Location	SAR REV 7	SAR REV 8
1.0	*"ROBATEL Technologies, LLC (RT) submits this Application and Safety Analysis Report (SAR), Revision 7, to the Nuclear Regulatory Commission (NRC) to renew the Certificate of Compliance (CoC) No. 9365, Revision No. 1 for the Model RT 100 Type B(U) Cask Package (RT-100)."*	*"ROBATEL Technologies, LLC (RT) submits this Application and Safety Analysis Report (SAR), Revision 8, to the Nuclear Regulatory Commission (NRC) to amend the Certificate of Compliance (CoC) No. 9365, Revision No. 2 for the Model RT-100 Type B(U) Cask Package (RT-100)."*
1.1	*"The purpose of this application is to request the renewal of the CoC for the Model No. RT-100 type B(U) cask, for package and transport contaminated spent resins and spent filters."*	*"The purpose of this application is to request the amendment of the CoC for the Model No. RT-100 type B(U) cask to allow for the transport of activated hardware or activated metal (terms used interchangeably) contents packaged in a secondary container in addition to contaminated spent resins and filters as specified on the current CoC. Moreover, this license amendment is to provide the flexibility to ship contaminated spent resins/filters and activated hardware of varying activities by limiting the waste's mass."*
1.2.1.6	*"The RT-100 contents are resins and filters from commercial nuclear power plants that contain only trace quantities of fissile radionuclides."*	*"The RT-100 contents are activated hardware and spent resins and filters from commercial nuclear power plants that contain only trace quantities of fissile radionuclides."*
1.2.1.11	*"The chief"*	*"The main"*
1.2.2.1	*"The contents of the RT-100 cask are limited to contaminated resins and filters containing byproduct or otherwise radioactive nuclear material."*	*"The contents of the RT-100 cask are limited to activated hardware and contaminated resins and filters containing byproduct or otherwise radioactive nuclear material."*
1.2.2.3	*"The type/form of material is defined as byproduct, source, or special nuclear material in the form of resins, filters, and mixtures of resins/filters. These materials are contained within secondary container(s). The chemical form of the contents is resins and filter media containing radioactive materials. The radioactive content of the resins and filters is considered to be in the form of dispersible solids."*	*"The type/form of material is defined as byproduct, source, or special nuclear material in the form of resins, filters, activated low-density hardware, activated high-density hardware, and mixtures of resins, filters, low-density hardware, and high-density hardware contained within a secondary container. The chemical forms of the contents are resins and filter media containing radioactive materials and metallic activated hardware segments in the form of dispersible solids."*

Location	SAR REV 7	SAR REV 8
1.2.2.3.2	*"primary water chemistry"*	*"pure water chemistry"*
1.2.2.3.3	N/A	Added a new section: *"1.2.2.3.3 Activated Hardware* *Activated hardware contents include low-density hardware, such as aluminum and zircoloy and high-density hardware, such as steel and Inconel. Low-density hardware is limited to hardware with a density greater than or equal to 2 g/cm^3 and less than 7.5 g/cm^3. High density hardware is limited to hardware with a density greater than or equal to 7.5 g/cm^3 and less than or equal to 9.0 g/cm^3. Common examples of activated hardware that could be shipped in the RT-100 Cask include but are not limited to fuel channels, velocity limiters, and reactor vessel internals from PWRs and BWRs."*
1.2.2.3.4 (1.2.2.3.3 previously)	*"The secondary containers are used to package resins or filters generated by nuclear power plants."*	*"The secondary containers are used to package contaminated spent resins/filters, activated low-density hardware, activated high-density hardware, or a mixture of spent resins/filters with activated hardware generated by nuclear power plants."*
1.2.2.6	N/A	Added: *"Activated hardware only shipments with no hydrogenous materials do not require hydrogen gas generation analysis."*
1.2.2.7	*"All contents shall be packaged in a secondary container (liner). The maximum gross weight of payload is 6,804 kg including the secondary container (liner)."*	*"All contents shall be packaged in a secondary container (liner). The maximum gross weight of payload is 6,804 kg including the secondary container (liner) and shoring. The maximum payload of activated hardware contents is limited to 5,896 kg (~900 kg for secondary container and shoring)."*

Location	SAR REV 7	SAR REV 8
1.2.2.10	*"The type and form of material is defined as byproduct, source, or special nuclear material in the form of dewatered or grossly dewatered resins, spent filters, or mixtures of resins/filters, contained within secondary container(s). Secondary containers are required to be passively vented within the cask cavity during shipment. The maximum bulk density of the contents may not exceed 1.0 g/cm^3. The maximum quantity of payload material including contents, secondary containers, and shoring is limited to 6,804 kg."*	*"The type and form of material is defined as byproduct, source, or special nuclear material in the form of dewatered or grossly dewatered spent resins/filters, activated hardware, or mixtures of resins/filters with activated hardware contained within secondary container(s). Secondary containers are required to be passively vented within the cask cavity during shipment. The maximum bulk density of resins and filters may not exceed 1.0 g/cm^3. Activated hardware contents include low-density and high-density hardware. Low-density hardware (e.g., aluminum and zircoloy) is limited to hardware with a density greater than or equal to 2 g/cm^3 and less than 7.5 g/cm^3. High-density hardware (e.g., steel and Inconel) is limited to hardware with a density greater than or equal to 7.5 g/cm^3 and less than or equal to 9.0 g/cm^3. The maximum payload of resins/filters and activated hardware including contents, secondary containers, and shoring is limited to 6,804 kg. The maximum payload of activated hardware is limited to 5,896 kg."*
Attachment 1.4-1	*"RT100 NM 1000 Rev. F — Bill of Material"*	*"RT100 NM 1000 Rev. G — Bill of Material"* Changed the NUREG/CR-6407 classification for ITEM 1012-07 from A to B. ITEM 1012-07 is not part of the containment boundary since the quick-disconnect cover plate (ITEM 1017-01) and the inner seal (ITEM 1017-03) are considered part of the containment boundary and both are Class A. A radioactive release will only occur if ITEM 1012-07 fails along with either 1017-01 or 1017-03. Refer to engineering drawing in Attachment 1.4-3 Section G-G for detailed view of the quick-disconnect cover plate assembly and Figure 4.1.2-1 on page 4-4 which shows the RT-100 containment boundary. This is the only change to the RT-100 Bill of Material.

