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

August 6, 2021

Don Shaw
Licensing Manager
TN Americas LLC
7160 Riverwood Drive
Suite 200
Columbia, MD 21046

SUBJECT: SECOND REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE MODEL NO. NUHOMS® MP-197HB PACKAGE

Dear Mr. Shaw:

By letter dated November 30, 2020, TN Americas LLC submitted an application for a revision to the Certificate of Compliance No. 9302 for the Model No. NUHOMS® MP-197HB transportation package. Staff issued a first request for additional information by letter dated April 7, 2021 (ADAMS Accession No. ML21090A290), to which you responded by letter dated May 28, 2021 (ADAMS Accession No. ML21148A067).

The staff has determined that further information is needed to complete its technical review. The information requested is listed in the enclosure to this letter. We request you provide this information by September 30, 2021.

Please reference Docket No. 71-9302 and EPID-L-2020-LLA-0260 in future correspondence related to this licensing action. If you have any questions regarding this matter, please contact me at pierre.saverot@nrc.gov.

Sincerely,

Signed by Saverot, Pierre
on 08/06/21

Pierre Saverot, Project Manager
Storage and Transportation Licensing Branch
Division of Fuel Management
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-9302
EPID-L-2020-LLA-0260

Enclosure:
2nd Request for Additional Information

Second Request for Additional Information
ORANO USA TN Americas LLC
Docket No. 71-9302
Model No. NUHOMS® MP-197HB Package

By letter dated November 30, 2020, ORANO USA (TN Americas LLC) submitted an application for a revision to the Certificate of Compliance No. 9302 for the Model No. NUHOMS® MP-197HB transportation package. The applicant requested to add optional specifications to the packaging and radioactive waste canister(s) (RWC) design to provide assurance that an RWC currently in storage, or an RWC that will be loaded and placed in storage, can be transported in the Model No. MP-197HB package.

Staff issued a first request for additional information (RAI) by letter dated April 7, 2021 (ADAMS Accession No. ML21090A290), to which TN Americas LLC responded by letter dated May 28, 2021 (ADAMS Accession Nos. ML21148A067 and ML21148A068).

This second RAI identifies information needed by the U.S. Nuclear Regulatory Commission (NRC) staff (the staff) in connection with its review of the application.

Each individual RAI describes information needed by the staff to complete its review of the application and to determine whether the applicant has demonstrated compliance with the regulatory requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 71.

CHAPTER 1 GENERAL INFORMATION

1.1 Revise the RWC drawing to address the following:

a. Ensure the drawing adequately addresses the actual closure configurations that the applicant proposes to be allowed for the RWC design.

   The applicant's RAI response indicates that the RWC drawing shows what is "typical" of the RWC closure configuration. It should be clear that, whatever the actual closure configuration is for any given RWC, it must conform to what the drawing shows/allows. This means that extra items, such as a welded outer top cover plate over the bolted top cover plate for the RWC-B or a weld to the bolted top cover plate for the RWC-B, cannot be added to the RWCs. As the staff stated in the previous RAIs (see RAI 5-2 of that letter dated April 7, 2021), fabricated packagings must comply with the specifications shown in the package drawings, as these are part of the Certificate of Compliance. For items shown in the drawings that are not important to safety and the package's safety functions, the applicant should ensure the drawings only show a general representation of such items or optional configurations and provide justification, as needed, for considering these items as not important to the package's safety functions.

b. Clarify whether or not the penetrations in item 3 on the RWC drawing are plugged as well.

   If the penetrations in item 3 are plugged, the time in the operations sequence and the quality category of those plugs should be provided in the appropriate spots in the application. Staff expects that item 3 will always be unplugged for the RWC-

B that is filtered and vented during storage prior to transport. However, that is not the same configuration for all RWC variations.

c. Confirm whether or not the possible configuration with lead in the top and bottom shield plugs is only for an RWC with the 0.5" thick shell.

   If this is the only RWC for which lead in top and bottom shield plugs is to be allowed, Note 14 should be explicitly clear on that. The current Note 14 indicates this configuration of top and bottom shield plug can be for any RWC.

d. Specify the material standard for the lead in Note 14 of the drawing; this should be specified (e.g., ASTM B29 copper lead) as is done for the DSCs that use lead.

e. Confirm and clarify that Note 1 means that the total minimum axial and radial thicknesses, which are required for shielding, do not include the gaps between any individual plates comprising the axial ends or the radial wall of the RWC.

