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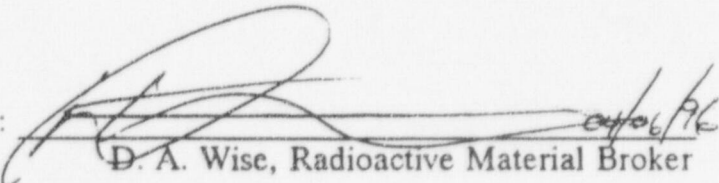
GUTIERREZ - PALMENBERG INC.

Classification of
Radioactive Waste

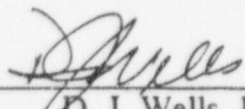
GPI-13



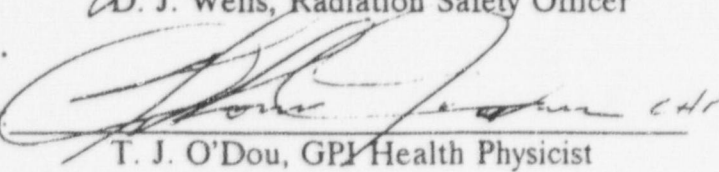
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CLASSIFICATION OF RADIOACTIVE WASTE

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This table provides the most recent changes to pages in this document. A '0' means the original page is valid, a date in the revision level box indicates the date of the most recent change to the page indicated.

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1.0 Purpose and Scope

- 1.1 The purpose of this procedure is to establish instructions used to classify waste for disposal, complete the shipment manifests verify waste receipt criteria.
- 1.2 Adherence to this procedure will provide reasonable assurance that waste will be properly classified pursuant to 10 CFR 61.

2.0 Applicability

This procedure will be used to classify wastes pursuant to 10 CFR 61. Waste classification considerations for disposal at a licensed facility require:

- 2.1 Consideration must be given to the concentration of long-lived radionuclides (and their shorter-lived precursors).
- 2.2 Consideration must be given to the concentration of shorter-lived radionuclides for which requirements on institutional controls, waste form, and disposal methods are effective.

3.0 General

3.1 Description of procedures.

3.1.1 This procedure will demonstrate the methodology for determining:

- a) If the waste is acceptable for near-surface disposal.
- b) If acceptable for near-surface disposal, whether the waste is classified as Class A, Class B, or Class C waste.

3.1.2 This procedure will determine whether the waste complies with any additional waste form, package or content requirement which may be in place at the particular disposal facility to which the waste is to be shipped.

3.2 Definitions

1. Class A Waste - Class A waste is waste that is usually segregated from other waste classes at the disposal site. The physical form and waste characteristics of Class A waste must meet the minimum requirements set forth in 10 CFR 61.56(a). If Class A waste also meets the stability requirements set forth in 10 CFR 61.56(b), it is not necessary to segregate the waste for disposal.
2. Class B Waste - Class B waste is waste that must meet more rigorous requirements on waste form to ensure stability after disposal. The physical form and characteristics of Class B waste must meet both the minimum and stability requirements set forth in 10 CFR 61.56.

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3. Class C Waste - Class C waste is waste that not only must meet more rigorous requirements on waste form to ensure stability but also requires additional measures at the disposal facility to protect against inadvertent intrusion. The physical form and characteristics of Class C waste must meet both the minimum and stability requirements set forth in 10 CFR 61.56.

3.3 Precautions

- 3.1.1 Minor differences may exist between individual disposal facilities and the Waste Class tables presented in this procedure. ALWAYS classify waste per the destined facilities criteria.
- 3.1.2 The Barnwell facility has a Class C determination form that must be completed and forwarded with the shipment.
- 3.1.3 US Ecology facilities has a NARM determination required to be completed before shipment.
- 3.1.4 Certain waste streams such as filter resins etc., also require isotopic analysis to be completed before shipment.