Location	SAR REV 7	SAR REV 8
1.5	*"Robatel Technologies, LLC, Quality Assurance Program for Packaging and Transportation of Radioactive Material, 10 CFR 71 Subpart H, Rev. 2, Dated November 10, 2017 and NRC Approved on March 21, 2012"* *"Robatel Technologies, LLC Application and Safety Analysis Report, Revision 6, for the Model RT-100 Cask Package, dated May 15, 2015."*	*"Robatel Technologies, LLC, Quality Assurance Program for Packaging and Transportation of Radioactive Material, 10 CFR 71 Subpart H, Rev. 6, Dated January 08, 2021 and NRC Approved on March 21, 2012"* *"Robatel Technologies, LLC Application and Safety Analysis Report, Revision 7, for the Model RT-100 Cask Package, dated December 05, 2018."*
2.6	*"Also, the requirements of 10 CFR 71.71 [Ref. 2] specify that the evaluation of the RT-100 for the normal conditions of transport be evaluated at the most unfavorable ambient temperature in the range from -29°C to +100°C."*	*"Also, the requirements of 10 CFR 71.71 [Ref. 2] specify that the evaluation of the RT-100 for the normal conditions of transport be evaluated at the most unfavorable ambient temperature in the range from -29°C to +38°C."*
2.13.2.1.2	N/A	Added a new section: *"2.13.2.1.2 HAC (Fire) Internal Pressure Load for Primary Lid Closure Bolts"* This calculation was done to show that the HAC impact load bounds the elevated internal pressure due to fire. The HAC impact loads are calculated in the later sections of Chapter 2.
2.13.2.1.4	N/A	Added a new section: *"2.13.2.1.4 HAC (Fire) Internal Pressure Load for Secondary Lid Closure Bolts"* This calculation was done to show that the HAC impact load bounds the elevated internal pressure due to fire. The HAC impact loads are calculated in the later sections of Chapter 2.
2.13.2.2.1	*"2.13.2.2.1 Temperature Loads for Primary Lid Closure Bolts"*	*"2.13.2.2.1 NCT Temperature Loads for Primary Lid Closure Bolts"*

Location	SAR REV 7	SAR REV 8
2.13.2.2.1	N/A $$F_{atp} = 0.25 \times \pi \times D_b \times E_b \times (\alpha_l \times T_l - \alpha_b \times T_b)$$ D_b = Nominal Bolt diameter = 48 mm E_b = Bolt Material Elastic Modulus, (SA 354 Grade BD) = 202 GPa at 20° C (Table 2.2.1-1) α_l = Primary Lid Material Coefficient of Thermal Expansion = 16.6×10^{-6} m/m/°C (Table 2.2.1-1) α_b = Bolt Material Coefficient of Thermal Expansion = 11.5×10^{-6} m/m/°C (Table 2.2.1-1) T_l = Maximum Primary Lid Temperature under NCT conditions = 71°C (conservatively use 100 °C) (Table 3.1.3-1) T_b = Minimum Bolt Temperature under NCT conditions = -20 °C (10 CFR 71.71 [Ref. 2])	Added*:* *"The temperature load is calculated for elevated (hot) and reduced (cold) temperatures of the lid and the bolt at NCT using the method presented in Table 4.4 in NUREG/CR-6007 [Ref. 10]. The cold case is neglected since the tensile force per bolt is negative for this case, and the hot case is considered in the analysis (+ve). NCT temperatures are also used for the initial conditions of HAC drop. Thus, the tensile force per bolt due to temperature* F_{at} *is:"* Recalculated temperature loads for the primary lid bolts: $$F_{at_{hot}} = 0.25 \times \pi \times D_b^2 \times E_b \times (\alpha_l \times T_l - \alpha_b \times T_b)$$ $$F_{at_{cold}} = 0.25 \times \pi \times D_b^2 \times E_b \times (\alpha_l \times T_{lc} - \alpha_b \times T_{bc})$$ D_b = Nominal diameter of the primary lid bolts = 48 mm = 0.048 m E_b = Young's modulus of bolt at 20°C = 202 GPa (Table 2.2.1-1) α_l = Thermal expansion coefficient of lid at 100°C = 16.2×10^{-6} m/m/°C (Table 2.2.1-1) α_b = Thermal expansion coefficient of bolt at 20°C = 11.5×10^{-6} m/m/°C (Table 2.2.1-1) T_{fl} = NCT hot temperature of lid, inner shell average = 71°C (Table 3.1.3-1) T_{fb} = NCT hot temperature of bolts = 70°C (Table 3.1.3-1) T_{flc} = NCT cold temperature of lid, inner shell average = -36°C (Table 3.1.3-1) T_{flcb} = NCT cold temperature of bolts -34.9°C (Table 3.1.3-1) T_i = Assumed initial temperature of bolts and lid = 20°C T_l = (T_{fl} - Ti) = Temperature change (T) of the closure lid (NCT hot) = 51°C T_b = (T_{fb} - Ti) = Temperature change of the closure bolt (NCT hot) = 50°C T_{lc} = (T_{flc} - Ti) = Temperature change (T) of the closure lid (NCT cold) = -56°C T_{bc} = (T_{flcb} - Ti) = Temperature change of the closure bolt (NCT cold) = -54.9°C

Location	SAR REV 7	SAR REV 8
	Thus, $$F_{atp} = 0.25 \times \pi \times 0.048^2 \times 202 \times 10^6 \times (16.6 \times 10^{-6} \times 100 - 11.5 \times 10^{-6} \times -20)$$ = 690.9 kN/bolt	Thus, $$F_{at_{hot}} = 0.25 \times \pi \times 0.048^2 \times 202 \times 10^6 \times (16.2 \times 10^{-6} \times 51 - 11.5 \times 10^{-6} \times 50)$$ = 91.8 kN/bolt $$F_{at_{cold}} = 0.25 \times \pi \times 0.048^2 \times 202 \times 10^6 \times (16.2 \times 10^{-6} \times -56 - 11.5 \times 10^{-6} \times -54.9)$$ = -100.8 kN/bolt (neglected)
2.13.2.2.2	N/A	Added a new section: *"2.13.2.2.2 HAC (Fire) Temerature Loads for Primary Lid Closure Bolts"*
2.13.2.2.3 (2.13.2.2.2 Previously)	N/A $$F_{atl} = 0.25 \times \pi \times 0.036^2 \times 202 \times 10^6 \times (16.6 \times 10^{-6} \times 100 - 11.5 \times 10^{-6} \times -20)$$ = 388.6 kN/bolt	Added: *"As shown in the following calculations, the cold case is neglected since the tensile force per bolt is negative, and the hot case is considered in the analysis (+ve). The secondary bolt diameter is 36 mm. The tensile force per bolt due to temperature F_{at} is:"* Recalculated temperature loads for the secondary lid bolts as follows: $$F_{at_{hot}} = 0.25 \times \pi \times 0.036^2 \times 202 \times 10^6 \times (16.2 \times 10^{-6} \times 51 - 11.5 \times 10^{-6} \times 50)$$ = 51.6 kN/bolt $$F_{at_{cold}} = 0.25 \times \pi \times 0.036^2 \times 202 \times 10^6 \times (16.2 \times 10^{-6} \times -56 - 11.5 \times 10^{-6} \times -54.9)$$ = -55.1 kN/bolt (neglected)
2.13.2.2.4	N/A	Added a new section: *"2.13.2.2.4 HAC (Fire) Temperature Loads for Secondary Lid Closure Bolts"*

Location	SAR REV 7	SAR REV 8
2.13.2.4.2 (New section)	N/A	Added new sections: *"2.13.2.4.2 NCT End Drop Loads* *2.13.2.4.2.1 Primary Lid Bolts* *2.13.2.4.2.2 Secondary Lid Bolts"* These new sections were added to calculate NCT impact loads of the primary and secondary lids using the formulas in Table 4.5 of NUREG/CR-6007. The maximum impact acceleration used in these calcuations is 44g as reported in Table 2.7.1-1 of the SAR for NCT. Previouely, HAC impact loads were used for load combinations which was very conservative.
2.13.2.4.3 (2.13.2.4.2 previously)	"*End Drop Loads*" *"The following subsections detail calculations for the end drop load."*	"*HAC End Drop Loads*" *"The following subsections detail calculations for the HAC end drop load."*
2.13.2.4.3.1	*"F_{tp}"* N/A *"F_{sp}"* $$F_{tp} = \frac{1.34xsin(x_i)xDLFxa_ix(W_L + W_c)xg}{N_b}$$ *"The additional tensile bolt force per bolt F_{tp} caused by the prying action of the primary lid is (Table 2.1 of NUREG/CR-6007 [Ref. 10])…….."*	*"F_a"* Added a reference for a_i (Table 2.7.1-1) *"F_s"* Removed g from F_a, F_f, and M_f equations. The g variable in included with a_i (maximum impact acceleration). $$F_a = \frac{1.34\ x\ sin(x_i)\ x\ DLF\ x\ a_i\ x\ (W_L + W_c)}{N_b}$$ F_{tp} variable was changed to F_{ap_c} to match NUREG/CR-6007 variable name. Moved F_{ap_c} calculations from Section 2.13.2.4.3.1 Primary Lid Bolts to Section 2.13.3.3 HAC Load Combination for Primary Lid Bolt.

