RH-TRU 72-B SAR, Revision 5			
Section	**Page**	**Change Description**	**Justification**
General		Revised header for revision number and date.	Administrative change. No impact to safety basis.
General		Revised references to 10CFR71 to 01-01-09 revision.	Administrative change. No impact to safety basis.
1.0	1.1-1	Added reference to neutron shielded canister SAR drawing and a sentence referring to RH-TRU Payload Appendix 5.1 for a description of the neutron shielded canister payload configuration.	Administrative change to accommodate new payload configuration. No impact to safety basis.
1.2.1.1.1	1.2-1	Revised the O-ring seal material description to reference Appendix 3.6.4, *Containment O-ring Seal Material Tests*, in lieu of ASTM D2000 alone to define material equivalency.	Appendix 3.6.4 has been significantly revised. In addition to retaining a requirement that individual batches of butyl continue to satisfy the previously identified ASTM D2000 string, a one-time qualification test for all butyl formulations is now imposed that addresses worst-case temperature and compression conditions. Changes provide an improved safety basis by rigorously defining O-ring seal material qualification and acceptance requirements.
1.2.1.1.4	1.2-4	Added sentence describing the neutron shielded canister designs, NS15 and NS30, as authorized variations of the removable lid canister.	Administrative change to accommodate new payload configuration. No impact to safety basis.
1.2.2	1.2-6	Revised description of OC and IV holes for use with a handling fixture in lieu of eyebolts only as allowed by the SAR drawing in flag note 20.	Administrative change for consistency with SAR drawings. No impact to safety basis.
1.3.1	1.3.1-1	Added neutron shielded canister SAR drawing, X-106-503-SNP, in this section.	SAR drawing prescribes the material, construction, inspection, and dimensional attributes of the neutron shielded canister.

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Section	**Page**	**Change Description**	**Justification**
2.0	2.1-1	Added a sentence to clarify that evaluations in this chapter are performed for canisters without neutron shielding and provide reference to RH-TRU Payload Appendix 5.1 for neutron shielded canister specific evaluations.	Administrative change to accommodate new payload configuration. No impact to safety basis.
3.0	3.1-1	Added a sentence to clarify that evaluations in this chapter are performed for canisters without neutron shielding and provide reference to RH-TRU Payload Appendix 5.1 for neutron shielded canister specific evaluations.	Administrative change to accommodate new payload configuration. No impact to safety basis.
3.1	3.1-4	Revised Table 3.1-2 allowable limits column entries for the IV and OC O-ring seal material from "-40 to 380" to "-20 to 360".	The "-40" to "-20" change is to correctly reference the regulatory HAC lower temperature. The HAC upper temperature limit change is for consistency with the revised O-ring seal material qualification requirements defined in Appendix 3.6.4. No impact to safety basis.
3.3	3.3-1	Revised the O-ring seal material description to reference Appendix 3.6.4, *Containment O-ring Seal Material Tests*, in lieu of ASTM D2000 alone to define material equivalency. Additionally, revised the summary of NCT (long-term) and HAC (short-term) allowable temperature limits consistent with Appendix 3.6.4.	Appendix 3.6.4 has been significantly revised. In addition to retaining a requirement that individual batches of butyl continue to satisfy the previously identified ASTM D2000 string, a one-time qualification test for all butyl formulations is now imposed that addresses worst-case temperature and compression conditions. Changes provide an improved safety basis by rigorously defining O-ring seal material qualification and acceptance requirements.

