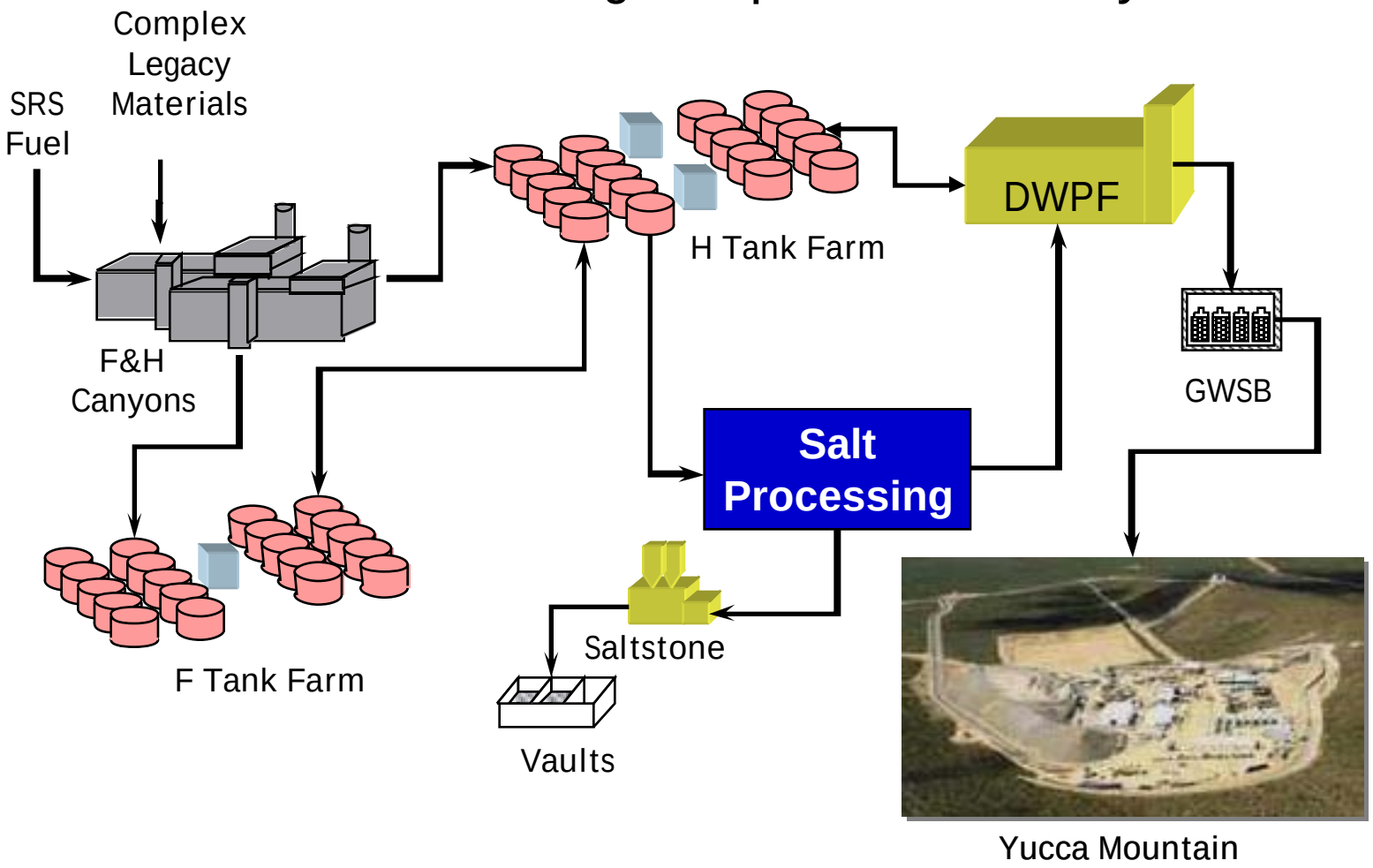
High Level Waste System at SRS

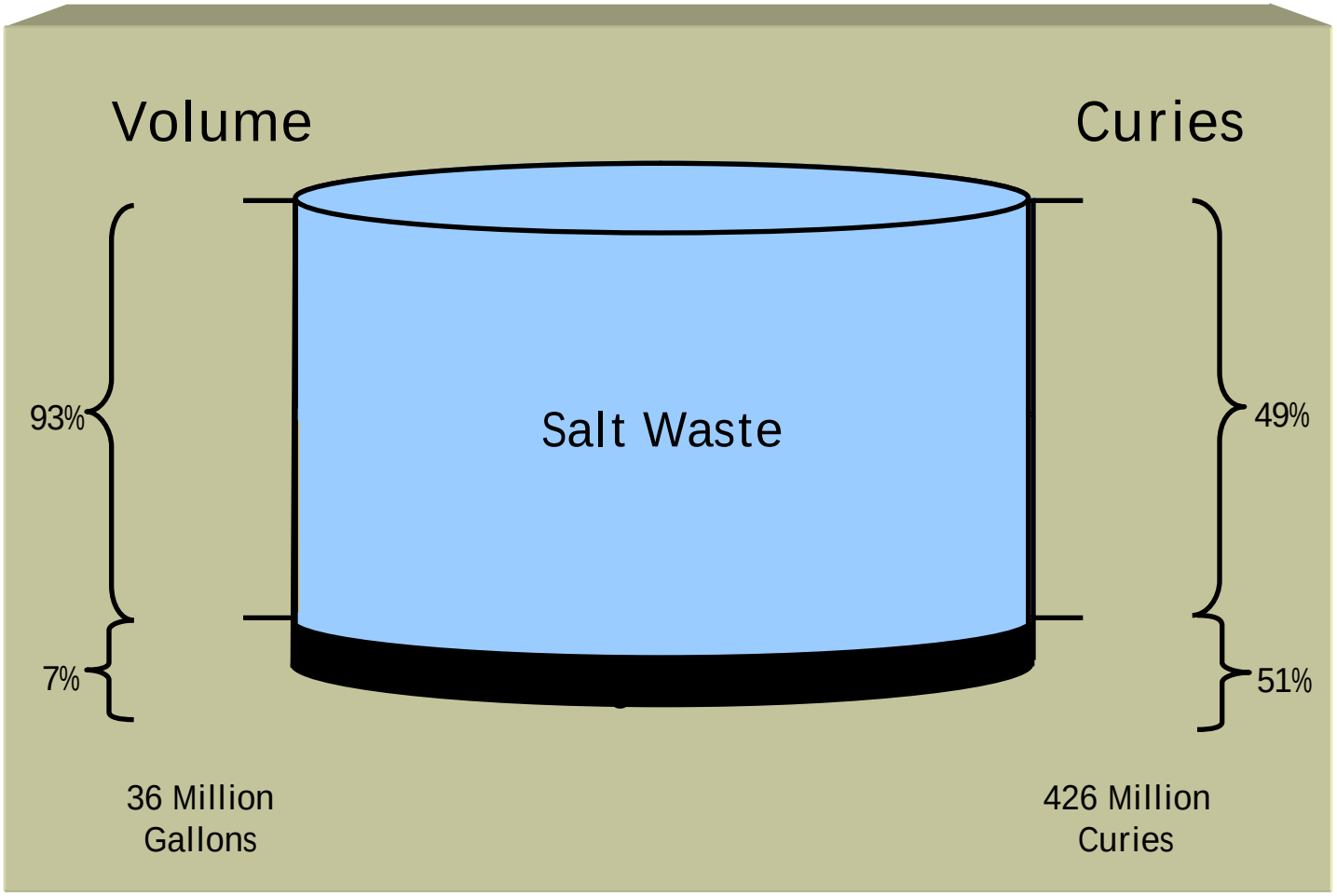
SRS Liquid Waste System

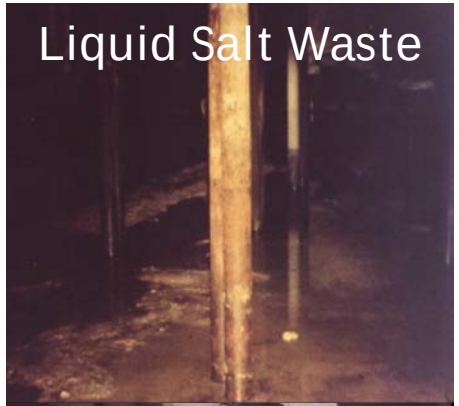
...Providing the path from Canyons to Yucca

