West Valley Demonstration Project

West Valley Environmental Services

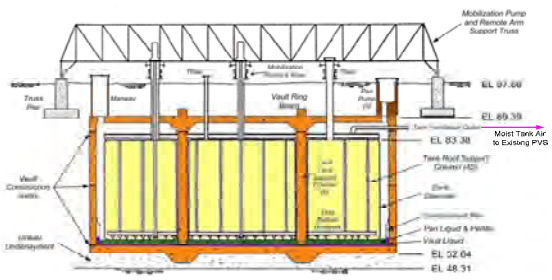
WVDP Tank Farm: Tank and Vault Drying System

Dan Meess, Chief Engineer
West Valley Environmental Services

November 17, 2010

8D-1 & 8D-2 Tank & Vault Background

- Carbon steel tanks
- Within separate concrete vaults
- Tank secondary containment:
  - Partial height pan
  - Vault
  - External vault coating
  - External hydraulic gradient on vaults
- Four-foot thick underdrain
  - Sampled
  - Pumped to limit hydrostatic pressure



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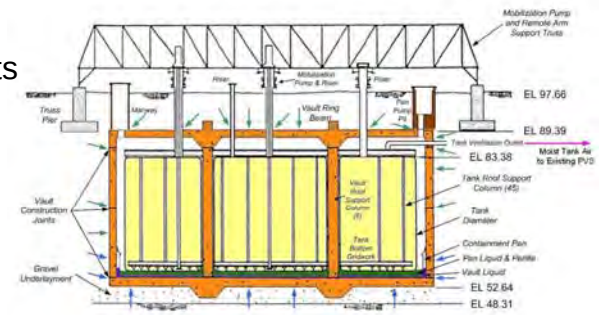
Vault and Pan Water Infiltration Pathways

- Roof penetrations
- Piping penetration waterstops
- Cracks in roof and bottom from 1965 vault floatation
- Side cracks
- Construction joints
- Carbon steel secondary containment jackets of original waste lines



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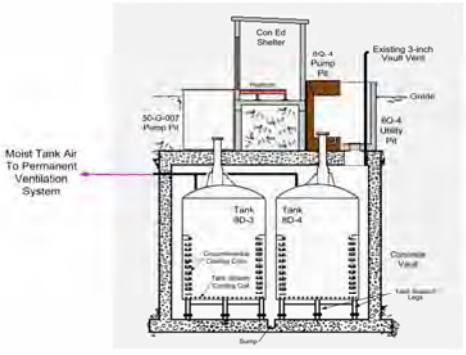
Tanks 8D-3 and 8D-4 in Common Vault

- Stainless steel tank
- Internal cooling coils, three sets per tank
- 8-inch diameter riser in each tank contains the transfer pump
- Vault bottom lined with stainless steel to height of 18 inches (4,900 gallon capacity)



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Underground Tanks: Status & Condition

Tank	8D-1	8D-2	8D-3	8D-4
Operational Status	Isolated 2003	Isolated 2003	Isolated 2010	Isolated 2010
Ventilation	Active	Active	Active	Active
Liquid Volume (gallons)	14,800 plus ~3,400 STS	5,700	1,600	6,000
Internal Corrosion* General/Pitting (mils/yr)/(mils)	5.4 / NA *Tank Bottom*	1.0 / 6 *Vapor Zone*	NA	0.015 / NA *Liquid Zone*
External Corrosion* General/Pitting (mils/yr)/(mils)	3.4 / 21 *Liquid/Vapor*	1.6 / 6 *Liquid/Vapor*	NA	NA

* Maximum rates measured during Project; prior rates could be higher

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WTF Tank and Vault Drying - Objectives

- Eliminate liquid heels within four main tanks
  - 8D-1 and 8D-2 (carbon steel)
  - 8D-3 and 8D-4 (stainless steel)
- Eliminate the risk and consequences of a tank leak
- Eliminate liquid within underground vaults that house the above tanks to reduce tank and pan corrosion
  - Tank 8D-1 vault and pan
  - Tank 8D-2 vault and pan
  - Tank 8D-3 and 8D-4 common vault

