



## Ohio Administrative Code

### Rule 3701:1-54-10 Land disposal - waste classifications and characteristics.

Effective: November 14, 2022

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(A) The criteria to use for classifying waste for disposal are recorded below.

(1) Determination of the classification of radioactive waste involves two considerations. First, consideration must be given to the concentration of long-lived radionuclides (and their shorter-lived precursors) whose potential hazard will persist long after such precautions as institutional controls and improved waste form have ceased to be effective. These precautions delay the time when long-lived radionuclides could cause exposures. In addition, the magnitude of the potential dose is limited by the concentration and availability of the radionuclide at the time of exposure. Second, consideration must be given to the concentration of shorter-lived radionuclides for which requirements on institutional controls, waste form, and disposal methods are effective.

(2) Determination of waste classes shall be performed using the following criteria.

(a) Class A waste is waste that is usually segregated from other waste classes at the disposal site. The physical form and characteristics of class A waste must meet the minimum requirements set forth in paragraph (B) of this rule. If class A waste also meets the stability requirements set forth in paragraph (B) of this rule, it is not necessary to segregate the waste for disposal.

(b) 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 paragraph (B) of this rule.

(c) 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 paragraph (B) of this rule.

(d) Waste that exceeds class C is not acceptable for disposal under rules 3701:1-54-06 to 3701:1-54-



12 of the Administrative Code.

(3) If radioactive waste contains only radionuclides listed in table 1, classification shall be 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 acceptable for disposal under rules 3701:1-54-06 to 3701:1-54-12 of the Administrative Code.

(d) For wastes containing mixtures of radionuclides listed in table 1, the total concentration shall be determined by the sum of fractions rule described in paragraph (A)(7) of this rule.

Radionuclide	Concentration Gigabecquerels per cubic meter	Concentration curies per cubic meter
C-14	296	8
C-14 in activated metal	2960	80
Ni-59 in activated metal	8140	220
Nb-94 in activated metal	7.4	0.2
Tc-99	111	3
I-129	2.96	0.08
Alpha emitting transuranic radionuclides with half-life greater than five years	\1\ 0.0037	\2\ 100
Pu-241	\1\ 0.1295	\2\ 3500
Cm-242	\1\ 0.74	\2\ 20,000
Ra-226	\1\ 0.0037	\2\ 100

\1\ Units are megabecquerels per gram.



\2\ Units are nanocuries per gram.

(4) If radioactive waste does not contain any of the radionuclides listed in table 1, classification shall be determined based on the concentrations shown in table 2. However, as specified in paragraph (A)(6) of this rule, if radioactive waste does not contain any radionuclides listed in either table 1 or table 2, it is class A.

(a) If the concentration does not exceed the value in column 1, the waste is class A.

(b) If the concentration 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 acceptable for disposal under rules 3701:1-54-06 to 3701:1-54-12 of the Administrative Code.

(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 paragraph (A)(7) of this rule.

Radionuclide	Concentration Gigabecquerels per cubic meter	Concentration curies per cubic meter		Col. 1	Col. 2	Col. 3
Col. 1	Col. 2	Col. 3	Total of all radionuclides with less than 5 year half-life	25,900	(\1\)	(\1\)
700	(\1\)	(\1\)	H-3	1480	(\1\)	(\1\)
40	(\1\)	(\1\)	Co-60	25,900	(\1\)	(\1\)
700	(\1\)	(\1\)	Ni-63	129.5	2590	25,900
3.5	70	700	Ni-63 in activated metal	1295	25,900	259,000
35	700	7000	Sr-90	1.48	5550	259,000
0.04	150	7000	Cs-137	37	1628	170,200



\1\There are no limits established for these radionuclides in class B or C wastes. Practical considerations 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 shall be class B unless the concentrations of other nuclides in table 2 determine the waste to be class C independent of these radionuclides.

(5) If radioactive 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 does not exceed 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 but does not exceed the value 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.

(6) If radioactive waste does not contain any radionuclides listed in either table 1 or table 2, it is class A.

(7) This is the sum of the 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 one if the waste class is to be determined by that column.

(8) The concentration of a radionuclide may be determined by indirect methods such as use of scaling factors which relate the inferred concentration of one radionuclide to another that is measured, or radionuclide material accountability, if there is reasonable assurance that the indirect methods can be correlated with actual measurements. 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 megabecquerels or nanocuries per gram.



(9) Each package of waste must be clearly labeled to identify whether it is class A waste, class B waste, or class C waste, in accordance with paragraphs (A)(1) to (A)(8) of this rule.

(B) The following waste characteristics are minimum requirements for all classes of waste and are intended to facilitate handling at the disposal site and provide protection of health and safety of personnel at the disposal site.

(1) Waste must not be packaged for disposal in cardboard or fiberboard boxes.

(2) Liquid waste must be solidified or packaged in sufficient absorbent material to absorb twice the volume of the liquid.

(3) Solid waste containing liquid shall contain as little free standing and noncorrosive liquid as is reasonably achievable, but in no case shall the liquid exceed one per cent of the volume.

(4) Waste must not be readily capable of detonation or of explosive decomposition or reaction at normal pressures and temperatures, or of explosive reaction with water.

(5) Waste must not contain, or be capable of generating, quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling, or disposing of the waste. This does not apply to radioactive gaseous waste packaged in accordance with paragraph (B)(7) of this rule.

(6) Waste must not be pyrophoric. Pyrophoric materials contained in waste shall be treated, prepared, and packaged to be nonflammable.

(7) Waste in a gaseous form must be packaged at a pressure that does not exceed 1.5 atmospheres at twenty degrees celsius. Total activity must not exceed one hundred curies per container.

(8) Waste containing biological, pathogenic, or infectious material must be treated to reduce to the maximum extent practicable the potential hazard from the non-radiological materials.

(9) The requirements in this rule are intended to provide stability of the waste. Stability is intended to ensure that the waste does not structurally degrade and affect overall stability of the site through



slumping, collapse, or other failure of the disposal unit and thereby lead to water infiltration. Stability is also a factor in limiting exposure to an inadvertent intruder, since it provides a recognizable and nondispersible waste.

(a) Waste must have structural stability. A structurally stable waste form will generally maintain its physical dimensions and its form, under the expected disposal conditions such as weight of overburden and compaction equipment, the presence of moisture, and microbial activity, and internal factors such as radiation effects and chemical changes. Structural stability can be provided by the waste form itself, processing the waste to a stable form, or placing the waste in a disposal container or structure that provides stability after disposal.

(b) Notwithstanding the provisions in paragraphs (B)(2) and (B)(3) of this rule, liquid wastes, or wastes containing liquid, must be converted into a form that contains as little free standing and noncorrosive liquid as is reasonably achievable, but in no case shall the liquid exceed one per cent of the volume of the waste when the waste is in a disposal container designed to ensure stability, or 0.5 per cent of the volume of the waste for waste processed to a stable form.

(c) Void spaces within the waste and between the waste and its package must be reduced to the extent practicable.

(C) The director may, upon request or on his or her own initiative, authorize other provisions for the classification and characteristics of waste on a specific basis, if, after evaluation of the specific characteristics of the waste, disposal site, and method of disposal, he or she finds reasonable assurance of compliance with the performance objectives specified in Chapter 3701:1-54 of the Administrative Code.