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Tanks 17 and 20 Closure Errata

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The information in the attached table, "Tanks 17 and 20 Closure Errata," was developed from a comparison of data within documents that support the tanks 17 and 20 closure process (References 1 – 7). The table lists the data that was found to be inconsistent between or within tank closure documents. After evaluation, correct data was selected for re-modeling. A basis is included for each data selection.

Attachment: Tanks 17 and 20 Closure Errata, pages 1 – 6.

References:

1) P. D. d'Entremont and J. R. Hester, *Characterization of Tank 20 Residual Waste,* WSRC-TR-96-0267, Revision 0, 17 March 1997.
2) P. D. d'Entremont, J. R. Hester, and T. B. Caldwell, *Characterization of Tank 17 Residual Waste*, WSRC-TR-97-0066, Revision 1, 22 September 1997.
3) Phillip L. Young, Tetra Tech NUS memorandum AIK-04-0303, Subject: "Verification of Closure Performance Calculations for Tanks 17 and 20" November 29, 2004.
4) Phillip Fulmer, Alan Toblin, Allan Jenkins, Tetra Tech NUS "Calculation Package for High-Level Waste Tank Closure Fate and Transport Modeling" January 5, 2000.
5) *Industrial Wastewater Closure Plan for F- and H-Area High-Level Waste Tank System*, WSRC-2003-00498, Preliminary Draft, August 2004.
6) *Industrial Wastewater Closure Module for the High-Level Waste Tank 20 System*, Revision 1, January 8, 1997.
7) *Industrial Wastewater Closure Module for the High-Level Waste Tank 17 System*, Revision 2, August 26, 1997.

Inconsistent Data	Selected Data	Basis
1. The Tank 17 Waste Characterization Report (WCR) radionuclide values in Table 1 and chemical values in Table 2 were calculated using 2400 gallons of sludge volume. The Tank 17 Closure Module Table A-4 and Table A-5 values were calculated using 2200 gallons of sludge volume.	Ensure that the modeled values for Tank 17 re-modeling are the adjusted values for 2200 gallons. Adjusted Curie Values for Table 1 (Waste Characterization Report). **H-3 2.22E+01 Ce-144 1.19E-04** **C-14 3.12E-03@ Pr-144 1.19E-04** **Ni-59 1.83E-01 Pm-147 2.48E+01** **Co-60 2.29E+00 Eu-154 3.94E+00** **Se-79 1.56E-02 Eu-155 8.07E-02** **Sr-90 8.34E+02 U-232 4.68E-05** **Y-90 8.34E+02 U-235 3.03E-04** **Tc-99 3.58E+00 U-238 1.83E-02** **Ru-106 2.02E-03 Np-237 1.38E-02@** **Rh-106 2.02E-03 Pu-238 6.51E+01@** **Sb-125 1.47E+00 Pu-239 1.48E+01@** **Sn-126 2.84E-02 Pu-240 3.36E+00@** **I-129 1.28E-06@ Pu-241 2.93E+02@** **Cs-134 6.42E-03 Pu-242 5.32E-03@** **Cs-135 1.74E-04 Am-241 3.94E+01** **Cs-137 5.78E+01 Cm-244 7.24E-04@** **Ba-137m 5.46E+01 Cm-245 4.40E-10@**	The Tank 17 Waste Characterization Report (WCR) radionuclide values in Table 1 and chemical values in Table 2 were calculated using 2400 gallons (an earlier residual volume estimate) and did not take into account the 200 gallon volume of concrete chips which are not radioactive waste. The characterization report states that the volume of sludge in Tank 17 is 2200 gallons; therefore, the Tank 17 Waste Characterization Report values in Tables 1 and 2 should be adjusted for 2200 gallons. @Values from the Closure Module, Table A-4, are slightly different than values derived from the Waste Characterization Report adjusted for 2200 gallons. The adjusted values derived from the Waste Characterization Report, Table 1, "Conservative Estimate" column, are shown here and are to be used for re-modeling.