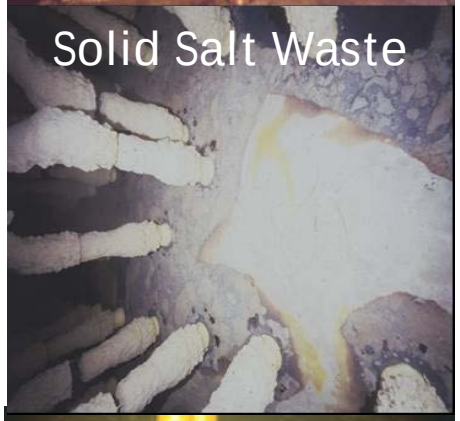


DWPF - Defense Waste Processing Facility
GWSB - Glass Waste Storage Building

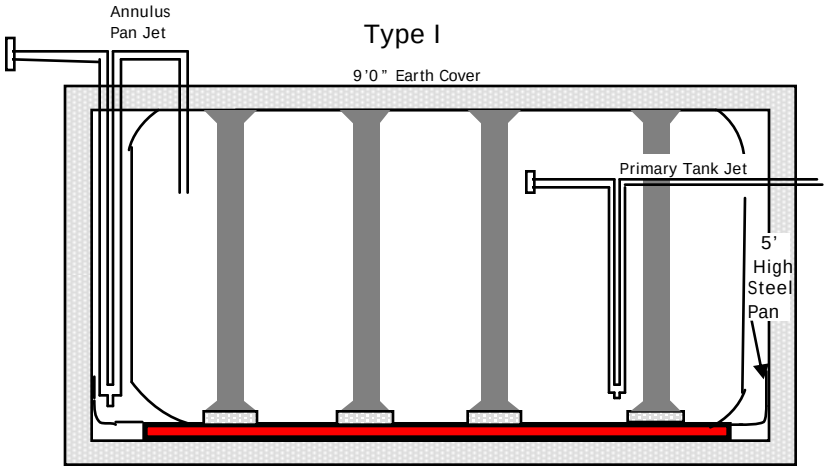
SRS Composite Inventory

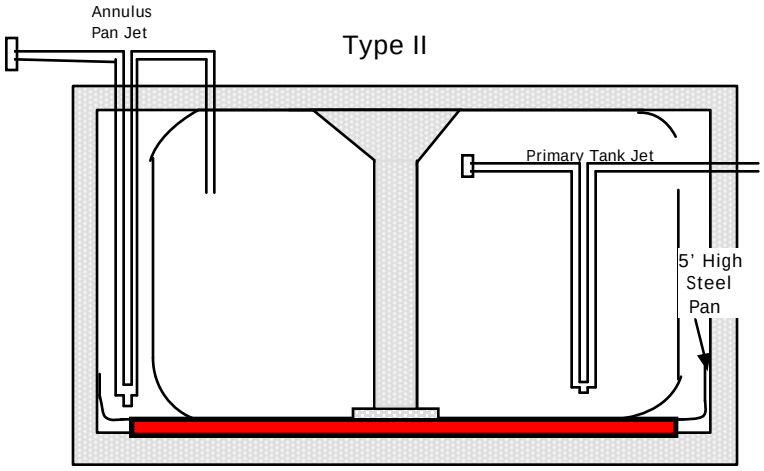


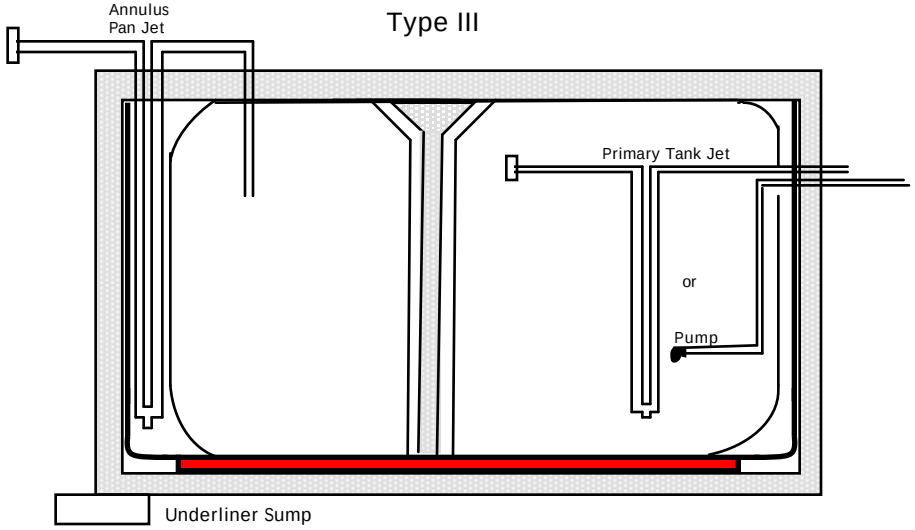


