Westinghouse
Savannah River Company

P.O. Box 616
Aiken, SC 29802

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To RICKWELLER	From LARRY LINE
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NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

Mr. A. L. Watkins, Assistant Manager
High Level Waste
U. S. Department of Energy
Savannah River Operations Office
P. O. Box A
Aiken, SC 29802

Dear Mr. Watkins:

RECOMMENDED APPROACH FOR HIGH LEVEL WASTE TANK CLOSURE (U)

The purpose of this letter is to provide the WSRC recommendation for High Level Waste (HLW) tank closure, in accordance with the three criteria that NRC has provided to DOE for classifying HLW as incidental waste. The HLW tanks have been divided into two categories (14 tanks in Category 1 and 37 in Category 2) which are discussed in this letter.

The three NRC criteria for incidental waste determination are as follows:

1. "The HLW has been processed (or will be further processed) to remove key radionuclides to the maximum extent that is technically and economically practical."

2. "The waste will be incorporated in a solid physical form at the concentration that does not exceed the applicable concentration limits for Class C low-level radioactive waste, as established in 10 CFR 61."

3. "The waste will be managed, pursuant to the Atomic Energy Act, in a manner that satisfies the safety requirements comparable to the performance objectives established in 10 CFR 61."

The current plan is to perform Standard Waste Removal on all tanks. Standard Waste Removal consists of hydraulic cleaning with slurry pumps followed by spray washing. For tanks that are predicted to meet the performance objectives (e.g., 4 mrem per year for a person drinking water at the seepline), no further waste removal is planned. For tanks or groups of tanks that are predicted to exceed the performance objectives with only Standard Waste Removal, some form of Enhanced Waste Removal will be required to ensure that the tanks or groups of tanks meet the performance objectives. This approach has been documented in the Tank Closure Plan, which has been approved by SCDHEC and EPA, and it should satisfy the NRC Criteria 1 and 3 for incidental waste determination.

WSRC recommends that the 51 HLW tanks at SRS be put into two categories as follows:

Category 1: These tanks are identified in the attached Table 1. These 14 tanks are expected to meet the DHEC/EPA agreed to performance limits at the seepline without enhanced cleaning.

Category 2: The remaining 37 tanks fall into this category. They are expected to meet the required performance limits with enhanced cleaning.

Both Category 1 and 2 tanks or closure groupings of these tanks will be supported by a performance assessment as required by the Tank Closure Plan to demonstrate that the performance limits are satisfied. The number of tanks in each category is expected to change as tank specific performance assessments are completed. The attachment provides sludge concentration estimates for each tank.

To meet the Class C low-level radioactive waste conditions cited in criterion 2 (above), specially prepared grout will be added to the radioactive sludge heel in each Category 1 tank to blend with and create a resulting waste form which satisfies the specified concentration limits. Table 1 identifies the estimated amount of grout required for each of these tanks. Initial qualitative tests conducted at CTL Laboratories show good propensity for mixing between sludge and grout. Further quantitative tests are planned to justify the use of concentration averaging.

The 37 Category 2 tanks will require enhanced cleaning to meet the seepline performance limits. Following this enhanced cleaning, it is expected that any remaining waste will be incidental waste under the NRC interpretations. The cost of this enhanced cleaning is currently estimated to be approximately $800,000 per tank.

In summary, WSRC recommends proceeding with planning to close the Category 1 tanks identified in Table 1 by mixing of the waste and grout in order to satisfy the Class C concentration limits. The Category 2 tanks will be de-inventoried and cleaned to meet the Tank Closure Plan performance objectives, and through this process, the remaining residual waste when combined with grout should be classified as incidental waste.

If you have any questions on this subject, please direct them to D. T. Bignell or T. J. Lex of my staff.