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WTF Tank and Vault Drying - Objectives

- Reduce relative humidity (<30% RH) of air inside and outside carbon steel tanks to prolong lifetime
- Minimize/eliminate need to pump water from vaults and pans
- Maintain the tanks in a safe configuration until decommissioned…minimum 30-year design life with periodic maintenance requirements

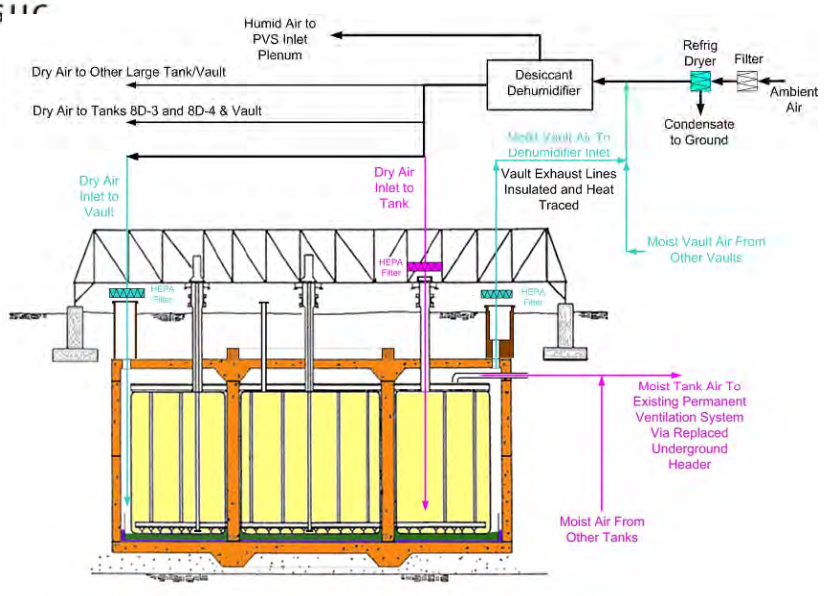
Tank & Vault Drying System Operation

- Tank Operation
  - Dry air from the rotary dryer is ducted into the bottom of tanks
  - Water is evaporated from tank internal surfaces, including standing liquids on tank bottom
  - Moist tank air is sent to the PVS via the new underground ventilation line
  - Within one day, the tank RH is expected to drop, reaching:
    - 70% in Tank 8D-1 and 8D-2
    - 40% in Tank 8D-3 and 8D-4
  - Once the tank liquid heel is evaporated, the relative humidity in tank will be quickly reduced to 30% to greatly reduce *internal* tank corrosion
  - Moisture removed in the dryer is discharged through HEPA-filtered Permanent Ventilation System (PVS) and its monitored stack