Location	SAR REV 7	SAR REV 8
2.13.2.4.3.2	*"F_{ts}"* N/A $$W_{cs} = \frac{A_s}{A_p} \times W_c = \left(\frac{D_s}{D_p}\right)^2 \times W_c$$ $$= \left(\frac{0.785}{3.192}\right) \times 7000$$ $$= 1674 \text{ kg}$$ $$F_{ts} = \frac{1.34 \times \sin(x_i) \times DLF \times a_i \times (W_L + W_{cs}) \times g}{N_b}$$ *"The additional tensile bolt force per bolt F_{tp} caused by the prying action of the primary lid is (Table 2.1 of NUREG/CR-6007 [Ref. 10]) ……."*	*"F_a"* Added a reference for a_i (Table 2.7.1-1) Removed W_{cs} calculation since it was previousely calculated in Section 2.13.2.4.2.2 (NCT End Drop Loads). Removed g from F_a, F_f, and M_f equations. The g variable in included with a_i (maximum impact acceleration). $$F_a = \frac{1.34\ x\ sin(x_i)\ x\ DLF\ x\ a_i\ x\ (W_L + W_{cs})}{N_b}$$ F_{tp} variable was changed to F_{ap_c} to match NUREG/CR-6007 variable name. Moved F_{ap_c} calculations from Section 2.13.2.4.3.2 Secondary Lid Bolts to Section 2.13.3.4 HAC Load Combination for Secondary Lid Bolt.

Location	SAR REV 7	SAR REV 8
2.13.3	Table 2.13.3-1 Primary Lid Bolt Load Summary Table 2.13.3-2 Secondary Lid Bolt Load Summary	Revised Tables 2.13.3-1 and 2.13.3-2 to correct the thermal loads per the revised calculations in Sections 2.13.2.2.1 and 2.13.2.2.3. Additionally, the new HAC (fire) pressure and thermal values from Sections 2.13.2.1.2, 2.13.2.1.4, 2.13.2.2.2, and 2.13.2.2.4 were added. Also, the new NCT end drop loads were added from Sections 2.13.2.4.2.1 and 2.13.2.4.2.2.
	Tables 2.13.3-1 and 2.13.3-2: *"F_t"*	Tables 2.13.3-1 and 2.13.3-2: *"F_a"*
	N/A	Added the prcocedure for combining loads from different sources per the method presented in Table 4.9-III of NUREG/CR-6007. *"The total tensile bolt force (F_a) is obtained by adding the combined non-prying tensile bolt forces (F_{a_c}) and the combined prying tensile bolt forces (F_{ap_c}), according to the method presented in Table 4.9-III of NUREG/CR-6007 [Ref. 10]………………. The sections below detail the NCT and HAC bolt load combinations for the primary and secondary lids and the calculations of F_{ap_c} based on the procedure described in this section."*

Location	SAR REV 7	SAR REV 8
2.13.3.1 2.13.3.2 2.13.3.3 2.13.3.4	*"Primary Lid Closure Bolt Evaluation under Normal Conditions of Transport* *Secondary Lid Closure Bolt Evaluation under Normal Conditions of Transport* *Primary Lid Closure Bolt Evaluation under Hypothetical Accident Conditions* *Secondary Lid Closure Bolt Evaluation under Hypothetical Accident Conditions"*	*"NCT Load Combination for Primary Lid Bolt* *NCT Load Combination for Secondary Lid Bolt* *HAC Load Combination for Primary Lid Bolt* *HAC Load Combination for Secondary Lid Bolt"* Mistakes in the load combination method in these sections were identified during the SAR review for this license amendment. The calculations were revised to correct the mistakes and the new load combinations were performed in accordance with the method presented in Table 4.9-I of NUREG/CR-6007. The primary and secondary lid bolts are still compliant with the basic allowable stress limits for both NCT and HAC.
2.16	*"Robatel Technologies, LLC, Quality Assurance Program for Packaging and Transportation of Radioactive Material, 10 CFR 71 Subpart H, Rev. 2, Dated November 10, 2017 and NRC Approved on March 21, 2012"* N/A	*"Robatel Technologies, LLC, Quality Assurance Program for Packaging and Transportation of Radioactive Material, 10 CFR 71 Subpart H, Rev. 6, Dated January 08, 2021 and NRC Approved on March 21, 2012"* Added a new reference: *"CN-21004-201, Rev. 1, "RT-100 Cask Bolting Load Combination Verification" (PROPRIETARY)"*
3.1.2	N/A	Deleted: *"and is conservative for the contaminated resin and filter contents that are transported in the cask."*

Location	SAR REV 7	SAR REV 8
3.2.3	*"the RT-100 is designed to transport contents that include contaminated resins and filters."* N/A	*"the RT-100 is designed to transport contents that include contaminated resins/filters and activated hardware."* Added: *"Activated hardware are solid metallic components that are classified as high-density hardware or low-density hardware."*
3.6	*"Robatel Technologies, LLC, Quality Assurance Program for Packaging and Transportation of Radioactive Material, 10 CFR 71 Subpart H, Rev. 2, Dated November 10, 2017 and NRC Approved on March 21, 2012"*	*"Robatel Technologies, LLC, Quality Assurance Program for Packaging and Transportation of Radioactive Material, 10 CFR 71 Subpart H, Rev. 6, Dated January 08, 2021 and NRC Approved on March 21, 2012"*
4.	*"Chapter 4 describes the RT-100 containment under the RT Quality Assurance Program [Ref. 1] and summarizes the results to demonstrate compliance with the structural requirements of 10 CFR 71 [Ref. 2]."*	*"Robatel performed the containment evaluation of the RT-100 using the Nuclear Industry standards and under the RT Company Quality Assurance Program [Ref. 1]."*
4.1	*"RT100 NM 1000-F - Bill of Material"*	*"RT100 NM 1000 Rev. G - Bill of Material"*
4.1.5	N/A	Deleted unused footnote labels (8 and 9) on the headers of Table 4.1.5-3.
4.3	N/A	Added: "*" to Table 4.1.5-1 (row 4, column 3) to correspond with the footnote.
4.4	N/A	Added: *"When no hydrogenous materials are included in the contents, a hydrogen buildup calculation is not required. For example, if the only radioactive contents are activated hardware and the secondary container and all shoring are metallic or non-hydrogenous, no calculations for hydrogen gas generation and buildup are required. When mixed with hydrogen generating contents, the effect of non-hydrogenous materials, such as activated hardware contents, is only from the volume that they occupy in the cavity."*