Yours very truly,

A. B. Scott, Jr.
Vice President and General Manager

TJL:cks

Attachment

Table 1
Tanks Predicted to Be Below Performance Limit (4 mrem/yr) With 1000 Gallons (About 1/4 Inch) Residual Sludge

Tank	Tc-99 Inventory (Ci)	Np-237 Inventory (Ci)	Tc-99 Seepline Dose (mRem/yr)	Np-237 Seepline Dose (mRem/yr)	Sum of Alpha Nuclides (nCi/gm)	Inches Grout to meet 100 nCi/gm with 1000 gal waste
17	1.8E+00	0.0E+00	0.22	0.00	30,213	12.5
18	2.1E+00	0.0E+00	0.26	0.00	31,930	13.2
19	8.3E-01	0.0E+00	0.10	0.00	5,270	2.2
20	8.3E-01	0.0E+00	0.10	0.00	5,270	2.2
23	0.0E+00	0.0E+00	0.00	0.00	0	0.0
25	4.1E+00	0.0E+00	0.49	0.00	68,308	28.2
26	4.1E+00	0.0E+00	0.49	0.00	68,308	28.2
27	4.1E+00	0.0E+00	0.49	0.00	68,308	28.2
28	4.1E+00	0.0E+00	0.49	0.00	68,308	28.2
44	4.1E+00	0.0E+00	0.49	0.00	68,308	28.2
45	4.1E+00	0.0E+00	0.49	0.00	68,308	28.2
46	4.1E+00	0.0E+00	0.49	0.00	68,308	28.2
47	3.4E+00	0.0E+00	0.41	0.00	75,342	31.1
50	0.0E+00	0.0E+00	0.00	0.00	0	0.0

Attachment
Sludge Concentration Estimates

This attachment presents concentration estimates for the sludge in each waste tank. It also presents estimates of the computed concentration if certain amounts of sludge were left behind and averaged with the mass of the tank, and the amount of grout that would need to be added to a known amount of sludge so that the mixture would equal Class C concentration limits. Plans are to add this grout to the tank through the center riser and allow it to flow over the waste, mixing naturally as it flows.

The estimated concentrations used in this study are from the Waste Characterization System (WCS), a recently developed database.[1] For actinides, the WCS estimates are based on canyon accountability records of discarded waste, which were tracked to specific waste tanks.[2] For fission products, the WCS estimates are based on known fission product distributions in spent fuel and target assemblies from the reactors.[3] For salt tanks, concentrations were estimated based on sludge tanks known to contain similar waste (For example, the concentration of components in the sludge in Tank 20 was estimated to be the same as Tank 19, because of the similarity in the history of the two tanks).

1. Sludge Concentrations

The detailed results are presented in Table 2. The first 3 pages of this table presents the concentration ratios for each radionuclide that has a Class C limit (26 radionuclides in all). Each number presented represents the ratio of the concentration of that nuclide in that tank to the Class C limit. For example, on the first page, row "Tank 1," column "Sr-90," the number "1.71" means that the estimated concentration of Sr-90 in Tank 1 is 1.71 times the Class C limit for Sr-90, which is 7000 curies per cubic meter (see the bottom of the table).

For transuranics, the Class C limit is 100 nCi/gm for all alpha emitting radionuclides with half lives greater than 5 years. In addition, there is a separate limit of 3500 nCi/gm for Pu-241, which is a beta emitter. Although Table 2 presents factors for individual transuranic radionuclides, the actual limit is for the sum of the transuranic radionuclides excluding Pu-241. This sum is shown on page 4, labeled "Factor for Sum of Alpha Nuclides." As can be seen from this column, alpha concentrations in HLW sludge range from about 50 to 100,000 times the limit of 100 nCi/gm, representing concentrations in the range of 5,000 to 10,000,000 nCi/gm. For example, the concentration of alpha emitting nuclides in Tank 20, the first tank planned for

closure, is estimated to be 5270 nCi/gm. Thus, Table 2 reports the factor for Tank 20 to be 52.7 times the limit of 100 nCi/gm.

The only tanks in which the waste is within Class C concentraitons are tank 23, the RBOF receipt tank, which has never received HLW, and Tank 50, the Saltstone feed tank (The waste in Tank 50 is approved for near surface disposal in Saltstone). The primary of Tank 16 has been cleaned, but considerable quantities remain in the annulus, which needs to be assessed. The table shows no estimates for Tanks 48 and 49, which are ITP tanks. The ITP precipitation process concentrates actinides, so the precipitate in this tank is expected to be above 100 nCi/gm of alpha-emitting radionuclides.

2. Concentration Averaging Using the Tank Wall

Page 5 of Table 2 shows the results of concentration averaging for each tanks. The leftmost column shows the concentration factor relative to Class C for no concentration averaging. The other columns show the factors for 1000 gallons sludge, 100 gallons sludge, 10 gallons sludge. One thousand gallons of sludge is the approximate amount of sludge that is expected to be left if waste is removed from a tank using the standard techniques of bulk waste removal and spray washing.