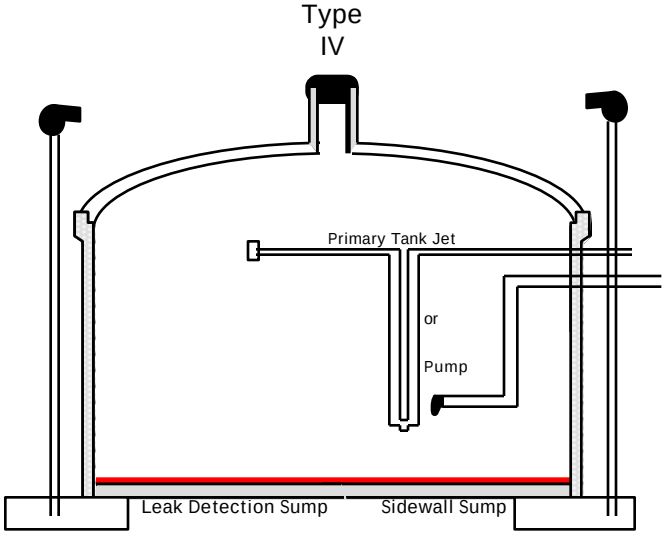


Waste Storage Tank Types





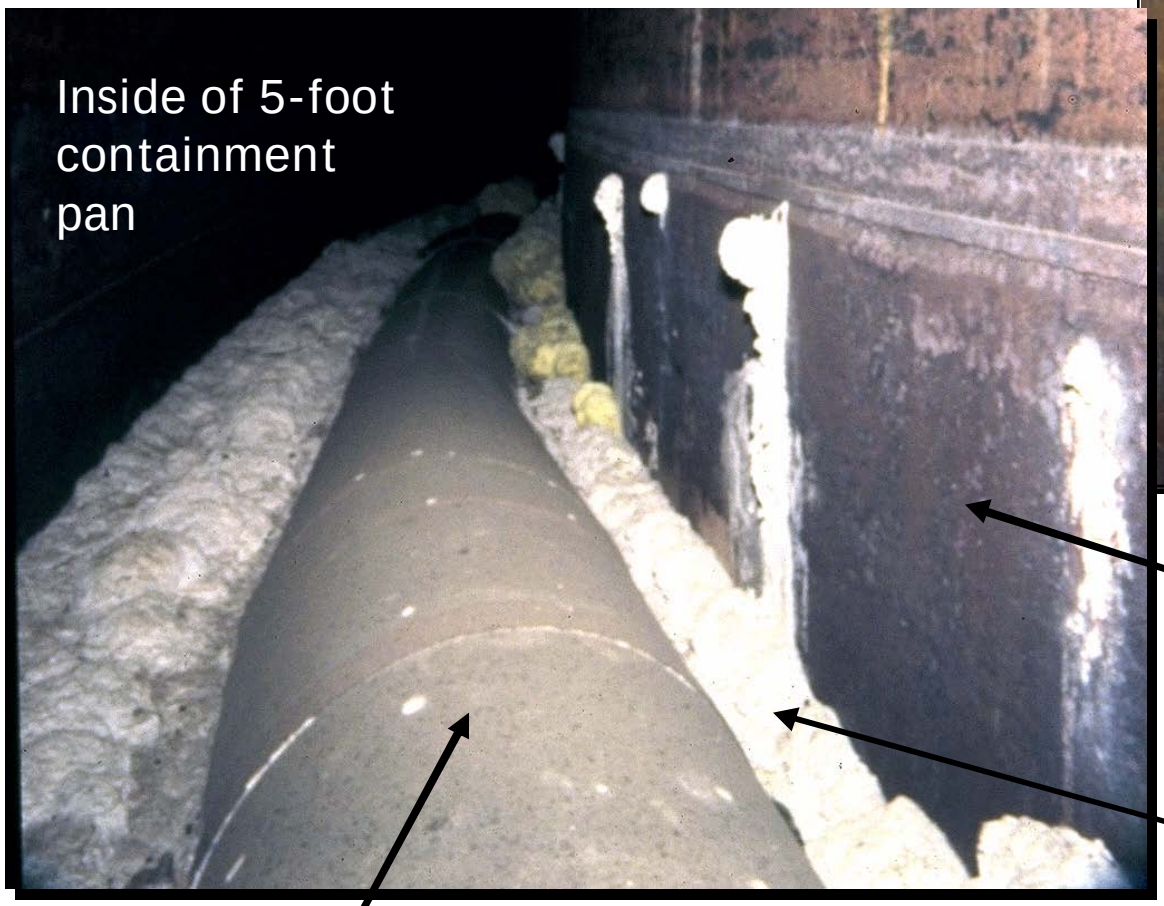


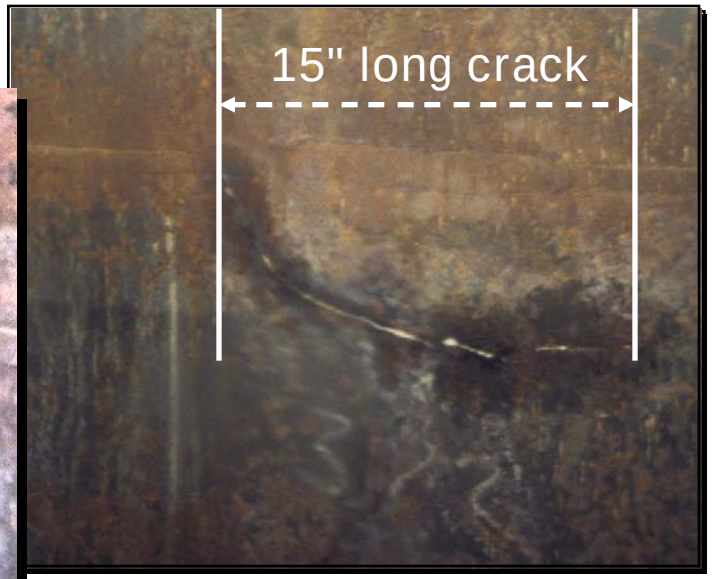


Tank Under Construction

Tanks are built at grade and then backfilled with dirt to provide shielding.

