

March 19, 2013

Mr. Troy Hedger, CEO
Alpha-Omega Services, Inc.
9156 Rose Street
P.O. Box 789
Bellflower, CA 90706

SUBJECT: SECOND REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF
THE MODEL NOS. AOS-25A, AOS-50A, AOS-100A, AOS-100B, AND AOS-
100A-S PACKAGES

Dear Mr. Hedger:

By letter dated August 7, 2012, Alpha-Omega Services, Inc. (AOS) submitted an amendment request to Certificate of Compliance (CoC) No. 71-9316 for the Model Nos. AOS-25A, AOS-50A, AOS-100A, AOS-100B, and AOS-100A-S packages. By letter dated January 2, 2013, AOS submitted responses to a first request for additional information (RAI) dated October 31, 2012.

In connection with the staff's review of both the RAI responses and the application "AOS Radioactive Material Transport Packaging System Safety Analysis Report," Report No. AOS-FM9054, Revision No. H, dated December 30, 2012, we need the information identified in the enclosure to this letter. We request that you provide this information by April 15, 2013. If you are unable to meet this deadline, you must notify us in writing no later than April 3, 2013, of your submittal date and the reasons for the delay. The staff will then assess the impact of the new submittal date and notify you of a revised schedule.

In addition, staff is currently examining issues related to compliance with 10 CFR 71.51 for shipment of normal form materials in order to better understand the original certification basis for the package. Pursuant to 10 CFR 71.39, staff will soon be seeking information to determine if your CoC should be modified.

Please reference Docket No. 71-9316 and TAC No. L24677 in future correspondence related to this request. The staff is available to meet with you to discuss your proposed responses. If you have any questions regarding this matter, I may be contacted at (301) 492-3408.

Sincerely,

/RA/

Pierre Saverot, Project Manager
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-9316
TAC No. L24677

DATE:	03/19/2013					
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Request for Additional Information
for the
Model Nos. AOS-25A, AOS-50A, AOS-100A,
AOS-100B, AND AOS-100A-S PACKAGES
Docket No. 71-9316

By application dated August 7, 2012, Alpha-Omega Services, Inc. (AOS) submitted an amendment request for the Model Nos. AOS-25A, AOS-50A, AOS-100A, AOS-100B, and AOS-100A-S packages. By letter dated January 2, 2013, AOS submitted responses to a first request for additional information (RAI) dated October 31, 2012, and a revised application.

This RAI identifies information needed by the staff in connection with its review of the "AOS Radioactive Material Transport Packaging System Safety Analysis Report for Model Nos. AOS-025, AOS-050, and AOS-100 Transport Packages," Report No. AOS-FM9054, Revision No. H, dated December 30, 2012. The requested information is listed by chapter number and title in the applicant's safety analysis report. The staff reviewed the application using the guidance in NUREG 1609, "Standard Review Plan for Transportation Packages for Radioactive Material."

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

Chapter 1 – General Information

Licensing Drawings and Bill of Materials

- 1-1 Provide design details from the seal manufacturer for the new elastomeric seal design. Reference the seal manufacturer part number on the certificate drawings. This RAI is a follow up to the response to RAIs 1-2 and 4-3, dated October 31, 2012.
- a. Provide dimensions on the licensing drawings to completely describe the "Lid seal, option" metallic rings and the groove shape created by the metallic rings.
 - b. Provide a seal manufacturer and part number on the licensing drawings for the metallic rings of the "Lid seal, option." If the design includes two rings like the Model Nos. AOS-100A, AOS-100B, AOS-100A-S packages, provide the seal manufacturer and part numbers on the licensing drawings for each of the rings.

The licensing drawings have been updated to define the dimensions and materials used for the new elastomeric seal design. However, the licensing drawings do not make reference to the manufacturer part number. The drawings of the new elastomeric seals provided in Appendix 4.5.1 reference a Helicoflex Part No. on the drawing.

Details from the manufacturer are needed to clarify whether the new elastomeric seal is going to be fabricated by the licensee or procured from a seal manufacturer.

This information is required by staff to determine compliance with 10 CFR 71.33 and 10 CFR 71.51(a).

- 1-2 Revise the licensing drawings to ensure that the elastomeric seals from the “Lid seal, option” design will be compressed based on the tolerances given on the drawings. Also revise the licensing drawings to ensure the metallic portion of the “Lid seal, option” will not prevent contact between the lid and cask shell based on the tolerances given on the drawings. This is a follow-up to the response to RAI 4-3, dated October 31, 2012.

Based on the elastomeric seal dimensions on the licensing drawings, the groove dimensions on the licensing drawings, and the tolerances on the licensing drawings, situations could be created where there is no compression on the seals. For example, on the AOS-25 licensing drawing 166D8143, the O-ring diameter is 0.103 +/- 0.010 and the lid groove is 0.083 +/- 0.010, this could result in no compression on the seal.

