

**Requests for Supplemental Information and Observations  
Model No. 3516 A**

**STRUCTURAL EVALUATION**

**RSI-St-1** Provide an evaluation of fatigue for the reusable package components for the period of use that considers the combined effects of all applicable types of accumulated stress cycles in the components during normal service conditions, including the following cycle types:

- a. Lifting cycles,
- b. Pressurization cycles,
- c. Thermal cycles, and
- d. Vibration cycles.

The NRC staff needs to assess a fatigue evaluation that considers the combined effects of all applicable types of stress cycles during normal service conditions including the justifications of the number of cycles considered in the fatigue evaluation for each cycle type. If certain types of stress cycles are not applicable or negligible for certain components, explain why they are not applicable or are negligible.

If such a complete fatigue evaluation cannot be performed, or if the fatigue evaluation show adequate protection against fatigue failure considering the combined effects of all applicable types of accumulated stress cycles in the components, provide the following information:

- a. Description about how periodic maintenance inspections will be used to identify and address fatigue cracks in the components of the package, and
- b. Description of the corrective actions (i.e., analytical flaw evaluation with follow-up inspections, repair/replacement of components with cracks, etc.) that will be taken for any detected fatigue cracks.

This information is needed by the NRC staff to determine compliance with the requirements in paragraph 613A of the IAEA SSR-6, 2018 Edition.

**MATERIALS EVALUATION**

**RSI-Ma-1** Describe any national or international codes, standards, and/or other methods, programs, or procedures that are implemented to ensure that package maintenance activities (including visual inspections, screening and evaluation of visual indications, and corrective actions such as component repairs and replacements) are adequate to manage the effects of aging in metallic package components that would see long-term use, such that the package components are capable of performing their requisite safety functions throughout the period of use.

Per the guidance in IAEA SSG-26, Paragraph 613A.3, "...the package should be evaluated during the design phase in the demonstration of compliance with the Transport Regulations. Based on this evaluation, an inspection and maintenance program should be developed. The program should be structured so that the assumptions (e.g. thickness of containment wall, leaktightness, neutron absorber effectiveness) used in the demonstration of compliance of the package are confirmed to be valid throughout the lifetime of the packaging.

The staff requests that this description address the following criteria:

1. Inspection methods (e.g., bare metal visual exams and/or other types of nondestructive exams such as liquid penetrant exams or ultrasonic exams) for detection, characterization, and sizing of localized aging effects such as cracks, pits, and crevice corrosion.
2. Inspection equipment and personnel qualification requirements (e.g., lighting and visual acuity requirements for performing visual exams) to ensure reliable inspections that can adequately detect and characterize indications of localized aging effects prior to component failure or loss of safety function.
3. Acceptance criteria for aging effects such as indications of fatigue and localized corrosion of stainless steel components, such as chloride induced stress corrosion cracking (SCC), pitting, and crevice corrosion. Examples of visual indications that may indicate potential localized corrosion of stainless steel components include the accumulation of atmospheric deposits such as salts, buildup of corrosion products, rust-colored stains or deposits, and surface discontinuities or flaws associated with pitting, crevice corrosion, and/or SCC.
4. Describe any surface cleaning requirements that are implemented to ensure that bare metal visual inspections of component surfaces are capable of detecting surface flaws, and for ensuring adequate removal of atmospheric deposits such as salts or other chemical compounds that may contribute to localized corrosion of stainless steel components.
5. Describe any flaw evaluation methods (such as flaw sizing and flaw analysis methods) and associated flaw acceptance criteria that may be used to determine whether components containing flaws are acceptable for continued service.

This information is requested in order to verify compliance with requirements of the 2018 Edition of IAEA SSR-6, Paragraph 613A.

**RSI-Ma-2**

Per the guidance in IAEA SSG-26, Paragraph 613A.1, "The designer of a package should evaluate the potential degradation phenomena over time, such as corrosion, abrasion, fatigue, crack propagation, changes of material compositions or mechanical properties due to thermal loadings or radiation, generation of decomposition gases and the impact of these phenomena on performance of safety functions."

As the staff was not able to locate discussions on abrasion and crack propagation being evaluated as aging mechanisms, the applicant should provide evaluations of abrasion and crack propagation as aging mechanisms.

This information is requested in order to verify compliance with requirements of the 2018 Edition of IAEA SSR-6, Paragraph 613A.

**RSI-Ma-3** Provide an inspection and maintenance program that addresses the effects of aging per the guidance in IAEA SSG-26, Paragraph 613A.3, "For packaging intended for repeated use, the effects of aging mechanisms on the package should be evaluated during the design phase in demonstration of compliance with the IAEA SSR-6. Based on this evaluation, an inspection and maintenance program should be developed."

The staff was not able to locate the acceptance criteria for the inspections described in the Packing and Handling Instructions in PMD 0038, which provides instructions for package maintenance and checks before loading, assembly, or transport. Thus, the staff requests the applicant to provide acceptance criteria in their inspection and maintenance program that addresses the effects of aging.

This information is requested in order to verify compliance with requirements of the 2018 Edition of IAEA SSR-6, Paragraphs 613A.

**RSI-Th-1** Provide a thermal analysis that shows package component temperatures will perform their function during Normal Conditions of Transport. The analysis should demonstrate how package temperatures are determined at equilibrium conditions assuming applicable ambient temperature and isolation data, per SSR-6, paragraphs 639 and 728.

The application (Part 2 Technical Analyses of "Transport Report No. 186 Issue 9 Design Safety Report"), states that package components will perform at the temperature range considered but no analysis is provided on how the temperature distribution in the package is obtained.

## **MAINTENANCE AND OPERATIONS**

Provide the following information regarding the support maintenance and management systems:

1. Section 1.8, Maintenance Packaging Operations: refers to FEMCS 2105, "Maintenance of Type 3516 Fuel Transport Containers"
2. Section 1.10, Management Systems, references Level I SSI 268, "Springfields Site System Manual"

## **OBSERVATIONS**

### **Structural Evaluation**

**OBS-St-1** The NRC staff observed a statement from the documentation (on page 28 of Transport Report No. 186 Issue 9, "Design Safety Report," in LTR-LCPT-25-27

Enclosure 3), in which the applicant mentioned that a fatigue failure of lifting points is not considered to be an issue, as shown in “packing calculation 28.” Submit the packing calculation 28 for the NRC staff’s review if the packing calculation 28 is part of responses to the RSI 2.1 above.

### **Materials Evaluation**

- OBS-Ma-1** Provide the maintenance document, FEMCS 2105, “Maintenance of Type 3516 Fuel Transport Containers.”
- OBS-Ma-2** Provide an affidavit listing the specific documents considered to contain proprietary information. Currently, the affidavit generally implies that all documents, including the certificate are considered to include proprietary information, which is not usually the case. Also, 10 CFR [2.390](#) specifically requires to identify the documents or portions of the documents that the individual or company is seeking to be withheld (see 10 CFR 2.390(b)(1)(ii)).