Example of Prior Leakage from Primary Tank into Secondary Pan



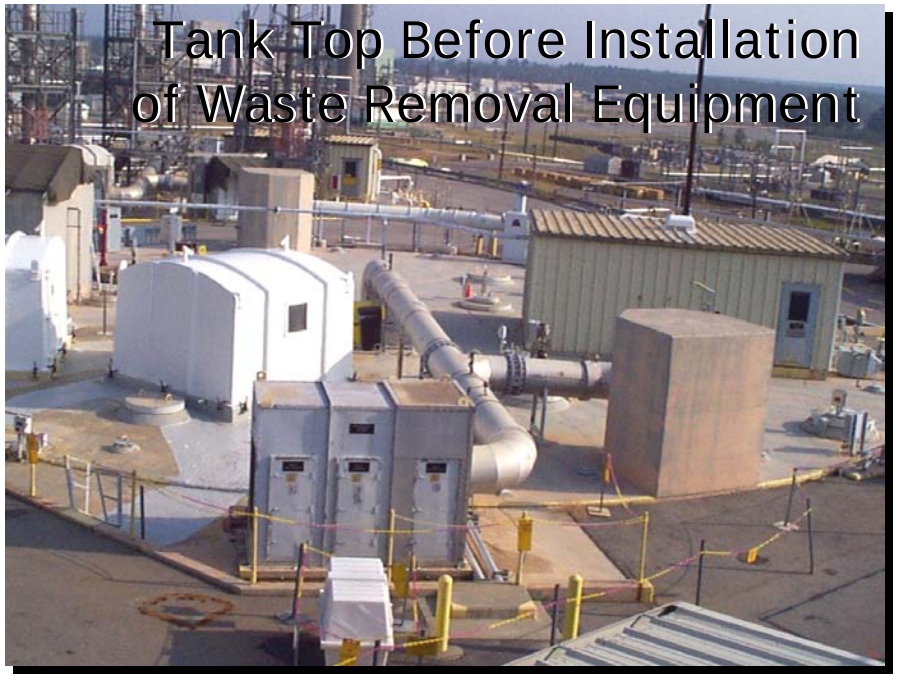


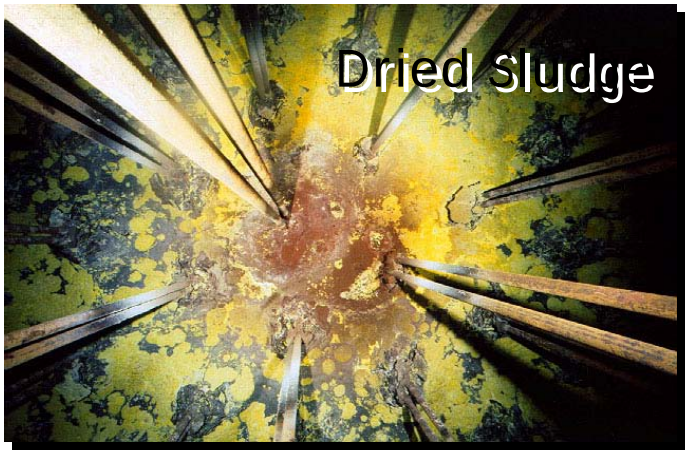
Outside of primary tank wall

Salt waste that leaked from tank and is contained in annulus pan

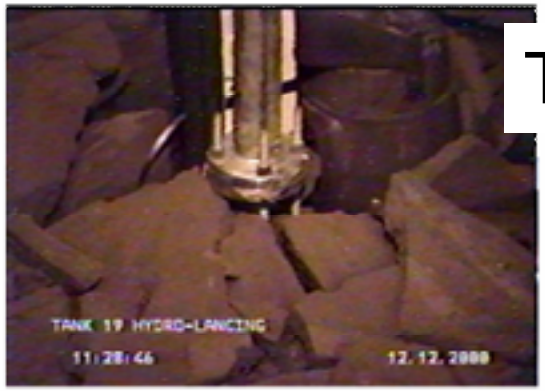
Ventilation duct

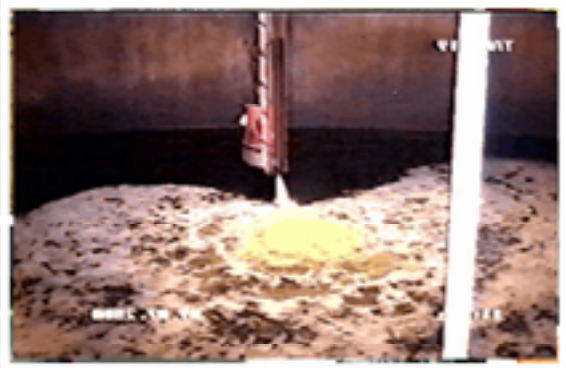
Waste Removal and Preparation

