

# Savannah River Tank Waste Residuals

## HLW Corporate Board

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Presentation By  
**Sherri R. Ross**

Department of Energy Savannah River Operations Office



# The Issue

- How clean is clean?
- Ultimate Challenge – *Justify highly radioactive radionuclides have been removed to the maximum extent practical?*
  - Building compelling regulatory documentation that will withstand intense scrutiny



# §3116 Requirements

1. Does not require disposal in deep geological repository
2. **Highly radioactive radionuclides removed to the maximum extent practical**
3. Meet the performance objectives in 10 CFR Part 61, Subpart C
4. Waste disposed pursuant to a State-approved closure plan or permit

Note: If it is anticipated that Class C disposal limits will be exceeded, additional consultation with the NRC is required



# DOE M 435.1-1 WIR Evaluation

“Determinations that any waste is incidental to reprocessing by the evaluation process shall be developed under good record-keeping practices, with an adequate quality assurance process, and shall be documented to support the determinations. Such wastes may include, but are not limited to, spent nuclear fuel reprocessing plant wastes that:

(a) Will be managed as low-level waste and meet the following criteria:

- 1. Key radionuclides removed to the maximum extent that is technically and economically practical; and**
2. Meet the performance objectives in 10 CFR Part 61, Subpart C
3. Meet Class C low-level waste concentration limits



# Performance Objectives

Requirement	All-Pathway Dose	Intruder Dose	Air Pathway Dose	Radon Flux	Groundwater Protection
NDAA Section 3116	25 mrem/yr	500 mrem/yr	N/A	N/A	N/A
DOE O 435.1	25 mrem/yr	500 mrem – acute 100 mrem/yr – chronic	10 mrem/yr	20 pCi/m <sup>2</sup> /s at ground surface	<MCL
Wastewater Permit	N/A	N/A	N/A	N/A	<MCL

