

From: Saverot, Pierre
Sent: Monday, November 02, 2009 11:35 AM
To: 'Troy Hedger'; 'Bob Robnett'; 'Raul Pomares'
Subject: AOS package application - Materials RAIs

Dear Mr. Hedger,

As a follow-up to our October 28, 2009 teleconference call on a staggered Request for Additional Information (RAI) process during the review of this application, you will find below our RAIs related to Materials issues for the AOS-025, AOS-50 and AOS-100 packages.

We request that you provide the information identified below in conjunction with your responses to our combined RAIs to be issued around December 15, 2009.

Sincerely,

Pierre Saverot
Project Manager, Licensing Branch.

Request for Additional Information
for the
Model Nos AOS-025, AOS-050, and AOS-100 Packages
Docket No. 71-9316

By letter dated September 14, 2009, Alpha-Omega Services, Inc, (AOS) submitted an application for approval of the Model Nos. AOS-025, AOS-050, and AOS-100 packages.

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 "AOS Radioactive Material Transport Packaging System Safety Analysis Report," Revision No. C, dated September 2009. This RAI is exclusively related to Materials issues at this time and will be followed by other RAIs in each technical discipline.

Each individual RAI below 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.

M1 State the temperature at which the modulus of elasticity, given in Table 2-4 of the application, is applicable.

The modulus of elasticity can be a function of temperature. The response of the material will be different if transportation is done at room temperature, ambient temperature or an elevated temperature.

This information is needed to satisfy 10 CFR 71.51(a)(1&2).

M2 Specify for which bolts the mechanical properties in Table 2.3.3 of the Appendix apply to.

The materials listed for the bolts in Table 2.3.3 are neither that for the lid bolts nor the trunnion bolts as indicated in Tables 2-15 and 2-16 respectively.

This information is needed to satisfy 10 CFR 71.51(a)(1) and 10 CFR 71.51(a)(2).

M3 Specify the relevant reference pages to support the tensile and yield strengths for the lid bolts (ASME SB-637, UN N07750, Type 3) as indicated in table 2-15 of the application.

This information is needed to satisfy 10 CFR 71.51(a)(1&2).

M4 Provide evidence that supports the position stated in Section 2.2.2 of the application, i.e., "AOS' experience in operating the 5979 Type B packages, with content-similar arrangements, indicates that no chemical, galvanic, or other reactions between the cask cavity surface and radioactive material containers, or between these containers and their solid contents, occur."

The applicant applies this statement as primary justification that there are neither galvanic nor chemical reactions taking place. Evidence and data that support the statement are necessary for the staff to make a regulatory finding.

This information is needed to satisfy 10 CFR 71.43(d).

M5 Specify the elements of the testing series that constitute the acceptance testing of the stainless steel and foam listed in Table 2-17 of the application.

This information is needed to satisfy 10 CFR 71.51(a)(1) and 10 CFR 71.51(a)(2).

M6 Provide details and results of the tests conducted to qualify the contents as "special form."

The application contains no description of the tests or results of the tests required to qualify the content as a "special form."

This information is needed to satisfy 10 CFR 71.75.

M7 Correct and justify the values for the specific heat and the conductivity listed in Table 3.6.

The values of the specific heat and the conductivity listed in Table 3.6 of the application appear to be interchanged and have the incorrect temperature dependence (for example see http://www.electronics-cooling.com/articles/1999/1999_jan_techdaat.php). The values reported in the application came from an independent laboratory's test of an alloy that has the nominal composition of 95W-3.57Ni-1.43Fe. It is of concern that the values of these parameters are so far different from pure tungsten. Table 5-12 of the application indicates that the tungsten shields are 100% tungsten so it is not clear that the independent testing on the less pure alloy is relevant to this package.

This information is needed to satisfy 10 CFR 71.7.

- M8** Justify the use of properties from two different ASME B&PV Code alloy Groups in Tables 3-7 and 3-99 of the application.

The thermal conductivity and thermal diffusivity for the carbon steel were checked against the ASME B&PV code. It appears that the conductivity was for alloys in Group A while the thermal diffusivities were for a material in Group B.