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Section	**Page**	**Change Description**	**Justification**
3.5.6	3.5-4	Revised 2nd sentence of 1st paragraph from "... and 221 °F below the short-term limit of 380 °F." to "... and 201 °F below the short-term limit of 360 °F."	The HAC upper temperature limit change is for consistency with the revised O-ring seal material qualification requirements defined in Appendix 3.6.4. Negligible impact to safety basis as the temperature margin remains significant.
3.6.4	3.6.4-1 thru 3.6.4-12	Completely revised Appendix 3.6.4 to define a robust set of O-ring seal material formulation qualification requirements, to correctly evaluate the limits of O-ring compression by accounting for compression reduction due to seal stretch, and to summarize qualification testing performed for Rainier Rubber material RR0405-70.	Changes provide an improved safety basis by rigorously defining O-ring seal material qualification and acceptance requirements.
4.3	4.3-1	Revised section to summarize and reference Appendix 3.6.4 for O-ring seal material equivalency test requirements, IV and OC O-ring seal compression limits, and associated formulation qualification tests performed on Rainier Rubber butyl compound RR0405-70.	Changes are for consistency with the revised Appendix 3.6.4, which evaluates the O-ring seals under compression requirements that correctly account for seal compression reduction due to O-ring stretch. No impact to safety basis.
4.3.3	4.3-3	Revised reference from Section 4.3 to Appendix 3.6.4 and revised justification to clarify that the O-ring remains leaktight under HAC because the minimum possible compression of the seal is greater than or equal to the minimum compression evaluated by qualification testing of seal materials.	Changes are for consistency with the revised Appendix 3.6.4. No impact to safety basis.

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Section	**Page**	**Change Description**	**Justification**
5.0	5.1-1	Added a sentence to clarify that evaluations in this chapter are performed for canisters without neutron shielding and provide reference to RH-TRU Payload Appendix 5.1 for neutron shielded canister specific evaluations.	Administrative change to accommodate new payload configuration. No impact to safety basis.
6.0	6.1-1	Added a sentence to clarify that RH-TRU Payload Appendix 5.1 explains how the evaluations in the chapter apply to the neutron shielded canister.	Administrative change to accommodate new payload configuration. No impact to safety basis.
7.1.2	7.1-1	Revised description regarding use of IV holes with a handling fixture in lieu of eyebolts only as allowed by the SAR drawing in flag note 20.	Administrative change for consistency with SAR drawings. No impact to safety basis.
7.1.2.1 7.1.2.23	7.1-2 7.1-4	Added sentence to allow option for removing the package from the Center-Pivot Trailer and locating it in a vertical holding fixture. Also added provision for replacing the package on the trailer if removed.	Administrative change to clarify optional removal of the package from the Center-Pivot Trailer (CPT) like that allowed for the Lift-Off Trailer (LOT). No impact to safety basis.
7.1.2.24 7.1.2.25	7.1-4	Replaced "transport vehicle" with "trailer" to clarify nomenclature.	Administrative change for clarification. No impact to safety basis.
7.2	7.2-1	Removed reference to DOE Order 232.1.	DOE Order is no longer active and not necessary due to applicability of 10 CFR 71.95. No impact to safety basis.
7.3	7.3-1	Added option to install the OC lid closure bolts and/or the impact limiter bolts with 100 – 200 lb*ft of torque for empty shipments.	Optional reduced torque will reduce undue wear on threads while maintaining sufficient torque to preclude loosening during transport. No impact to safety basis.

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Section	**Page**	**Change Description**	**Justification**
8.1.3.1	8.1-3	Revised IV leakage rate test ambient temperature requirement from 45 °F or greater to 40 °F or greater.	Ambient temperature of 40 °F or greater is sufficient to ensure proper operation of leakage rate test equipment and consistent with that required for other WIPP Type B packages.
9.0	9.1-1 thru 9.3-2	Revised section to incorporate latest revision of Regulatory Guide 7.10 and clarify quality assurance program requirements for Type B packaging. Revised references to 49CFR173, and DOE Order 460.1B to latest revision.	Administrative change. No impact to safety basis.