   Not only should gaps between cover plates and shield plugs be excluded, but any gaps between plates comprising a particular cover plate and any gaps between plates comprising a particular shield plug should also be clearly excluded. Also, if multiple plates make up the radial minimum thickness needed for shielding, that thickness should exclude any gaps between plates used to obtain the minimum amount of radial shielding. If possible, Note 1 should be more explicitly clear on this point.

f. Ensure the drawing includes the appropriate configurations for RWCs that are repurposed DSCs that have lead as part of their top or bottom shield plugs.

   The premise of the application for requesting a thinner RWC shell was to enable DSCs to be used as RWCs. Any DSC that is used as an RWC must meet the specifications in the RWC drawing, since it will be used and identified as an RWC. Some DSCs, such as the 24PT4, use lead in their axial top and base. It is not clear that the RWC configurations shown in the drawing adequately include these configurations. While it appears that the base configuration for having a bottom lead shield plug is covered by the RWC drawing, the drawing does not adequately address the configuration for a top shield plug with lead. Current Note 14 indicates the top shield plug can be all lead. That is not a correct representation of the top shield plug for any of the DSCs that use lead in axial shielding. Plus, if the RWC's top shield plug were only lead, the configurations shown in the drawing for the shield plug lead to other concerns about the lead shielding maintaining its configuration with nothing like a steel shell around the lead preventing slump, creep or other displacements of the lead. These concerns would need to be addressed in the application analyses, but have not been dealt with at this time.

g. Confirm whether Note 1, which allows use of multiple plates to meet the drawing-specified minimum thicknesses, only applies to the RWCs with a minimum 1.75-inch thick shell or it also applies to the 0.5-inch thick shell RWCs. If it only applies to the 1.75-inch thick shell RWCs, the note should be explicit on this point like it was done for Note 8. Whether or not this note applies to the 0.5-inch thick shell RWCs will impact which DSCs may be used as RWCs. Several DSCs have

a nominal shell thickness of 0.5 inches, which means their minimum shell thickness is less than the specified minimum in the RWC drawing's Note 14.

h. Ensure the RWC drawing includes the closure configurations for DSCs that may be used as RWCs with regards to the vent and drain (or siphon) ports.

The RWC drawing indicates that the vent and drain ports will be penetrations through the top shield plug and top cover plate. For many of the DSCs, including the 24PT4, the vent and drain (or siphon) ports are in their own block assembly and are not penetrations in the top shield plug. Furthermore, the vent and siphon ports do not penetrate through the top cover plate for any DSC. Thus, it does not appear that the 24PT4 DSC or any DSC has a top configuration that is consistent with the RWC drawing, including Note 11 of that drawing. This would mean that no DSC could be used as an RWC.

i. Clarify which DSCs may be considered to use as RWCs, and ensure the RWC drawing includes the specifications, at the appropriate level of detail, necessary to allow use of those DSCs as RWCs.

Note 14 simply states that a DSC can be used as an RWC. Hence, the staff understands that any DSC is a candidate for use provided it meets the specifications of the RWC drawing. Thus, the staff reviewed the DSCs' drawings to identify which DSCs may be useable as RWCs. Based on the staff's review, assuming appropriate resolution of the questions above about the vent and siphon configuration and the lead top shield plug meeting the RWC drawing specifications, it would appear that the 24PT4 may be used. It appears that the 32PT, 24PTH S, 24PTH L, 61BT and 61BTH DSCs may also be used, but only if Note 1 of the RWC drawing also applies to the 0.5 inch thick RWC, since their nominal shell thickness is 0.5 inches (which means their minimum shell thickness is less than the minimum 0.5 inches specified for the thinner RWC). The vent and siphon configuration question also affects their useability. However, all other DSCs would not be useable because their outer diameter is at least 2 inches larger than the RWC drawing specification, or, in the case of the 24PTH S-LC, the outer bottom steel plate thickness is much less than the specified thickness in the RWC drawing.