For each quantity of sludge, the factor is shown if credit is taken for the floor of the tank (assumed to be a circular 3/8-inch steel plate that is 85 feet in diameter) and for the floor of the tank plus the wall (a hollow cylinder 3/8-inch thick, 33 feet high and 85 feet in diameter). Note that the dimensions are approximately that of a type IV tank. For completeness, the exact dimensions of each type of tank should be used, but this will introduce a small change relative to the large factors in this analysis.

As can be seen from Page 5 of Table 2, all tanks with HLW sludge would be above Class C limits with 1000 gallons of sludge, taking credit for the floor only. Tanks 19 and 20 would be about half of the Class C limit taking credit for the floor plus walls. By comparison, with only 10 gallons of equivalent sludge remaining, most tanks would be below Class C taking credit for the floor only.

3. Taking Credit for Grout

The rightmost columns on Page 5 present the amount of grout (assumed density of 1.6 gram per cubic centimeter) that must be credited to reduce the calculated concentration to the upper Class C limit of 100 nCi/gm. As in the leftmost columns, the results are

presented for 1000, 100, and 10 gallons of residual waste. The calculation does not take into account the mass of the tank steel, although this would have only a small effect on the computed heights.

For most tanks, the amount of grout needed with 1000 gallons of sludge is quite high. The range is from about 2 inches (for tanks 19 and 20) to 3863 inches for Tank 30 (For this tank, even a tank full of grout is not sufficient). The amounts of grout that must be credited with 10 gallons of sludge are modest, ranging from 0.02 inches to 39 inches.

4. References

[1] J. R. Hester, "High-Level Waste Characterization System," WSRC-TR-96-0264, DRAFT of September 1996

[2] M. C. Chandler, "Estimated Sludge Inventory for Individual Tanks," WSRC-TR-94-0191, Rev. 1, 30 August 1996

[3] Tables III and IV of G. K. Georgeton and J. R. Hester, "Characterization of Radionuclides in HLW Sludge Based on Isotopic Distribution in Irradiated Assemblies," WSRC-TR-94-0562, 27 January 1995,