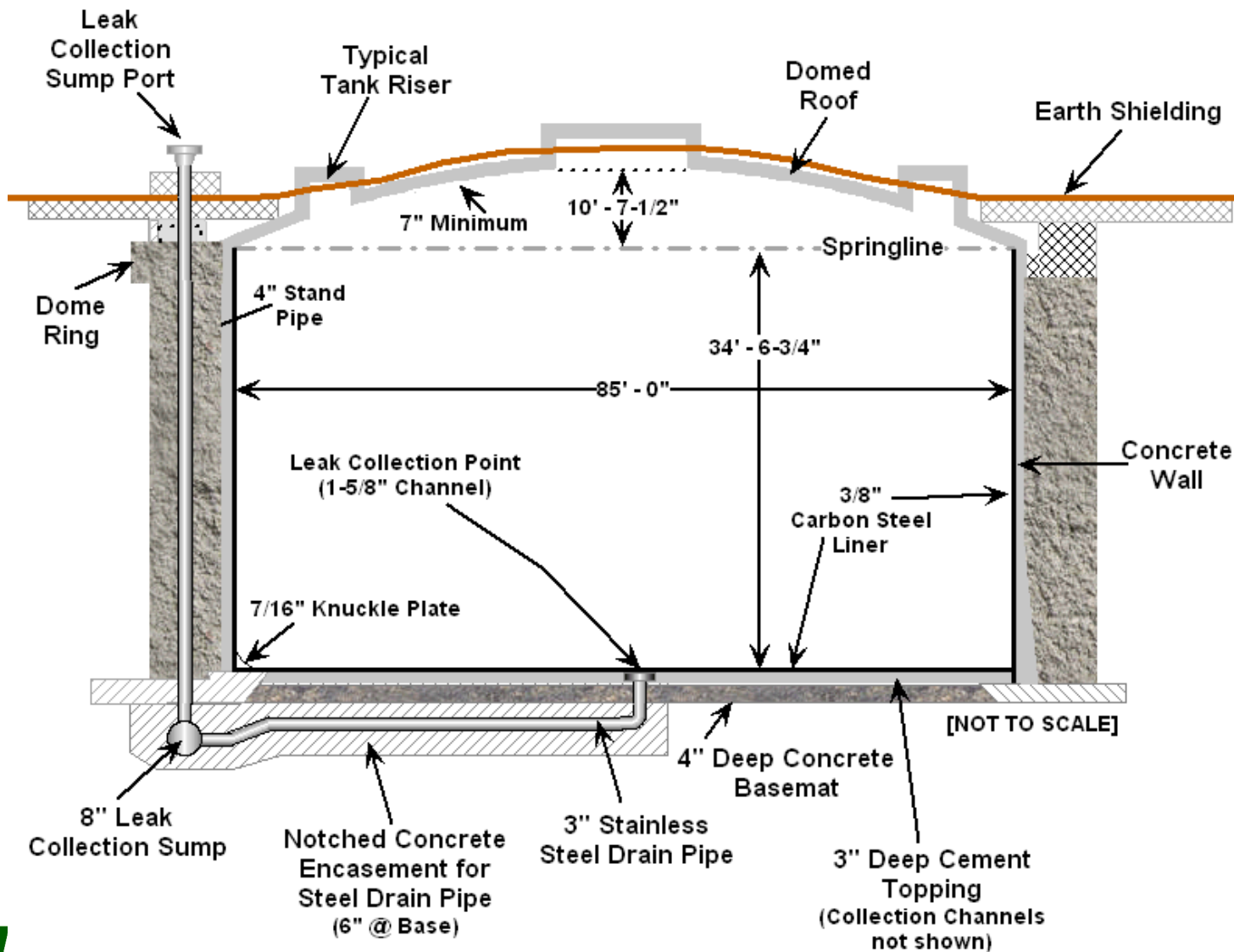


# Results Achieved To Date

	Tank 17	Tank 18	Tank 19	Tank 20
<b>Total Water Additions (gal)</b>	<b>1,900,000</b>	<b>2,200,000</b>	<b>2,600,000</b>	<b>1,700,000</b>
<b>Total Residual Volume (gal)</b>	<b>7,080</b>	<b>6,700</b>	<b>16,900</b>	<b>3,540</b>
Liquid	4,680	2,400	1,800	2,540
Wet Solids	2,400	4,300	15,100	1,000
Percent Zeolite	0%	46%	66%	0%
<b>Total Residual Curies (Ci)</b>	<b>2,260</b>	<b>28,000</b>	<b>96,000</b>	<b>540</b>
C-137/Ba-137m	112	24,200	95,600	80
Sr-90/Y-90	1,668	2,820	80	380
Pu Isotopes	380	521	122	62
Tc-99	3.6	1.5	6.8	0.9



# Typical Type IV Tank

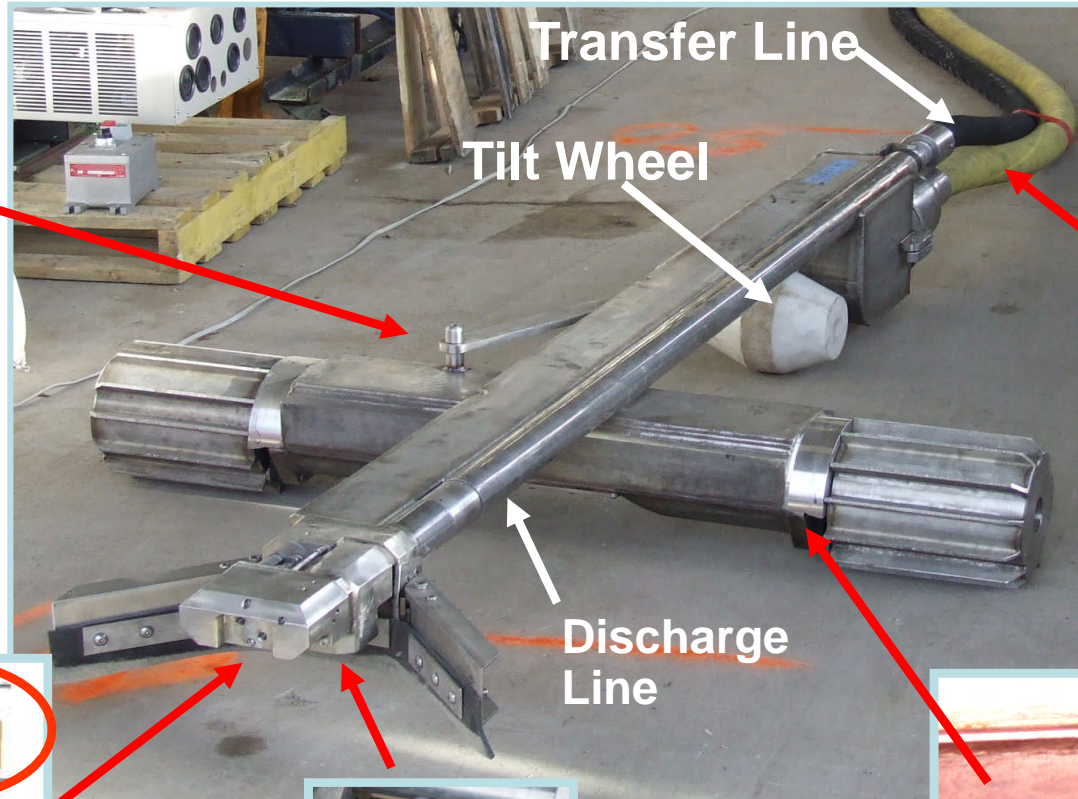
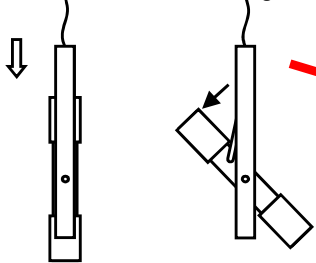


