

# Organic Contamination in the Vadose Zone (OCVZ) Citizens Advisory Board

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# Context: Organic Contamination in the Vadose Zone (OCVZ)

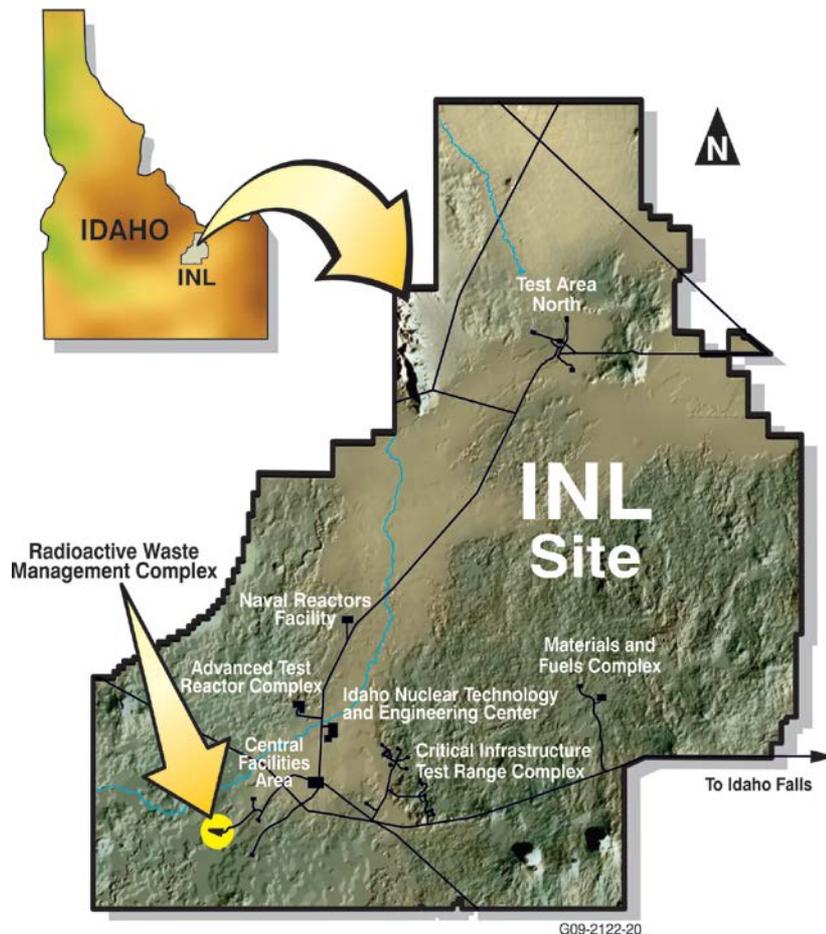
- What is the Waste: Volatile Organic Compounds (e.g., carcinogenic  $\text{CCL}_4$ ) being released from buried waste into the vadose zone beneath the SDA
- Potential Risks: Potential contamination of the Snake River Plain Aquifer to above drinking water Standards
- Settlement Agreement: N/A; Part of CERCLA remediation of the buried waste under OU 7-13/14 ROD
- How treated/disposed: Onsite Vapor Vacuum Extraction and Treatment by catalytic oxidation
- Current Budget: Current Fiscal Year Budget for the OCVZ system is \$490K.
- Note: EPA recently completed a Five-Year Review of the cleanup effectiveness at the Idaho Site, including actions to protect groundwater. The review resulted in a “protectiveness determination” from EPA.

# Nature and Extent of Contamination

- Some contaminants migrate from buried waste into the vadose zone and aquifer
- Carbon tetrachloride:
  - Routinely detected (with other volatile organic compounds) in vadose zone vapor, trends declining
  - Slightly exceeded its MCL (5µg/L) in two aquifer wells in the last 5-year period; trends declining
  - Remediation of CCl<sub>4</sub> vapors also addresses remediation of other Volatile Organic Compounds (VOCs)

# OCVZ Background

- Terminology
  - OCVZ = Organic Contamination in the Vadose Zone
  - VVET = Vapor Vacuum Extraction and Treatment
  - $\text{CCl}_4$  = Carbon Tetrachloride
  - Vadose Zone = The zone between ground surface and the top of the aquifer that is not saturated with ground water. About 600 feet at RWMC.
- Organic Contamination in the Vadose Zone (OCVZ) is part of the CERCLA remediation at the Subsurface Disposal Area (SDA) at the Radioactive Waste Management Complex (RWMC) as established by the CERCLA Record of Decision (ROD) for Operable Unit (OU) 7-13/14.
- Coupled with targeted buried waste retrieval, OCVZ addresses risk to groundwater from the SDA.



