Department of Energy
National Nuclear Security Administration
P.O. Box 5400
Albuquerque, NM 87185

September 11, 2017

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Dear Sir:

This letter is in regard to Docket No. 71-9370, CAC No. L25109. The purpose of this letter is to submit the National Nuclear Security Administration's (NNSA) supplemental response to the Nuclear Regulatory Commission's (NRC) Request for Additional Information (RAI) for the Model 380-B Transport Package. The NRC's request was contained in the NRC letter from Norma Garcia-Santos to Ahmad M. Al-Daouk, subject: *Request for Additional Information for Review of the Certificate of Compliance No. 9370, for the Model 380-B Packaging (CAC No. L25109)*, dated March 16, 2017. NNSA's supplemental responses are included in the enclosures.

Questions regarding this application may be addressed to Chad E. Thompson at 505-845-4114.

Sincerely,

A-M. Al-Daouk

Ahmad M. Al-Daouk
NNSA Certifying Official

Enclosures:
1) NNSA Supplemental Responses to NRC Request for Additional Information, Docket No. 71-9370, Model No. 380-B – 1 hard copy
2) 380-B Transport Package Safety Analysis Report (SAR), Revision 2 – 1 hard copy
3) Roadmap for 380-B, Revision 2 – 1 hard copy

cc:
Norma Garcia-Santos, NRC NMSS/DSFM/SFLB MS:4 B34
R. Murphy, NA-LA
T. Taplin, NA-212
C. Thompson, NA-531
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NMSS01

Section	RAI	Change/Revision
Drawing 1916-02-02-SAR	M-6	Revise General Note 12 to remove mention of ASTM A276 material.
Drawing 1916-02-02-SAR	M-6	List of Materials: revise the specification for Items 26 and 27.
2.2.1	M-6	Removed footnote 7 from Table 2.2-1.
2.7.1.2	M-5	Corrected terminology.
2.12.4.4.7	M-5	Corrected terminology.
2.12.4	M-5	Corrected terminology in Figure 2.12.4-40, Figure 2.12.4-44, Figure 2.12.4-44a, Figure 2.12.4-44b, and Figure 2.12.4-66.
2.12.5.3.3	M-6	Added clarification regarding use of ASTM A276.
3.2.1	M-6	Removed mention of ASTM A276.
3.3.1.1	---	Corrected typographical error.
5.3.1	M-5	Corrected terminology in Table 5.3-1.
7.1.2	M-4	Added Step 12 to ensure that the device and cask cavity are dry.
8.1.6.1	M-16	Revised shielding acceptance test.

August 24, 2017

NNSA Supplemental Responses to NRC Request for Additional Information

Docket No. 71-9370
Model No. 380-B

A teleconference between the applicant (DOE-NNSA) and NRC was held on July 6, 2017 to discuss the NRC's request for supplemental responses for the subject docket. The teleconference was summarized in an email from Norma Garcia-Santos of the NRC to Chad Thompson of NNSA on July 10. The following paragraphs provide the requested supplemental information, based on the email summary. A further teleconference was held on August 1, 2017. Where necessary, changes have been made to the SAR, which has been reissued as Revision 2. Verbatim SAR changes are provided in the revised responses, below.

RAI M-4 Revise Section 7 of the application to add a requirement to verify that the sources (payload) as well as the packaging cavity are dry prior to loading. Provide revisions to the application as part of your response.

M-4 Supplemental Response: The applicant notes that the NCT and HAC pressure evaluations in Section 3.3.2 and 3.4.3.1, respectively, and the radiolysis evaluation in Section 5.5.4 conservatively do not rely on a limitation of the amount of water in the cask cavity. However, a new step 12 has been added to Section 7.1.2 (which reinforces and expands on the existing step 7 of that section) as follows:

"12. Prior to placing the shielded device into the cask, verify that the device and the cask cavity are dry."

RAI M-5 Since the applicant removed the term "forging" from the description of items in the drawings, revise the application to ensure that the term "forging" (as applicable to the components described in the drawings) is removed from the application, as applicable. For graphics related to code runs including the word "forging," the applicant can add a clarification note to ensure that terms are used consistently through the application or can re-run the code, if appropriate. Examples in which the term "forging" that refers to either the upper or base forging or "forgings" that refers to both the upper and base forgings appear in Revision 1 of the application are the following:

1. Section 2.7.1.2, page 2.7-8
2. Section 2.12.4.4.7, page 2.12.4-12
3. Figure 2.12.4-40, page 2.12.4-42
4. Figure 2.12.4-44, page 2.12.4-44
5. Figure 2.12.4-44a, page 2.12.4-45
6. Figure 2.12.4-44b, page 2.12.4-45
7. Figure 2.12.4-66, page 2.12.4-57
8. Table 5.3-1, page 5.3-3

Provide revisions to the application as part of your response.