Location	SAR REV 7	SAR REV 8
4.4.1.2	*"Table 4.4-1 lists the G Values for the material that could be transported in the cask."*	*"Table 4.4-1 lists the G Values for the hydrogenous material that could be transported in the cask."*
4.4.3	N/A *"Where the free gas volume (V) is equivalent to the total cavity volume (4.60 x 10^6 cm^3) minus the sum of the container, shoring, and polyethylene or polypropylene filter volume (V_C), water volume (V_W), and the ionic resin and stainless steel filter volume (V_i)."* $V = (4.60 \times 10^6\ cm^3) - (V_C + V_W + V_i)$ $V = (4.60 \times 10^6\ cm^3) - (V_C + 0.2575V_{waste} + 0.6336V_{waste})$ $V = (4.60 \times 10^6\ cm^3) - V_C - 0.8911V_{waste}$	Added: *"It is assumed the decay heat is entirely absorbed by hydrogenous materials and none is absorbed or dissipated by the activated hardware contents which is conservative."* *"Where the free gas volume (V) is equivalent to the total cavity volume (4.60 x 10^6 cm^3) minus the sum of the container, shoring, and polyethylene or polypropylene filter volume (V_C), water volume (V_W), the ionic resin and stainless steel filter volume (V_i), and the volume of any activated hardware contents (V_H), as applicable."* Revised the following equations to account for the volume occupied by activated hardware: $V = (4.60 \times 10^6\ cm^3) - (V_C + V_W + V_i + V_H)$ $V = (4.60 \times 10^6\ cm^3) - (V_C + 0.2575V_{waste} + 0.6336V_{waste} + V_H)$ $V = (4.60 \times 10^6\ cm^3) - V_C - 0.8911V_{waste} - V_H$

Location	SAR REV 7	SAR REV 8
4.4.4	N/A Table 4.4.4-1: *"Waste consisting of resins and filters from commercial power plants"* *"Historically shipments of commercial resins and filters have consisted of approximately 90-100% gamma radiation [Ref. 22]."* *"Shipment time calculated for 20 days (allowing a shipment within 10 days following regulation)."*	Added: *"Note that for this simplified model, similar to the filter materials, any activated hardware waste in the contents is grouped as ionic bead waste and is assumed to be hydrogen generating. The non-hydrogen gas generating characteristic of the hardware waste is only credited in the analytical model for the hydrogen gas buildup calculations outlined in Section 4.4.5."* Table 4.4.4-1: *"Waste consisting of spent resins/filters or mixture of spent resins/filters with activated hardware from commercial power plants"* *For mixed shipments, activated hardware are grouped with resins and filters when the simplified model is used."* *"Historically shipments of commercial resins/filters and activated hardware have consisted of approximately 90-100% gamma radiation [Ref. 22]."* *"Shipment time calculated for 20 days (allowing a shipment within 10 days following regulation). This is true for resins/filters shipments and mixture of resins/filters with activated hardware shipments when the simplified loading curve is used."*

Location	SAR REV 7	SAR REV 8
4.4.5	**Equation 4.8** $$t_{max} = \frac{(2.5A_N P_0)(4.6E6 - V_C - 0.8911V_{WASTE})(0.8911V_{WASTE} + V_C)}{(R_g T_0 D_H)[0.6336V_{WASTE}G_{Ti}(\alpha_i - 0.05) + V_C G_{TC}(\alpha_C - 0.05) + 0.2575V_{WASTE}G_{TW}(\alpha_W - 0.05)]}$$ **Equation 4.9** $$D_{H,max} = \frac{(2.5A_N P_0)(4.6E6 - V_C - 0.8911V_{WASTE})(0.8911V_{WASTE} + V_C)}{(R_g T_0 t)[0.6336V_{WASTE}G_{Ti}(\alpha_i - 0.05) + V_C G_{TC}(\alpha_C - 0.05) + 0.2575V_{WASTE}G_{TW}(\alpha_W - 0.05)]}$$	Revised Equations 4.8 and 4.9 to subtract V_H (activated hardware volume): **Equation 4.8** $$t_{max} = \frac{(2.5A_N P_0)(4.6E6 - V_C - 0.8911V_{WASTE} - V_H)(0.8911V_{WASTE} + V_C)}{(R_g T_0 D_H)[0.6336V_{WASTE}G_{Ti}(\alpha_i - 0.05) + V_C G_{TC}(\alpha_C - 0.05) + 0.2575V_{WASTE}G_{TW}(\alpha_W - 0.05)]}$$ **Equation 4.9** $$D_{H,max} = \frac{(2.5A_N P_0)(4.6E6 - V_C - 0.8911V_{WASTE} - V_H)(0.8911V_{WASTE} + V_C)}{(R_g T_0 t)[0.6336V_{WASTE}G_{Ti}(\alpha_i - 0.05) + V_C G_{TC}(\alpha_C - 0.05) + 0.2575V_{WASTE}G_{TW}(\alpha_W - 0.05)]}$$
	N/A	Added: *"V_H = volume occupied by activated hardware in the waste material (combined volume of low-density and high-density hardware) [cm^3]"*
	Table 4.4.5-1: *"Waste consists of resins and filters from commercial power plants."*	Table 4.4.5-1: *"Waste consists of resins/filters or mixture of resins/filters with activated hardware from commercial power plants. Activated hardware only shipments do not require hydrogen gas analysis."*
	"The volume occupied by the secondary container, shoring, and polyethylene or polypropylene filters in the waste (V_C) and the volume occupied by the ionic resin and stainless steel filters in the waste material (V_{WASTE}) are known."	*"The volume occupied by the secondary container, shoring, and polyethylene or polypropylene filters in the waste (V_C), the volume occupied by the ionic resin and stainless steel filters in the waste material (V_{WASTE}), and the activated hardware volume (V_H) are known."*
	N/A	Added: *"Note 2: Alternatively, the user can follow the NUREG/CR-6673 requirements to determine the shipping time to reach a hydrogen concentration of 5%. The shipping time has to be defined as ½ the time to reach the 5% hydrogen concentration per the requirement in NUREG/CR-6673 [Ref. 16]."*

Location	SAR REV 7	SAR REV 8
4.6	*"Robatel Technologies, LLC, Quality Assurance Program for Packaging and Transportation of Radioactive Material, 10 CFR 71 Subpart H, Rev. 2, Dated November 10, 2017 and NRC Approved on March 21, 2012"*	*"Robatel Technologies, LLC, Quality Assurance Program for Packaging and Transportation of Radioactive Material, 10 CFR 71 Subpart H, Rev. 6, Dated January 08, 2021 and NRC Approved on March 21, 2012"*
5.	*"The RT-100 cask package is designed to transport contaminated resin and filter media from nuclear power plant operation."*	*The RT-100 cask package is designed to transport radioactive materials including contaminated resin and filter media from nuclear power plant operation, as well as activated hardware (low and high-density hardware)."*
5.1.2	*"Table 5.1.2-1 shown below summarizes the calculated results for the maximum radiation levels allowed for exclusive use shipment using an open (flat-bed) transport vehicle under NCT and HAC for the worst-case loading of radionuclides."* *"Table 5.1.2-1 Summary Table of External Radiation Levels (Exclusive Use)"*	*"Table 5.1.2-1 shown below summarizes the calculated results for the maximum radiation levels allowed for exclusive use shipment using an open (flat-bed) transport vehicle under NCT and HAC for the worst-case loading of radionuclides in spent resin/filter material."* *"Table 5.1.2-1 Resin/Filter Summary Table of External Radiation Levels (Exclusive Use)"*
5.2	*"The RT-100 is designed to transport nuclear plant radioactive resins and filters. This content is described in Chapter 1, Section 1.2.2. The radionuclides in these resins and filters produce primarily gamma emissions and trace neutron emissions from actinide spontaneous fission and alpha-n reactions in the media."*	*"The RT-100 is designed to transport nuclear plant radioactive resins/filters and activated hardware. This content is described in Chapter 1, Section 1.2.2. The radionuclides in these resins, filters, and activated hardware wastes produce primarily gamma emissions and trace neutron emissions from actinide spontaneous fission and alpha-n reactions in the media."*
5.4	*"5.4 Shielding Evaluation"* *"Section 5.4 describes the shielding evaluation for the RT-100 using industry accepted methods."*	*"5.4 Shielding Evaluation – Resins and Filters"* *"Section 5.4 describes the shielding evaluation for the RT-100 containing resin and filter contents using industry accepted methods. The shielding evaluations for mass restricted filters and activated hardware are outlined in Sections 5.5 and 5.6, respectively."*

