

10 CFR Part 61.55 Waste Classification

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Background on Regulations

- NRC's low-level radioactive waste disposal regulations are provided in 10 CFR Part 61 (1982).
- Safety decisions heavily informed by analyses – some performed by licensee; some performed by NRC.
- For the NRC portion, assumptions about waste form and quantities are fixed.
- Development of the rule was based on analysis of the waste types and volumes expected circa 1981

Part 61 Performance Objectives

- Provides requirements for a licensee or applicant to demonstrate compliance with the performance objectives in Part 61:
 - 61.41: Protection of the public from releases.
 - 61.42: Protection of inadvertent intruders
 - 61.43: Protection of individuals during operations
 - 61.44: Stability of the disposal site after closure.

Waste Classification Table 1

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 nuclides with half-life greater than five years	100*
Pu-241	3,500*
Cm-242	20,000*

*
Units are nanocuries per gram

Note: Limits are Class C values. Class A is 10% of the Class C value)

Waste Classification Table 2

Table 2

Radionuclide	Concentration, Curies/cubic meter		
	Column 1	Column 2	Column 3
Total of all nuclides 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	7000
Sr-90	0.04	150	7000
Cs-137	1	44	4600

** 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 the Class C independent of these nuclides.

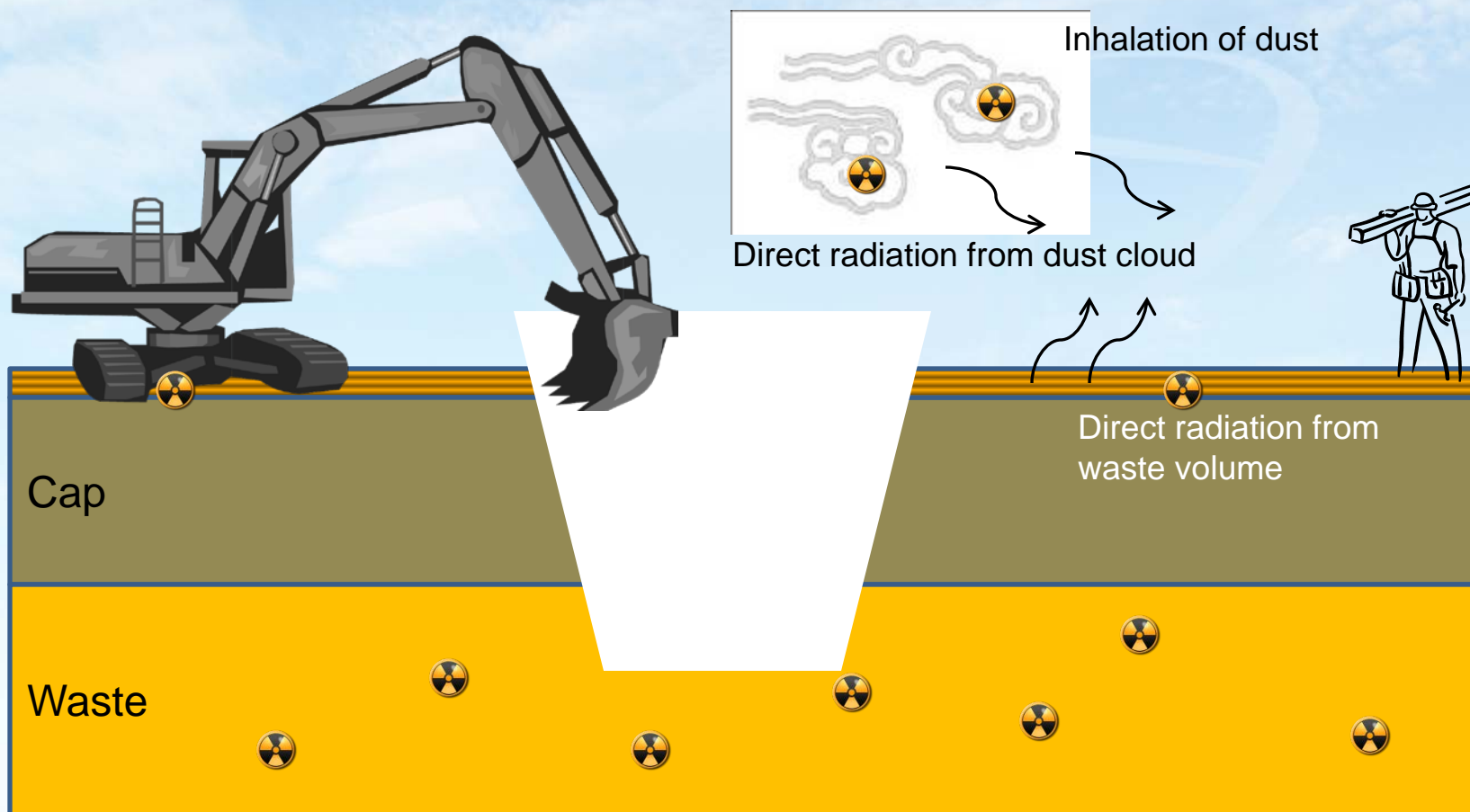
Waste Classification Tables

- Limits inventory suitable for near-surface disposal
- Constrains societal uncertainty
- Embedded assumptions – inventory, waste disposal
- Combined short- and long-lived isotopes
- Designed to address intruder protection only, other performance objectives may not be met by waste classification alone
- Not all isotopes important for limiting releases to the environment are reflected in Tables 1 and 2 of 61.55