M-5 Supplemental Response: The SAR was examined and it was found that the eight items listed above constitute the only instances where the word 'forging' was inaccurately used. Each instance has been corrected to use the appropriate terminology. For the noted figures, text has been added in the figure caption to clarify the meaning, without changing the software-supplied text within the figure.

RAI M-6 Provide the proper justification for the temperature dependent material properties of ASTM A276. Provide revisions to the application as part of your response.

M-6 Supplemental Response: The application has been revised to remove ASTM A276, Type 304 material from the 380-B package body design. Specifically:

- Drawing 1916-02-02-SAR, Sheet 1, General Note 12, has been revised to read; "ASTM A240 and A479 are optional material forms that may be substituted for any ASTM A240 or A479, Type 304 stainless steel."
- Drawing 1916-02-02-SAR, Sheet 1, List of Materials, the specification for item numbers 26 and 27 has been changed to read: "ASTM A479, Type 304".
- Footnote 7 has been removed from Table 2.2-1.
- A clarification sentence has been added to Section 2.12.5.3.3: "(ASTM A276, Type 304 is not used for any components of the cask body on drawing 1916-02-02-SAR.)".
- The first sentence of Section 3.2.1 has been revised to read: "The 380-B packaging is fabricated primarily of Type 304 austenitic stainless steel (predominately ASTM A240 and A479), lead, and polyurethane foam."

Of note, ASTM A276, Type 304 stainless steel is still specified on drawing 1916-02-03-SAR, since the application does not rely on mechanical properties at elevated temperatures for the impact limiters. Similarly, ASTM A276, Grade UNS S21800 material is retained on drawing 1916-02-02-SAR because it is not part of the containment boundary.

RAI M-13 Provide a complete response to the application including explaining the changes in the application to address this question.

M-13 Supplemental Response: The thermal analysis has been revised in Revision 1 of the SAR to identify the maximum temperature of the closure bolts. Table 3.1-1 now shows the peak closure bolt temperature under NCT and HAC as 133 °F and 570 °F, respectively. The response to RAI M-8 provides a justification for the use of 800 °F for the allowable temperature for the bolting material. Thus, significant temperature margins exist for NCT and HAC. Consequently, no deterioration of the leaktight condition will occur.

RAI M-16 Since the applicant changed its approach, provide the information identified in NUREG\CR-3854, Section 3.2.1, "Acceptance Testing for the Gamma

Shield." This information needs to be incorporated into the information.

M-16 Supplemental Response: To provide more details about the conduct of the shielding acceptance test, each of the seven points in NUREG\CR-3854, Section 3.2.1 will be addressed in the SAR. To that end, Section 8.1.6.1 has been revised to read:

"The poured lead shielding shall be tested to confirm its integrity. The shop test procedure shall include the following elements and requirements:

1. The test technique shall be a gamma scan using a hand held surface probe.
2. The gamma source shall be Co-60. Source strength shall be sufficient to provide a dose reading on the cask surface which is sufficiently above the background dose and is within the calibrated range of the measuring equipment.
3. The source strength shall be recorded at the time of the test.
4. The grid pattern shall be a maximum of four inches square.
5. The type of gamma sensor used for measurements shall be recorded. All equipment shall be calibrated per manufacturer's instructions.
6. The gamma scan test shall be performed according to a written procedure. The cask outer surface shall be marked with a grid which extends over the length of the side lead shield. A chart shall be made corresponding to the gridded surface, where each row of the table represents a circumferential ring of grid squares. The source shall be placed at one end of the cask cavity while the surface is scanned around its circumference. The source shall then moved to the next axial grid position and the corresponding circumference scanned again. This sequence shall be repeated until the entire cask outer surface is scanned. The maximum dose rate from each grid square shall be recorded on the chart.
7. Acceptance criteria for each grid square will be established using the dose rate results of the analytical shielding model from Chapter 5, *Shielding Evaluation*. The analytical model will be revised to account for the presence of a test lid and test base shielding, but the poured lead thickness shall be the same as in Chapter 5. The model dose rate results shall be calibrated to the actual test source and detector characteristics using a calibration fixture. A computer model of the calibration fixture shall be created, and a ratio of the predicted dose rate to the measured dose rate of the fixture shall be used to adjust the analytical model dose rate results and create the acceptance criteria for the test measurements. Optionally, the un-collided gamma count may be used instead of the dose rate."

Additional Change made to Revision 2 of the SAR: on page 3.3-2, fourth paragraph, at the end of the fourth line of text, reference to Figure 3.3-7 and Figure 3.3-8 have been changed to Figure 3.3-6 and Figure 3.3-7, respectively, due to a typographical error in Revision 1.