Location	SAR REV 7	SAR REV 8
5.4.3	*"Table 5.4.3-1 ANSI/ANS 6.1.1-1977 – Gamma Flux-to-Dose Conversion Factors"*	*"Table 5.4.3-1 ANSI/ANS 6.1.1-1977 – Gamma Flux-to-Dose Conversion Factors [Ref. 13]"*
5.5	N/A	Added a new section: *"5.5 Shielding Evaluation – Mass Restricted Resins and Filters"* This supplemental mass restricted resins and filters shielding evaluation is an extension of the dose rate calculations outlined in Section 5.4. This shielding evaluation calculates dose rates for content volumes equivalent to 500, 1,000, and 1,500 lbs of radioactive resins and filters, with the goal of allowing increased radionuclide specific activity limits by implementing a mass restriction on the total quantity of radioactive contents. Content mass bands analyzed in 5.5 are: ≤500 lbs, ≤1,000 lbs, ≤1,500 lbs. Any shipment of resins and filters exceeding 1,500 Ibs will defer back to the original specific activity limits established in Section 5.4 *"Shielding Evaluation – Resins and Filters"*.
5.6	N/A	Added a new section: *"5.6 Shielding Evaluation – Activated Hardware"* This activated hardware shielding evaluation is similar to the mass restricted filter analysis outlined in Section 5.5, except the content material analyzed is activated hardware. The imposed mass limits for activated hardware are 1,000, 2,000, 8,000, and 13,000 lbs, with the goal of allowing increased radionuclide specific activity limits by implementing a mass restriction on the total quantity of radioactive contents. Additionally, low-density and high-density activated hardware were modeled separately with a specified density range for each content type.

Location	SAR REV 7	SAR REV 8
5.7.2	Table 5.7.2-1: *"Note 1: Marked nuclides are analyzed individually."* Table 5.7.2-2: *"Note 1: Marked nuclides are analyzed individually."*	Table 5.7.2-1: *"Note 1: Marked nuclides are analyzed individually in Sections 5.4, 5.5, 5.6. Values displayed in this table are for the general resins and filters shielding evaluation from Section 5.4. For the mass restricted resins/filters and activated hardware gamma responses on these 8 primary isotopes, refer to Sections 5.5 and 5.6, respectively."* Table 5.7.2-2: *"Note 2: Marked nuclides are analyzed individually in Sections 5.4, 5.5, 5.6. Values displayed in this table are for the general resins and filters shielding evaluation from Section 5.4. For the mass restricted resins/filters and activated hardware gamma responses on these 8 primary isotopes, refer to Sections 5.5 and 5.6, respectively."*
5.7.3	Table 5.7.3-1: *"Note 1: Marked nuclides are analyzed individually."*	Table 5.7.3-1: *"Note 1: Marked nuclides are analyzed individually in Sections 5.4, 5.5, and 5.6. Values displayed in this table are for the general resins and filter shielding evaluation from Section 5.4. For the mass restricted resins/filters and activated hardware specific activities on these 8 primary isotopes, refer to Sections 5.5 and 5.6, respectively."*

Location	SAR REV 7	SAR REV 8
5.8	*"Robatel Technologies, LLC, Quality Assurance Program for Packaging and Transportation of Radioactive Material, 10 CFR 71 Subpart H, Rev. 2, Dated November 10, 2017 and NRC Approved on March 21, 2012"* *"LA-UR-13-22934, "Initial MCNP 6 Release Overview – MCNP6 version 1.0," Los Alamos National Laboratory, T. Goorley, et al., April 20 "ORIGEN-S: SCALE System Module To Calculate Fuel Depletion, Actinide Transmutation, Fission Product Buildup And Decay, And Associated Radiation Source Terms," I. C. Gauld, O. W. Herman and R. M. Westfall, ORNL/TM-2005/39, Volume 2, Section F7, January 2009. "ORIGEN-S Data Libraries," ORNL/TM-2005/39, Volume 3, Section M6, January 2009."* N/A	*"Robatel Technologies, LLC, Quality Assurance Program for Packaging and Transportation of Radioactive Material, 10 CFR 71 Subpart H, Rev. 6, Dated January 08, 2021 and NRC Approved on March 21, 2012"* *"ORIGEN-S: SCALE System Module To Calculate Fuel Depletion, Actinide Transmutation, Fission Product Buildup And Decay, And Associated Radiation Source Terms," I. C. Gauld, O. W. Herman and R. M. Westfall, ORNL/TM-2005/39, Volume 2, Section F7, January 2009."* Added references 14, 15, and 16: *"J. H. Hubbell and S. M. Seltzer, "Tables of X---Ray Mass Attenuation Coefficients and Mass---Energy Absorption Coefficients from 1keV to 20MeV for Elements Z = 1 to 92 and 48 Additional Substances of Dosimetric Interest," Radiation Physics Division, PML, NIST. Jul 2004. Web Nov 2014. http://www.nist.gov/pml/data/xraycoef/index.cfm"* *"CN-21004-501, Rev. 1, "RT-100 Supplemental Filter Shielding Evaluation" (PROPRIETARY)"* *"CN-21004-502, Rev. 0, "RT-100 Irradiated Hardware Shielding Evaluation" (PROPRIETARY)"*

Location	SAR REV 7	SAR REV 8
7.5	N/A	Added: *"Activated hardware materials are not hydrogen generating and do not retain water that cannot be evacuated like filters and resin wastes. As a result, the only effect hardware materials have on the hydrogen buildup calculations in the RT-100 is if they are mixed with resin & filter contents. In this scenario, the volume occupied by the hardware contents in the cavity must be accounted for. If no hydrogenous materials are included in the contents, including the liner and shoring, the hydrogen gas buildup calculations are not required."*
7.5.1	*"Identify the waste volume (V_{WASTE}) in cubic feet."* Table 7.5.1-1: *"Waste consisting of resins and filters from commercial power plants"* *"Shipment time not greater than 10 days"*	*"Identify the waste volume in cubic feet. Waste volume in the simplified model include resins, filters, and activated hardware (low-density and high-density). Note that for this simplified model, activated hardware waste in the contents is grouped as ionic bead waste and is assumed to be hydrogen generating."* Table 7.5.1-1: *"Waste consisting of resins/filters or mixture of resins/filters with activated hardware from commercial power plants"* *"Shipment time not greater than 10 days for resin/filter shipments or mixture of resin/filter with activated hardware shipments"*