4.0 Responsibilities

- 4.1 Program Director - The Program Director is responsible for ensuring that all personnel assigned the tasks of waste classification are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.
- 4.2 Radiation Safety Officer - The Radiation Safety Officer (RSO) is responsible for quality audits of waste classification performed by the Waste Broker.
- 4.3 Waste Broker - The Waste Broker is responsible to collect all required information about the waste and classifying the waste as outlined in this procedure.

5.0 Procedure

5.1 Procedural methods

Methods for determination of concentration may be made by using the following individually or in combination.

- 5.1.1 Compliance through materials accountability, a given quantity (and resulting concentration) of radioactive material may be known to be contained within a given waste or may be inferred through determining the difference between the quantity of radioactive material entering and exiting a given process.
- 5.1.2 Classification by source is similar to the above method of materials accountability and involves determining the radionuclide content and classification of waste through knowledge and control of the source of the waste.

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5.1.3 Gross radioactivity measurements is an acceptable method for all classes of waste provided that:

- a) The gross radioactivity measurements are correlated on a consistent basis with the distribution of radionuclides within the particular waste stream analyzed, and
- b) The radionuclide distributions are initially determined and periodically verified by direct measurement techniques.

5.1.4 Measurement of specific radionuclides may establish an inferential measurement program whereby concentrations of radioisotope which cannot be readily measured (through techniques such as gamma-spectral analysis) are projected through ratioing to concentrations of radioisotopes which can be readily measured.

5.1.5 The concentration of a radionuclide may be averaged over the volume of the waste, or weight of the waste if the units are expressed as nanocuries per gram (using NRC Branch Technical Position Paper on Waste Classification current revision). For double packaged containers, only the inner package volume may be used for classification.

5.2 Preferred waste classification procedure

This algorithm for waste classification is performed using a computer when available. When using computer ensure data entry is accurate. Waste classification is to be performed by the Waste Broker with quality review performed by the RSO.

5.2.1 Classification determined by long-lived radionuclides. If the waste contains only radionuclides listed in Table 1, classification is determined as follows:

- a) If the concentration does not exceed 0.1 times the value in Table 1, the waste is Class A.
- b) If the concentration exceeds 0.1 times the value in Table 1, but does not exceed the value in Table 1, the waste is Class C.
- c) If the concentration exceeds the value in Table 1, the waste is not generally acceptable for near-surface disposal.
- d) For waste containing mixtures of radionuclides listed in Table 1, the total concentration shall be determined by the sum of fractions rule described in Section 4.5.
- e) Site specific variations to Tables 1 and 2 may exist. Prior to classifying waste verify that correct numbers are being used for the planned disposal facility.

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Table 1

Radionuclide	Concentration Curies/Cubic Meter
C-14	8
C-14 in activated metal	80
Ni-59 in activated metal	220
Nb-94 in activated metal	0.2
Tc-99	3
I-129	0.08
Alpha emitting transuranic radionuclides with half life greater than five years	100 ¹
Pu-241	3,500 ¹
Cm-242	20,000 ¹
Ra-226	100 ¹

¹Units are nanocuries per gram, to convert to becquerels (Bq) per gram multiply by 37, to convert from curies to gigabecquerels (GBq) multiply by 37. Specific approval of SCDHEC is required for disposal of these radionuclides if their concentration is greater than ten percent of the Table 1 value.

5.2.2 Classification determined by short lived radionuclides. If the waste does not contain any of the radionuclides listed in Table 1, classification shall be determined based on the concentrations shown in Table 2. If the radioactive waste does not contain any radionuclides listed in either Table 1 or 2, it is Class A.

- a) If the concentration does not exceed the value of Column 1, the waste is Class A.
- b) If the concentration value exceeds the value in Column 1, but does not exceed the value in Column 2, the waste is Class B.
- c) If the concentration exceeds the value in Column 2, but does not exceed the value in Column 3, the waste is Class C.
- d) If the concentration exceeds the value in Column 3, the waste is not generally acceptable for near-surface disposal.
- e) For wastes containing mixtures of the radionuclides listed in Table 2, the total concentration shall be determined by the sum of fractions rule described in (4.5).
- f) Site specific variations to Table 2 may exist. Prior to classifying waste verify that correct numbers are being used for the planned disposal facility.