	Except where noted, all numbers reported are factors relative to Class C Limits									
Tank	C-14	Ni-59	Ni-63	Sr-90	Nb-94	Tc-99	I-129	Cs-137	U-232	Th-232
1	0.00	0.00	0.00	1.71	0.00	1.56	0.00	0.18	0.01	0.00
2	0.00	0.00	0.00	0.94	0.00	1.00	0.00	0.10	0.01	0.00
3	0.00	0.00	0.00	0.44	0.00	0.44	0.00	0.05	0.00	0.00
4	0.00	0.00	0.00	2.26	0.00	1.68	0.00	0.24	0.01	0.00
5	0.00	0.00	0.00	1.54	0.00	1.29	0.00	0.16	0.01	0.00
6	0.00	0.00	0.00	3.15	0.00	2.49	0.00	0.33	0.02	0.00
7	0.00	0.00	0.00	0.25	0.00	0.24	0.00	0.03	0.00	0.00
8	0.00	0.00	0.00	0.64	0.00	0.48	0.00	0.07	0.00	0.00
9	0.00	0.00	0.00	1.05	0.00	1.12	0.00	0.11	0.01	0.00
10	0.00	0.00	0.00	0.54	0.00	0.56	0.00	0.06	0.00	0.00
11	0.00	0.00	0.00	1.82	0.00	1.03	0.00	0.15	0.00	0.00
12	0.00	0.00	0.00	1.84	0.00	1.16	0.00	0.16	0.00	0.08
13	0.00	0.00	0.00	0.67	0.00	0.49	0.00	0.06	0.00	0.00
14	0.00	0.00	0.00	1.82	0.00	1.70	0.00	0.18	0.01	0.03
15	0.00	0.00	0.00	1.91	0.00	1.25	0.00	0.16	0.00	0.07
16	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
17	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.36	0.00	0.18	0.00	0.03	0.00	0.00
22	0.00	0.00	0.00	0.37	0.00	0.18	0.00	0.03	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.67	0.00	0.49	0.00	0.06	0.00	0.00
25	0.00	0.00	0.00	0.05	0.00	0.03	0.00	0.01	0.00	0.00
26	0.00	0.00	0.00	0.05	0.00	0.03	0.00	0.01	0.00	0.00
27	0.00	0.00	0.00	0.05	0.00	0.03	0.00	0.01	0.00	0.00
28	0.00	0.00	0.00	0.05	0.00	0.03	0.00	0.01	0.00	0.00
29	0.00	0.00	0.00	0.67	0.00	0.49	0.00	0.06	0.00	0.00
30	0.00	0.00	0.00	2.90	0.00	1.15	0.00	0.24	0.00	0.00
31	0.00	0.00	0.00	0.67	0.00	0.49	0.00	0.06	0.00	0.00
32	0.00	0.00	0.00	2.56	0.00	1.28	0.00	0.21	0.00	0.00
33	0.00	0.00	0.00	3.48	0.00	1.78	0.00	0.36	0.01	0.00
34	0.00	0.00	0.00	4.14	0.00	2.17	0.00	0.43	0.02	0.00
35	0.00	0.00	0.00	3.44	0.00	1.57	0.00	0.28	0.00	0.00
36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	0.00	0.00	0.00	0.67	0.00	0.49	0.00	0.06	0.00	0.00
38	0.00	0.00	0.00	0.76	0.00	0.31	0.00	0.06	0.00	0.00
39	0.00	0.00	0.00	3.93	0.00	1.62	0.00	0.32	0.00	0.00
40	0.00	0.00	0.00	0.05	0.00	0.03	0.00	0.00	0.00	0.00
41	0.00	0.00	0.00	0.24	0.00	0.11	0.00	0.02	0.00	0.00
42	0.00	0.00	0.00	0.74	0.00	0.48	0.00	0.06	0.00	0.03
43	0.00	0.00	0.00	0.78	0.00	0.31	0.00	0.06	0.00	0.00
44	0.00	0.00	0.00	0.05	0.00	0.03	0.00	0.01	0.00	0.00
45	0.00	0.00	0.00	0.05	0.00	0.03	0.00	0.01	0.00	0.00
46	0.00	0.00	0.00	0.05	0.00	0.03	0.00	0.01	0.00	0.00
47	0.00	0.00	0.00	0.04	0.00	0.02	0.00	0.00	0.00	0.00
48	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
49	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
51	0.00	0.00	0.00	0.04	0.00	0.03	0.00	0.00	0.00	0.00
Class C	8.000E+00	2.200E+02	7.000E+02	7.000E+03	2.000E-01	3.000E+00	8.000E-02	4.600E+03	100	100
Limit	Ci/m^3	Ci/m^3	Ci/m^3	Ci/m^3	Ci/m^3	Ci/m^3	Ci/m^3	Ci/m^3	nCi/gm (1)	nCi/gm