Location	SAR REV 7	SAR REV 8
7.5.2	**Equation 4.8** $$t_{max} = \frac{(2.5A_N P_0)(4.6E6 - V_C - 0.8911V_{WASTE})(0.8911V_{WASTE} + V_C)}{(R_g T_0 D_H)[0.6336V_{WASTE}G_{Ti}(\alpha_i - 0.05) + V_C G_{TC}(\alpha_C - 0.05) + 0.2575V_{WASTE}G_{TW}(\alpha_W - 0.05)]}$$ **Equation 4.9** $$D_{H,max} = \frac{(2.5A_N P_0)(4.6E6 - V_C - 0.8911V_{WASTE})(0.8911V_{WASTE} + V_C)}{(R_g T_0 t)[0.6336V_{WASTE}G_{Ti}(\alpha_i - 0.05) + V_C G_{TC}(\alpha_C - 0.05) + 0.2575V_{WASTE}G_{TW}(\alpha_W - 0.05)]}$$	Revised Equations 4.8 and 4.9 to subtract VH (activated hardware volume): **Equation 4.8** $$t_{max} = \frac{(2.5A_N P_0)(4.6E6 - V_C - 0.8911V_{WASTE} - V_H)(0.8911V_{WASTE} + V_C)}{(R_g T_0 D_H)[0.6336V_{WASTE}G_{Ti}(\alpha_i - 0.05) + V_C G_{TC}(\alpha_C - 0.05) + 0.2575V_{WASTE}G_{TW}(\alpha_W - 0.05)]}$$ **Equation 4.9** $$D_{H,max} = \frac{(2.5A_N P_0)(4.6E6 - V_C - 0.8911V_{WASTE} - V_H)(0.8911V_{WASTE} + V_C)}{(R_g T_0 t)[0.6336V_{WASTE}G_{Ti}(\alpha_i - 0.05) + V_C G_{TC}(\alpha_C - 0.05) + 0.2575V_{WASTE}G_{TW}(\alpha_W - 0.05)]}$$
	N/A	Added: *"V_H = volume occupied by activated hardware in the waste material (combined volume of low-density and high-density hardware) [cm^3]"*
	Table 7.5.2- 1: *"Waste consists of resins and filters from commercial power plants."*	Table 7.5.2- 1: *"Waste consists of resins/filters or mixture of resins/filters with activated hardware from commercial power plants."*
	"Determine the values of the variables P_0, T_0, V_C, and V_{WASTE}."	*"Determine the values of the variables P_0, T_0, V_C, and $V_{WASTE,}$ and V_H. The variable V_H is only required if activated hardware contents are included with the waste."*
	N/A	*"Note 2: Alternatively, the user can follow the NUREG/CR-6673 requirements to determine the shipping time to reach a hydrogen concentration of 5%. The shipping time has to be defined as ½ the time to reach the 5% hydrogen concentration per the requirement in NUREG/CR-6673 [Ref. 12]."*

Location	SAR REV 7	SAR REV 8
7.5.3	*"An example calculation using the analytical model developed in Section 7.5.2 is shown below. The following two variables are constants are known:"* *"In this example, the user has input the following parameters:"* P_0 = 1 atm T_0 = 89 °F = 305 K t = 8 days = 691200 s V_C = 30.1 ft^3 = 8.52E05 cm^3 V_{WASTE} = 70.0 ft^3 = 1.98E06 cm^3 $D_{H,max} = \frac{(2.5A_N P_0)(4.6E6 - V_C - 0.8911V_{WASTE})(0.8911V_{WASTE} + V_C)}{(R_g T_0 t)[0.6336V_{WASTE}G_{Ti}(\alpha_i - 0.05) + V_C G_{TC}(\alpha_C - 0.05) + 0.2575V_{WASTE}G_{TW}(\alpha_W - 0.05)]}$ $= \frac{[(2.5)(6.022E23)(1)] \times [4.6E6 - 8.52E5 - (0.8911)(1.98E6)] \times [(0.8911)(1.98E6) + 8.52E5]}{[(82.05)(305)(691200)][0.6336(1.98E6)G_{Ti}(\alpha_i - 0.05) + (8.52E5)G_{TC}(\alpha_C - 0.05) + 0.2575(1.98E6)G_{TW}(\alpha_W - 0.05)]}$ N/A	*"Example 1 calculation using the analytical model developed in Section 7.5.2 is shown below. The following two constants are known:"* *"In this example, the user has to input the following parameters:"* P_0 = 1 atm T_0 = 89 °F = 305 K t = 8 days = 691200 s V_C = 30.1 ft^3 = 8.52E05 cm^3 (secondary container, shoring, and PE/PP volumes) V_{WASTE} = 70.0 ft^3 = 1.98E06 cm^3 (ionic resin and steel filter volumes) V_H = 0 ft^3 = 0 cm^3 (no hardware contents) $D_{H,max} = \frac{(2.5A_N P_0)(4.6E6 - V_C - 0.8911V_{WASTE} - V_H)(0.8911V_{WASTE} + V_C)}{(R_g T_0 t)[0.6336V_{WASTE}G_{Ti}(\alpha_i - 0.05) + V_C G_{TC}(\alpha_C - 0.05) + 0.2575V_{WASTE}G_{TW}(\alpha_W - 0.05)]}$ $= \frac{[(2.5)(6.022E23)(1)] \times [4.6E6 - 8.52E5 - (0.8911)(1.98E6) - 0] \times [(0.8911)(1.98E6) + 8.52E5]}{[(82.05)(305)(691200)][0.6336(1.98E6)G_{Ti}(\alpha_i - 0.05) + (8.52E5)G_{TC}(\alpha_C - 0.05) + 0.2575(1.98E6)G_{TW}(\alpha_W - 0.05)]}$ Added Example 2 using the analytical model with 30 ft^3 hardware contents.

Location	SAR REV 7	SAR REV 8
7.6	*"The maximum content density is 1.0 g/cm^3. The weight of free water must be excluded in this determination. The source strength density must be ensured at any point of the content. Average density by dividing the total activity by total weight is not acceptable."*	*"The maximum bulk filter/resin content density is 1.0 g/cm^3 and/or the activated hardware content density shall be determined to be within the low-density hardware (2.0 g/cm^3 ≤ r < 7.5 g/cm^3) or high-density hardware (7.5 g/cm^3 ≤ r ≤ 9.0 g/cm^3) range. The weight of free water must be excluded in this determination. The source strength density must be ensured at any point of the content. Average density by dividing the total activity by total weight is not acceptable."*
	N/A	Deleted: *"and no concentration or shift during normal conditions of transport."* The shielding analyses assume the maximum activity of any isotope from any waste stream is homogeneously distributed within the waste volume. Additionally, the analysis does not take credit for the liner's thickness or the shoring for maintaining the waste radially centered within the cask.
	"The allowable content must be determined based on dry resin or filter media."	*"For resins and filters, the allowable content must be determined based on dry resin or filter media."*
	N/A	Deleted: *"Any potential concentration of sources during loading and transport is not permitted."* The shielding analyses assume the maximum activity of any isotope from any waste stream is homogeneously distributed within the waste volume. Additionally, the analysis does not take credit for the liner's thickness or the shoring for maintaining the waste radially centered within the cask.
	"The radioactive content is not to exceed 1.0 g/cm^3 and the nuclear physical characteristics, i.e., the gamma attenuation coefficient of the content must not be smaller than that of the carbon material resin."	*"For resins and filters, the radioactive content is not to exceed 1.0 g/cm^3 and the nuclear physical characteristics, i.e., the gamma attenuation coefficient of the content must not be smaller than that of the carbon material resin."*
	"7.6.1 RT-100 Loading Table Discussion"	*"7.6.1 RT-100 Loading Table"*

