3509.

Sincerely,

A handwritten signature in black ink, appearing to read "Sisley", is written over a horizontal line.

Steven E. Sisley
Cask Licensing Manager
EnergySolutions

Attachments:

- (1) Summary of Changes, 10-160B Consolidated SAR, Revision 7 (1 page)

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Enclosures:

- 1) Response to Request for Additional Information.
- 2) Safety Analysis Report for the Model 10-160B Type B Radwaste Shipping Cask, Consolidated SAR Revision 7, November 2013, Non-Public Version (1 paper copy), **(Security-Related Information – Withhold Under 10 CFR 2.390)**.
- 3) Safety Analysis Report for the Model 10-160B Type B Radwaste Shipping Cask, Consolidated SAR Revision 7, November 2013, Public Version (1 paper copy).

cc

Mr. John Vera, Division of Spent Fuel Storage and Transportation

Mr. Dan Shrum, *EnergySolutions*

The following is a summary of the changes incorporated in the Safety Analysis Report (SAR) for Model 10-160B Type B Radwaste Shipping Cask, Consolidated SAR Revision 7. The revisions indicators in the margins of Revision 6 of the 10-160B SAR have also been included in Revision 7 to indicate the cumulative changes that have been made in association with the request to amend the 10-160B CoC. However, the summary of the changes incorporated in Revision 6 of the 10-160B SAR is not repeated below.

Summary of Changes, 10-160B Consolidated SAR Revision 7

| Section | Page(s) | Change | Purpose |
|-----------------------------------|---------|--|-----------------------------|
| Table A2-17 | 2-172 | Corrected drop condition in notes. | Editorial correction. |
| Table A2-23 | 2-180 | Corrected drop condition in notes. | Editorial correction. |
| Table A2-27 | 2-184 | Corrected drop condition in notes. | Editorial correction. |
| 8.2.6 | 8-5 | Clarified requirements for threaded inserts used for repair of bolt holes. | Revised in response to RAI. |
| Shield Insert A Addendum, 8.2.2.4 | 8-3 | Clarified requirements for threaded inserts used for repair of bolt holes. | Revised in response to RAI. |
| Shield Insert B Addendum, 8.2.2.4 | 8-3 | Clarified requirements for threaded inserts used for repair of bolt holes. | Revised in response to RAI. |

Enclosure 1

Responses to Request for Additional Information

(2 pages total)

The response to the NRC Request for Additional Information (RAI) associated with the EnergySolutions request to amend the Certificate of Compliance (CoC) for the Model No. 10-160B Radwaste Shipping Cask is provided herein. The NRC RAI question, which is shown in *italics*, is followed by the ES response and a summary of the resulting changes to the 10-160B Safety Analysis Report.

QUESTION:

Provide an analysis or justification that repaired bolt holes will meet regulatory requirements for lifting.

The SAR states that a 150% load test will be performed; however, the regulatory requirement states that lifting devices “must be designed with a minimum safety factor of three against yielding when used to lift the package in the intended manner.” Analysis to meet this regulatory requirement was only provided for unrepaired bolt holes (threads).

This information is needed to verify compliance with the requirements of 10 CFR 71.45(a).

RESPONSE:

The 10-160B has four (4) removable lifting lugs that bolt to the lift lug pads (Item 10) that are affixed to the cask outer shell. As discussed in Section 8.2.6 of the SAR, the bolt holes in the lift lug pads may be repaired using helical threaded inserts. Both the bolt-to-insert and insert-to-base metal thread interfaces are stronger than the original (unrepaired) threaded connection.

Helical threaded inserts are made of coiled wire that has high tensile strength; typically 200 ksi. The minimum acceptable tensile strength of helical threaded inserts used to repair bolt holes on the 10-160B package is specified as 150 ksi, which is much higher than the 70 ksi tensile strength of the lift pad plate material. The minimum length of the threaded insert is also required to be at least one (1) bolt diameter, or 1.25 inches for the lift lug bolt holes. As shown in Section 2.4.3 of the SAR, the thread engagement length required to develop the full strength of the bolt, L_e , is 1.21 inches. Therefore, since the insert tensile strength is higher than the base metal tensile strength and the insert length exceeds that required to develop the full strength of the bolt, the bolt-to-insert thread interface is stronger than the original threaded connection.

A thread repair using a helical threaded insert is performed by drilling the damaged bolt hole to a larger diameter (generally 1/8-inch larger) to remove the damaged threads, re-tapping the hole to accept the external threads of the insert, and installing the insert in the repaired hole. By drilling and tapping the threads in the base metal to a larger diameter, the base metal thread shear area per unit length is significantly increased. Since the 1.25-inch length of the threaded insert (i.e., the length of thread engagement with the repaired hole base metal) is greater than the 1.21-inch engagement length required to develop the full strength of the bolt for the original threads, and the shear area per unit length of the repaired base metal threads is significantly higher than that of the original threads, the insert-to-base metal threaded connection is also stronger than the original threaded connection.

The analysis of the threaded holes in the lift lug mounting pad presented in Section 2.4.3 of the SAR shows that the original threaded holes provide a factor of safety greater than three against yield. As discussed above, a bolt hole repaired with a helical threaded insert is stronger than the original threaded hole. Therefore, it follows that the bolt holes repaired with threaded inserts will also provide the factor of safety required by 10 CFR 71.45(a) for lifting devices.

Summary of SAR changes:

- Base SAR, Section 8.2.6: Revised to clarify that only helical threaded inserts may be used to repair bolt holes, and that the inserts are required to have a minimum tensile strength of 150 ksi and a minimum length equal to one (1) bolt diameter.
- SAR Shield Insert A Addendum, Section 8.2.2.4: Revised to clarify that only helical threaded inserts may be used to repair bolt holes, and that the inserts are required to have a minimum tensile strength of 150 ksi and a minimum length equal to one (1) bolt diameter.
- SAR Shield Insert B Addendum, Section 8.2.2.4: Revised to clarify that only helical threaded inserts may be used to repair bolt holes, and that the inserts are required to have a minimum tensile strength of 150 ksi and a minimum length equal to one (1) bolt diameter.