Savannah River Remediation

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F-Tank Farm NDAA Section 3116 Draft Basis Document Scoping Meeting

Radionuclide Concentrations of Stabilized Residuals, Tanks and Ancillary Structures Input Package (FTF-WDIP-004)

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Presentation Overview

- NDAA 3116(a) Criteria
  - 10 CFR 61.55, Concentration Limits
- Draft FTF 3116 Basis Document Approach
- 10 CFR 61.55
  - Demonstration of NDAA 3116(a)(3)(A) Criterion
  - Draft FTF 3116 Basis Document Content

Presentation Overview

- Input package FTF-WDIP-004 provides information anticipated to be used in Section 6.0, *Radionuclide Concentrations of Stabilized Residuals, Tanks and Ancillary Structures*, of the Draft FTF 3116 Basis Document. Specifically, this input package addresses:
  - 10 CFR 61.55, *Waste Classification*

NDAA 3116(a)

The NDAA Section 3116(a) provides in pertinent part:

> [T]he term "high-level radioactive waste" does not include radioactive waste resulting from the reprocessing of spent nuclear fuel that the Secretary of Energy…, in consultation with the Nuclear Regulatory Commission…, determines –
>
> (3)(A) does not exceed concentration limits for Class C low-level waste as set out in section 61.55 of title 10, Code of Federal Regulations, and will be disposed of—

