



August 5, 2015 – updated September 2, 2015

NRC Operations Center
Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Update to the Interim Report of Potential 10CFR Part 21 Failure to Comply
AOS SAR Document No. FM9054 Revision H

Pursuant to 10CFR 21.21 (d)(3)(ii) Alpha-Omega Services, Inc. provided the USNRC with written notification and report of the identification of a potential failure to comply on August 5, 2015; and supplemented that notification on August 7, 2015. AOS has complied with the requirements of § 21.21 as stated in regard to notification and report requirements.

AOS is now providing an interim report with update to the Commission per 10CFR 21.21 (a)(2).

The following information is required for the written interim report per 10CFR 21.21 (d)(4):

- (i) *Name and Address of the individual or individuals informing the Commission.*
Troy Hedger, President
Alpha-Omega Services, Inc.
9156 Rose Street
Bellflower, CA 90706
- (ii) *Identification of the facility, the activity, or the basic component supplied for such facility or such activity within the United States which fails to comply or contains a defect.*
AOS Document Number FM9054, Rev. H, *Radioactive Material Transport Packaging System Safety Analysis Report for Model AOS-025, AOS-050, and AOS-100 Transport Packages (Revision H, December 30, 2012; Docket No. 71-9136)*
Model AOS-100A Package, USA/9316/B(U)-96 (Certificate of Compliance #9316)
- (iii) *Identification of the firm constructing the facility or supplying the basic component which fails to comply or contains a defect.*
The basic component is supplied by Alpha-Omega Services, Inc. 9156 Rose Street
Bellflower, CA 90706
- (iv) *Nature of the defect of failure to comply and the safety hazard which is created or could be created by such defect of failure to comply.*

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There is a potential issue that shielding fails to comply with 10CFR 71.47 and/or 10CFR 71.51(a)(2). This is not a "defect" of the package, but rather an un-analyzed condition that could lead, if credible, to a safety hazard.

DAHER-TLI Engineering Services notified AOS via telephone conversation on July 28, 2015 that there is a possible discrepancy in the original SAR shielding calculations originally performed. The potential discrepancy was discovered in conjunction with the independent preparation of a DAHER-TLI symposium paper that they are working on for presentation for future use of the AOS Cask family products. Specifically, DAHER-TLI observed that the AOS SAR does not analyze the radiation levels on the exterior of the package when a point source is located in a corner of the cask cavity.

AOS Engineering has reviewed the potential discrepancy identified by DAHER-TLI against the SAR and related documents; and have concluded the following, in summary:

1. Chapter 5 of the SAR analyses point sources in two positions in the cavity: the top center and the side at mid-height. Paragraph 5.3.1 justifies this approach. "This is a more conservative approach than modeling a point source at the center of the cask, or explicitly modeling the internal source geometry and other internal structural components. Point sources do not account for the self-shielding effects due to the actual source geometry and density, nor for the shielding due to internal components, such as source racks. By placing the point sources directly against the cask cavity wall, the most likely source displacements are modeled in an appropriately conservative way... This choice is further justified by noting that an actual radioactive load in the container would be distributed over significantly more volume than a point source".
2. However, in Chapter 1 of the SAR (re. 1.2.2 Contents – 6th paragraph), the SAR states, "Radioactive contents can be in any location within the cask cavity, and unconstrained within the inner containers. Holders, fixtures, and packaging materials (shoring devices) must be used to secure the inner containers, so that the inner containers are immobilized."

Accordingly, it is possible that a user could locate a high activity source near a corner of the cavity. This was not assessed in Chapter 5.

- (v) *The date on which the information of such defect or failure to comply was obtained.*

August 4, 2015

- (vi) *In the case of a basic component which contains a defect or fails to comply, the number and location of these components in use at, supplied for, or may be supplied for, manufactured, or being manufactured for one or more facilities or activities subject to the regulations in this part.*

Currently, four (4) AOS-100A packages have been fabricated and three (3) were certified for use prior to August 4, 2015; one (1) is currently not in service. There are two (2) AOS-050 packages which are on hold for completion of fabrication activities.