RH-TRU 72-B SAR DRAWINGS – X-106-500-SNP Rev. 5			
Sheet	**Zone**	**Change Description**	**Justification**
ALL	A-3	Revised the lineal dimension portion of the tolerance block as follows: 0 – <2" ±1/16 2" – <6" ±1/8 6" – <18" ±1/4 18" – <48" ±1/2 ≥48" ±3/4	Revising the drawing tolerance block eliminates duplicity and confusion when interpreting the applicable dimensional tolerance that should be applied to the corresponding lineal dimension. No impact to safety basis.
1	B-7/8	Revised General Note 12 to the following: "ALL WELDS SHALL BE VISUALLY INSPECTED IN ACCORDANCE WITH AWS D1.1 FOR CARBON STEELS AND AWS D1.6 FOR STAINLESS STEELS."	Earlier versions of AWS D1.6, *Structural Welding Code – Stainless Steel*, did not include visual weld test (VT) criteria, so AWS D1.1, *Structural Welding Code – Steel*, was universally referenced. Since both standards now contain VT criteria, AWS D1.6 can be used for VT of stainless steel welds, and AWS D1.1 can be used for VT of carbon steel welds. No impact to safety basis.
1	C-5/6	Revised Flag Note 35 to the following: "MATERIAL: RAINIER RUBBER RR0405-70, OR EQUIVALENT, PER APPENDIX 3.6.4 OF THE SAR."	The drawing note revision defines, through reference to SAR Appendix 3.6.4, rigorous O-ring material formulation qualification tests that simulate NCT and HAC extremes of temperature, compression, and duration. Alternative O-ring materials are only to be qualified after successfully passing the formulation qualification tests. The ASTM D2000 string is used to define performance parameters verified on a material batch basis.

RH-TRU 72-B SAR DRAWINGS – X-106-500-SNP Rev. 5			
Sheet	**Zone**	**Change Description**	**Justification**
1	B-5/6	Revised Flag Note 50 to the following: "INSERT MATERIAL SHALL MEET ASTM A434 (OR EQUIVALENT) WITH 140,000 PSI MINIMUM TENSILE STRENGTH."	Not all threaded inserts are manufactured to the ASTM A434 standard, but instead often use other equivalent standards such as ASTM A108 or A331, *Standard Specification for Steel Bars, Alloy, Cold-Finished*, MIL-S-5626C, *Military Specification – Steel, Chrome-Molybdenum (4140) Bars, Rods, and Forging Stock (for Aircraft Application)*, and/or AMS6382M, *Steel, Bars, Forgings and Rings, 0.95Cr - 0.20Mo (0.38 - 0.43C) (SAE 4140), Annealed*. No impact to safety basis.
1	D-3/4	Added General Note 56 as follows: "REPAIR OF BASE MATERIAL FOR THE INNER VESSEL AND OUTER VESSEL CONTAINMENT BOUNDARY COMPONENTS SHALL BE IN COMPLIANCE WITH ASME CODE, SECTION III, DIVISION 1, SUBSECTION NB, ARTICLE NB-2538 AND NB-2539, OR ARTICLE NB-4131. ALTERNATIVELY, REPAIRS OF OUTER VESSEL CONTAINMENT COMPONENTS PERFORMED AFTER THE COMPLETION OF OUTER VESSEL FABRICATION MAY BE IN COMPLIANCE WITH ASME CODE, SECTION III, DIVISION 1, SUBSECTION NG, ARTICLE NG-2538 AND NG-2539. MAXIMUM WELD REINFORCEMENT SHALL BE 3/32 INCH IN COMPLIANCE WITH ASME CODE, SECTION III, DIVISION 1, SUBSECTION NB, ARTICLE NB-4426, PARAGRAPH NB-4426.1.	Base material repairs were originally addressed in the TRUPACT-II SAR drawing (see General Note 48) by referencing applicable sections of the ASME Boiler and Pressure Vessel Code. Since the RH-TRU 72-B package uses similar fabrication practices and materials, the same requirements have been added to the RH-TRU 72-B SAR drawing to eliminate confusion regarding base material repairs. No impact to safety basis.