# OU 7-13/14 Selected Remedy

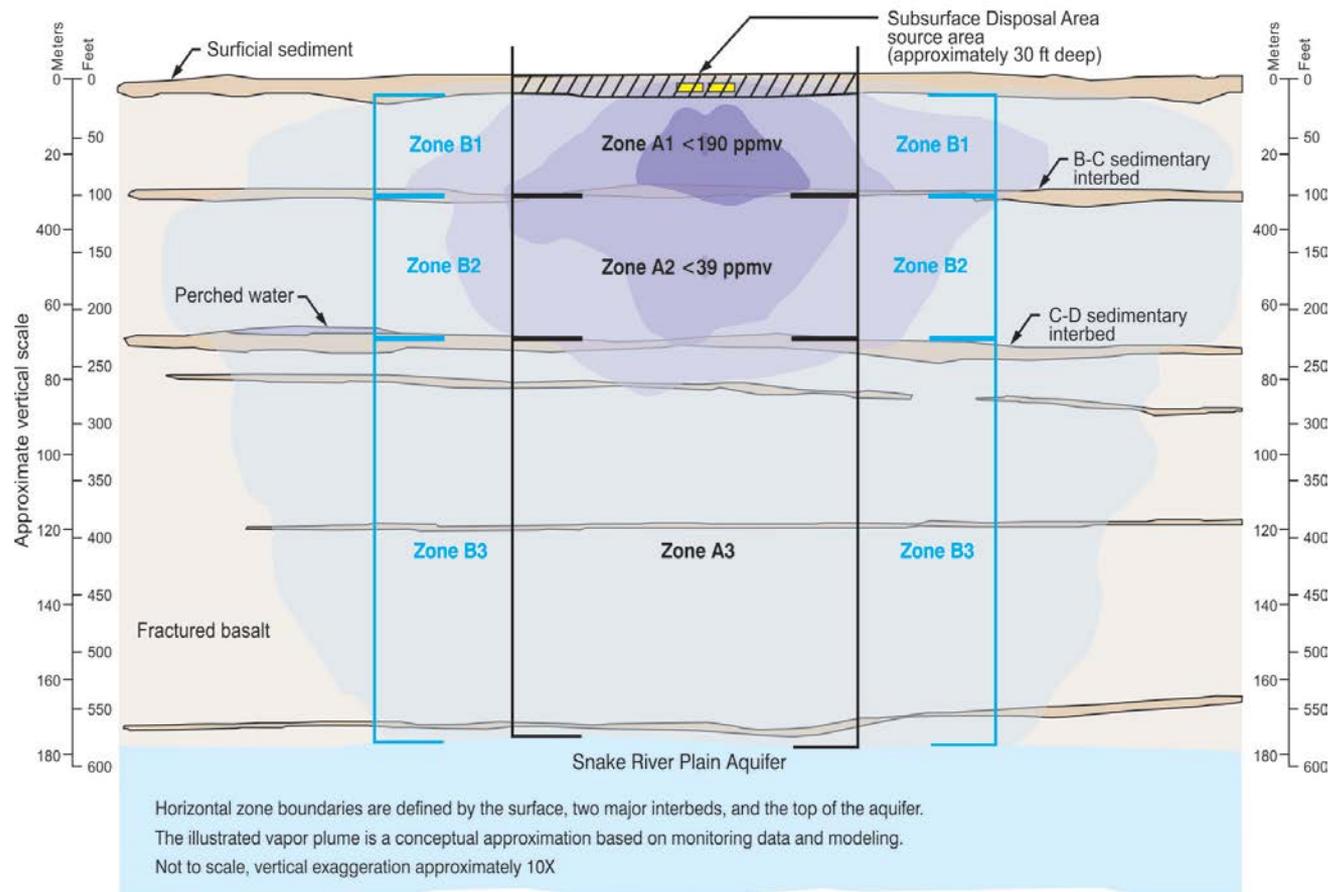
The selected remedy for OU 7-13/14 has three phases:

- Phase 1—Continue previously initiated actions:
  - Targeted waste retrieval - ARPs
  - **Operations and Maintenance of the Vapor Vacuum Extraction & Treatment (VVET) system and maintaining the cover on Pad A**
  - Monitoring the vadose zone and groundwater
  - Land-use and groundwater-use restrictions
- Phase 2—In situ grouting (completed in 2010)
- Phase 3—Cap construction and transition to a final end state

- Remove the source (targeted waste exhumation).
- Treat existing contamination (operate the vapor vacuum extraction system).
- Prevent future infiltration (construct a surface barrier).