Inconsistent Data	Selected Data	Basis
1. (Continued)	Adjusted values (kg) for Table 2 (Waste Characterization Report):	

Silver	**6.6**	**Sodium**	**186.0**
Aluminum	**113.4**	**Silicon**	**34.3**
Barium	**3.9**	**Boron**	**<.40**
Fluoride	**3.5**	**Calcium**	**17.0**
Chromium	**4.7**	**Lithium**	**<.17**
Copper	**3.3**	**Magnesium**	**30.6**
Iron	**535.1**	**Molybdenum**	**<0.062**
Mercury	**1.4**	**Titanium**	**.7**
Nitrate + Nitrite	**97.5**	**Zirconium**	**0.0**
Manganese	**47.6**	**Cadmium**	**17.9**
Nickel	**.8**	**Phosphate**	**<0.4777**
Lead	**5.5**	**Chloride**	**1.4**
Uranium	**55.8**	**Sulfate**	**1.9**
Zinc	**6.6**	**Oxalate**	**18.5**

Inconsistent Data	Selected Data	Basis
2. The Se-79 value in the Tank 17 Closure Module Table A-4 is 1.53E-03 curies. The Se-79 value in the Tank 17 Waste Characterization Report Table 1 is 1.7E-02 curies.	Re-model using the following value: 1.7E-02 curies x 2200gal./2400gal. = **1.56E-02 curies of Se-79** in Tank 17. (See #1 above)	The Tank 17 Closure Module Table A-4 value for Se-79 is incorrect, it was a typo. Per the Tetra Tech NUS Verification Report, (Ref. 5) Table B.1, the modeled value for Se-79 was 1.5E-02 Ci.. The Tank 17 Waste Characterization Report radionuclide values in Table 1 and chemical values in Table 2 were calculated using 2400 gallons (an earlier residual volume estimate) and did not take into account the 200 gallon volume of concrete chips which are not radioactive waste. The characterization report states that the volume of sludge in Tank 17 is 2200 gallons; therefore, the Tank 17 Waste Characterization Report values are adjusted for 2200 gallons.
3. The Tc-99 value in the Tank 20 Closure Module, Table A-4 is 5.53E-02 curies. The Tc-99 value in the Tank 20 Waste Characterization Report Table 1 is 8.5E-01 curies.	Re-model using the following value: **8.5E-01** curies of Tc-99 in Tank 20.	The closure module incorrectly listed Tc-99 as 5.53E-02 vs. the correct characterization report value of 8.5E-01 curies. This was previously noted by the NRC review. Per the Tetra Tech NUS Verification Report, Table B-5, 7.47 E-01 Ci was modeled for Tc-99.

Inconsistent Data	Selected Data	Basis
4. Sample analysis for Tank 20 indicated 7.16E-04 Ci of Np-237. Page 20 of the WCR states that "Np-237 can be neglected" for Tank 20 modeling.	Add **7.16E-04 Ci of Np-237** to the Tank 20 inventory for re-modeling.	Np-237 is the primary contributor to the alpha concentration at the point of compliance.
5. Per the Tetra Tech NUS Verification Report, Uranium isotopes were not modeled for Tanks 17 and 20.	Model Uranium isotopes for Tanks 17 and 20. The following values from the Waste Characterization Reports* provide input for re-modeling: *Tank 17 values are adjusted for 2200 gallons. **Tank 20 (Ci)** ***Tank 17 (Ci)** **U-232 1.0E-05 4.68E-05** **U-233 0.0E+00 not listed** **U-234 0.0E+00 not listed** **U-235 6.4E-05 3.03E-04** **U-236 2.7E-05 not listed** **U-238 5.8E-03 1.83E-02**	Uranium has a chemical drinking water criterion; however, uranium isotopes contribute to the total dose and should have been modeled.
6. Ba-137m curie values are not listed in the Waste Characterization Reports for Tanks 17 and 20.	Re-model using the following values: **5.46E+01 curies of Ba-137m in Tank 17.** **3.88E+01 curies of Ba-137m in Tank 20.**	Ba-137 curies are calculated based on Cs-137 inventory as listed in the characterization report. Ba-137m data is not explicitly included in the characterization or analysis reports because the dose conversion factor, used for Cs-137 impacts on human health, includes the dose due to its daughter product Ba-137m. The calculation of Ba-137m inventory is based on a Ba-137m/Cs-137 ratio of 0.946:1.

