



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 29, 2022

Richard W. Boyle
Radioactive Materials Branch
U.S. Department of Transportation
1200 New Jersey Avenue SE
Washington, D.C. 20590

SUBJECT: REQUEST FOR REVALIDATION OF JAPANESE CERTIFICATE OF
APPROVAL J/2037/AF-96 – FIRST REQUEST FOR ADDITIONAL
INFORMATION

Dear Richard Boyle:

By letter dated October 18, 2021 (Agencywide Documents Access and Management System {ADAMS} Accession No. ML21319A053), the U.S. Department of Transportation (DOT) requested that the U.S. Nuclear Regulatory Commission (NRC) staff perform a review of the Japanese Certificate of Approval J/2037/AF-96, dated May 6, 2021, for the Model No. MX-6P transport package and make a recommendation concerning the revalidation of the package for import and export use.

In connection with our review, we need the information identified in the enclosure to this letter. To assist us in scheduling the staff's review of your response, we request that you provide this information 1 month from the date of issuance of this request. Inform us at your earliest convenience, but no later than 3 weeks after issuance of this request if you are not able to provide the information by that timeframe. If you are unable to provide a response 1 month after issuance of this request, our review may be delayed.

R. Boyle

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Please reference Docket No. 71-3100 and Enterprise Project Identifier No. L-2021-DOT-0007 in future correspondence related to this request. The staff is available to meet to discuss your proposed responses. If you have any questions, I may be contacted at (301) 415-6577.

Sincerely,



Signed by White, Bernard
on 06/29/22

Bernard White, Senior Project Manager
Spent Fuel Licensing Branch
Division of Spent Fuel Management
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-3100
EPID L-2021-DOT-0007

Enclosure:
Request for Additional Information

R. Boyle

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SUBJECT: REQUEST FOR REVALIDATION OF JAPANESE CERTIFICATE OF APPROVAL J/2037/AF-96 – FIRST REQUEST FOR ADDITIONAL INFORMATION

DOCUMENT DATE: June 29, 2022

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UNITED STATES
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Request for Additional Information
Docket No. 71-3100
Model No. MX-6P
Japanese Certificate of Approval J/2037/AF-96

By letter dated October 18, 2021 (Agencywide Documents Access and Management System {ADAMS} Accession No. ML21319A053), the U.S. Department of Transportation (DOT) requested that the U.S. Nuclear Regulatory Commission (NRC) staff perform a review of the Japanese Certificate of Approval J/2037/AF-96, dated May 6, 2021, for the Model No. MX-6P transport package and make a recommendation concerning the revalidation of the package for import and export use.

This request for additional information (RAI) identifies information needed by the U.S. Nuclear Regulatory Commission staff (the staff) in connection with its review of the application. The staff used the International Atomic Energy Agency (IAEA) Specific Safety Requirements No. 6 (SSR 6), "Regulations for the Safe Transport of Radioactive Material," 2012 Edition, in its review of the application.

Materials Evaluation

- 2-1 Describe the applicable consensus codes and standards that are followed for design, fabrication, qualification testing, and acceptance inspections of packaging body welds, fuel basket lodgment welds, and top and rear shock absorbing cover welds to ensure that the welds will be capable of maintaining their structural integrity.

Examples of consensus codes and standards that address design, fabrication, qualification testing, and acceptance inspection of safety-related welds for nuclear applications include those published by the American Society of Mechanical Engineers (ASME), the American Welding Society (AWS), and analogous consensus codes and standards published by national or international standards organizations.

If a consensus code or standard is not followed for design, fabrication, qualification testing, and/or acceptance inspections of certain packaging welds, please describe how the welds for the packaging body, fuel basket lodgments, and top and rear shock absorbing covers are designed, fabricated, qualification tested, and inspected to ensure that the welds will be capable of maintaining their structural integrity.

Background and Reason for RAI

The application documents the use of welded metallic items for several packaging components, including the packaging body, the fuel basket lodgments, and the top and rear shock absorbing covers. The staff noted that the application does not include adequate technical information concerning the codes, standards, and/or other specifications that are followed for design and fabrication of welds that are used to join the metallic subcomponents for the packaging body, the fuel basket lodgments, and the top and rear shock absorbing covers.