The RWC drawing should be sufficiently clear and provide adequate specification of the RWC design. This facilitates confirmation that the package operations are consistent with the certificate of compliance (including the drawings) and ensures the package user will use the package consistent with its design. It also enables confirmation that the package analyses are adequate and demonstrate that the package, as designed, will perform its safety functions in conformance with regulatory requirements.

This information is needed to confirm compliance with 10 CFR 71.33(a), 71.35(a), 71.47, and 71.51(a).

CHAPTER 2 STRUCTURAL AND MATERIALS REVIEW

2.1 Justify the use of any alternative code.

In its response to RAI 5-2, and particularly in the mark-up of the second paragraph on page A.1.4.9A-2 and Note 10 the mark-up to drawing NUHRWC-71-1001, the applicant states “Alternate welds of equivalent strength may be used with approval of certificate holder. As an alternative to AWS D1.1 or D1.6 requirements, it is acceptable for the RWC to be welded to ASME Section IX requirements and inspected to ASME Section V requirements.”

The staff is unclear whether the applicant intends to use optional welds instead of specified welds: if the intent is to use any optional welds, then the applicant shall provide the design of these optional welds and specify them accordingly on the licensing drawing. Also, the applicant needs to (i) reconcile the codes, when the certified design basis code is changed to a different code, to ensure that the design of the weld remains consistent with the system performance requirements, and (ii) justify why the proposed code is conservative in all respects (design, process, inspection. etc.).

This information is required to determine compliance with 10 CFR 71.31(a) and 71.31(c).

2.2 Explain how the derivation of the allowable stress was used for the weld design.

In its response to RAI 2-1, the applicant did not explain how the weld allowable value of 21.4 ksi was selected for determining the weld stress ratio. Choosing the proper weld allowable stress is important for assessing the adequacy of the weld design. The applicant shall provide a detailed explanation for the derivation of the allowable stress of 21.4 ksi (selection of the ASTM standard, temperature, yield, ultimate strength, etc.) that was used for the weld design.

This information is required by the staff to determine compliance with 10 CFR 71.43.

CHAPTER 5 SHIELDING REVIEW

5.1 Revise the shielding evaluation for the RWC to address lead slump impacts and impacts of gaps between the lead and steel components on package radiation levels.

As part of the application changes submitted with the response to the staff’s RAIs, the applicant modified the RWC drawing to allow for lead shielding to be used as (part of) the RWC’s top and bottom shield plugs. However, the shielding analysis is based on the top and bottom shielding being all steel, with no gaps between components (axially or radially). Based on the DSC drawings for the DSC designs that use lead in their top and bottom shield plugs, it appears there could be axial or radial gaps between the lead components and the steel components of the shield plugs. Such gaps can have an impact on package radiation levels and also introduce concerns for lead slump and its impact on package radiation levels. Additionally, if the RWC’s top shield plug is made entirely of lead, it is not clear how it will maintain its configuration as described in the RWC drawing, which also impacts package radiation levels. The shielding analyses should address the impacts of these aspects of lead shielding for both normal conditions of transport and hypothetical accident conditions.

This information is needed to confirm compliance with 10 CFR 71.47 and 71.51(a).

5.2 Revise the application to clearly describe the calculation method for the shielding analysis to determine the radiation sources in Table A.5-66 of the application.

In response to RAIs 5-6 and 5-7, the applicant modified the shielding analysis method that it used to calculate radiation levels and determine maximum allowed source strengths for the contents of an RWC with the 0.5-inch thick shell. The method differs from the description of the analysis method that is currently given in the application (see Section A.5.2.1.5 of the application) and is used for the sources in Tables A.5-61 and A.5-62 of the application for RWCs with the 1.75 inch thick shell; the application should clearly and accurately describe the methods used to perform the analysis and determine allowable contents. Since the applicant used slightly different methods for calculating the maximum allowed source strengths for RWCs with a 1.75-inch thick shell and those with a 0.5-inch thick shell, the application should include a description for each method. This will facilitate a clear and accurate understanding of the analysis methods for both kinds of RWC.

This information is needed to confirm compliance with 10 CFR 71.47 and 71.51(a)

5.3 Demonstrate that the radiation levels for packages containing RWCs with the 1.75-inch thick shell include sufficient margin to ensure maximum package radiation levels do not exceed regulatory limits or modify the source strengths for these RWCs to ensure sufficient margin exists.