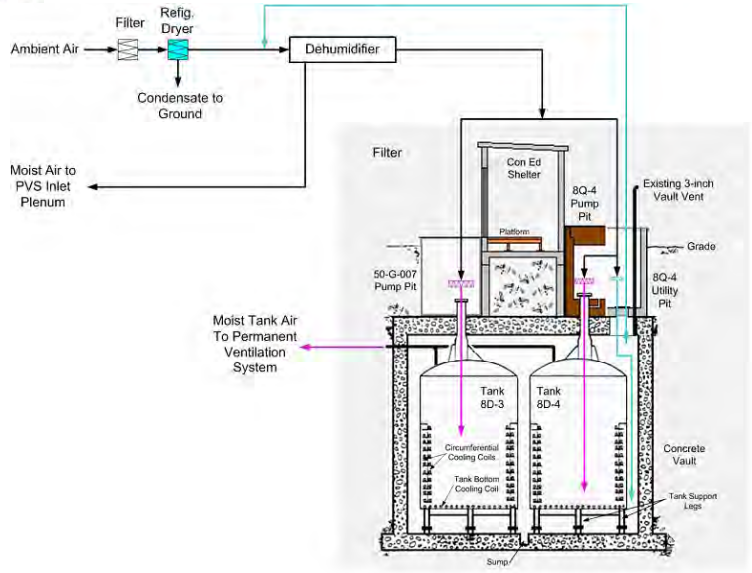
Tank & Vault Drying System Operation

- Vault Operation
  - Dry air from the rotary dryer is ducted to the bottom of the vaults
  - HEPA-filtered moist air from the top of the vaults is ducted back to the rotary dryer (recirculation system) to remove moisture
  - Water is evaporated from tank external surfaces, vault internal surfaces, perlite/cement blocks and containment pan
  - Within one day, the vault RH is expected to drop, reaching:
    - 45% in 8D-1 and 8D-2 vaults
    - 50% in 8D-3 and 8D-4 common vault
  - Once the vault/pan liquid is evaporated, the relative humidity in vault will be quickly reduced to 30% to greatly reduce *external* tank corrosion
  - Moisture removed in the dryer is discharged through HEPA-filtered Permanent Ventilation System (PVS) and its monitored stack

Tank & Vault Drying System Design



Tank & Vault Drying System Design



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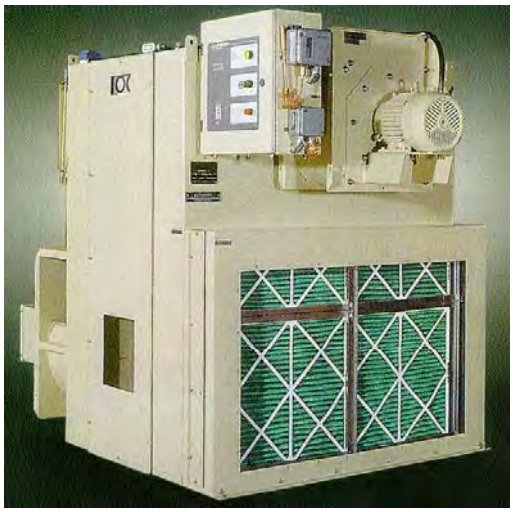
Rotary Wheel Drying Module



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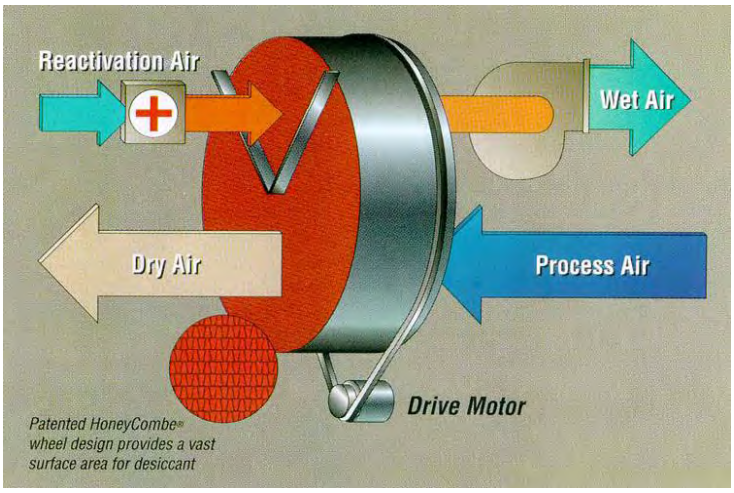
Drying System Principle