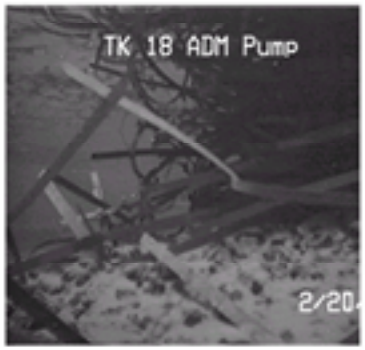




Tank Cleaning Technology

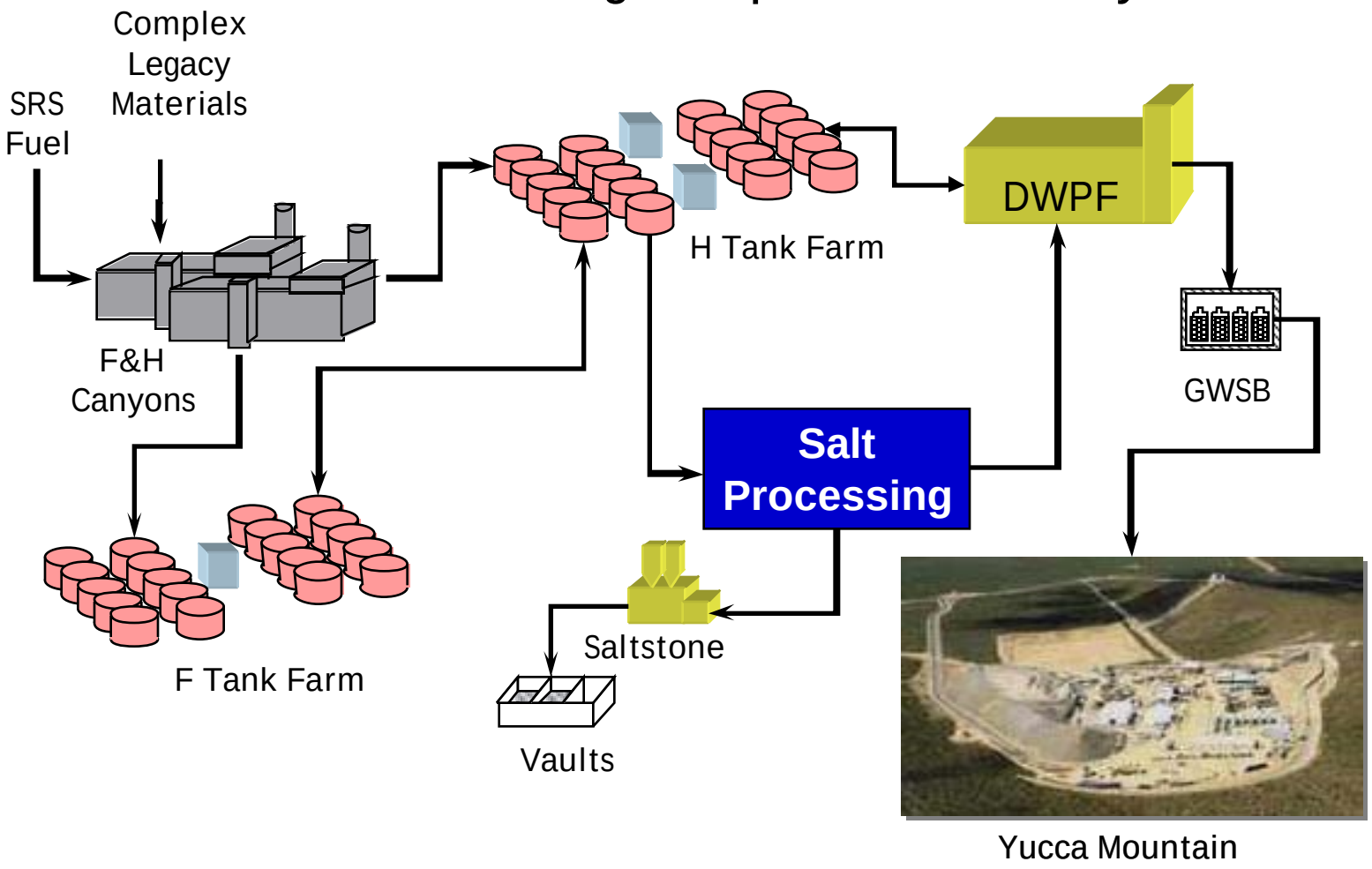






SRS Liquid Waste System

...Providing the path from Canyons to Yucca



DWPF - Defense Waste Processing Facility
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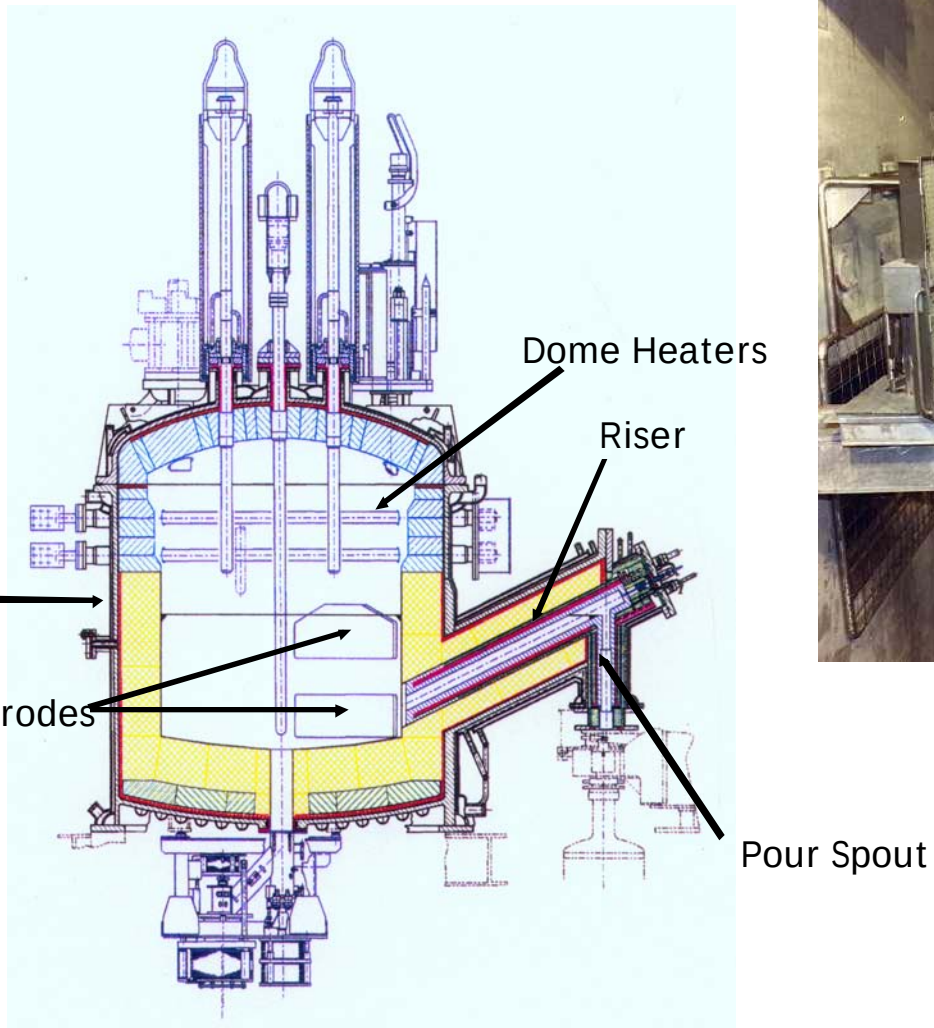
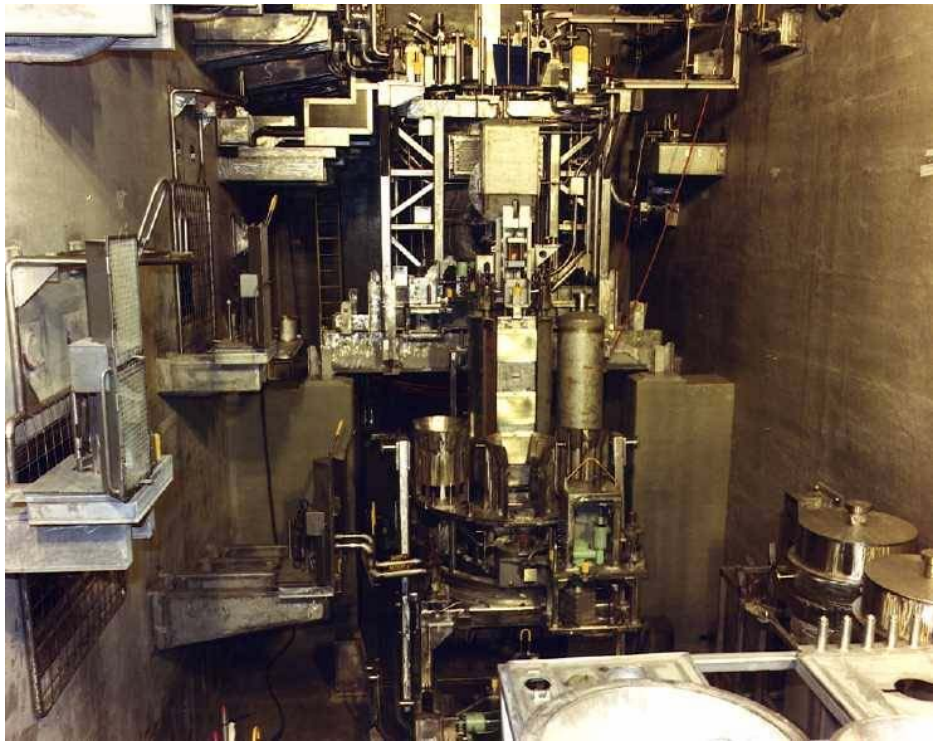
DWPF Melter