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Table 2

Radionuclide	Concentration Curies/Cubic Meter		
	Column 1	Column 2	Column 3
Total of all radionuclides with less than 5-year half-life	700	(*)	(*)
H-3	40	(*)	(*)
Co-60	700	(*)	(*)
Ni-63	3.5	70	700
Ni-63 in activated metal	35	700	7,000
Sr-90	0.04	150	7,000
Cs-137	1	44	4,600

(*) There are no limits established for these radionuclides in Class B or C wastes. Practical consideration such as the effects of external radiation and internal heat generation on transportation, handling, and disposal will limit the concentrations for these wastes. These wastes are Class B unless the concentration of other radionuclides in Table 2 determine the waste to be Class C independent of these radionuclides. Specific approval of SCDHEC is required prior to packaging of Class B tritium waste.

5.2.3 Classification determined by both long-lived and short-lived radionuclides. If the waste contains a mixture of radionuclides, some of which are listed in Table 1, and some of which are listed in Table 2, classification shall be determined as follows:

- a) If the concentration of a radionuclide listed in Table 1 is less than 0.1 times the value listed in Table 1 the class shall be that determined by the concentration of radionuclides listed in Table 2.
- b) If the concentration of a radionuclide listed in Table 1 exceeds 0.1 times the value listed in Table 1, the waste shall be Class C, provided the concentration of radionuclides listed in Table 2 does not exceed the value shown in Column 3 of Table 2.

5.2.4 Classification of waste with radionuclides other than those listed in Tables 1 and 2. If the waste does not contain any radionuclides listed in either Table 1 or 2, it is Class A.

5.2.5 The 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 by dividing each radionuclide's concentration by the appropriate limit and adding the resulting values. The appropriate limits must all be taken from the same column of the same table. The sum of the fractions for the column must be less than or equal to 1.0 if the waste class is to be determined by that column.

EXAMPLE

A waste contains Sr-90 in a concentration of 50 Ci/m³ and Cs-137 in a concentration of 22 Ci/m³. Since the concentrations both exceed the values

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in Column 1, Table 2, 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 the fractions = 0.83. Since the sum is less than 1.0, the waste is Class B.

5.2.6 Determine package type in accordance with 49 CFR 173.431, 173.433 and 173.435.

5.2.7 Determine if R.Q. marking is required using 49 CFR 172.101 Appendix Table 2.

5.2.8 Verify LSA concentrations with 49 CFR 173.403 (N).

5.2.9 Any items exceeding a destination facility license shall not be shipped, refer to destination facility license. If material does not comply with license for the facility the shipment is going to, the waste will not be accepted.

6.0 Quality Control

Instrumentation used to perform measurements required by this procedure will be checked with standards and verified to have a current calibration.

7.0 Records

7.1 Waste classification will be documented on Form GPI13-1, (may be computer generated).

7.2 Waste classification will be documented when shipping radioactive material to the burial site in accordance with GPI-11.

8.0 References

10 CFR part 61

CNSI Barnwell Waste Management Facility License

US Ecology Hanford License

9.0 Attachments

Form GPI13-1

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Form GPI13-1

VERIFICATION WORKSHEET FOR WASTE CLASSIFICATION DETERMINATION

CONTAINER NUMBER: _____

GENERATOR: _____

CONTAINER WEIGHT: _____

CONTAINER VOLUME: _____

PACKAGE TYPE: _____

TYPE A FRACTION: _____

RQ LABELING: _____

LSA CONCENTRATION: _____

TABLE 1 CLASS: _____

TABLE 2 CLASS: _____

RADIONUCLIDE QUANTITIES IN THIS CONTAINER (mCi's)

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	TOTALS _____

WEIGHT OF WASTE = _____ LBS.