Except where noted, all numbers reported are factors relative to Class C Limits

Tank	U-233	U-234	U-235	U-236	U-238	Np-237	Pu-238	Pu-239	Pu-240	Pu-241
1	0.00	0.00	0.02	0.00	0.39	0.56	0.00	116.47	25.96	1.25
2	0.00	0.00	0.01	0.00	0.13	1.34	0.00	124.89	27.83	0.78
3	0.00	0.00	0.01	0.00	0.16	1.22	0.00	76.66	17.13	0.68
4	0.00	0.00	0.01	0.00	0.50	0.45	0.00	89.38	19.93	2.43
5	0.00	0.00	0.02	0.00	0.45	0.76	0.00	87.06	20.74	1.34
6	0.00	0.00	0.02	0.00	0.62	0.21	0.00	63.03	21.85	2.64
7	0.00	0.00	0.01	0.00	0.23	0.21	0.00	92.27	21.98	1.61
8	0.00	0.00	0.01	0.00	0.39	0.18	0.00	111.72	26.25	4.68
9	0.00	0.00	0.01	0.00	0.19	1.32	0.00	41.05	9.15	0.25
10	0.00	0.00	0.01	0.00	0.18	1.35	0.00	97.68	21.77	0.68
11	0.18	0.15	0.00	0.02	0.01	0.10	11,827.68	128.85	80.72	76.54
12	2.27	0.21	0.00	0.02	0.04	0.47	7,190.28	137.05	75.60	27.40
13	1.02	0.14	0.00	0.01	0.05	0.37	1,099.03	36.54	15.07	2.65
14	0.90	0.12	0.01	0.01	0.19	1.32	485.93	145.27	46.77	2.02
15	0.91	0.25	0.30	0.02	0.00	0.23	3,194.98	80.09	38.69	8.20
16	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
17	0.00	0.00	0.00	0.00	0.11	0.00	0.00	62.44	16.48	3.14
18	0.00	0.00	0.00	0.00	0.12	0.00	0.00	72.58	18.43	3.07
19	0.00	0.00	0.00	0.00	0.07	0.00	0.00	43.00	9.60	17.99
20	0.00	0.00	0.00	0.00	0.07	0.00	0.00	43.00	9.60	17.99
21	0.30	0.30	0.00	0.06	0.00	0.16	1,511.02	1.89	1.09	0.62
22	0.90	0.32	0.00	0.05	0.01	0.20	1,238.70	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	1.02	0.14	0.00	0.01	0.05	0.37	1,099.03	36.54	15.07	2.65
25	0.00	0.00	0.00	0.00	0.14	0.00	0.00	161.16	35.98	23.36
26	0.00	0.00	0.00	0.00	0.14	0.00	0.00	161.16	35.98	23.36
27	0.00	0.00	0.00	0.00	0.14	0.00	0.00	161.16	35.98	23.36
28	0.00	0.00	0.00	0.00	0.14	0.00	0.00	161.16	35.98	23.36
29	1.02	0.14	0.00	0.01	0.05	0.37	1,099.03	36.54	15.07	2.65
30	0.00	0.34	0.01	0.06	0.00	0.15	65,513.29	566.45	406.40	1,235.51
31	1.02	0.14	0.00	0.01	0.05	0.37	1,099.03	36.54	15.07	2.65
32	0.00	0.18	0.00	0.04	0.00	0.07	24,695.88	229.50	170.14	255.93
33	0.00	0.00	0.02	0.00	1.41	1.17	0.00	169.36	37.82	22.96
34	0.00	0.00	0.01	0.00	1.06	0.82	0.00	170.86	38.16	22.64
35	0.00	0.26	0.00	0.08	0.00	0.09	37,243.38	314.08	239.97	426.31
36	0.00	0.45	0.01	0.16	0.00	0.13	36,753.44	302.66	240.35	319.06
37	1.02	0.14	0.00	0.01	0.05	0.37	1,099.03	36.54	15.07	2.65
38	0.00	0.44	0.01	0.10	0.00	0.23	2,864.43	22.32	14.74	30.01
39	0.00	0.39	0.01	0.09	0.00	0.15	59,738.23	574.99	399.05	1,044.52
40	0.09	0.03	0.00	0.01	0.11	0.02	129.43	65.00	16.50	2.75
41	0.00	0.06	0.00	0.02	0.00	0.17	914.64	0.00	0.00	0.00
42	0.37	0.14	0.00	0.02	0.06	0.11	1,382.44	63.57	22.75	4.48
43	0.00	0.44	0.01	0.10	0.00	0.23	2,864.43	22.32	14.74	30.01
44	0.00	0.00	0.00	0.00	0.14	0.00	0.00	161.16	35.98	23.36
45	0.00	0.00	0.00	0.00	0.14	0.00	0.00	161.16	35.98	23.36
46	0.00	0.00	0.00	0.00	0.14	0.00	0.00	161.16	35.98	23.36
47	0.00	0.00	0.00	0.00	0.11	0.00	0.00	172.60	38.54	20.03
48	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
49	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
51	0.04	0.02	0.00	0.00	0.11	0.01	108.76	67.16	17.08	2.87
Class C Limit	100 nCi/gm	100 nCi/gm	100 nCi/gm	100 nCi/gm	100 nCi/gm	100 nCi/gm	100 nCi/gm	100 nCi/gm	100 nCi/gm	3500 nCi/gm