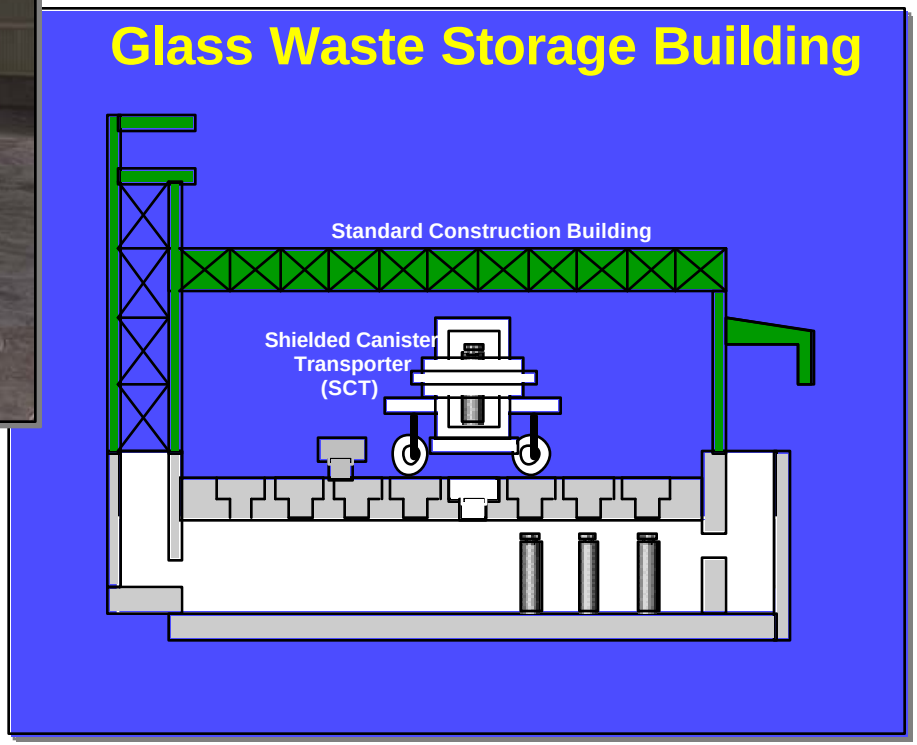




Canister Storage

Glass Canisters are transported in the Shielded Canister Transporter

Transporter lifts a floor plug, inserts canister, and replaces plug



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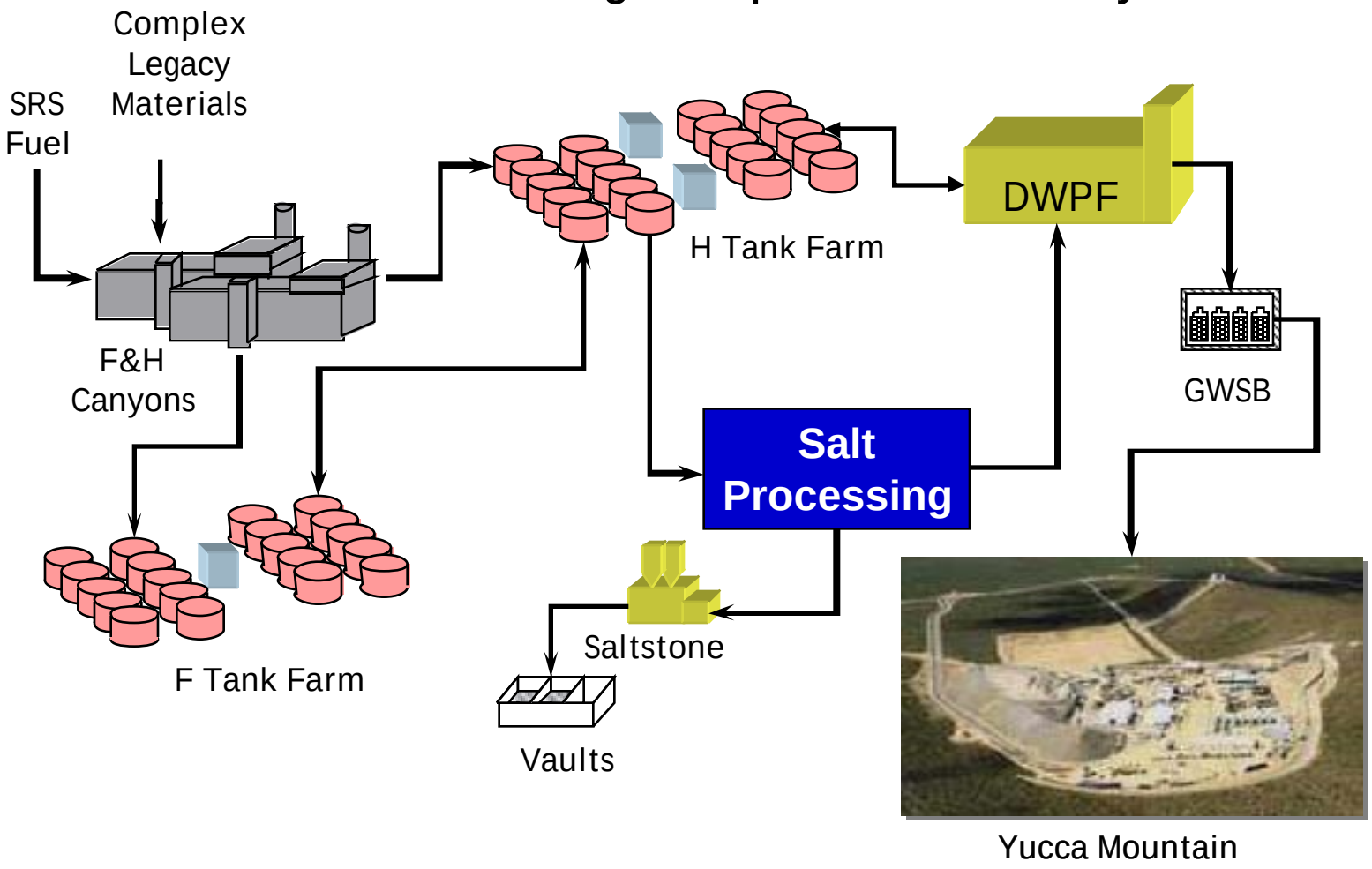