Enclosure

Section II-C.2 of the application includes some general information on structural strength testing, leakage testing, and nondestructive examination (NDE) activities that are performed for packaging body shell welds that form the containment boundary. However, the staff noted that this section does not include any information on codes, standards, or quality assurance criteria that are applied for weld qualification tests (e.g., mechanical tests of weld samples to ensure the required structural strength) and NDE criteria for inspections of safety-related production welds in packaging components that are placed into service. Further, the staff noted that the general information in Section II-C.2 concerning qualification testing and NDE activities for the packaging body shell welds does not address other safety-related welds such as the other packaging body welds that are not shell welds, the fuel basket lodgment welds, and the welds that join the metallic plates of the shock absorbing covers.

This information is requested in order to determine whether the package meets the requirements in Paragraphs 640 and 648 of IAEA SSR-6, 2012 Edition.

- 2-2 Provide information to demonstrate that the mechanical properties and stress-strain relationship for the fuel cladding, as specified in Sections II-A.5.3 and II-A.9.2 of the application (detailed below), are sufficiently representative for all three cladding types identified Section I-D of the application to ensure that the three cladding types will maintain their integrity for the 0.3 meter free drop condition, the 9 meter drop test accident condition, and the fire test accident condition, as demonstrated in Sections II-A.5.3 and II-A.9.2 of the application.

Background and Reason for RAI

Section I-D of the application states that the MX-6P package contains fresh (unirradiated) PWR fuel assemblies. This section specifies three types of zirconium alloy cladding for the unirradiated fuel rods – zircalloy-4, MDA, or ZIRLO.

The package structural analyses in Section II-A of the application include evaluations of the structural performance of the fuel cladding for normal and accident conditions. The application includes fuel cladding integrity evaluations for the following conditions:

- Section II-A.5.3 evaluated the structural performance of the fuel cladding for the 0.3 meter free drop normal operating condition;
- Section II-A.9.2 evaluated the structural performance of the fuel cladding for the 9 meter drop test accident condition;
- Section II-A.9.2 evaluated the pressure-retaining performance of the fuel cladding at elevated temperature for the fire test accident condition.

The evaluations demonstrate that fuel cladding integrity is maintained for these three conditions based on the physical properties of fuel cladding listed in Table II-A.15, the assumed stress-strain relationship for fuel cladding addressed at the top of page II-A-83 in Section II-A.5.3 and depicted in Figure II-A.31, and the elevated temperature tensile strength of the fuel cladding identified on page II-A-141 in Section II-A.9.2 of the application.

The staff noted that the fuel cladding integrity evaluations in Sections II-A.5.3 and II-A.9.2 of the application do not distinguish between the three types of zirconium alloy cladding that may be used for the unirradiated fuel assemblies contained in the package. Since different types of zirconium alloy cladding materials can show different mechanical properties and stress-strain relationships, the staff does not have sufficient basis for ascertaining that the results of the structural performance evaluations are representative for all three cladding types, considering the potential for significant differences in the mechanical properties and stress-strain relationships for the three zirconium alloy cladding materials.

This information is requested in order to determine whether the package meets the requirements in Paragraphs 673, 682, and 726 of IAEA SSR-6, 2012 Edition.

Shielding Evaluation

- 5-1 Revise the application to provide reference [3] from Section D.6.1 of the application and justify the spent pool water contamination value provided in Table II-D.3 of the application.

Table II-D.3 of the application provides a value for spent fuel pool water contamination concentration for the water assumed to remain on the fuel assembly surfaces. The applicant provides a reference for the value in Section D.6.1 of the application. The applicant should provide this reference, as it is not readily available to NRC staff. The applicant should also clarify where in the reference the spent fuel pool water contamination value is taken from and justify that this value is appropriate for the shielding analysis for the contents in the MX-6P package.

This information is needed for the staff to confirm that the package design will meet the package external dose rate requirements of IAEA SSR-6, "Regulations for the Safe Transport of Radioactive Material."

RAI for the MX-6P DATE June 29, 2022

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