This information is needed to satisfy 10 CFR 71.51(a)(1) and 10 CFR 71.51(a)(2).

- M10** Clarify the applicable set of values for the thermal conductivity of the Last-A-O-Foam given in Table 3-106 of the application. Justify the use of a particular set of data.

Two sets of values for the thermal conductivity of the Last-A-O-Foam are given in Table 3-106. There appears to be an implication that the newer set of values is the more accurate.

This information is needed to satisfy 10 CFR 71.51(a)(1) and 10 CFR 71.51(a)(2).

- M11** Justify the thermal conductivities given in Table 3-8 of the application.

The thermal conductivities given in Table 3-8 do not agree with the values given in Table 3, "Thermal Properties," of the manufacturer's Design Guide provided in the appendix to the structural section of the SAR.

This information is needed to satisfy 10 CFR 71.51(a)(1) and 10 CFR 71.51(a)(2).

- M12** Provide a justification for the impact limiter temperature criteria given in Table 3-4 of the application. Provide a justification for a lower operation temperature limit.

No basis for this limit or any limit is provided in the application. Also no lower temperature limit is provided in the application.

This information is needed to satisfy 10 CFR 71.51(a)(1) and 10 CFR 71.51(a)(2).

- M13** Provide a complete list (table) of the contents that can be transported. Include physical characteristics, chemical composition, and isotopic composition.

Only examples of typical shipments are provided in Section 1.4.2 of the application. If the requested information is not provided, the Certificate of Compliance will be limited to the example contents that are sufficiently detailed in the application.

This information is needed to satisfy 10 CFR 71.33(b)(3) and 10 CFR 71.4.

- M14** Provide calculations to support the claim that the AGR-1 Compacts are exempt from classification as fissile material, i.e. meet either 10 CFR 71.15 (a) or (b).

The information provided does not provide adequate justification that the criteria in the regulations are met.

This information is needed to satisfy 10 CFR 71.15

- M15** Justify the use of the test data in Appendix 4.5.1 of the application to indicate the behavior of the lid seals used in the design. Provide justification for a -54°C to 232°C (-65°F to 450°F) operating temperature range for the ethylene propylene O-ring compound used in the AOS-100. Correct the notation on the drawings, for the Parker compound.

The testing described in Appendix 4.5.1 was conducted on Helicoflex H-309646 (metal) and H-309353 (elastomer). These are not the seals used in the AOS casks as indicated below from the drawings. The Helicoflex seals can be any combination of jacket and spring materials. Stainless steel jackets will behave differently than silver jackets. The reviewer was not able to find the applicant’s Helicoflex designations in the Helicoflex literature. The Parker compound is given on the drawings as 51224-70. It should be S1224-70.

| | AOS-025A | AOS-050A | AOS-100A(B) | AOS-100A-S |
|-----------------|------------------|------------|----------------------|-----------------|
| Lid seal | None indicated-a | Helicoflex | Parker | Helicoflex |
| # | | H-309852 | E0740-75 a | H-309850 |
| Jacket | silver | silver | | |
| Spring material | Alloy 90 | Alloy 90 | | |
| | | | EPDM | Stainless steel |
| Port seals | Parker | Parker | | |
| | 51224-70 | 51224-70 | E 0740-75 a | 51224-70 |
| material | silicon | silicon | Ethylene propylene-a | |

a- indicated on drawings

This information is needed to satisfy 10 CFR 71.51(a)(1&2).

- M16** Remove the Table 2.3.1 in Appendix 2.3 since there is no lead used in the casks submitted for review and approval. Delete all references to a package “fabricated from pig lead” as stated in the application.

This information is needed to satisfy 10 CFR 71.7.

- M17** Add a statement in Section 7.3.5.2b of the application to indicate that the vacuum pump will be isolated from the cask cavity during the 30 minutes when the cask must remain below 1 Torr.

If the vacuum pump is not isolated then it can not be determined if the pressure rise limit is actually met since the valve could be leaking and keeping the pressure low.

This information is needed to satisfy 10 CFR 71.43(d).

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