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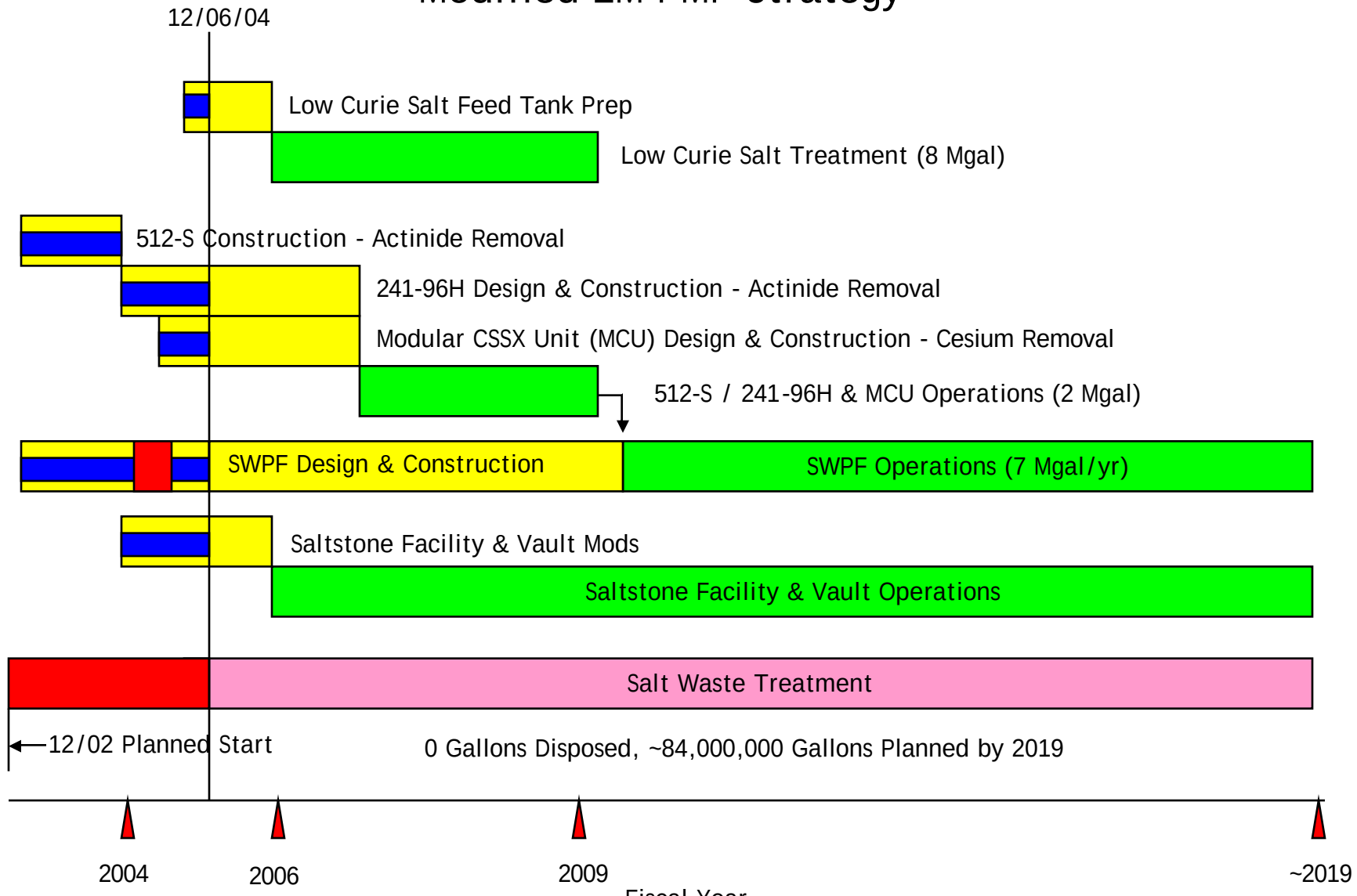
SRS Salt Project Baseline Schedule

Modified EM PMP Strategy



Material Characterization Technology Needs

- Develop cost effective methods for representative sample retrieval, especially for hard salt, variable depth samples, stratified layer tanks, etc.
- Develop analytical methods for in-tank characterization of select radionuclides
- Develop analytical methods that reduce time for tank qualification samples
- Develop analytical method to measure fissile material content of scale buildup in evaporator systems
- Develop in-tank method for measurement of tank corrosion chemistry

Tank Farm Technology Needs

- Develop effective methods for flammable vapor control
  - Develop improved understanding of hydrogen gas generation rates especially when solids are present in solution
  - Develop improved understanding of hydrogen gas retention in HLW Tanks especially in different waste forms (sludge, saltcake, supernate, etc.)
  - Develop methods to mitigate hydrogen and other explosive gases in tank vapor space
- Develop methods to protect tanks from corrosion (especially for short duration activities) that do not involve manipulation of liquid chemistry
- Develop methods to inspect tank domes for deterioration of rebar and tension rings
- Develop methods to seal leaking tanks from the outside (especially those used for waste removal process)
- Develop improved understanding of vapor space corrosion chemistry

Infrastructure Technology Needs

- Develop cost effective and environmentally benign corrosion protection alternative for chromate cooling water
- Develop methods to monitor gases hazardous to tank farm worker such as ammonia, dimethyl mercury, etc.
- Develop mitigation strategies to eliminate exposure to hazardous gases such as ammonia, dimethyl mercury, etc.
- Develop effective methods to monitor mercury compounds in the HLW system

Criticality Control Technology Needs

- Develop understanding of drivers for U & Pu precipitation, especially in caustic environments
- Develop understanding of effect of acid addition on heel removal and potential for precipitation of U & Pu
- Determine maximum uranium loading for MST for criticality control strategy

Salt Processing Technology Needs

- ARP (Actinide Removal Process)
  - Develop fundamental understanding of MST (monosodium titanate) including reaction kinetics, alternative actinide sorption methodologies, filtration methods, maximum loading, aging effects, etc.
  - Develop on-line turbidity meter for ARP effluent

- CSSX (Caustic Side Solvent eXtraction)
  - Develop fundamental understanding of CSSX process including process chemistry, process engineering and HLW system interface impacts (examples include dimethyl mercury effects on process, solvent droplet size, solvent carryover, mitigation of solvent carryover, solvent monitoring, feed stream limits, solvent decomposition products, etc.)
  - Develop on-line gamma monitor for effluent streams

