

PROCEDURE TO DETERMINE RADIOACTIVE WASTE CLASSIFICATION

1.0 GENERAL

Radioactive waste sent to the burial sites must meet the classification and physical form requirements specified in 10 CFR 61. The waste will fall into one of three classes, Class "A," Class "B" or Class "C." Classification is based on the concentration of certain nuclides in the waste. In addition, depending upon which class the waste falls into, the physical form of the waste must be able to withstand certain tests specified by the NRC. This procedure outlines the steps necessary to determine in which waste class individual packages of waste will be classified.

2.0 REFERENCES

- 2.1 10 CFR 61
- 2.2 NRC Low-Level Waste Licensing Branch Technical Position on Radioactive Waste Classification, dated May, 1983
- 2.3 NRC Technical Position on Waste Form, dated May 1983
- 2.4 State of South Carolina Radioactive Materials License No. 097, issued to Chem Nuclear, expiration date December 31, 1984.
- 2.5 State of Washington Radioactive Materials License No. WN-I019-2, issued to U.S. Ecology, expiration date November 30, 1985.

3.0 WASTE CLASSIFICATION (10 CFR 61.55)

- 3.1 Considerations for wastes containing nuclides listed in the attachment.

Determination of the classification of radioactive waste involves two considerations.

3.1.1 Long-lived isotopes

Consideration must be given to the concentration of long-lived radionuclides (and their shorter-lived precursors) whose potential hazard will persist long after precautions such as institutional controls, improved waste form, and deeper disposal have ceased to be effective.

3.1.2 Shorter-lived isotopes

Consideration must also be given to the concentration of shorter-lived radionuclides for which the requirements on institutional controls, waste form and disposal methods are effective.

- 3.2 If the radioactive waste contains a nuclide which is not listed in the attachment, then that nuclide does not need to be considered when determining the waste class.

If the waste does not contain any of the nuclides listed in the attachment, then the waste is classified as Class "A."

3.3 Sum of Fractions Rule for Mixtures of Radionuclides

For determining classification for waste that contains a mixture of radionuclides, it is necessary to determine the sum of fractions as follows.

- 3.3.1 Divide each nuclide's concentration by its appropriate limit in the attachment and add the resulting values. The appropriate limits must all be taken from the same column when doing this calculation.

- 3.3.2 The sum of the fractions for the column must be less than 1.0 if the waste class is to be determined by that column.

EXAMPLE: A waste contains Sr-90 in a concentration of $50 \mu\text{Ci}/\text{cm}^3$ and Cs-137 in a concentration of $22 \mu\text{Ci}/\text{cm}^3$. Since the concentration of both exceeds the values listed in Column 1, for Class "A" they must be compared to Column 2 values. For Sr-90 fraction, $50/150 = 0.33$; for Cs-137 fraction, $22/44 = 0.5$. The sum of fractions is $0.33 + 0.5 = 0.83$. Since the sum is less than 1.0, the waste is Class "B."

3.4 Radionuclide Distribution of Radioactive Waste

File HP 2.12 contains the results from the chemical analysis to determine the radionuclides distribution of the various forms of radioactive waste.

ATTACHMENT

WASTE CLASSIFICATION TABLE

<u>RADIONUCLIDES</u>	<u>CONCENTRATION LIMITS IN $\mu\text{Ci}/\text{cm}^3$</u>		
	<u>Class A</u>	<u>Class B</u>	<u>Class C</u>
<u>Group 1 (short-lived)</u>			
Total of all nuclides with half-life less than 5 years	≤ 700	>700	*
H-3	≤ 40	> 40	*
Co-60	≤ 700	>700	*
Ni-63	≤ 3.5	≤ 70	≤ 700
Ni-63 in activated metal	≤ 35	≤ 700	≤ 7000
Sr-90	≤ 0.04	≤ 150	≤ 7000
Cs-137	≤ 1	≤ 44	≤ 4600
<u>Group 2 (long-lived)</u>			
C-14	≤ 0.8	*	≤ 8
C-14 in activated metal	≤ 8	*	≤ 80
Ni-59 in activated metal	≤ 22	*	≤ 220
Nb-94 in activated metal	≤ 0.02	*	≤ 0.2
Tc-99	≤ 0.3	*	≤ 3
I-129	≤ 0.008	*	≤ 0.08

Limits Applicable Only To Waste Sent To Barnwell, SC

	<u>CONCENTRATION LIMITS IN nCi/gm</u>		
Alpha emitting transuranics with half-life greater than 5 years	≤ 10	*	≤ 100
Pu-241	≤ 350	*	≤ 350
Cm-242	≤ 2000	*	≤ 20000

Limits Applicable Only To Waste Sent To Richland, WA

	<u>CONCENTRATION LIMITS IN nCi/gm</u>		
Transuranics	≤ 10	**	**
Ra-226	≤ 10	**	**

* There are no limits established for these radionuclides in Class "B" or "C" wastes. Practical considerations such as the effects of external radiation or internal heat generation on transportation, handling and disposal will limit the concentrations for these wastes.

** Specific approval is required from U.S. Ecology for waste sent to Richland, WA with concentrations of transuranics or Ra-266 greater than 10 nanocuries/gram.