# Vadose Zone Vapor Remediation Goals

- Carbon tetrachloride (CCl<sub>4</sub>) vapor concentration:
  - Zone A1 < 190 ppmv
  - Zone A2 < 39 ppmv



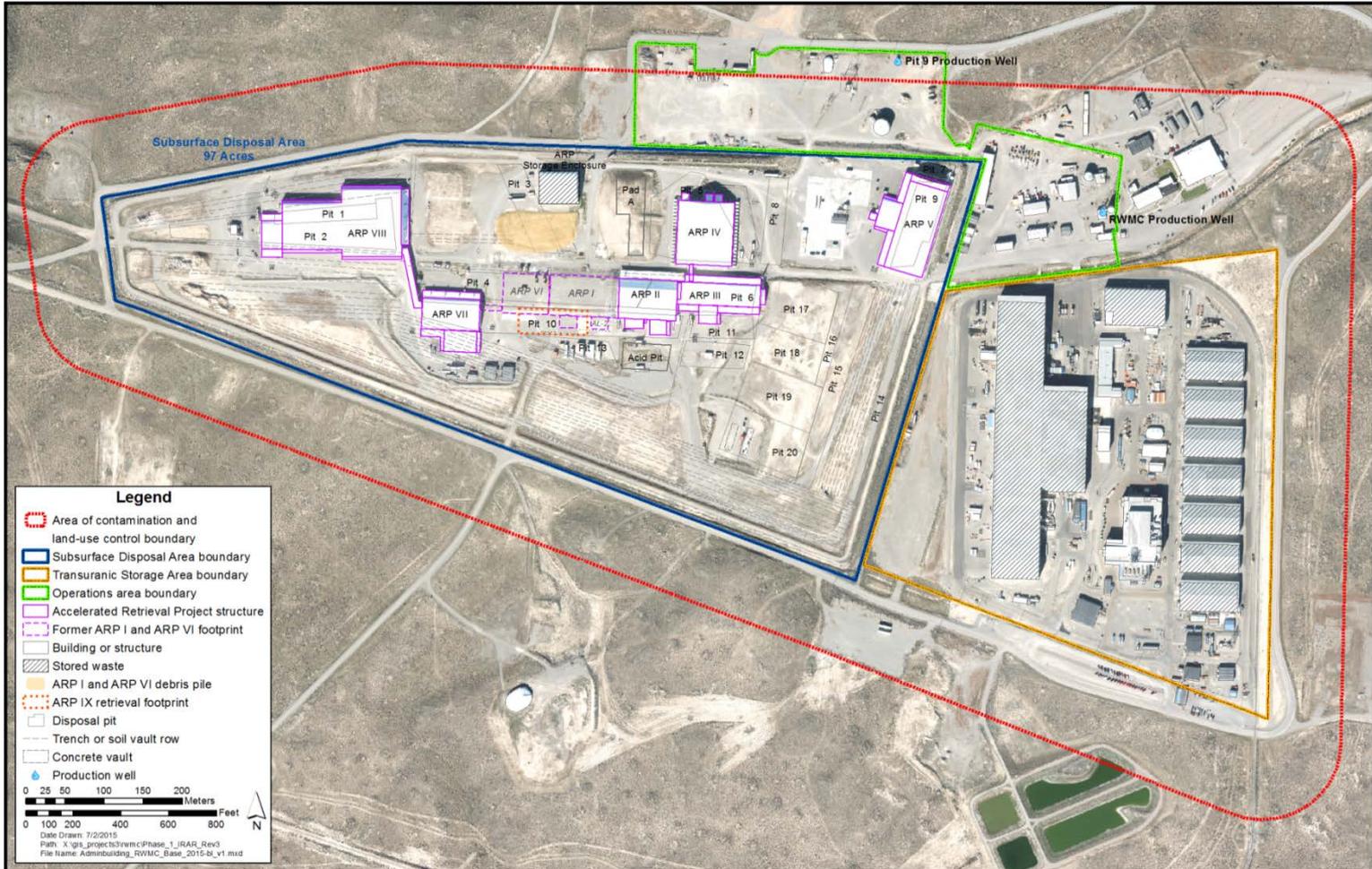
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# Remedy Implementation Status

- Phase 1 (ongoing) includes:
  - Environmental monitoring and institutional controls
  - **Continue VVET** (which began in 1996)
  - Maintaining Pad A in a safe configuration
  - Targeted waste retrieval from a minimum of 5.69 acres
- Phase 2 (completed in 2010): in-situ grouting of selected wastes
- Phase 3 encompasses design studies, design, constructing an evapotranspiration cover, installing monitoring equipment, and producing post-construction documentation (e.g., O&M plan)
  - Phase 3 RDWP published 2013
  - **Regulatory milestone for completing the cap design is 2020.**
  - Regulatory milestone for completing cap construction is 2028.

