Request for Revalidation of Japanese Competent Authority Certificate of Approval No. J/2044/B(U)F, Model No. JMS-87Y-18.5T
Materials Review -
Request for Additional Information (RAI)
EPID: L-2023-DOT-0005

RAI-Ma-1:

Please 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 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 programme should be developed. The programme should be structure 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 through 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 early stage fatigue cracks 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, Paragraphs 503(e), 613A, and 809(f).

RAI-Ma-2:

Per 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 a discussion on abrasion being evaluated as an aging mechanism, the staff requests the applicant to provide an evaluation of abrasion as an aging mechanism.

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

RAI-Ma-3:

Per IAEA SSG-26, Paragraph 613A.5, "For designs of Type B(U), B(M) and Type C packages these programmes are required to be included in the application for approval of packages for shipment after storage (see paras 809(f) and (k) of the Transport Regulations). The results of the ageing management programme and the gap analysis programme should be taken into account when preparing an inspection plan prior to transport." The staff was not able to locate an aging management program or gap analysis program as required by IAEA SSR-6, Paragraphs 809(f) and (k). The staff requests the applicant to provide the aging management program (per the structure and procedure in IAEA SSG-26, Paragraph 613A.3) and gap analysis program.

This information is requested in order to verify compliance with requirements of the 2018 Edition of IAEA SSR-6, Paragraphs 809(f) and (k).

RAI-Ma-4: The staff requests the applicant to address two inconsistencies identified between the maximum temperatures identified for the wood impact limiter (Fir-Plywood) in SAR Section B.4.2 and SAR Section F.2, and provide the basis for the evaluation of the wood in the impact limiter in the analyzed range of temperatures. In SAR Section F.2, the applicant states that the maximum temperature identified at the surface of the package is [redacted] during transportation. However, in SAR Section B.4.2, Table (II)-B.15 and B.16, the highest temperature listed is [redacted]. Secondly, the applicant states that based on the results of analysis, the temperature inside the shock absorber during actual transportation is estimated to be below about 40°C. The applicant later states that the average temperature data of the shock absorber of another package with a track record of transportation of spent fuel was evaluated and shown to be around 40°C to 70°C, which contradicts the previous temperature estimate.

This information is requested in order to verify compliance with requirements of the 2018 Edition of IAEA SSR-6, Paragraphs 613A, 616, and 639.

RAI-Ma-5: In SAR Section F.2, the applicant described the corrosion that could affect the shock absorber (Wood – Fir-Plywood). The staff requests the applicant to clarify how they are addressing potential water absorption by the shock absorber. In SAR Table III-B.1, a visual inspection is described but does not include any mention of inspection of the welds or areas adjacent to the welds, nor is any specific acceptance criteria described.

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

RAI-Ma-6: In SAR Section F.2, the applicant describes heat related aging mechanisms that can affect the Boron Carbide-Aluminum Alloy, stating that thermal analysis indicated a substantial temperature difference between the maximum temperature expected during transport and the melting temperature of the Boron Carbide-Aluminum Alloy. The [redacted] cladding material, however, has a much lower melting temperature and the staff requests that the applicant provide a comparison between the maximum temperature expected during transport to the qualified temperature limit for the [redacted] cladding material.

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

General RAI

Replace all references to the IAEA transport safety regulations in the JMS SAR to appropriately reflect Rev. 1 of SSR-6, (2018).

In the JMS SAR, Rev. 1, on page (II)-A-410 (for example), reference (29) is listed as "IAEA/Radio active material safety transportation regulations (1985 transaction) safety series No. 6"; however, since the SAR has been revised to meet the requirements of SSR-6, Rev. 1 (2018), the correct reference should be to SSR-6, Rev. 1 (2018).

This information is needed to establish alignment with the requirements in SSR-6, Rev. 1 (2018 Edition) Paragraph 102.