# Sand Mantis®

## Tank Insertion

lower platform  
into tank

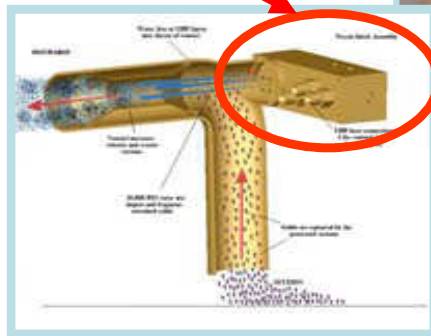
extend wheel  
housing



## Umbilical Line

(Contains Hydraulic, HP and UHP Hoses)

## Eductor



## Cable Cutter



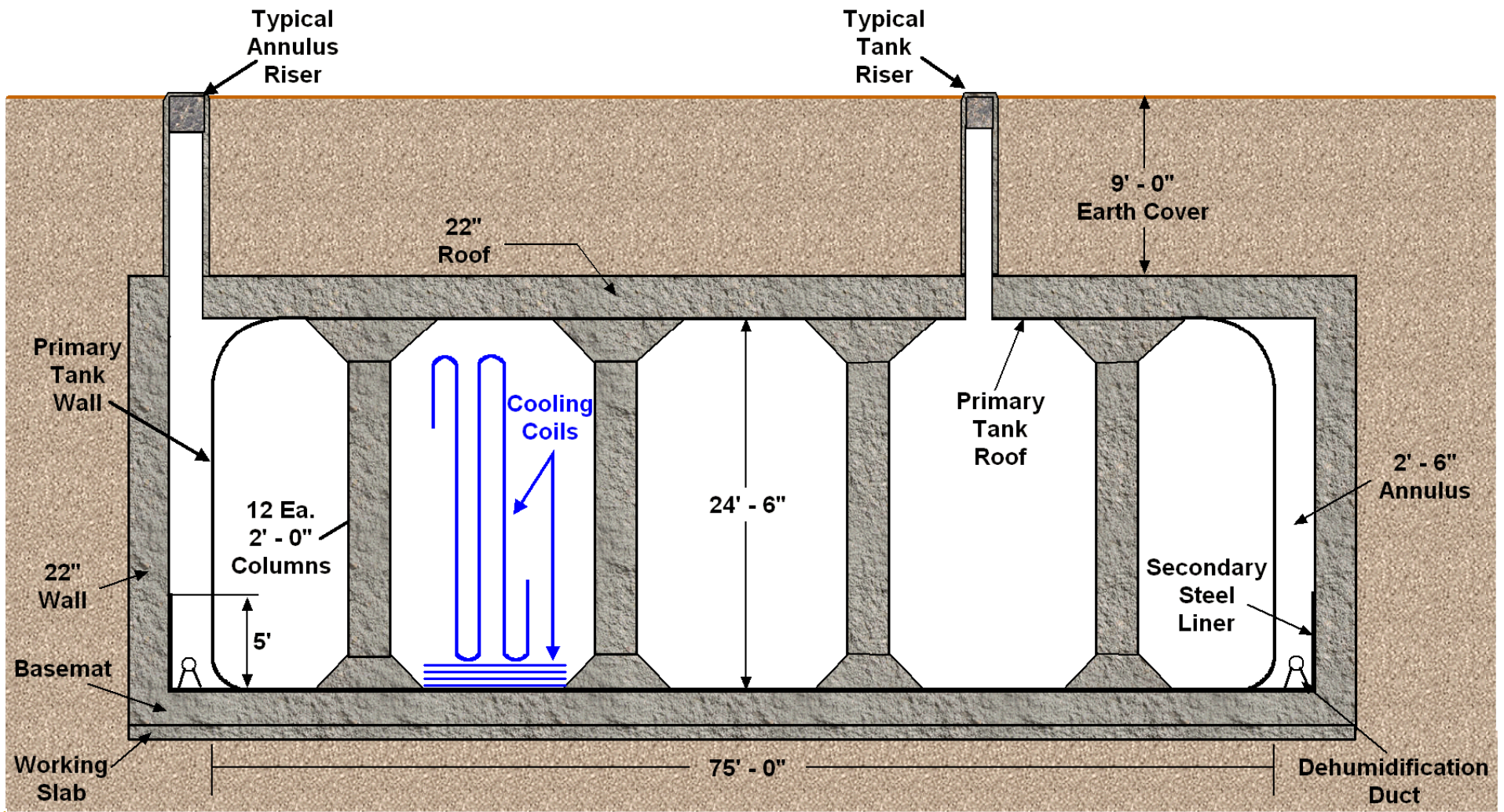
## Discharge Line

## Suction