# CAP Design Studies Include Vadose Zone

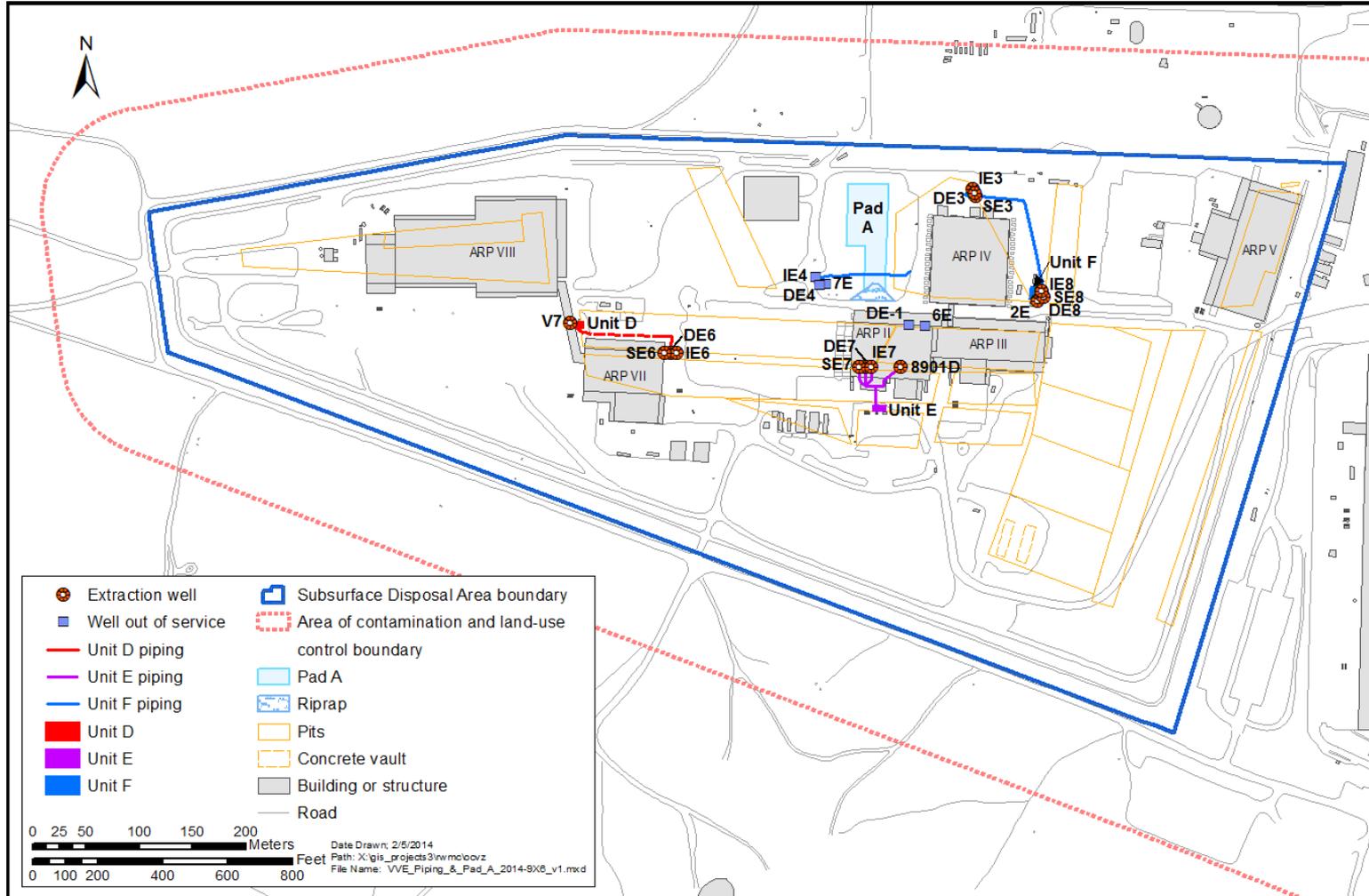
- The Remedial Design Work Plan requires that 5 studies be conducted to support the design of the final cap over the SDA.
  1. Long-Term Monitoring Network Design Study
    - Will include vadose zone vapor monitoring
  2. Vadose Zone Vapor Rebound Study
    - Characterize  $\text{CCl}_4$  concentrations under static conditions and compare to cleanup goals
    - Provide information to support design of long-term monitoring network
  3. Decommissioning and Demolition Plan
    - Will include plan for D&D of current vapor vacuum extraction system to accommodate cap construction
  4. Pad A Focused Feasibility Study
  5. Borrow Source Study
- Either the Vadose Zone Vapor Rebound Study or the Long-Term Monitoring could result in installation and operation of a new vapor vacuum extraction system after cap construction.