	Except where noted, all numbers reported are factors relative to Class C Limits							
Tank	Pu-242	Am-241	Am-241	Am-242m	Cm-244	Cm-245		
1	0.01	184.44	1,512.82	1.93	0.40	0.00		
2	0.01	157.99	947.51	1.18	0.20	0.00		
3	0.00	114.17	420.64	0.53	0.10	0.00		
4	0.00	189.11	1,664.51	2.18	0.60	0.00		
5	0.01	176.11	1,261.38	1.62	0.38	0.00		
6	0.04	297.16	2,457.62	3.19	0.80	0.00		
7	0.01	197.11	217.14	0.27	0.06	0.00		
8	0.03	248.56	459.35	0.60	0.17	0.00		
9	0.00	51.39	1,064.09	1.33	0.22	0.00		
10	0.00	130.17	523.99	0.65	0.17	0.00		
11	0.17	4,891.64	621.23	0.75	5.32	0.00		
12	0.11	2,166.08	727.76	0.87	4.97	0.00		
13	0.01	334.53	340.79	0.41	1.42	0.00		
14	0.01	308.19	1,525.27	1.90	1.40	0.00		
15	0.03	1,006.16	748.81	0.88	5.17	0.00		
16	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5		
17	0.02	223.07	0.00	0.00	0.00	0.00		
18	0.02	216.15	0.00	0.00	0.00	0.00		
19	0.02	0.00	0.00	0.00	0.00	0.00		
20	0.02	0.00	0.00	0.00	0.00	0.00		
21	0.00	36.94	79.48	0.10	1.13	0.00		
22	0.00	0.00	79.24	0.10	1.15	0.00		
23	0.00	0.00	0.00	0.00	0.00	0.00		
24	0.01	334.53	340.79	0.41	1.42	0.00		
25	0.01	485.78	0.00	0.00	0.02	0.00		
26	0.01	485.78	0.00	0.00	0.02	0.00		
27	0.01	485.78	0.00	0.00	0.02	0.00		
28	0.01	485.78	0.00	0.00	0.02	0.00		
29	0.01	334.53	340.79	0.41	1.42	0.00		
30	0.97	26,315.03	713.72	0.90	10.45	0.00		
31	0.01	334.53	340.79	0.41	1.42	0.00		
32	0.36	10,281.34	780.92	0.96	8.12	0.00		
33	0.01	523.07	1,806.42	2.49	1.13	0.00		
34	0.01	516.89	2,205.41	3.03	1.32	0.00		
35	0.54	15,874.41	957.17	1.20	11.39	0.00		
36	0.52	14,754.20	0.00	0.00	0.00	0.00		
37	0.01	334.53	340.79	0.41	1.42	0.00		
38	0.03	1,026.39	138.65	0.17	2.78	0.00		
39	1.00	27,629.05	1,004.76	1.26	13.80	0.00		
40	0.02	204.31	8.28	0.01	0.12	0.00		
41	0.00	0.00	46.31	0.06	0.81	0.00		
42	0.02	472.42	277.92	0.33	2.02	0.00		
43	0.03	1,026.39	138.65	0.17	2.78	0.00		
44	0.01	485.78	0.00	0.00	0.02	0.00		
45	0.01	485.78	0.00	0.00	0.02	0.00		
46	0.01	485.78	0.00	0.00	0.02	0.00		
47	0.01	542.15	0.00	0.00	0.01	0.00		
48	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5		
49	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5		
50	0.00	0.00	0.00	0.00	0.00	0.00		
51	0.02	212.76	6.04	0.01	0.09	0.00		
Class C	100	100	100	100	100	100		
Limit	nCi/gm	nCi/gm	nCi/gm	nCi/gm	nCi/gm	nCi/gm		