Inherent Assumptions

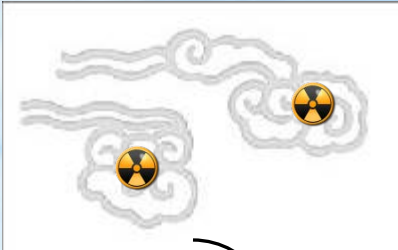
- Based on simple disposal practices
- Assumed random mixing of waste packages
 - Concentrations in table were increased by factor of 4, 10 or 20 to account for mixing
- Scenarios included intruder construction (possibility of discovery) [acute], and intruder agriculture [chronic] but no ground water
- Intake to Dose conversion factors used ICRP 2 (1959)

Intruder Construction

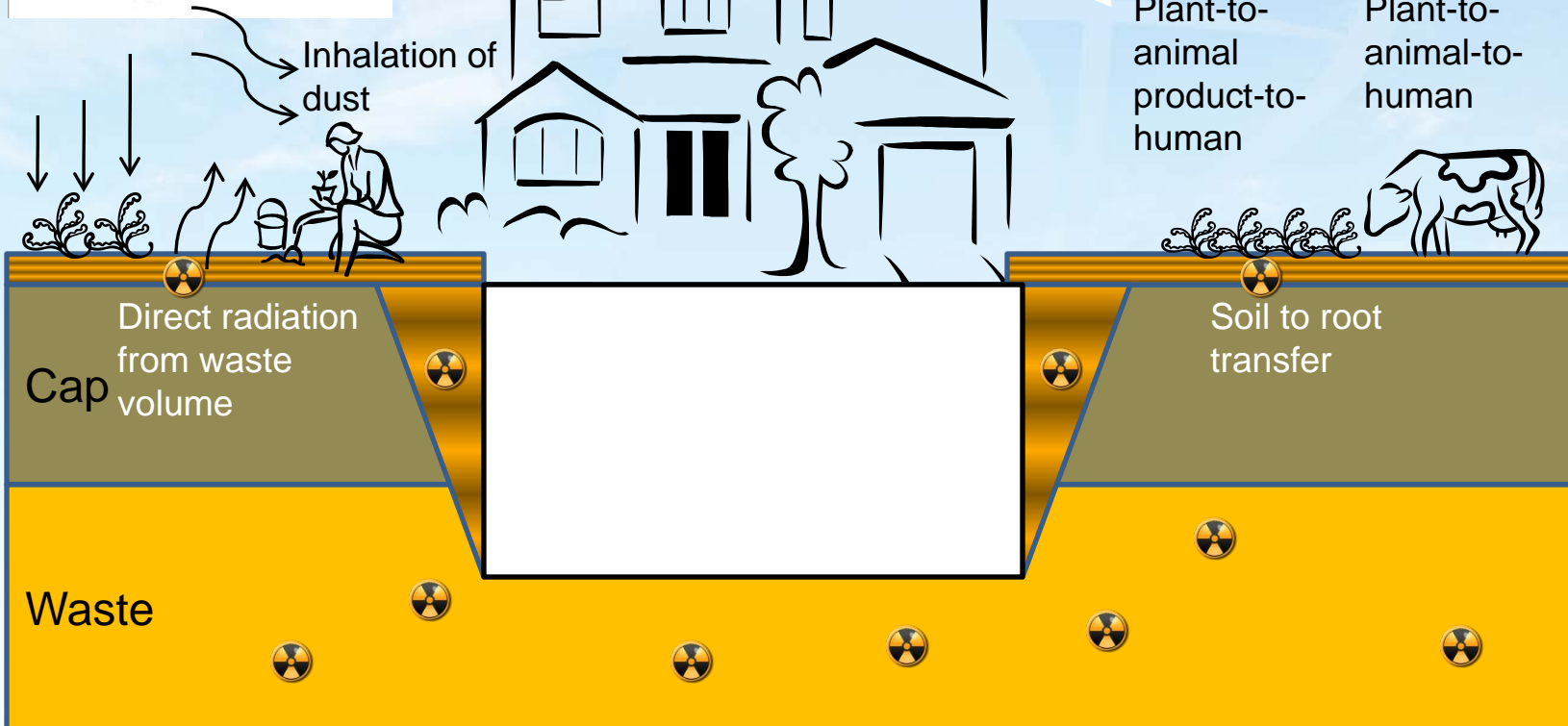


Intruder Agriculture

Direct radiation
from dust cloud



NOTE: Includes modified food pathways to account for non-equilibrium deposition and subsequent root uptake: (i) plant-human; (ii) plant-animal-human; and (iii) plant-animal product-human



Waste Classification System

- 2 tables with specific isotopes and concentration limits
- Divides low level radioactive waste into four categories:
 - Class A waste - 100 year intrusion
 - Class B waste - 300 year intrusion
 - Class C waste - 500 year intrusion
 - Greater than Class C waste

Waste Classification System (cont'd)

- Several radionuclides of interest are NOT on the table
- Uranium, Thorium, Radium, and Chlorine-36
- At time of original rule, either
 - Not large amounts going to commercial sites
 - Not part of Atomic Energy Act authority

NRC Staff Guidance

- NRC Commission directed staff to update the tables in a future rulemaking including adding uranium
- In addition, advise on potential legislative changes due to inclusion in Federal Law
- This rulemaking has not started