Location	SAR REV 7	SAR REV 8
7.6.1.1	N/A *"The loading table has ten columns as follows:"* *"The maximum allowed activity for the isotope being entered into the RT-100 transport cask, in milliCuries/kg, that is based on the methodology described in Section 5.4.4 and presented in Table 7.6.1-6"* *""Actual Content Activity Concentration" – The maximum activity concentration of the isotope to be placed in the RT-100 transport entered by the user in units of milliCuries/kg. This value should be the maximum for any waste stream placed in the cask. The user shall ensure that the bulk density of the resin or filter media does not exceed 1 g/cm^3."*	Added a new header: *"7.6.1.1 RT-100 Loading Table Description"* *"An individual loading table is available for each of the three content types (Filters/resins, low-density hardware, and high-density hardware), each of which has ten columns as follows:"* *"The maximum allowable activity for the isotope being entered into the RT-100 transport cask, in mCi/kg, that is based on the methodology described in Sections 5.4, 5.5, and 5.6 and presented in either Table 7.6.1-18 or Table 7.6.1-19. The 8 explicitly analyzed isotopes in Sections 5.4, 5.5, and 5.6 are in Table 7.6.1-18 and the generic energy line isotopes are in Table 7.6.1-19."* *""Actual Content Activity Concentration" – The maximum activity concentration of each isotope for each content analyzed is entered by the user in units of mCi/kg. This value should be the maximum activity concentration of the content being analyzed (e.g., for mixed filters and high-density hardware shipments, the user shall input the maximum activity concentration of each isotope for the filter content on the Filters & Resins sheet, and the maximum activity concentration of each isotope for the hardware content on the High-density Hardware sheet). The user shall ensure that the bulk density of the wastes meet the bulk density requirements from 7.6."*

Location	SAR REV 7	SAR REV 8
7.6.1.1	N/A *"The "Maximum Allowable Activity Concentration (milliCuries/kg)" column contains the maximum activity per kilogram allowed for each isotope based on the NCT and HAC dose rate limits and the most conservative response functions (mrem/hr/Curie) generated by MCNP calculations. The "% of Maximum" column is summed at the end of the column. If the sum is greater than 100%, than the inventory dose rate would potentially exceed the NCT or HAC dose rate limits, which would make the package not acceptable. If the sum is less than or equal to 100%, the package would generate an acceptable dose rate under NCT and HAC conditions. The "A2 (Curie)" column contains the A2 activity value in Curies for the isotope. The "Activity (i) / A2(i)" column is the ratio of the activity entered by the user divided by the A2 value for the isotope. The "Activity (i) / A2(i)" column is summed. If the value is under 3000 A2, the inventory total activity is below the containment limit."*	Deleted: *"The total waste inventory volume and mass is entered into the first two rows in cubic feet and kilograms (in the yellow cells in Table 7.6.1 1). The "Actual Content Activity Concentration (milliCuries/kg)" and "Actual Content Nuclide" columns (columns in yellow in Table 7.6.1-1) is where the user inputs the activity concentration and radionuclides in the package.* *Once total mass in kilograms, total activity concentration in milliCuries/kg, and radionuclides are input into the table, the rest is automatically updated. The "% of Maximum" column is the ratio of the results in "Actual Content Activity Concentration (milliCuries/kg)" column divided by the values in "Maximum Allowable Activity Concentration (milliCuries/kg)" column."* *"The "Maximum Allowable Activity Concentration (milliCuries/kg)" column contains the maximum activity per kilogram allowed for each isotope based on the NCT and HAC dose rate limits and the most conservative response functions (mrem/hr/Curie) generated by MCNP calculations. For the eight explicitly analyzed radionuclides in Sections 5.4, 5.5, and 5.6, the "Maximum Allowable Activity Concentration" updates to the appropriate limit automatically based on the content mass input. The "% of Maximum" column is summed at the end of the column. If the sum is greater than 100%, than the inventory dose rate would potentially exceed the NCT or HAC dose rate limits, which would make the package not acceptable. If the sum is less than or equal to 100%, the package would generate an acceptable dose rate under NCT and HAC conditions. The "A2 (Curie)" column contains the A2 activity value in Curies for the isotope. The "Activity (i) / A2(i)" column is the ratio of the activity entered by the user divided by the A2 value for the isotope. The "Activity (i) / A2(i)" column is summed. If the value is under 3000 A2, the inventory total activity is below the containment limit and the package is acceptable under the containment limitation."*

Location	SAR REV 7	SAR REV 8
7.6.1.1	*"The third test is determining the total heat load of the inventory. Each radionuclide's activity is multiplied by the value in the "Q Value (Watts/milliCurie)" column and the result is automatically entered into the "Heat Load (Watts)" column. At the end of the column, the results are summed and compared to the 200 Watt limit. If it is below the limit, the package is acceptable under heat load limitations."* *"The final test is to ensure the neutron emitter limit of 3.5 milliCuries/kg is not exceeded. If the user-entered radionuclide is a neutron emitter, it is indicated in the "Neutron Emitter?" column. For these radionuclides, the "Actual Content Activity Concentration" is shown. At the end of the column, the results are summed and compared to the limit of 3.5 milliCuries/kg. If the sum is below the limit, the package is considered to contain only trace amounts of neutron-emitting radionuclides."* N/A	*"Each radionuclide's activity is multiplied by the value in the "Q Value (Watts/milliCurie)" column and the result is automatically entered into the "Heat Load (Watts)" column. At the end of the column, the results are summed and compared to the 200 Watt limit. If it is below the limit, the package is acceptable under heat load limitations."* *"If the user-entered radionuclide is a neutron emitter, it is indicated in the "Neutron Emitter?" column. For these radionuclides, the "Actual Content Activity Concentration" is shown in the last column. At the end of the column, the results are summed and compared to the limit of 3.5 milliCuries/kg. If the sum is below the limit, the package is considered to contain only trace amounts of neutron-emitting radionuclides."* Deleted: *"At the end of each evaluation, a marker indicating if the inventory passes a particular set of criteria (for example the cell beside "Passed Shielding Criteria"). If the cell turns green and states "TRUE", then the inventory passes that particular set of criteria. If the cell turns red and states "FALSE", then the inventory has failed that particular set of criteria. An inventory must pass all four criteria (shielding, containment, heat load, and neutron limit) in order to be shipped in an RT-100 cask."*

