INTERNATIONAL TECHNOLOGY CORPORATION

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Project No. 301679

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SL-1/BORAX-I Class C Waste Equivalency Determination

Dear Jean:

Based on a comparison of radionuclide concentrations for the SL-1 and BORAX-I burial grounds with Class C waste determination criteria, no waste containing concentrations in excess of Class C waste levels exists at either site. This comparison utilized the concentrations from the baseline risk assessment (BRA) in the Operable Units 5-05/6-01 remedial investigation/feasibility study (RI/FS), and the IT-produced calc brief "Class C Waste Determination Criteria," 7/28/95 (Attachment 1). As noted in the uncertainty discussion in the RI/FS, deviations from the assumption of uniform distribution of contaminants throughout the estimated source volume could result in areas of higher or lower concentration than appear in the BRA. Because of this, it is possible that some small volumes of waste could exceed Class C waste criteria.

Cesium-137 and strontium-90 are the only potential contaminants of concern for both sites for which Class C waste criteria exist. Step 1, from page 2 of the calc brief states that if the contaminant concentrations are all below the lower end of the Class B range, the waste will not be Class C. A comparison of the lower end Class B range with the concentrations used in the BRA appears in Table 1.

Table 1. Comparison of low-end Class B range with 1994 radionuclide concentrations used in the baseline risk assessment for the SL-1 and BORAX-I burial grounds.

Site	Radionuclide	Low end Class B Range (pCi/g)	Surface Concentration (pCi/g)	Subsurface Concentration (pCi/g)
SL-1	Cesium-137	6.7E+05	904	2.29E+04
SL-1	Strontium-90	2.7E+04	1.37E+03	2.15E+04
BORAX-I	Cesium-137	6.7E+05	1.82E+03	1.20E+03
BORAX-I	Strontium-90	2.7E+04	2	1.10E+03

If you have any questions, please call me at 505-662-1236.

Respectfully submitted,

IT CORPORATION

Richard Filemyr
Project Manager

attachment

cc: Doug Vetter, IT-Albuquerque
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Attachment 1

Calc Brief: Class C Waste Determination Criteria

Class C Waste
Determination Criteria

Purpose: To determine the concentration of

Sr-90
Cs-137
Eu-154
Th-228
U-235

that would constitute an NRC classification of "Class C Waste."

References: 10 CFR 61.55(a)

Analysis: Based on 10 CFR 61.55(a)(4) and (6), the concentrations of Eu-154, Th-228, and U-235 would not be included in the "Class C" determination because these isotopes are not listed in Tables 1 or 2.

Based on 10 CFR 61.55(a)(4) and Table 2, a "Class C" determination for waste containing Sr-90 and Cs-137 would be based on the following:

$$150\ Ci/m^3 < \text{Sr-90} < 7{,}000\ Ci/m^3$$

$$44\ Ci/m^3 < \text{Cs-137} < 4{,}600\ Ci/m^3$$

where Ci/m^3 = Curies per cubic meter.

Converting Ci/m^3 to pCi/g (based on an assumed soil density of 1.5 g/cc)

$$1\ Ci/m^3 = \left(\frac{Ci}{m^3}\right)\left(\frac{10^{12}\ pCi}{Ci}\right)\left(\frac{m^3}{(100\ cm)^3}\right)\left(\frac{cm^3}{1.5\ g}\right) = 6.67 \times 10^5\ pCi/g$$

The "Class C" range for Sr-90 and Cs-137 then becomes:

$$1.0 \times 10^6\ pCi/g < \text{Sr-90} < 4.7 \times 10^9\ pCi/g$$

$$2.9 \times 10^7\ pCi/g < \text{Cs-137} < 3.1 \times 10^9\ pCi/g$$

Class C Waste
Determination Criteria
Continued

Since both Sr-90 and Cs-137 are present, the "Sum of Fractions Rule" for mixtures of radionuclides must be applied (10 CFR 61.55(a)(7)).

In order to apply the sum of fractions rule, the "Class B" range for Sr-90 and Cs-137 must be known in pCi/g. From Table 2, 10 CFR 61.55 the Class B range is:

$$0.04\ Ci/m^3 < \text{Sr-90} < 150\ Ci/m^3$$

$$1.0\ Ci/m^3 < \text{Cs-137} < 44\ Ci/m^3$$

or

$$2.7 \times 10^4\ pCi/g < \text{Sr-90} < 1.0 \times 10^6\ pCi/g$$

$$6.7 \times 10^5\ pCi/g < \text{Cs-137} < 2.9 \times 10^7\ pCi/g$$

Step 1: If the concentrations of <u>both</u> Sr-90 and Cs-137 are <u>below</u> the lower end of the "Class B" range, the waste will <u>not</u> be "Class C" (it is either A or B).

Step 2: If the concentrations of <u>either</u> or <u>both</u> Sr-90 and Cs-137 are <u>within</u> the "Class B" range, then compute the sum of fractions as:

$$X = \frac{\text{conc. of Sr-90 (pCi/g)}}{1.0 \times 10^6\ (pCi/g)} + \frac{\text{conc. of Cs-137 (pCi/g)}}{2.9 \times 10^7\ (pCi/g)}$$

$X < 1$: <u>not</u> Class C (is Class B)

$X > 1$: Class C waste

Step 3: If the concentrations of <u>either</u> or <u>both</u> Sr-90 and Cs-137 are <u>within</u> the "Class C" range, then compute the sum of fractions as:

$$X = \frac{\text{conc. of Sr-90 (pCi/g)}}{4.7 \times 10^9\ (pCi/g)} + \frac{\text{conc. of Cs-137 (pCi/g)}}{3.1 \times 10^9\ (pCi/g)}$$

$X < 1$: Class C waste

$X > 1$: Greater-than-Class C

Step 4: If the concentrations of <u>either</u> or <u>both</u> Sr-90 and Cs-137 are above the high-end of the Class C range, then the waste is "Greater-Than-Class C."