In its review of the proposed new RWC variation with a 0.5-inch thick shell and the proposed source limits for that RWC, the staff had identified concerns that the proposed source strengths would result in package radiation levels that exceed regulatory limits (RAI 5-6) and that the source strengths for each gamma energy used in the evaluation were not equivalent to the proposed Cobalt-60 (Co-60) source strength in terms of package radiation levels (RAI 5-7). Since the same method was used to develop the source strengths for the existing RWC variations with a 1.75-inch thick shell, the staff had the same concerns about the source terms for those RWC variations (RAI 5-7). In response to RAI 5-7, the applicant provided reasons for why the current source terms in Tables A.5-61 and A.5-62 of the application are adequate and acceptable. These reasons include the margin between the target package radiation limit used to determine the source terms and the regulatory limit.

Based on the staff's evaluation, it is not clear that there is sufficient margin for at least a few of the gamma energies in those tables. Sufficient margin to the regulatory limit is needed because the method and models used to develop the source strength limits in these tables include uncertainties and result in underprediction of package radiation levels. In particular, the method for determining the source strength limits, referred to by the applicant as the response function method, uses a calculation parameter that underpredicts the package radiation levels. For example, for the 70 kCi Co-60 source for the Unit 01 packaging and Table A.5-62 sources, pages A.5-6a and A.5-6b of the application indicate that the 70 kCi source was set so that the 2m radial radiation levels would be 9.41 mrem/hr. Based on Table A.5-62, for the same source strength the response function method results in 2m radiation levels of 8.71 mrem/hr. Thus, the response function underpredicts the radiation levels by about 8 percent. In addition, the models used in the applicant's MCNP calculations and response function method use the nominal thickness of the package's inner steel shell and outer steel shell (on the package's cask body) instead of minimum thicknesses allowed by the package drawings, which would increase package radiation levels. Also, the CRUD calculation results in an additional contribution to package radiation levels. Accounting for all these items, the radiation levels at 2 meters from the package exceed the 10 mrem/hr limit for

at least some of the gamma energies in Table A.5-62. Even if with a smaller underprediction by the response function, the cumulative impact of the underprediction with the other uncertainties noted above still results in package radiation levels that exceed the regulatory limit at 2 meters from the package.

This information is needed to confirm compliance with 10 CFR 71.47.

CHAPTER 7 – PACKAGE OPERATIONS

7.1 Modify Table A.7-1 of the application to address the following:

a. Revise “L-125” in the 4th row (row for 5.7-inch spacer) to be “32PT L-125”

b. Revise “32PTH1” in the 5th row (row for 12.5-inch spacer) to be “32PTH1 S”

c. Revise “32PTHq M” in the 6th row (row for 5.25-inch spacer) to be “32PTH1 M”

d. Revise the “Bottom spacer height (inches)” column heading to account for spacers being either bottom or top spacers (or both). Based on Note 1 for this table, it would seem like this column heading should be “Bottom/Top spacer total height (inches)”. Otherwise, Note 1 for the table does not make much sense as written, since it refers to a top spacer but the revised table no longer has a row for top spacer dimensions.

This Table is part of the package operations that are incorporated by reference into the package’s certificate of compliance. The Table, as revised in the application changes submitted with the response to the staff’s first round of RAIs, contains various errors or is missing information, as identified above, that is needed to ensure clear understanding and correct operation of the package.

This information is needed to confirm compliance with 10 CFR 71.87.

7.2 Modify Section A.7.7.10.1 of the application to address the following:

(i) Include a paragraph that is similar to paragraph 9 in the previous revision of this section. It seems that such a step should be included in this section since inspection of proper installation of the plug/lid is important to proper performance of the package.

(ii) Confirm the sequence of paragraphs 5 and 6 is correct, revising as needed; it would appear that the sequence should be in reverse order.

(iii) Include seal/gasket installation in paragraphs 3 (for the RWC-DD) and 7 (for the RWC-B). Based on the RWC drawing, it appears such an operation description is necessary.