Tank	Sum of Alpha Nuclides (Factor Above Class C)	Alpha Nuclide with Highest Factor		Highest Factor Above Class C for non-alpha nuclide	Non-alpha nuclide with highest Factor	
1	1,842.99	Am-241		1.71	Sr-90	
2	1,261.08	Am-241		1.00	Tc-99	
3	630.82	Am-241		0.68	Pu-241	
4	1,966.68	Am-241		2.43	Pu-241	
5	1,548.53	Am-241		1.54	Sr-90	
6	2,844.56	Am-241		3.15	Sr-90	
7	529.30	Am-241		1.61	Pu-241	
8	847.26	Am-241		4.68	Pu-241	
9	1,166.75	Am-241		1.12	Tc-99	
10	775.97	Am-241		0.68	Pu-241	
11	17,556.80	Pu-238		76.54	Pu-241	
12	10,305.61	Pu-238		27.40	Pu-241	
13	1,629.41	Pu-238		2.65	Pu-241	
14	2,517.34	Am-241		2.02	Pu-241	
15	5,074.31	Pu-238		8.20	Pu-241	
16	Note 5	NA		Note 5	NA	
17	302.13	Am-241		3.14	Pu-241	
18	319.30	Am-241		3.07	Pu-241	
19	52.70	Pu-239		17.99	Pu-241	
20	52.70	Pu-239		17.99	Pu-241	
21	1,632.50	Pu-238		0.62	Pu-241	
22	1,320.67	Pu-238		0.37	Sr-90	
23	0.00	NA		0.00	NA	
24	1,629.41	Pu-238		2.65	Pu-241	
25	683.08	Am-241		23.36	Pu-241	
26	683.08	Am-241		23.36	Pu-241	
27	683.08	Am-241		23.36	Pu-241	
28	683.08	Am-241		23.36	Pu-241	
29	1,629.41	Pu-238		2.65	Pu-241	
30	93,527.78	Pu-238		1,235.51	Pu-241	
31	1,629.41	Pu-238		2.65	Pu-241	
32	36,167.51	Pu-238		255.93	Pu-241	
33	2,542.91	Am-241		22.96	Pu-241	
34	2,939.58	Am-241		22.64	Pu-241	
35	54,652.57	Pu-238		426.31	Pu-241	
36	52,051.92	Pu-238		319.06	Pu-241	
37	1,629.41	Pu-238		2.65	Pu-241	
38	4,072.30	Pu-238		30.01	Pu-241	
39	89,362.77	Pu-238		1,044.52	Pu-241	
40	423.94	Am-241		2.75	Pu-241	
41	962.06	Pu-238		0.24	Sr-90	
42	2,222.19	Pu-238		4.48	Pu-241	
43	4,072.30	Pu-238		30.01	Pu-241	
44	683.08	Am-241		23.36	Pu-241	
45	683.08	Am-241		23.36	Pu-241	
46	683.08	Am-241		23.36	Pu-241	
47	763.42	Am-241		20.03	Pu-241	
48	Note 5	NA		Note 5	NA	
49	Note 5	NA		Note 5	NA	
50	0.00	NA		0.00	NA	
51	412.12	Am-241		2.87	Pu-241	
Class C Limit	100 nCi/gm	100 nCi/gm				