Also based on the metallic portion of the “Lid seal, option” on the licensing drawings, the groove dimensions on the licensing drawings, and the tolerances on the licensing drawings, situations could be created where the metallic rings of the “Lid seal, option” could prevent contact between the lid and the cask shell. For example, on the AOS-100 licensing drawing 105E9712 the “Lid seal, option” metallic rings are 0.11 +/- 0.02 and the lid groove is 0.123 +/- 0.01, this could result in the metallic rings preventing contact between the lid and the cask shell.

Since there may be other situations beyond what has been described above for all models, the applicant should review them and make appropriate changes to the licensing drawings.

This information is required by staff to determine compliance with 10 CFR 71.33 and 71.51(a).

Chapter 2 – Materials Evaluation

- 2-1 Clarify which seals were tested in each drop of the 30-foot drop test of the AOS-165 prototype. Provide a justification of the adequacy of the new elastomeric seal design by further linking the new design to the drop test results or by providing manufacturing data. This RAI is a follow up to the response to RAI 4-5, dated October 31, 2012.

The elastomeric seals provide an essential safety function of the package, establishing and maintaining radioactive material containment for normal form contents. In response to RAI 4-5, dated October 31, 2012, the applicant justified the adequacy of the new elastomeric seal design by explaining that it was tested in the 30-foot drop test of the AOS-165 prototype. However, it is not clear, from the information provided, which seal designs were used in the various drop test orientations:

- a. It is not clear if the lid seal design used only in the side drop was the same design from the “Lid seal, option” that is currently being requested on the licensing drawings.
- b. The seal material mentioned in the drop test report for the side drop only was EPDM, not silicone, as stated on the licensing drawings.

- c. It is not clear what type of seal material or design was used for the slap down test.

The “Lid seal, option” was not used in each of the three drops; therefore, it would appear that the “Lid seal, option” has not been shown to meet the requirements of 10 CFR 71.73.

Provide a summary of the seal designs that were utilized in each of the drop tests. Provide drawings of each seal design used, including the dimensions and materials of the seal components.

This information is required by staff to determine compliance with 10 CFR 71.51(a) and 71.73.

Chapter 4- Containment Evaluation

- 4-1 Provide design details and address concerns regarding the “Lid seal, option.” This is a follow-up to RAI 4-3, dated October 31, 2012.

Typically a complete seal design can be referenced in a seal manufacturer catalog; in this case the “Lid seal, option” appears to be a unique design. Typically a seal and groove combination is designed by a seal manufacturer after discussions with a customer based on the customer needs. If the seal is intended to perform as part of the containment boundary for normal form contents, a detailed description is needed.

- a. The seal manufacturer for the entire “Lid seal, option” (metal ring(s) in combination with the elastomeric seals) was not provided on the licensing drawings.
- b. Although informational “Lid seal, option” drawings have been provided, these drawings did not include any reference to a lid groove. It is not clear if the “Lid seal, option” has been designed by a seal manufacturer for the lid groove. It is not clear if the elastomeric seal in combination with the metal retainer ring(s) and the lid groove will have the appropriate level of compression and decompression characteristics over the operating temperature, springback adequacy, and suitability for impact loads.
- c. It appears that the v-groove design as well as the pointed portions of the metal ring(s) near the lid surface and cavity shell will possibly pinch or damage the seals during use, potentially leading to a loss of containment during transport. For the AOS-100 models, the inner metal ring is not attached to the lid groove and the free movement of that metal ring could damage the seal while in use, potentially leading to a loss of containment during transport. These interactions between the elastomeric seal and the metal rings within the specific lid groove design have not been addressed in the structural analysis and could cause damage to the elastomeric seal during transport.
- d. It appears to the staff, that the “Lid seal, option” as shown on the licensing drawings, containing multiple parts, could come apart relatively easily while not in a lid groove, or in the case of the AOS-100, the inner metallic ring does not appear to attach to the lid groove. It is not apparent to the staff that the “Lid seal,

option” once assembled (only including the two elastomeric seals and either one or two metal retainer rings) will hold together as a unit. The AOS-25 and AOS-50 “Lid seal, option” has one metal retainer ring surrounded by two flexible elastomeric seals, and the AOS-100 elastomeric lid seal design has four components, with the design alternating elastomeric seals and metal rings. This becomes a consideration if the seal is tested to leaktight during an ANSI N14.5 fabrication, periodic, or a maintenance leakage rate test. For example, when it is time to use the package for transport, and less than 12 months have passed since ANSI N14.5 periodic leakage rate test has been performed on the seals, only an ANSI N14.5 pre-shipment test is necessary. But consider if the “Lid seal, option” as defined on the licensing drawing does come apart. In that case an ANSI N14.5 maintenance test to the leaktight criterion would then be necessary. This consideration should be addressed in both Chapter 7 “Operating Procedures” and Chapter 8 of the application that should reference the ANSI N14.5 maintenance leakage rate test.