Inconsistent Data	Selected Data	Basis
7. Table 1 of the Tank 20 Waste Characterization Report reports the value for Pu-238 as 8 Ci. The sample data (also in Table 1) reports the value for Pu-238 as 7.36 Ci.	The input for re-modeling is **7.36 Ci of Pu-238** for Tank 20.	Based on the sample concentration of 8.3 microCi/gm for Pu-238 reported in Table 1 of the Waste Characterization Report, the inventory for Pu-238 is correctly listed as 7.36Ci in Table 1. The value of 8 Ci is a rounding error or typo.
8. Per the Tetra Tech NUS Verification Report, Table B-6, no value for nickel was modeled for Tank 20. The Tank 20 Waste Characterization Report has a value of .8 kg. for nickel.	The input for re-modeling is **.8 kg. of nickel** for Tank 20.	The Tank 20 Waste Characterization Report documents the chemical constituent values that should be input data for modeling.
9. Per the Tetra Tech NUS Verification Report, Table B-5, no value for Am-241 was modeled for Tank 20. The Tank 20 Waste Characterization Report has a value of 1.7E+00 Ci for Am-241.	The input for re-modeling is **1.7E+00 Ci of Am-241** for Tank 20.	The Tank 20 Waste Characterization Report documents the radiological constituent values that should be input data for modeling.
10. Nonradiological tables in the closure modules for Tanks 17 and 20 do not list magnesium.	Include input for remodeling for **magnesium**: **Tank 17 30.6 kg (adjusted for 2200)** **Tank 20 4.3 kg**	Per Table 6-1 of the General Closure Plan, magnesium has performance standard criteria.

Inconsistent Data	Selected Data	Basis
11. Per the Tetra Tech NUS Verification Report, the chemical concentrations input to the model have slight errors for the following constituents: Tank 17: Manganese, Mercury, Nickel Tank 20: Chromium VI, Fluoride, Manganese, Nickel	Include chemical concentration input calculated from the Tanks 17 and 20 waste characterization reports for remodeling: **Tank 17 (kg/kg)** **Manganese 2.5E-02** **Mercury 7.1E-04** **Nickel 4.3E-04** **Tank 20 (kg/kg)** **Chromium VI 2.8E-03** **Fluoride 2.7E-02** **Manganese 1.4E-02** **Nickel 9.1E-04**	The Waste Characterization Reports document the chemical constituent values that should be input data for modeling.
12. Some chemical constituent values listed in Table A-5 of the Tank 20 Closure Module (CM) are inconsistent with the chemical constituent values in the Tank 20 Waste Characterization Report (WCR), Table 2. Chromium CM (kg) 2.16E+00, WCR (kg) 2.5E+00 Fluoride 6.31E-01, 2.35E+01 Iron 1.66E+01, 2.47E+02 Manganese 1.14E+01, 1.19E+01	Ensure that all Chemical constituent model input values match the highest of WCS and sample values in the Tank 20 Waste Characterization Report, Table 2. Re-model using the following values: (kg) **Chromium 2.5E+00** **Fluoride 2.35E+01** **Iron 2.47E+02** **Manganese 1.19E+01**	During the Tank 20 closure process, some preliminary values were identified and used in the Tank 20 Closure Module table. The correct final values are documented in the Waste Characterization Report.