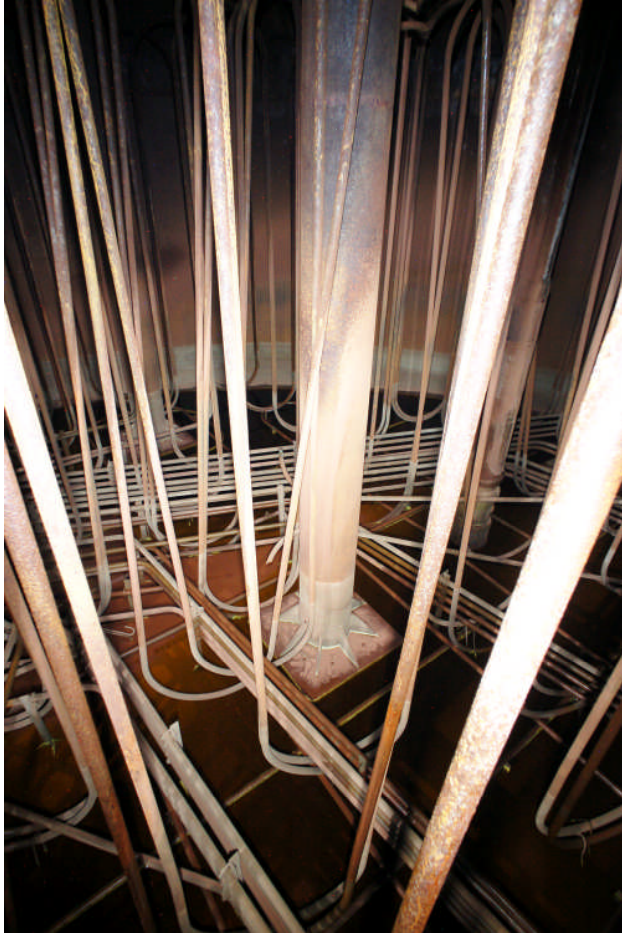




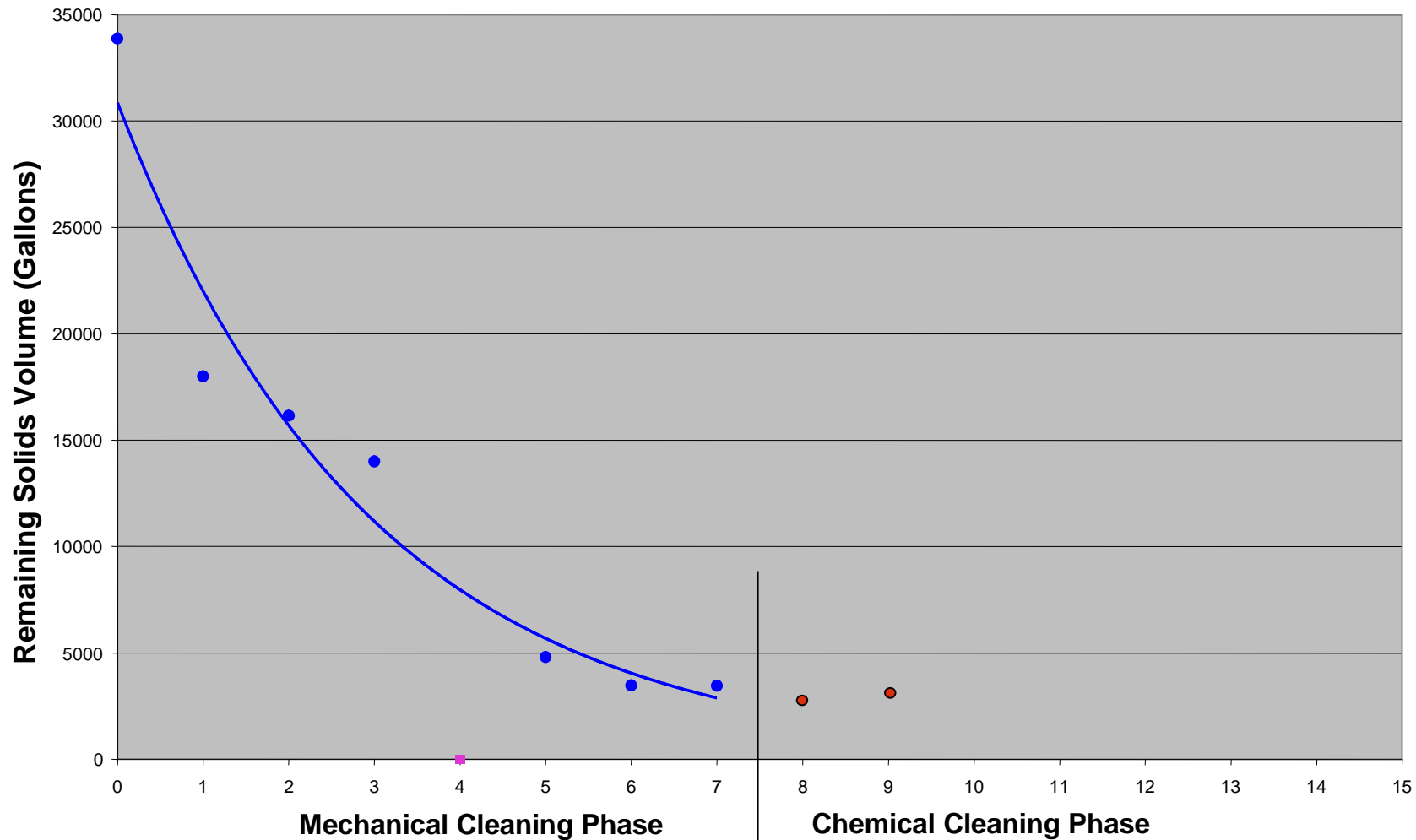
# Typical Type I Tank



# Cooling Coils in Type I Tanks