RH-TRU 72-B SAR DRAWINGS – X-106-500-SNP Rev. 5			
Sheet	**Zone**	**Change Description**	**Justification**
1	D-3/4	General Note 56 *(continued)*: "REPAIR OF BASE MATERIAL FOR NON-CONTAINMENT BOUNDARY COMPONENTS SHALL BE IN COMPLIANCE WITH ASME CODE, SECTION III, DIVISION 1, SUBSECTION NF, ARTICLE NF-4131, OR ARTICLE NF-2510 AND ASTM A480. ALTERNATIVELY, REPAIRS MAY BE IN COMPLIANCE WITH ASME CODE, SECTION III, DIVISION 1, SUBSECTION NB, ARTICLE NB-2538 AND NB-2539, OR ARTICLE NB-4131. MAXIMUM WELD REINFORCEMENT SHALL BE 3/32 INCH." REMOVAL OF EXCESS WELD REINFORCEMENT FROM BASE MATERIAL REPAIR WELDS, TEMPORARY ATTACHMENT WELDS, ETC., SHALL BE UNIFORMLY BLENDED, THAT IS, SHALL HAVE A MAXIMUM 3/32 INCH WELD REINFORCEMENT AND HAVE A TAPERED TRANSITION TO THE BASE MATERIAL SURFACE. DOCUMENTATION OF BASE MATERIAL REPAIRS SHALL BE IN COMPLIANCE WITH ASME CODE, SECTION III, DIVISION 1, SUBSECTION NB, ARTICLE NB-4132."	
6	B-7	Revised "HINGE" to be "HINGE 2X, ROUND BAR OR ROUND MECHANICAL TUBING, TYPE 304 SS" Added leader and "HINGE PIN 2X, ROUND BAR, TYPE 304 SS".	Specifying the use of round bar and round mechanical tubing will eliminate confusion about the form of the material used for the hinge during fabrication. No impact to safety basis.
7	D-7	Removed the 250 surface finish callout on the lift/tie-down trunnions.	Maintaining the surface finish for the lift/tie-down trunnions is not important to cask operation. No impact to safety basis.

RH-TRU 72-B SAR DRAWINGS – X-106-500-SNP Rev. 5			
Sheet	**Zone**	**Change Description**	**Justification**
7	D-7	Revised "1/2" to be "1/2 ±1/4" for the flange thickness of the lift/tie-down trunnions.	The lift/tie-down trunnion flange is only used as a guide for the cask lift fixture. No impact to safety basis.
7	D-4/5	Removed the 250 surface finish callout on the main trunnions.	Maintaining the surface finish for the main trunnions is not important to cask operation. No impact to safety basis.

RH-TRAMPAC, Revision 1			
Section	**Page**	**Change Description**	**Justification**
General		Revised header for revision number and date.	Administrative change.
		Updated references to 10 CFR 71 to the 01-01-09 edition.	Administrative change.
Acronyms	v	Updated to add and remove acronyms as used.	Administrative change.
List of Appendices	vi	Added Section 5.0, Payload Container Design Basis Evaluations, and Appendix 5.1, Description of Neutron Shielded Canister.	Revised to reflect the addition of the new Appendix 5.1, which provides a description of the neutron shielded canister.
1.6.2	1.6-1	Text added to clarify that compliance verification audits are not required at sites using personnel from a qualified and audited program.	Clarification addresses the implementation of mobile qualified and audited programs at various sites.
Table 2.2-1	2.2-1	Added maximum gross weight limits for NS15 and NS30 neutron shielded canisters.	Incorporation of neutron shielded canister as an allowable payload container for the RH-TRU 72-B.
2.2.1, 2.2.2	2.2-1	Deleted reference to one standard deviation as the error associated with weight.	Revised to delete incorrect reference to "standard deviation" in defining the error associated with weight measurement.
Table 2.4-1	2.4-1	Added minimum filter vent specifications for NS15 and NS30 neutron shielded canisters.	Incorporation of neutron shielded canister as an allowable payload container for the RH-TRU 72-B.
2.8	2.8-1 thru 2..8-8	Numbered existing text as Section 2.8.1 and added new Section 2.8.2, Neutron Shielded Canister. Revised Table 2.8-1 to clarify "overall" height and "outside" diameter measurements and to clarify the requirement to use dunnage within the fixed and removable lid RH-TRU waste canister if packaging fewer than three 30- or 55-gallon drums.	Clarification of fixed and removable lid canister specifications and incorporation of neutron shielded canister as an allowable payload container for the RH-TRU 72-B.