Location	SAR REV 7	SAR REV 8
7.6.1.1	*“Notes for the RT-100 Loading Table:* ○ *Each radionuclide in the resin mixture is listed by row.* ○ *The sum of column 4 (% of max) should be less than 100% for dose rate regulatory compliance and the sum of column 6 (C(i)/A(i)) should be less than 3000 A2 for containment regulatory compliance.* ○ *The sum of column eight should be less than 200 Watts in order to satisfy the heat load limit.* ○ *A basic procedure has been provided in Section 7.6.1.1.* ○ *Several examples have been provided in Section 7.6.1.2, Section 7.6.1.3, and Section 7.6.1.4.* ○ *Example of the RT-100 Loading Table Format provided below in Table 7.6.1-1.”* *“Table 7.6.1-1”* N/A	*“Notes for the RT-100 Loading Table:* ○ *Each radionuclide in the content is listed by row.* ○ *The sum of column 4 (% of maximum) should be less than 100% for dose rate regulatory compliance.* ○ *The sum of column 6 (C(i)/A(i)) should be less than 3000 A2 for containment regulatory compliance.* ○ *The sum of column eight should be less than 200 Watts in order to satisfy the heat load limit.* ○ *In the loading table, LD Hardware refers to low-density hardware and HD Hardware refers to high-density hardware.* ○ *The “Loading Summary” sheet shows the status of user-entered radionuclides and activity concentrations relative to the four acceptance criteria (shielding, containment, heat load, and neutron limit).* ○ *A basic “RT-100 Loading Table Procedure” is provided in Section 7.6.1.2.* ○ *Loading examples are provided in Sections 7.6.1.3, 7.6.1.4, 7.6.1.5, and 7.6.1.6.* ○ *Examples of the RT-100 Loading Table format are provided below in Table 7.6.1 1 (Filters and Resins Sheet), Table 7.6.1-2 (LD Hardware Sheet), Table 7.6.1-3 (HD Hardware Sheet), Table 7.6.1-4 and (Loading Summary Sheet). Note that these examples are presented with arbitrary masses, volumes, radionuclides, and activity concentrations for illustration purposes only.”* Deleted: *“Table 7.6.1-1”* Added: *“Tables 7.6.1-1, 7.6.1-2, 7.6.1-3, and 7.6.1-4”*
7.6.1.2 (7.6.1.1 previously)	Loading Table Procedure Steps 1 through 5.	Complete rewrite of the loading table procedure, refer to Step 1 through Step 8.

Location	SAR REV 7	SAR REV 8
7.6.1.3	*"7.6.1.2 Turkey Point Source Term Example Evaluation"* *"Sample results were entered into the RT-100 Loading Table and the results are shown in Table 7.6.1-2."* N/A *"Table 7.6.1-2"* N/A	*"7.6.1.3 Turkey Point Source Term Example Evaluation (Resin and Filter)"* *"Sample results were entered into the RT-100 Loading Table and the results are shown in Table 7.6.1-5 and Table 7.6.1-6."* Added: *"Note that the 160 ft^3 volume is used in this example for illustration purposes only and may not be the actual volume of this example package."* Deleted: *"Table 7.6.1-2"* Added: *"Tables 7.6.1-5 and 7.6.1-6"*
7.6.1.4	*"7.6.1.3 St. Lucie Loading Table"* *"The maximum values for each isotope from the two samples were inputted into the RT-100 Loading Table and the results are shown in Table 7.6.1-3."* N/A *"Table 7.6.1-3"* N/A	*"7.6.1.4 St. Lucie Loading Table (Resin and Filter)"* *"The maximum values for each isotope from the two samples were inputted into the RT-100 Loading Table and the results are shown in Table 7.6.1-7 and Table 7.6.1-8."* Added: *"Note that the 160 ft^3 volume is used in this example for illustration purposes only and may not be the actual volume of this example package."* Deleted: *"Table 7.6.1-3"* Added: *"Tables 7.6.1-7 and 7.6.1-8"*

Location	SAR REV 7	SAR REV 8
7.6.1.5	N/A	Added a new section: *"7.6.1.5 Mixed Shipment Example (Resin/filter and Activated Hardware)"* This section was added to show an example of the filled out loading table of mixed resin/filter and high-density hardware. The radionuclides, activities, masses, and volumes were chosen arbitrary.
7.6.1.6	*"Two additional examples have been generated to show the maximum Co-60 loading for the RT- 100 and an arbitrary example showing a load that fails the RT-100 Loading Table. Table 7.6.1-4 shows the maximum Co-60 inventory allowed due to shielding limits. The activity concentration is at 100% under the "% of Maximum" column. Table 7.6.1-5 shows the effect of inputting two radionuclides that individually would pass the compliance tests, but having both radionuclide quantities in the cask would generate a dose rate that would fail either NCT or HAC shielding conditions. This is illustrated by the red "FALSE" cell due to shielding sum is 100.73%, which is above the 100% limit. The inventory in Table 7.6.1-5 would not be acceptable in an RT-100 Transport Cask."* *"Table 7.6.1-4"* N/A N/A "Table 7.6.1-5"	*"Additional examples have been generated to show the maximum Co-60 loading for the RT-100 mass restricted filter and resin shipments (arbitrary masses were chosen within the established mass bands). Table 7.6.1-12, Table 7.6.1-13, Table 7.6.1-14, and Table 7.6.1-15 show the maximum Co-60 inventory allowed due to shielding limits for each mass limit. The activity concentration is at 100% under the "% of Maximum" column."* Deleted: *"Table 7.6.1-4"* Added: *"Tables 7.6.1-12, 7.6.1-13, 7.6.1-14, and 7.6.1-15"* Added: *"Table 7.6.1-16 and Table 7.6.1-17 show the effect of inputting two radionuclides that individually would pass the compliance tests, but having both radionuclide quantities in the cask would generate a dose rate that would fail either NCT or HAC shielding conditions. This is illustrated by the red "FALSE" cell due to shielding sum is 100.73%, which is above the 100% limit. The inventory in Table 7.6.1-16 would not be acceptable in an RT-100 Transport Cask."* Deleted: *"Table 7.6.1-5"*

Location	SAR REV 7	SAR REV 8
7.6.1.6	N/A N/A N/A *"Table 7.6.1-6 Radionuclide Activity Concentration Limits"* *"Table 7.6.1-19"*	Added: *"Tables 7.6.1-16 and 7.6.1-17"* Added: *"Similarly, the Co-60 limits for low-density and high-density activated hardware are a function of the waste's mass. Table 7.6.1-18 shows mass restricted limits of the 8 explicitly analyzed isotopes for each content type."* Added" *"Table 7.6.1-18 Radionuclide Activity Concentration Limits (8 Explicitly Analyzed)"* *"Table 7.6.1-19 Radionuclide Activity Concentration Limits (Generic Energy Line Method)"* Revised Table 7.6.1-19 and added "*Refer to Table 7.6.1-18*" next to the 8 explicitly analyzed isotopes.
7.7	*"Robatel Technologies, LLC, Quality Assurance Program for Packaging and Transportation of Radioactive Material, 10 CFR 71 Subpart H, Rev. 2, Dated November 10, 2017 and NRC Approved on March 21, 2012"*	*"Robatel Technologies, LLC, Quality Assurance Program for Packaging and Transportation of Radioactive Material, 10 CFR 71 Subpart H, Rev. 6, Dated January 08, 2021 and NRC Approved on March 21, 2012"*
8.4	*"Robatel Technologies, LLC, Quality Assurance Program for Packaging and Transportation of Radioactive Material, 10 CFR 71 Subpart H, Rev. 2, Dated November 10, 2017 and NRC Approved on March 21, 2012"*	*"Robatel Technologies, LLC, Quality Assurance Program for Packaging and Transportation of Radioactive Material, 10 CFR 71 Subpart H, Rev. 6, Dated January 08, 2021 and NRC Approved on March 21, 2012"*