								Height of Grout in Inches to Bring		
		Factor Relative to Class C Limit Taking Credit for Tank Structures						Concentration to Class C Limit (4)		
	No credit	1000 gal	1000 gal	100gal	100 gal	10 gal	10 gal	Gallons of Waste		
Tank	for structure	Floor	Floor+wall	Floor	Floor+wall	Floor	Floor+wall	1,000	100	10
1	1,842.99	40.55	16.59	4.06	1.59	0.41	0.16	76.12	7.61	0.76
2	1,261.08	27.74	11.35	2.78	1.09	0.28	0.11	52.09	5.21	0.52
3	630.82	13.88	5.68	1.39	0.54	0.14	0.05	26.05	2.61	0.26
4	1,966.68	43.27	17.70	4.33	1.70	0.43	0.17	81.23	8.12	0.81
5	1,548.53	34.07	13.94	3.41	1.34	0.34	0.13	63.96	6.40	0.64
6	2,844.56	62.58	25.60	6.26	2.45	0.63	0.25	117.49	11.75	1.17
7	529.30	11.64	4.76	1.17	0.46	0.12	0.05	21.86	2.19	0.22
8	847.28	18.64	7.63	1.87	0.73	0.19	0.07	34.99	3.50	0.35
9	1,168.75	25.71	10.52	2.57	1.01	0.26	0.10	48.27	4.83	0.48
10	775.97	17.07	6.98	1.71	0.67	0.17	0.07	32.05	3.20	0.32
11	17,556.80	386.25	158.01	38.66	15.14	3.86	1.51	725.15	72.52	7.25
12	10,305.81	226.73	92.75	22.69	8.89	2.27	0.89	425.66	42.57	4.26
13	1,829.41	40.25	16.46	4.03	1.58	0.40	0.16	75.56	7.56	0.76
14	2,517.34	55.38	22.66	5.54	2.17	0.55	0.22	103.97	10.40	1.04
15	5,074.31	111.63	45.67	11.17	4.38	1.12	0.44	209.58	20.96	2.10
16	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
17	302.13	6.65	2.72	0.67	0.26	0.07	0.03	12.48	1.25	0.12
18	319.30	7.02	2.87	0.70	0.28	0.07	0.03	13.19	1.32	0.13
19	52.70	1.16	0.47	0.12	0.05	0.01	0.00	2.18	0.22	0.02
20	52.70	1.16	0.47	0.12	0.05	0.01	0.00	2.18	0.22	0.02
21	1,632.50	35.92	14.69	3.59	1.41	0.36	0.14	67.43	6.74	0.67
22	1,320.67	29.05	11.89	2.91	1.14	0.29	0.11	54.55	5.45	0.55
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	1,829.41	40.25	16.46	4.03	1.58	0.40	0.16	75.56	7.56	0.76
25	683.08	15.03	6.15	1.50	0.59	0.15	0.06	28.21	2.82	0.28
26	683.08	15.03	6.15	1.50	0.59	0.15	0.06	28.21	2.82	0.28
27	683.08	15.03	6.15	1.50	0.59	0.15	0.06	28.21	2.82	0.28
28	683.08	15.03	6.15	1.50	0.59	0.15	0.06	28.21	2.82	0.28
29	1,829.41	40.25	16.46	4.03	1.58	0.40	0.16	75.56	7.56	0.76
30	93,527.78	2,057.61	841.75	205.95	80.67	20.58	8.07	3862.99	386.30	38.63
31	1,829.41	40.25	16.46	4.03	1.58	0.40	0.16	75.56	7.56	0.76
32	36,167.51	795.69	325.51	79.64	31.19	7.96	3.12	1493.83	149.38	14.94
33	2,542.91	55.94	22.89	5.60	2.19	0.56	0.22	105.03	10.50	1.05
34	2,939.58	64.67	26.46	6.47	2.54	0.65	0.25	121.41	12.14	1.21
35	54,652.57	1,202.36	491.87	120.34	47.14	12.02	4.71	2257.32	225.73	22.57
36	52,051.92	1,145.14	468.47	114.62	44.89	11.45	4.49	2149.91	214.99	21.50
37	1,829.41	40.25	16.46	4.03	1.58	0.40	0.16	75.56	7.56	0.76
38	4,072.30	89.59	36.65	8.97	3.51	0.90	0.35	168.20	16.82	1.68
39	89,362.77	1,965.98	804.26	196.78	77.08	19.66	7.71	3690.96	369.10	36.91
40	423.84	9.33	3.82	0.93	0.37	0.09	0.04	17.51	1.75	0.18
41	962.06	21.17	8.66	2.12	0.83	0.21	0.08	39.74	3.97	0.40
42	2,222.19	48.89	20.00	4.89	1.92	0.49	0.19	91.78	9.18	0.92
43	4,072.30	89.59	36.65	8.97	3.51	0.90	0.35	168.20	16.82	1.68
44	683.08	15.03	6.15	1.50	0.59	0.15	0.06	28.21	2.82	0.28
45	683.08	15.03	6.15	1.50	0.59	0.15	0.06	28.21	2.82	0.28
46	683.08	15.03	6.15	1.50	0.59	0.15	0.06	28.21	2.82	0.28
47	753.42	16.58	6.78	1.66	0.65	0.17	0.06	31.12	3.11	0.31
48	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
49	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
51	412.12	9.07	3.71	0.91	0.36	0.09	0.04	17.02	1.70	0.17
Class C Limit										

Tank											
1											
2											
3		Notes to Table									
4											
5		(1)Formula for conversion from Ci/kg to Ci/m^3									
6		= Concentrations/(2.205#/kg)*(1.95#/gal)*(264.172gal/m^3)									
7											
8		(2) Formula for conversion from Ci/kg to nCi/gm									
9		= Concentrations*(1E9 nCi/Ci)/(1000gm/kg)									
10											
11		(3) Alpha nuclides include all transuranic nuclides shown except Pu-241, which									
12		is a beta emitter and has a separate limit									
13											
14		(4) Formula to calculate height of grout									
15		=WasteVol*1.95lb/gal*(Factor)*12in/ft/(1.6*62.4lb/ft^3*Pi*(85*ft)^2/4)									
16											
17		(5) The primary of Tank 16 has been cleaned, but considerable quantities									
18		remain in the annulus. The table shows no estimates for Tanks 48 and 49,									
19		which are ITP tanks.									
20											
21											
22											
23											
24											
25											
26											
27											
28											
29			Alpha Reduction Factors								
30			1000 gal	100 gal	10 gal						
31		Floor	0.022	0.002202	2.20E-04						
32		Floor + Wall	0.009	8.63E-04	8.63E-05						
33											
34											
35											
36											
37											
38											
39											
40											
41											
42											
43											
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47											
48											
49											
50											
51											
Class C Limit											