

August 23, 2013

Mr. Richard W. Boyle, Chief
Sciences Branch
Division of Engineering and Research
Office of Hazardous Materials Safety
U.S. Department of Transportation
1200 New Jersey Ave., S.E.
Washington, D.C. 20590

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE MODEL NO. ANF-50
PACKAGE

Dear Mr. Boyle:

By letter dated November 27, 2012, the U.S. Department of Transportation requested that NRC staff performed a review of the German Certificate of Approval No. D/4365/AF-96, Revision 1, for the Model No. ANF-50 package, and made a recommendation concerning the revalidation of the package for import and export use. The review was limited to the renewal of Competent Authority Certificate USA/0745/AF-96 as well as the responses to the request for additional information (RAI) forwarded by letter dated January 15, 2009. The review was terminated in November 2009.

The application was re-submitted in November 2012. In connection with the staff's detailed technical review, the staff needs the information identified below:

Criticality Safety

1. Justify the use of intact pellets for Content No. 1 in the criticality analyses.

For Content No. 1 (uranium oxide pellets), the criticality analyses assume that all the pellets are intact. Under accident conditions, the structural evaluation of the package shows that some of the dummy pellets are severely damaged.

This information is needed to determine compliance with paragraphs 671(a), 679, 680, 681, and 682 of the International Atomic Energy Agency (IAEA) Regulations for the Safe Transport of Radioactive Material (TS-R-1).

2. Clarify the mass and composition of Content No. 2 and if this refers to 14.5 kilograms (kg) of uranium oxide rather than 14.5 kg of uranium.

Content No. 2 on page 2 of the *Translated Certificate of Approval* states the following:

Content No. 2: Max. "...14.5 kg uranium, containing a maximum of 12.8 kg uranium with an enrichment (U-235 mass content in the uranium) of max. 5%, in the form of pellets, pellet fragments, abraded pellet material, or uranium oxide powder."

This information is needed to determine compliance with paragraphs 671(a), 679, 680, 681, and 682 of IAEA TS-R-1.

3. Provide a benchmarking analysis of SCALE 4.4a program with the selected cross section library as well as the area of applicability of the selected benchmark experiments and an upper subcriticality limit (USL). Also, clarify the statement on page 7 of 48 of the *Criticality Safety Analysis* (ANFG-5.061 (11), Revision 3).

The discussion about the benchmarking of the SCALE 4.4a program for the criticality analyses, page 7 of 48 of the *Criticality Safety Analysis* (ANFG-5.061 (11), Revision 3), states the following: "The results lead to a slight underestimate of the calculated multiplication factors for rod configurations."

This information is needed to determine compliance with paragraphs 671(a), 679, 680, 681, and 682 of IAEA TS-R-1.

4. Justify that the geometry of the ANF-50 model is conservative with respect to criticality safety. Include an explanation of assumptions considered when analyzing the geometry of the ANF-50 model such as the decision for including the material of pellet trays between the pellet rows and if any of the structural material is included in the model of the pellet chips and powders.

Figure 9, "Model of a Pellet Tray Stack," of the *Criticality Safety Analysis* (ANFG-5.061 (11), Revision 3), shows that the pellets on pellet trays are modeled in a hexagonal array with the tray material present as shown in the following sections:

- Section 6.2, page 14 of 48, states: "The bulk mass of the pellets and pellet chips is modeled uniformly as spheres in hexagonal arrangement."
- Section 6.3, page 14 of 48, states: "The maximum uranium oxide mass of 14.5 kg is assumed to be distributed over the free volume of the pellet box."

This information is needed to determine compliance with paragraphs 671(a), 679, 680, 681, and 682 of IAEA TS-R-1.

5. Provide the materials of construction for the packaging components of the ANF-50. State if any materials, such as plastic wrap, that are hydrogenous and can be used as a moderator, may potentially be used as a part of, or can be shipped with, the ANF-50. If so, these materials should be considered in the analyses.

The certificate states that the shipping frame and pellet box and lid are made of stainless steel, but it is silent on the materials of construction for the other packaging components. Since additional materials that can be used a moderator (e.g., hydrogenous material) would affect the criticality analysis, these materials should either be considered as part of the analysis or excluded from the allowable contents. List the allowed materials of the pellet trays, ANF-50 scrap/powder box, and insulation, and include these materials in the criticality safety analysis if any of these materials can be used as a moderator.

This information is needed to determine compliance with paragraphs 671(a), 679, 680, 681, and 682 of IAEA TS-R-1.

Structural

6. Verify that attachments that could be used to lift the package are rendered incapable of lifting and handling operations. Provide ANFG-11.107 (02), and reference where handling is administratively controlled and verified.

Per ANFG-11.106, the application states that the owner's functional unit responsible of shipping containers must ensure that the necessary instructions are received and observed by any users.

However, staff notes that reference number 8, report ANFG-11.107 (02), was not provided with the application. The staff did not find where handling is administratively controlled and could not verify if TS-R-1 paragraph 608 is fulfilled.

This information is needed to verify compliance with paragraph 608 of TS-R-1, which states that "Attachments and any other features on the outer surface of the *package* which could be used to lift it shall be designed either to support its mass in accordance with the requirements of Para. 607 or shall be removable or otherwise rendered incapable of being used during transport."

General

7. Provide the drawings of the ANF-50 tested specimens, referenced page 68 of ANFG-11.106 (04E), to verify any discrepancies between the tested specimens and the series (as fabricated for use) packages.

This information is needed to determine compliance with paragraph 701 of TS-R-1, which states that "Demonstration of compliance with the performance standards required in Section VI shall be accomplished by any of the methods listed below or by a combination thereof..." (See TS-R-1 for further details.)

The applicant should notify the U.S. Department of Transportation when it can provide the requested information.

Please reference Docket No. 71-3080 and TAC No. L24702 in future correspondence related to this revalidation action. If you have any questions regarding this matter, you may contact me at (301) 287-9185.

Sincerely,

/RA/

Norma Garcia Santos, Project Manager
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-3080
TAC No. L24702

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 /RA/
 Norma Garcia Santos, Project Manager
 Licensing Branch
 Division of Spent Fuel Storage and Transportation
 Office of Nuclear Material Safety
 and Safeguards

Docket No. 71-3080
 TAC No. L24702
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