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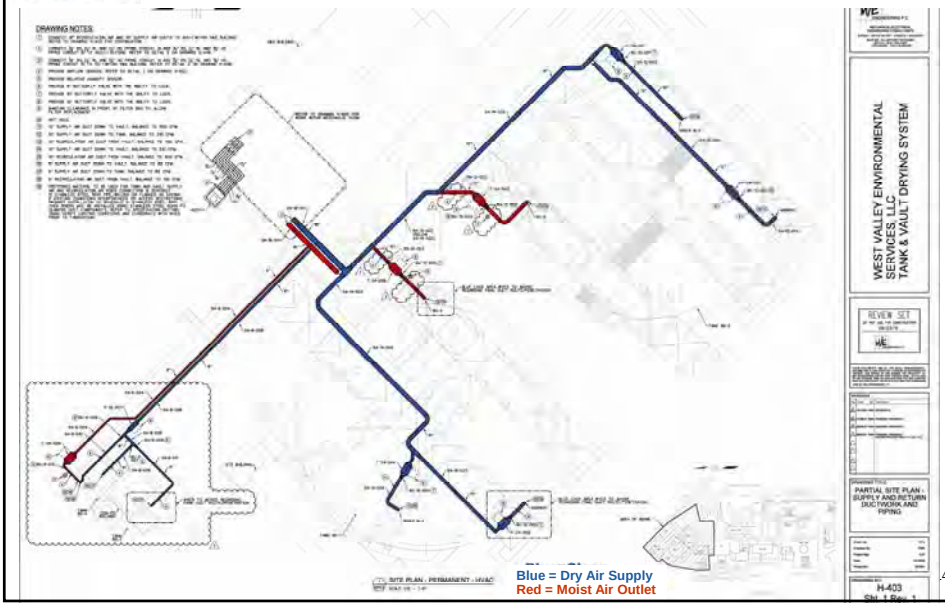
Tank & Vault Drying System Process Flow



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Design Overview

- Tank ventilation is once-through into the PVS
- Vault ventilation by recirculation system
- Excess moisture directed to PVS inlet plenum
- Total flow to PVS: 4,000 cfm

Support Activities Associated with Tank & Vault Drying System

- Replacement of the existing breached underground 16-inch ventilation header ventilating all four tanks to the PVS
  - Replace the existing 45-year old carbon steel underground ventilation header from the 8D-1 and 8D-2 tank connections to the PVS inlet with stainless steel line(s)
  - Remove the entire underground ventilation header from the PVS inlet to the condensers and WTF Shelter to prevent leaching contamination from the breached line and allow future removal of the shelter and condenser assemblies
- Seal the 12-inch ventilation lines to vault exterior and coating the exposed lines to minimize external corrosion
- Reroute 8D-3/8D-4 ventilation line to PVS inlet instead of looping through the WTF Shelter and condensers

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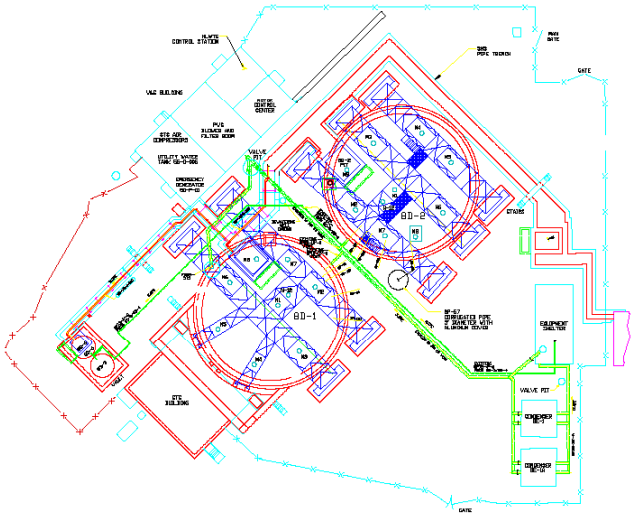
Existing Tank Farm Ventilation



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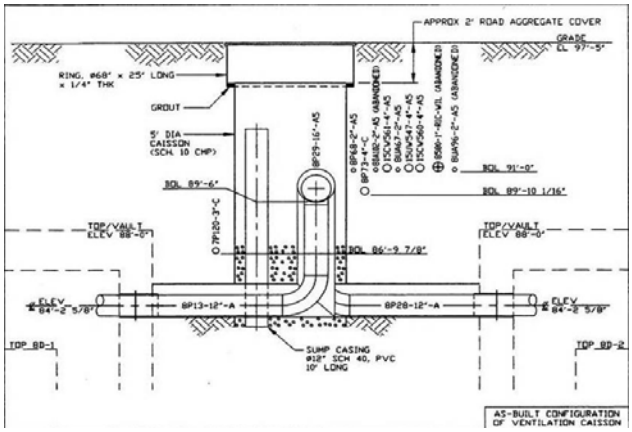
Ventilation Header Caisson