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The following are the locations of the active units:

<u>Customer</u>	<u>Location</u>	<u>Package Serial Number</u>
AOS	Bellflower, CA	AOS-100A-0001 (not currently in service)
Elekta	Nordion Ottawa, Canada	AOS-100A-0002
AOS	GE Vallecitos Sunol, CA	AOS-100A-0003
Elekta	Nordion Ottawa, Canada	AOS-100A-0004

As of August 6, 2015, responsible personnel for the owner/users of the AOS Packages have been notified in writing, as follows:

Elekta AB
GE-Hitachi
International Isotopes, Inc.
Nordion
Source Production and Equipment Co., Inc.

- (vii) *The corrective action which has been, is being, or will be taken; the name of the individual or organization responsible for the action; and the length of time that has been or will be taken to complete the action.*

Based on our initial evaluation, AOS has initiated CAPA No. FM9016.1-082015-001 for providing corrective action relating to the above-identified subject. A 10CFR Part 21 Applicability Form (re. FM9015.2-082015-001) has also been prepared and is currently under evaluation. The CAPA identifies the issue and begins the internal investigation process to determine the cause and to identify corrective action(s); this investigation is currently in progress.

1. AOS has initiated a Part 21 evaluation to determine applicability.
2. In parallel, AOS has contacted the NRC to inform the project manager of the concern; and to seek guidance/advice as to the direction that this evaluation needs to proceed.
3. Assuming that all of the activity is condensed in a point source in the corner of the cavity is a very conservative assumption.
4. In reality there may not be a problem due to self-shielding and distributed activity; i.e., it is very unlikely to have all of our activity in a single source and if we did, we would constrain it to the center of the cavity.

(Update September 2, 2015)

On August 17, 2015, AOS issued a second supplemental letter to the NRC, Division of Spent Fuel Management providing information regarding the potential 10CFR Part 21 Failure to Comply with USNRC Certificate of Compliance USA/9316/B(U)-96.

This supplemental information was compiled as a part of our investigation into the significance of locating a theoretical point source in the corner of the cask cavity.

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AOS has performed a shielding analysis of a Cobalt-60 point source in the corner of the cask cavity and compared the model results against the allowable dose rates for the Hypothetical Accident Conditions (HAC) at 1 m from the package. The analysis demonstrates that there is still a significant margin between the calculated HAC dose rate and the regulatory dose rate limit.

As a result of the Part 21 report dated August 5, 2015, as supplemented August 7 and 16, 2015, CoC No. 9316 Revision 5 and the Safety Evaluation Report for the Model Nos. AOS-025A, AOS-050A, AOS-100A, AOS-100B, and AOS-100A-S Packages was issued by the NRC on August 20, 2015.

The next step in our investigation will be to perform a scoping analysis to determine the best course of action to resolve the problem. At this stage, we expect that the solution will involve one or more of the following items:

- (i) A revised structural evaluation accounting for the shoring devices as part of the package;
- (ii) additional shielding analysis with a more realistic configuration to assist in distributing the source strength;
- (iii) an evaluation of a potential change in the axial/radial shield designs to increase the overlap in order to help reduce the streaming paths between the cask body and axial lids; and
- (iv) a new shielding analysis for this package design to account for such a potential reconfiguration.

We anticipate that we will be submitting our report and analysis for NRC approval within 6 to 9 months.

Currently, it is our intention to ship only Co-60 sources in the configurations described in the supplementary information provided on August 17, 2015. We have no intention of shipping any other isotopes or shipping configurations in the coming months.

- (viii) *Any advice related to the defect or failure to comply about the facility, activity, or basic component that has been, is being, or will be given to purchasers or licensees.*

In parallel to the notifications of August 5, 2015 and August 7, 2015 made to the NRC, AOS has notified the owners and users of the AOS-100 package of this potential failure to comply.

(Update September 2, 2015)

Any action by the NRC on continued use will be communicated to the package owners and users.

- (ix) *In the case of an early site permit, the entities to whom and early site permit was transferred.*

Not applicable

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Sincerely,

Alpha-Omega Services, Inc.

A handwritten signature in black ink, appearing to read 'Troy Hedger', with a long horizontal flourish extending to the right.

Troy Hedger, President