Salt Removal Technology Needs

- Develop improved models for saltcake draining and dissolution to better understand solution chemistry, rates, dissolution methods, radionuclide partitioning, etc.
- Develop annular space cleaning methods for dry materials
- Develop understanding of characteristics and treatment methodologies for removal of salt heels following bulk salt removal

Waste Solidification Technology Needs (Saltstone)

- Study evolution of trace organic chemicals from grout formations
- Provide an increased understanding of grout flow which includes basic research and modeling
- Expand the state-of-the-art understanding of vault science technology
- Develop a method of technetium removal in radioactive waste

Sludge Removal Technology Needs

- Develop improved models for sludge removal to better understand solution chemistry, processing rates, heel removal methods, radionuclide partitioning, etc.
- Develop additive to sludge and sludge solutions to change rheology of sludge to aid in it's suspension
- Develop understanding of oxalic acid interaction during heel removal activities as it impacts carbon steel waste tank corrosion and hydrogen gas generation rates
- Characterize potential for floating layer formation during neutralization of heel removal oxalic acid solutions including potential for trapping hydrogen gas by floating layer
- Develop methods for heel removal that minimize water usage, remove mounds of residual sludge located away from available risers that work effectively despite interferences from cooling coils and support columns
- Develop techniques for removal of hardened sludge and residual material (may include dry sludge removal or other aggressive methods)

Waste Solidification Technology Needs (DWPF)

- Study the rheology of sludge feed which includes the effects of washing and chemistry
- Develop a fundamental understanding of hydrogen generation in radioactive waste processing which includes sources from chemical reactions and radiolytic decay
- Develop a fundamental understanding of glass waste chemistry with respect to cold cap chemistry, flash reactions, off gas (generation, chemistry, and flammability), and overall melting reactions and rates

Waste Solidification Technology Needs (DWPF)

- Develop a fundamental understanding of foam formation and destruction for liquid streams indigenous to vitrification operations
- Complete development of millimeter wave guide technology for in situ measurement of glass properties
- Study the sulfur solubility and retention properties of sulfur compounds in glass waste forms
- Investigate improved (with respect to effectiveness) chemical methods for equipment decontamination

Tank Closure Technology Needs

- Develop improved methods for mapping residual materials in tank bottom with cooling coils and support columns and determining volume of the residual materials
- Develop in situ method for analysis of residual materials in tank, especially Tc-99, Se-79 and Np-237
- Develop improved methods for sampling and characterizing the residual materials
- Develop techniques for closing annular spaces including validation of material removal
- Develop improved understanding of radionuclide transport phenomenon in various soil conditions
- Release mitigation and grout issues similar to Hanford discussion

Questions

SRS Liquid Waste System

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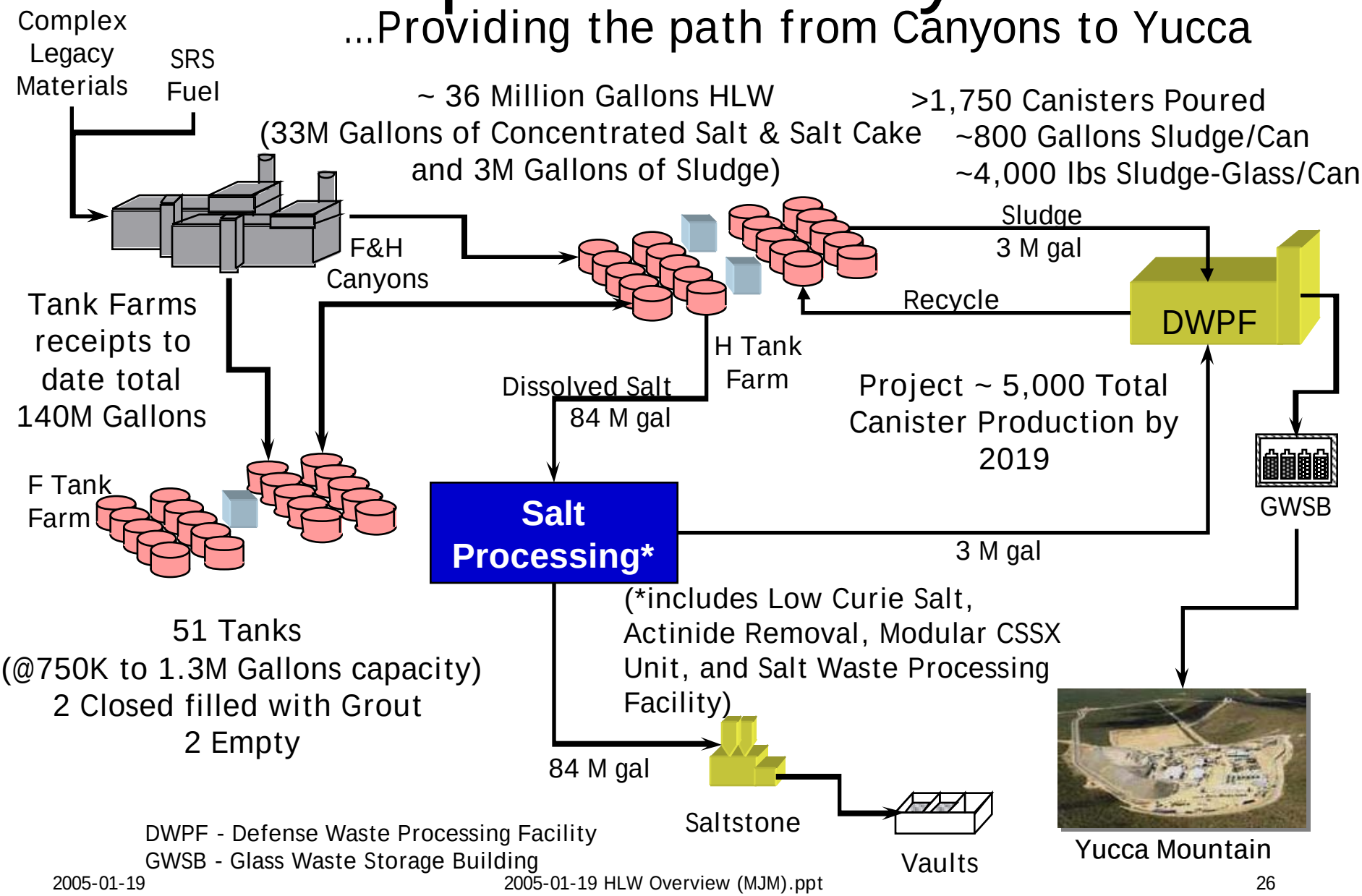

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