- 16-inch ventilation header is breached underground
- Groundwater around the area is periodically pumped to maintain the level below the header and prevent egress into Tank 8D-1



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Activities Completed

- Subcontractor schedule submitted; monthly updates provided
- Preliminary design completed in October with interactive design review conducted on October 29, 2009
- Test excavations to verify line locations
- Final design completed in February with interactive design review on February 22, 2010
- Ordered long-lead equipment in January
- Temporary vent system installed in February 2010

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Activities Completed (cont'd)

- Shop fabrication of above-grade piping/ducting 90% complete
- Completed mock-ups of vent line removal and WIPs for these activities were issued
- Installed inflatable bladder in 16-inch vent line for isolation
- Placed Tanks 8D-3 and 8D-4 on temporary vent system
- Initiated removal of the four 8-inch above-grade ventilation lines

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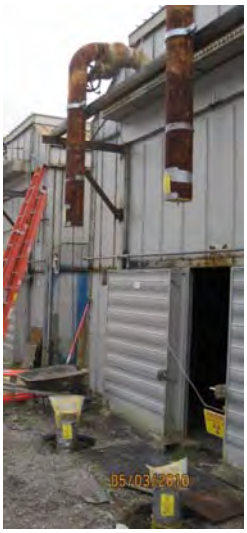
Activities Completed (cont'd)

- Removed the four 8-inch above-grade ventilation lines in April
- Began removal of 16-inch underground header on May 17



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Activities Completed (cont'd)

- Removed the 16-inch carbon steel underground ventilation line with the breach discovered – May to Aug
- Removed the 12-inch carbon steel branch lines to the 8D-1 and 8D-2 vaults – Sep to Oct

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Activities Completed (cont'd)

- Installation and initial testing of rotary dryer and condenser unit - July

Activities Completed (cont'd)

- Installation of above-ground ventilation piping 95% complete - November

Activities Completed (cont'd)

- Moist air outlets from 8D-1 and 8D-2 vaults connected to the drying system – Oct to Nov

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Activities Completed (cont'd)

- Dry air inlet diffusers installed into the vaults of Tanks 8D-1 and 8D-2 – November 10-12

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Activities Completed (cont'd)

- Replacement of the original carbon steel underground ventilation line with stainless steel piping - October

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Activities Completed (cont'd)

- Tie 4-inch ventilation line from Tanks 8D-3 and 8D-4 and WTF Shelter ventilation equipment into the new line - October

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Activities Completed (cont'd)

- Sealing Tank 8D-1 and 8D-2 12-inch carbon steel ventilation pipe stubs at the vaults exteriors - November

Activities Completed (cont'd)

- Sealing the Tank 8D-1 and 8D-2 4-inch carbon steel transfer line "jackets" at the vaults exteriors to prevent groundwater from entering the vaults - November

Tank 8D-4 Pump Removal Preps - May

- Received shielded box liner
- Set up and removed 8Q-4 pit covers, jumpers, pump motor and pit equipment

Before

After

Tank 8D-4 Pump Removal - September

- Decontaminated pump interior and exterior
- Size-reduced the pump remotely as it was removed
- Packaged pump sections into a shield container
- Waste characterized as LLW

Tank 8D-3 Pump Removal - November

- Size-reduced the pump remotely as it was removed
- Packaged pump sections into a standard container
- Waste characterized as LLW
- Pump removal completed on November 15 and 16

Major Remaining Activities

- Backfill excavation and grade
- Install dry air diffuser ducting into the tanks
- Complete piping connections to tank diffusers and vaults
- Complete the T&VDS operating procedure and issue
- Check-out, start up and balance system
- Train personnel
- Complete readiness checklist
- Further reduce tank and vault infiltration air as necessary
- Turn over system to Operations
- Remove temporary ventilation system