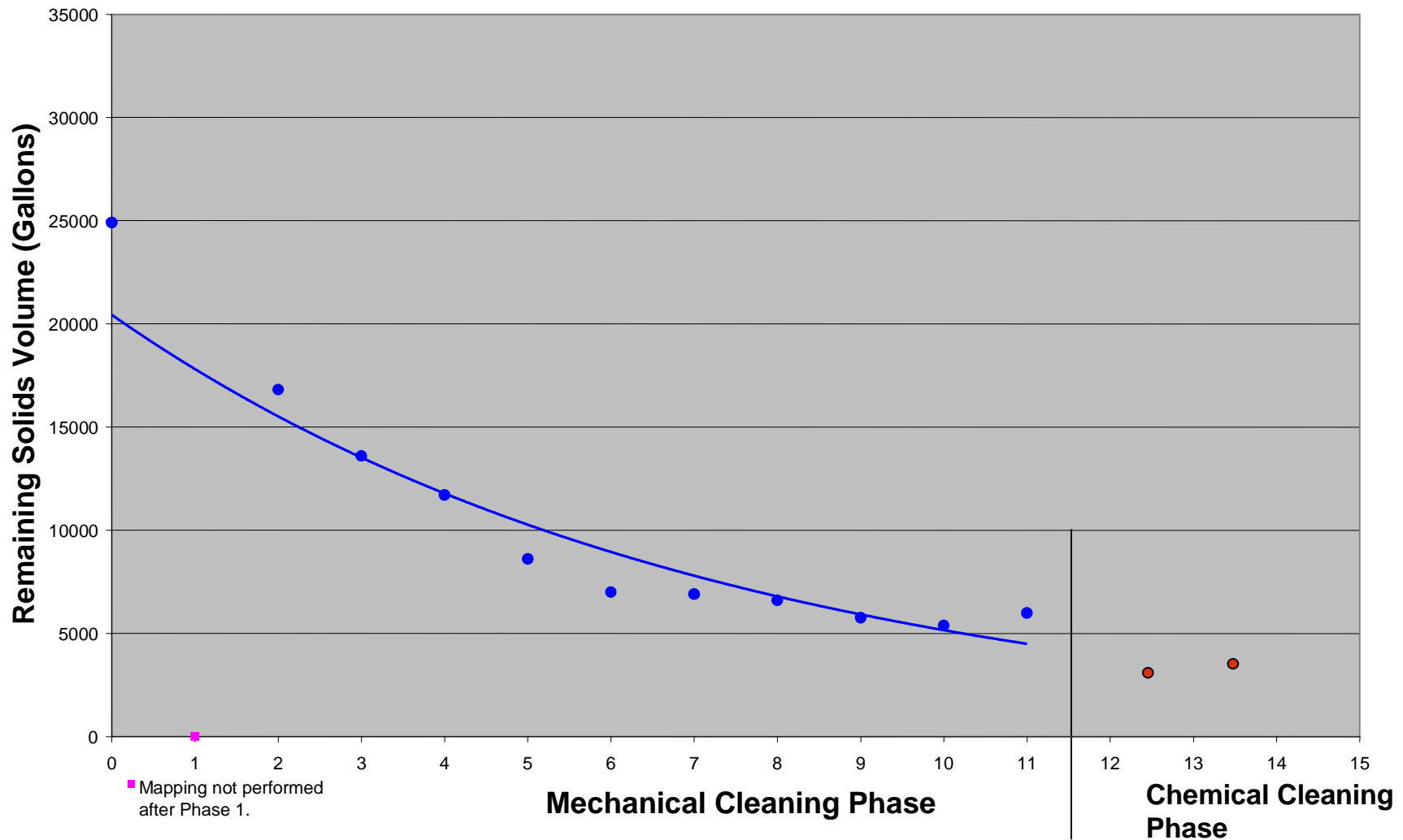
# Tank 5 – Cleaning To Date



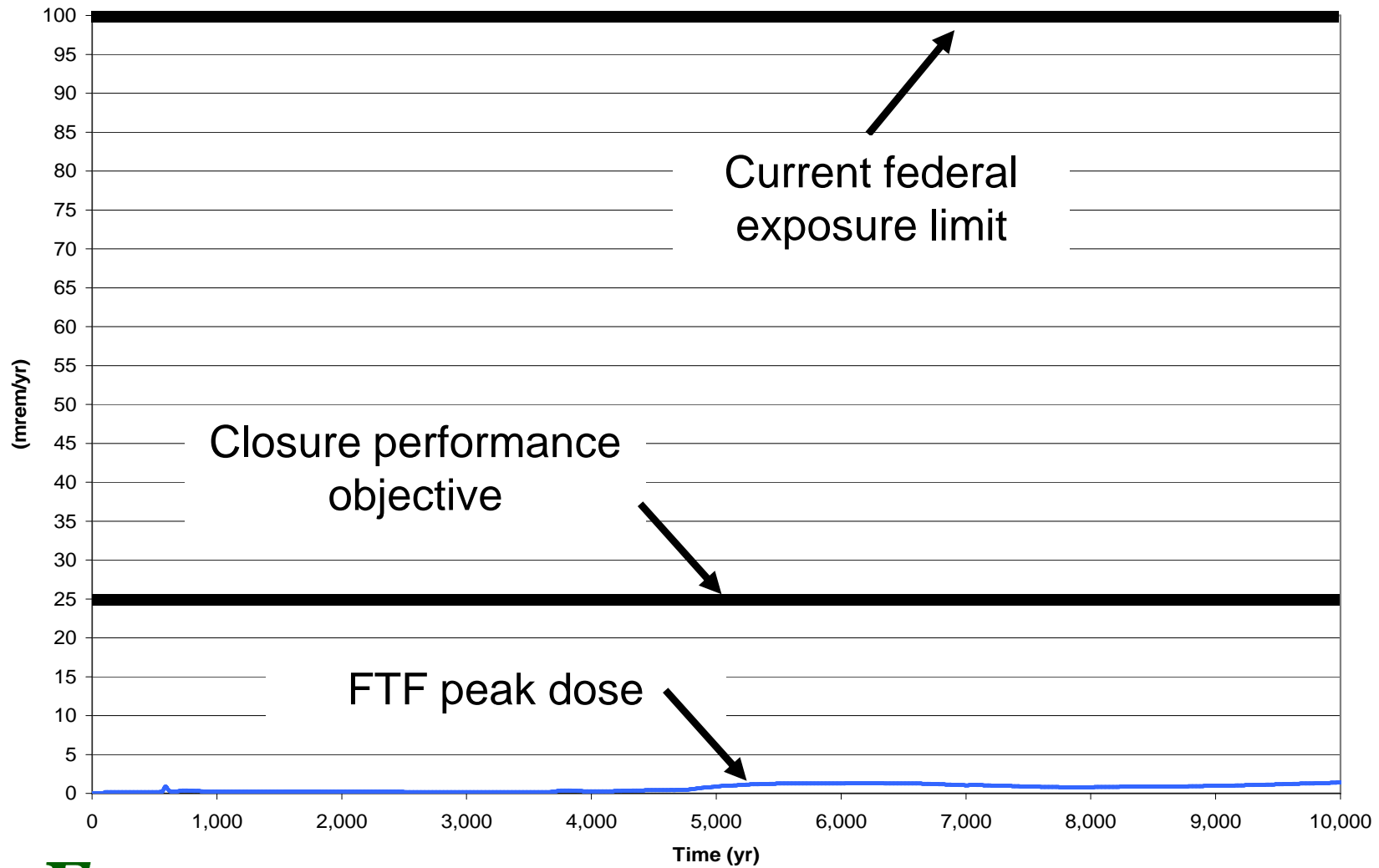
■ Mapping not performed after Phase 4.