- e. A traditional elastomeric O-ring in a lid groove designed for that O-ring can be visually inspected by removing it, inspecting it, then putting it back in the groove. In this case, removing an o-ring or any part of the “Lid seal, option” from the “Lid seal, option” would technically nullify any previously valid leak test performed on the seal, therefore necessitating an ANSI N14.5 maintenance test. This consideration should be addressed in both Chapters 7 and 8 of the application that should reference the ANSI N14.5 maintenance leakage rate test.
- f. The use of the wording “Elastomeric seal” has to be carefully considered in Chapter 7 and 8 of the application. For example, Section 7.1.3.1.a.2.e of the application states, “Install the cask lid elastomeric seal after it has been visually inspected, –or– a new cask lid metallic seal onto the cask lid...” It is not clear if this could mean that a “Lid seal, option” as defined on the licensing drawings is installed after it has been visually inspected, or if only the elastomeric portion of the “Lid seal, option” is installed after it has been visually inspected, or it could mean either depending on if the package is first being used or if the package has been used before.

This information is required by staff to determine compliance with 10 CFR 71.33 and 71.51(a).

4-2 For normal form contents, show how the “Lid seal, option” will remain leaktight during normal conditions of transport (NCT) and after hypothetical accident conditions (HAC). This is a follow-up to the response to RAI 4-5, dated October 31, 2012.

- a. Refer to RAI 4-1 parts a, b, and c (in addition to ANSI N14.5 leakage rate testing already described) to demonstrate that each package (AOS-25, AOS-50, AOS-100A, AOS-100B, and AOS-100A-S) meets the containment requirements of 10 CFR 71.51(a)(1) under NCT.
- b. It appears that the v-groove design as well as the pointed portions of the metal ring(s) near the lid surface and cavity shell will possibly pinch or damage the seals during use, potentially leading to a loss of containment after a HAC drop. For the AOS-100 models, the inner metal ring is not attached to the lid groove and the free movement of that metal ring could damage the seal while in use,

potentially leading to a loss of containment after a HAC drop. These interactions between the elastomeric seal and the metal rings within the specific lid groove design have not been addressed in the structural section of the SAR and could cause damage to the elastomeric seal after a HAC free drop. The concerns above should be addressed.

- c. If compliance is demonstrated by test, the leakage rate of the package subjected to the tests of 10 CFR 71.73 shall not exceed the maximum allowable leakage rate for HAC.
- d. If compliance is demonstrated by analysis, it must be verified that the structural evaluation shows that the containment boundary, seal region, and closure bolts do not undergo any inelastic deformation when subjected to the conditions in 10 CFR 71.73. Also refer to RAI 2-1.

This information is required by staff to determine compliance with 10 CFR 71.51(a).

Chapter 7 – Operating Procedures

- 7-1 Modify Section 7.1.3.3 of the application to perform an ANSI N14.5 preshipment leakage rate test on all package closures that have been opened for packages that contain normal form or special form content.

To ensure each closure of the package is properly installed and secured, it is necessary to perform an ANSI N14.5 preshipment leakage rate test on all seals (e.g. lid seals, vent and drain port seals) that have been opened for packages that contain normal form or special form content.

This information is required by staff to determine compliance with 10 CFR 71.87(c).

Chapter 8 – Acceptance Tests and Maintenance Program

- 8-1 Revise the cask cavity gas used for leakage rate detection or the elastomeric seal material of the “Lid seal, option” to address permeation of helium through the silicone material of the “Lid seal, option” when performing a leakage rate test to the ANSI N14.5 leaktight criteria for normal form contents. This is a follow-up to the response to RAI 8-4, dated October 31, 2012.

Silicone at room temperature is highly permeable to helium, and the applicant would not be able to detect the real rate of helium leakage at the ANSI N14.5 leaktight criteria because of the high permeation rate. Limiting the soaking time, or the elapsed time from pressurization until leak detection, may not provide sufficient time for the pressurized gas to escape through a leak path. More time may be necessary to perform a leakage rate test when determining the presence of leakage to the ANSI N14.5 leaktight criteria.

Therefore limiting the soaking time may not allow for detection of a leak to the ANSI N14.5 leaktight criteria. Staff suggests changing the cask cavity gas used for leakage detection or the elastomeric seal material of the “Lid seal, option” so the real rate of leakage will not potentially be confused with permeation.

This information is required by staff to determine compliance with 10 CFR 71.51(a).

- 8-2 Provide specific information regarding the seal testing in Section 8.1.5.3 of the application.

This RAI is a follow up to the response to RAI 4-3, dated October 31, 2012.

Provide information regarding the assembled elastomeric seal with capture rings, as designed by Helicoflex. Clarify whether this is a service proven design or new design that has undergone proof-of-concept testing. Include manufacturer recommendations for (i) seal seating load or percent compression, (ii) groove size, and (iii) surface finish.

A description of and justification for the proposed seal and seal component acceptance and maintenance tests are needed to confirm that the seal will perform adequately as part of the containment boundary for normal form contents.

This information is required by staff to determine compliance with 10 CFR 71.33 and 71.51(a).