FTF-WDIP-004

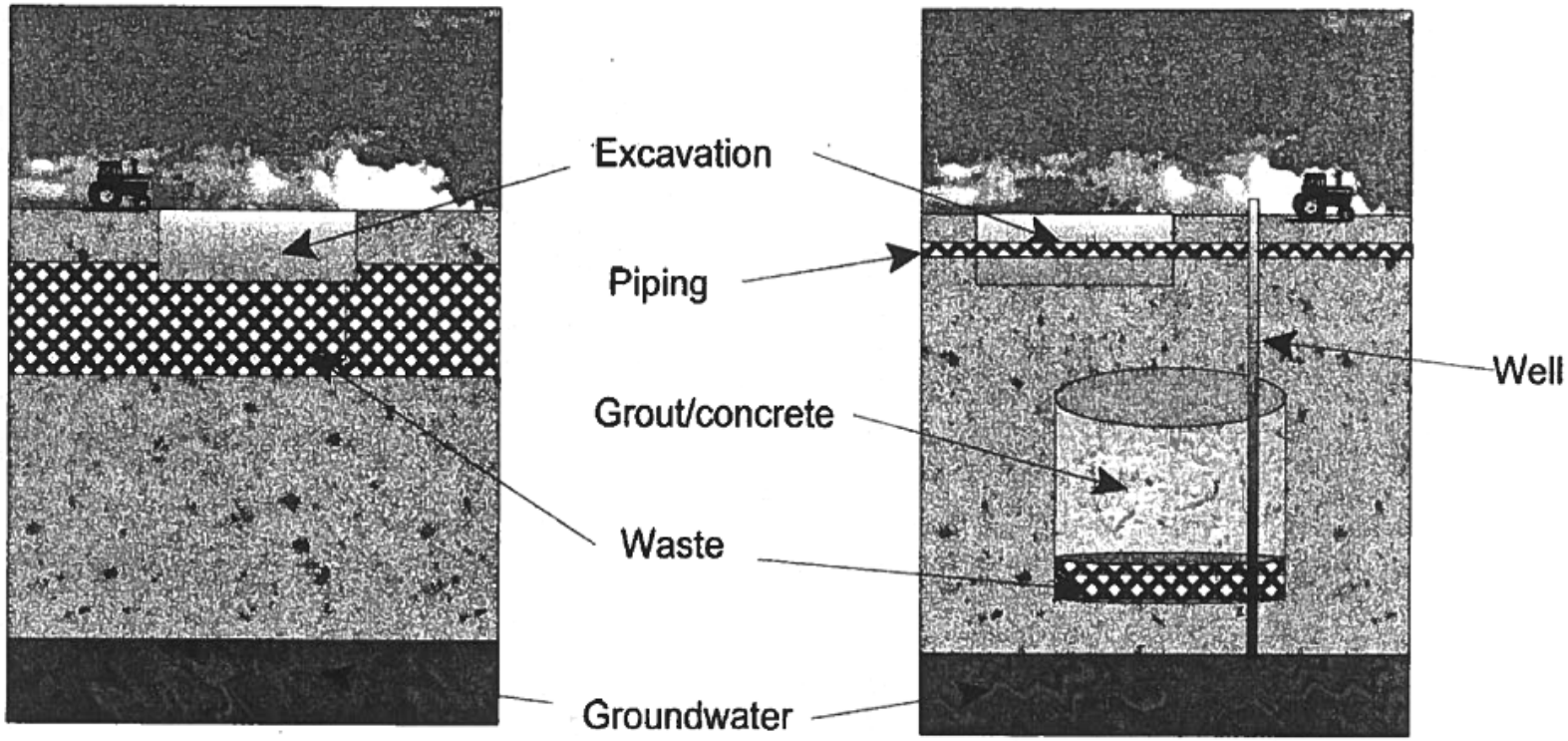
Draft Basis Document Approach

- For the Draft FTF 3116 Basis Document, comparison with the 10 CFR 61.55 Table 1 and 2 concentration limits will be used to demonstrate compliance with NDAA 3116(a)(3)(A) of less than Class C.
  - Using an intruder-drilling scenario
  - Concentration calculations consistent with NUREG-1854 Category 3 site-specific averaging