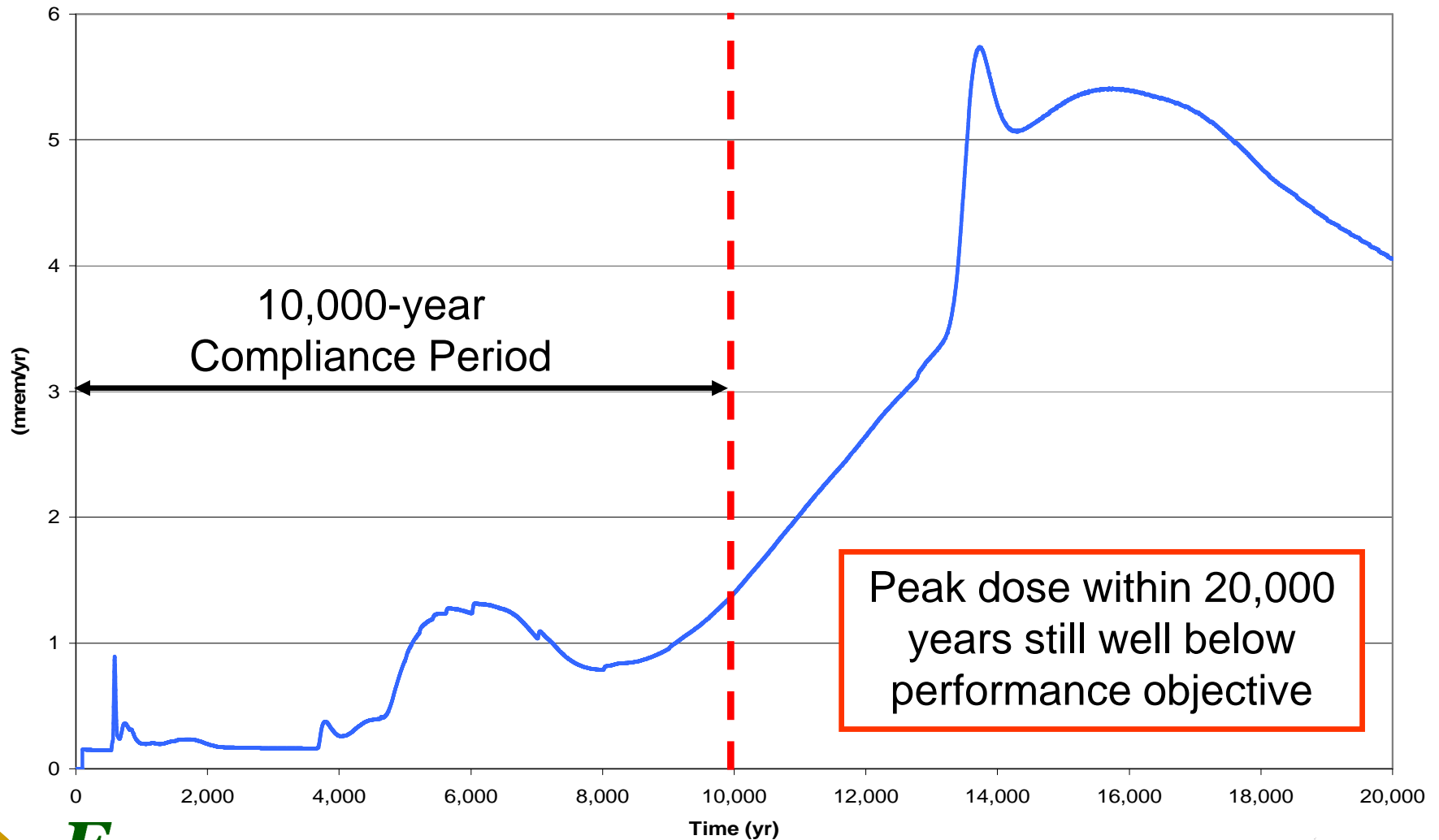
# Tank 6 – Cleaning To Date



# Comparison of Public Dose Risks



# F-Tank Farm All-Pathways Peak Dose for 20,000 Years



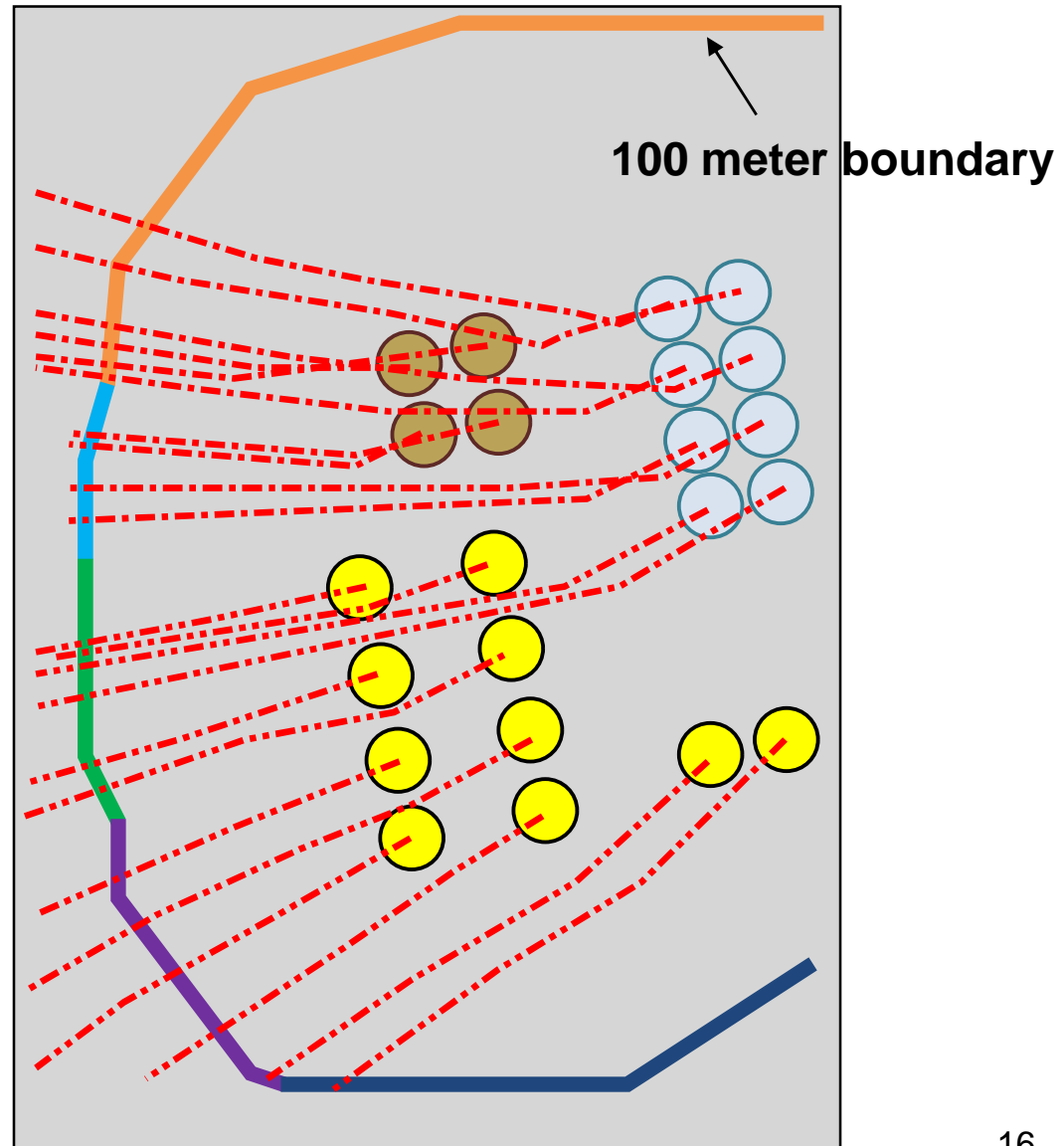
# FTF Contributors to Peak Dose

Waste Source	Contribution to Peak Dose (mrem/yr)*	Percentage of Total Peak Dose (%)
Tank 17	0.10	8%
Tank 18	1.05	83%
Tank 19	0.06	5%
Tank 20	0.01	1%
Transfer Lines	0.03	2%
Other Sources	<0.01	<1%
<b>Total</b>	<b>1.3</b>	<b>~100%</b>



# F-Tank Farm Aquifer Flow Paths

Location of peak doses around FTF driven by physical features, inventory and timing. The peak dose within 10,000 years is driven by Type IV tanks and therefore additional waste removal decisions from another tank type may have no impact on the PA conclusions.





# “How Much is Enough”?

- Demonstrating “Maximum Extent Practical”
  - Subjective; no quantitative values defined
  - Must develop compelling, quantitative arguments
  - Risks versus benefits must be clear
- Demonstration of “Extent of Technology”
  - Rationale for original technology selection
  - Graphics showing “diminishing returns”
  - Why additional technology deployment is not “practical”



# Defining What's Clean Enough

- Risk/Benefit Analysis
  - Worker Dose versus Hypothetical Future Individual
  - Exigencies
    - Remaining Tank Space
    - Aging infrastructure resulting in increased risk
    - Potential impact on other risk reduction activities
  - Cost of additional residual waste removal



# Upcoming Waste Determinations

- F-Tank Farm Waste Determination
  - Anticipate draft Basis Document in Fall, 2009
- H-Tank Farm Waste Determination
  - Not currently scheduled