(iv) Revise paragraph 8 to address or have a note on what to do and what gets welded versus what does not when the top cover plate is made of multiple plates (e.g., all are welded or just the outermost). If that affects when water removal occurs, then the package operations descriptions should note that as well in the

appropriate place(s). The package operations should be consistent with what the RWC drawing allows, including the allowed design options.

(v) Revise paragraph 8 to include the bolts' torque values for the RWC-B and RWC-DD top cover plate bolts or justify why this information is not needed. It seems like this information should be here since it is part of ensuring the closure of the RWC, which retains the contents within the RWC consistent with the shielding evaluation.

The package operations descriptions will be incorporated by reference into the package's certificate of compliance. Thus, they should be consistent with the package design and ensure the package performs its functions as evaluated in the application to ensure compliance with the regulatory requirements. The applicant revised this section as part of the application changes submitted with the response to the staff's first round of RAIs. The items identified above are or appear to be necessary to ensure clear understanding and correct operation of the package, including consistency with the safety evaluations in the application.

This information is needed to confirm compliance with 10 CFR 71.47 and 71.87.

7.3 Revise the package operations descriptions in Sections A.7.7.10.1 and A.7.7.10.2 of the application to be consistent with and support using a DSC as an RWC.

Given the design of the 24PT4 DSC (and any of the other DSCs that are being contemplated for use as RWCs), it is not clear that the operations in Section A.7.7.10.1 #7-9 of the application can be done before the operations in Section A.7.7.10.2 #1-6 of the application for the 24PT4 DSC (or any DSC) that is used as an RWC. The package operations do not match with use of a 24PT4 DSC, or any DSC, as an RWC. Since Note 14 on the RWC drawing simply refers to a DSC, without specifying a particular one, the staff looked at the drawings for all the DSCs and identified that many DSCs have a separate vent and siphon block (vs. ports in the shield plug and top lid covers) and none of them have a top outer cover plate with penetrations to access the vent and siphon ports. Thus, for a DSC that is used as an RWC, the operations described in Section A.7.7.10.2 #1-6 of the application would need to be done prior to the operations in Section A.7.7.10.1 #7-9 of the application.

The package operations descriptions should be consistent with the package design, including the variations or options allowed in the design, and ensure the package performs its functions as evaluated in the application to ensure compliance with the regulatory requirements.

This information is needed to confirm compliance with 10 CFR 71.87.

7.4 Modify Section A.7.7.10.2 of the application to address the following:

(i) Revise paragraph 5 to be consistent with Note 11 of the RWC drawing.

Section A.7.7.10.2 paragraph 5 indicates that vent/drain covers may be bolted onto RWC-B. However, Note 11 of the RWC drawing only describes welding or use of threaded plugs. Thus, it appears that the drawing note and this paragraph

of the package operations are not consistent and should be revised for consistency with each other.

(ii) Revise paragraph 5 to include the bolts' torque values for the RWC-B and RWC-DD vent and drain port covers' bolts or justify why this information is not needed.

It seems like this information should be here since it is part of the closure of RWC, which retains the contents within the RWC consistent with the shielding evaluation.

The package operations descriptions should be consistent with the package design, including the variations or options allowed in the design, and ensure the package performs its functions as evaluated in the application to ensure compliance with the regulatory requirements.

This information is needed to confirm compliance with 10 CFR 71.87.

CHAPTER 8 ACCEPTANCE TESTS AND PACKAGE MAINTENANCE

8.1 Modify Section A.8.1.6.1, to include an appropriate acceptance test and acceptance criteria for the lead shielding in the top and bottom shield plugs of RWCs and DSCs.

While Section A.8.1.6.1 specifies an acceptance test and acceptance criteria for the radial lead shield in the package's cask body, it does not include an acceptance test and acceptance criteria for lead in the axial ends of the DSCs. Since the axial bottom and top materials are important for shielding and maintaining package radiation levels below the regulatory limits, acceptance testing is needed and important for lead used in these areas just like it is needed for the package's radial lead shielding. With Note 14 of the RWC allowing DSCs with lead axial shielding to be used as RWCs, this concern applies to RWCs as well as DSCs. The acceptance test and criteria for this axial lead should include a method and criteria that ensure the axial shielding meets the minimum specifications in each area that are provided in the respective DSC and RWC drawings.

This information is needed to confirm compliance with 10 CFR 71.47 and 71.85.