RH-TRAMPAC, Revision 1			
Section	**Page**	**Change Description**	**Justification**
3.1.1	3.1-1 thru 3.1-3, 3.1-6 & 3.1-7	Revised section (including Table 3.1-1) to specify nuclear criticality limits for the neutron shielded canister.	Incorporation of neutron shielded canister as an allowable payload container for the RH-TRU 72-B.
3.2.1	3.2-1	Revised to clarify that additional payload container shielding shall not be used to meet the radiation dose rate requirements.	Clarification of currently allowed compliance method for the radiation dose rate requirements.
3.2.2	3.2-1 & 3.2-2, 3.2-9 thru 3.2-12	Revised to define the hypothetical accident condition dose rate requirement compliance methodology for the neutron shielded canister and to add new Table 3.2-2, Summary of Hypothetical Accident Condition Curie Limits for Each Radionuclide for Neutron Shielded Canisters.	Incorporation of neutron shielded canister as an allowable payload container for the RH-TRU 72-B.
4.1	4.1-1	Revised the quoted definition of pyrophoric materials to exactly match the definition in 10 CFR 61.2 and to move descriptive text from Section 4.1.1, Requirements, to Section 4.1, Introduction.	Administrative change.
4.2	4.2-1	Revised the quoted definitions of explosives and corrosives to exactly match the definitions in 49 CFR 173.50 and 40 CFR 261.22, respectively.	Administrative change.
5.3	5.3-1 thru 5.3-4	Added text to clarify the bounding assessment of pressure increase values corresponding to the maximum possible FGGR limit.	Clarification of existing pressure analysis.

RH-TRAMPAC, Revision 1			
Section	**Page**	**Change Description**	**Justification**
6.2.1	6.2-1 thru 6.2-3	Revised section (including Table 6.2-1) to reflect changes made to sections referenced in the payload certification procedures.	Revised for consistency with changes described above for the RH-TRAMPAC.
6.2.3	6.2-4 thru 6.2-10	Revised section (including Tables 6.2-2 and 6.2-3) to allow for controlled intersite shipments (in addition to shipments to WIPP) of the RH-TRU 72-B and to allow for a 9-day transport and unloading time.	Revised to allow for controlled intersite shipments.

RH-TRU Payload Appendices, Revision 1		
Appendix	**Change Description**	**Justification**
General	Revised header for revision number and date.	Administrative change.
Table of Contents	Added Section 5.0, Payload Container Design Basis Evaluations, and Appendix 5.1, Description of Neutron Shielded Canister.	Revised to reflect the addition of the new Appendix 5.1, which provides a description of the neutron shielded canister.
Introduction	Added reference to Section 5.0, Payload Container Design Basis Evaluations.	
2.3	Revised to clarify the allowance of shipments between sites in addition to shipments to WIPP and to eliminate outdated text describing the 49 CFR 395 regulations governing hours of service for drivers.	Clarification of allowance for intersite shipments as well as shipments to the WIPP. Correction of text for consistency with current regulations.
2.4	Revised to allow for controlled shipments between sites in addition to shipments to WIPP. Revised to clarify that controlled shipments between sites are not allowed if the proposed distance exceeds 2,391 miles. Revised to replace the 8-day transport time and 1-day unloading time with a combined 9-day transport and unloading time.	Revised to allow for intersite controlled shipments necessary for the consolidation of waste (e.g., from small quantity sites). Revised to reallocate the time associated with the transport and unloading time to utilize available time remaining after shipment arrival at the receiving site.
2.5	Revised to address the compliance methodology for gas generation requirements for the NS15 and NS30 neutron shielded canisters. In addition, Equation 19 was revised to correct the ratio used in the calculation for the decay heat of a container needed to evaluate compliance with the watt*year criteria.	Incorporation of neutron shielded canister as an allowable payload container for the RH-TRU 72-B. Correction of typographical error in Equation 19.

RH-TRU Payload Appendices, Revision 1		
Appendix	**Change Description**	**Justification**
5.1	Added to provide a detailed description of the neutron shielded canister, including the structural, thermal, shielding, and criticality basis for the neutron shielded canister payload.	Incorporation of neutron shielded canister as an allowable payload container for the RH-TRU 72-B.