NUREG-1854 Category 3 Scenarios

Part 61 Intruder Construction Scenario

Incidental Waste Intruder Scenario for Tank Residuals or Ancillary Equipment

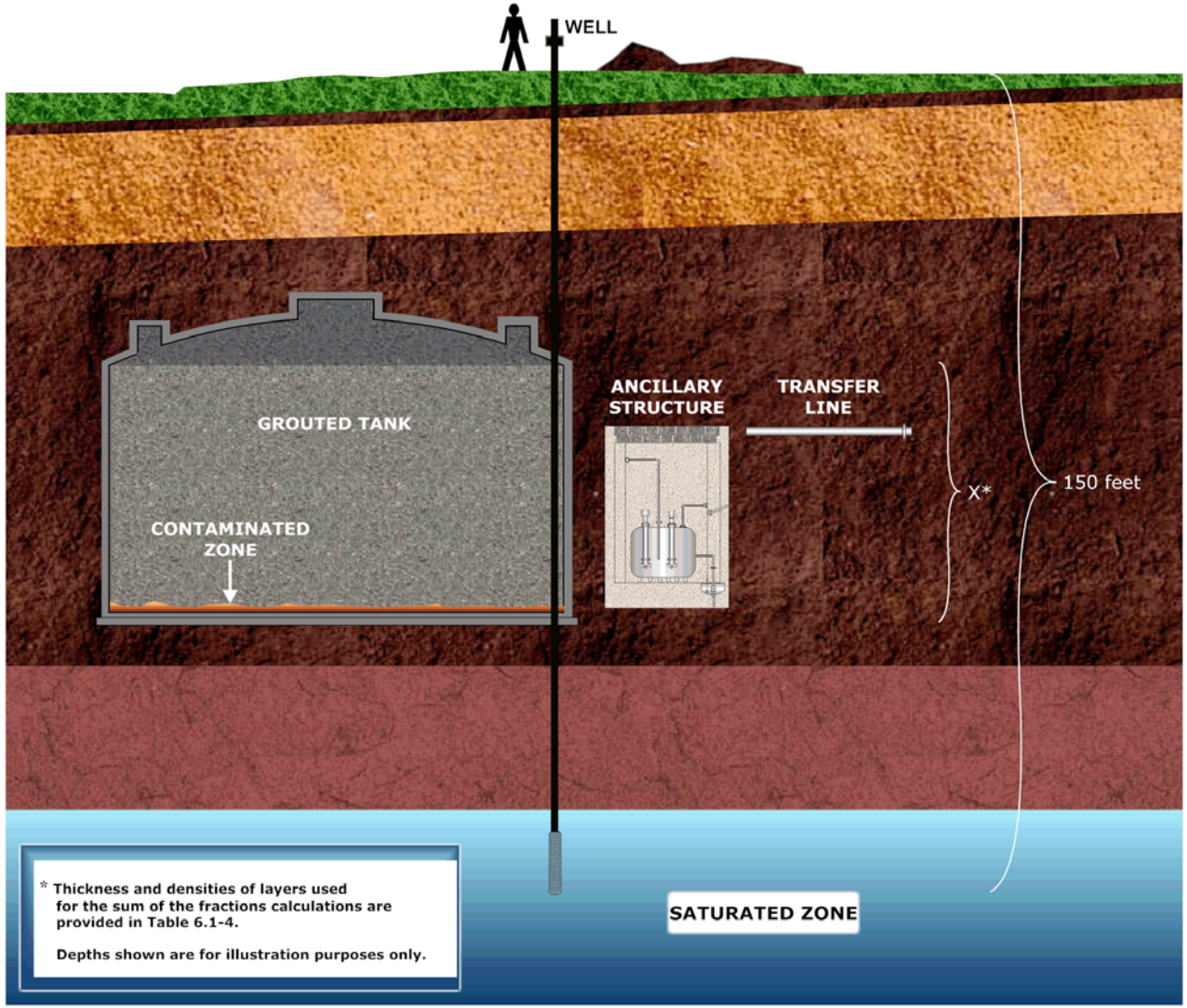


Deterministic calculations
Dosimetry - ICRP 2
Generic parameter sets
(a)

Probabilistic or deterministic calculations
Dosimetry - ICRP 26 and 30
Site-specific parameter values or distributions
(b)

[NUREG-1854 page 3-29]

Draft Basis Document Approach



[NOT TO SCALE]

Draft Basis Document Approach

- Draft FTF 3116 Basis Document input:
  - Tanks filled with reducing grout
  - All residual inventory in tank assumed to be as a uniform thickness on tank floor
  - Intruder assumed to drill an 8” diameter 150 foot deep borehole
  - Four basic tank designs can be standardized in terms of masses and volumes for sum of fraction calculations

NDAA 3116(a)(3)(A) Criterion

- 10 CFR 61.55 Class C Table 1 and 2 concentration limits

10 CFR 61.55 Table 1 Class C Concentration Limits

Radionuclides (Long-lived)	**Concentration (Ci/m^3)**
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	[1]100
Pu-241	[1]3,500
Cm-242	[1]20,000

[1] Units are in nanocuries per gram.
[10 CFR 61]

NDAA 3116(a)(3)(A) Criterion

10 CFR 61.55 Table 2 Class C Concentration Limits

Radionuclides (Short-lived)	**Concentration (Ci/m³)**		
	Column 1 [Class A]	**Column 2 [Class B]**	**Column 3 [Class C]**
Total of all nuclides with less than 5 year half-life	700	([1])	([1])
H-3	40	([1])	([1])
Co-60	700	([1])	([1])
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

[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 the table determine the waste to be Class C independent of these nuclides.
[10 CFR 61]

Draft FTF 3116 Basis Document Content

- Draft Basis Document contains Class C concentration calculation inputs for:
  - Ratio of borehole cross sectional area to tank floor area for each tank type (WasteRatio)
  - Mass calculations for each material layer for each tank type ($M_{structure}$)

Draft FTF 3116 Basis Document Content

- Draft Basis Document contains Class C concentration calculation equations:
  - For volume-based concentrations

$$SOFi = \frac{(Ci) \times (WasteRatio)}{1.48\ m^3} x \frac{1}{Table_Value}$$

  - For mass-based concentrations

$$SOFi = \frac{(Ci) \times (WasteRatio)}{M_{structure}} x \frac{1}{Table_Value}$$

Draft FTF 3116 Basis Document Content

- Two concentration example calculations are included with both based on radionuclide inventory information in the FTF Performance Assessment
  - Waste tank concentration example calculation using the Tank 18 PA inventory
    - Sum of fractions is 0.11
  - Transfer line concentration example calculation using 4-inch transfer line PA inventory
    - Sum of fractions is 0.0034
- Final inventories will be used for Tier 2 documentation before individual tank or equipment closure

Conclusions

- The Draft FTF 3116 Basis Document will outline the methodology and input assumptions to be used in concentration calculations
- Concentration calculations will be based on an intruder-drilling scenario through a representative waste tank or ancillary structure using the NUREG-1854 Category 3 methodology
- DOE believes there is a reasonable basis to determine that none of the stabilized residuals at FTF will exceed that Class C concentration limits in 10 CFR 61.55

Notes

Notes