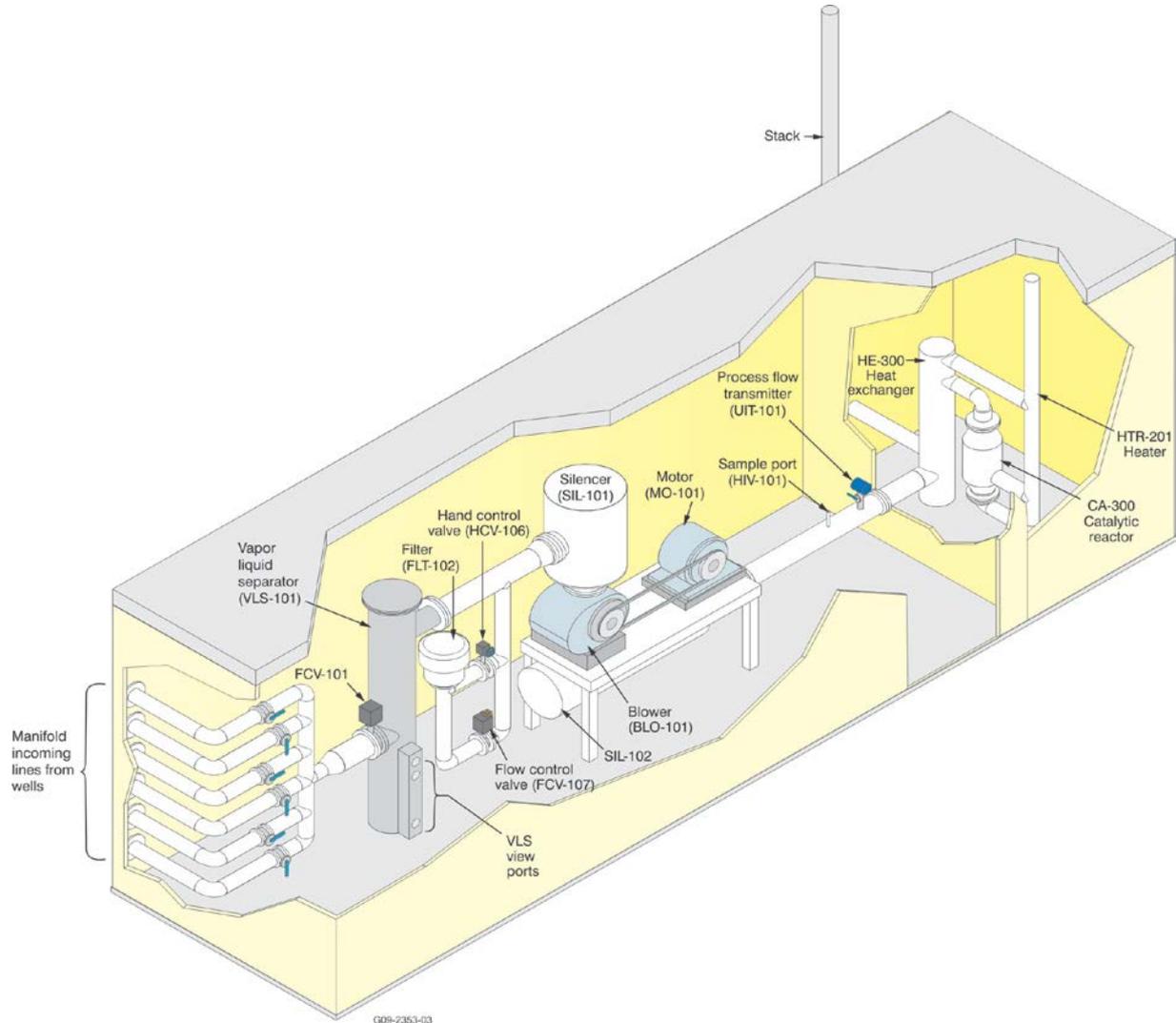
# Operation and Maintenance

- Collect and analyze monthly and quarterly vadose zone vapor samples per the Field Sampling Plan appended to the O&M Plan:
  - 30 vapor wells (91 ports) inside the SDA - sampled monthly
  - 26 vapor wells (67 ports) outside the SDA – all sampled quarterly
    - Of these 13 wells (33 ports) - sampled monthly

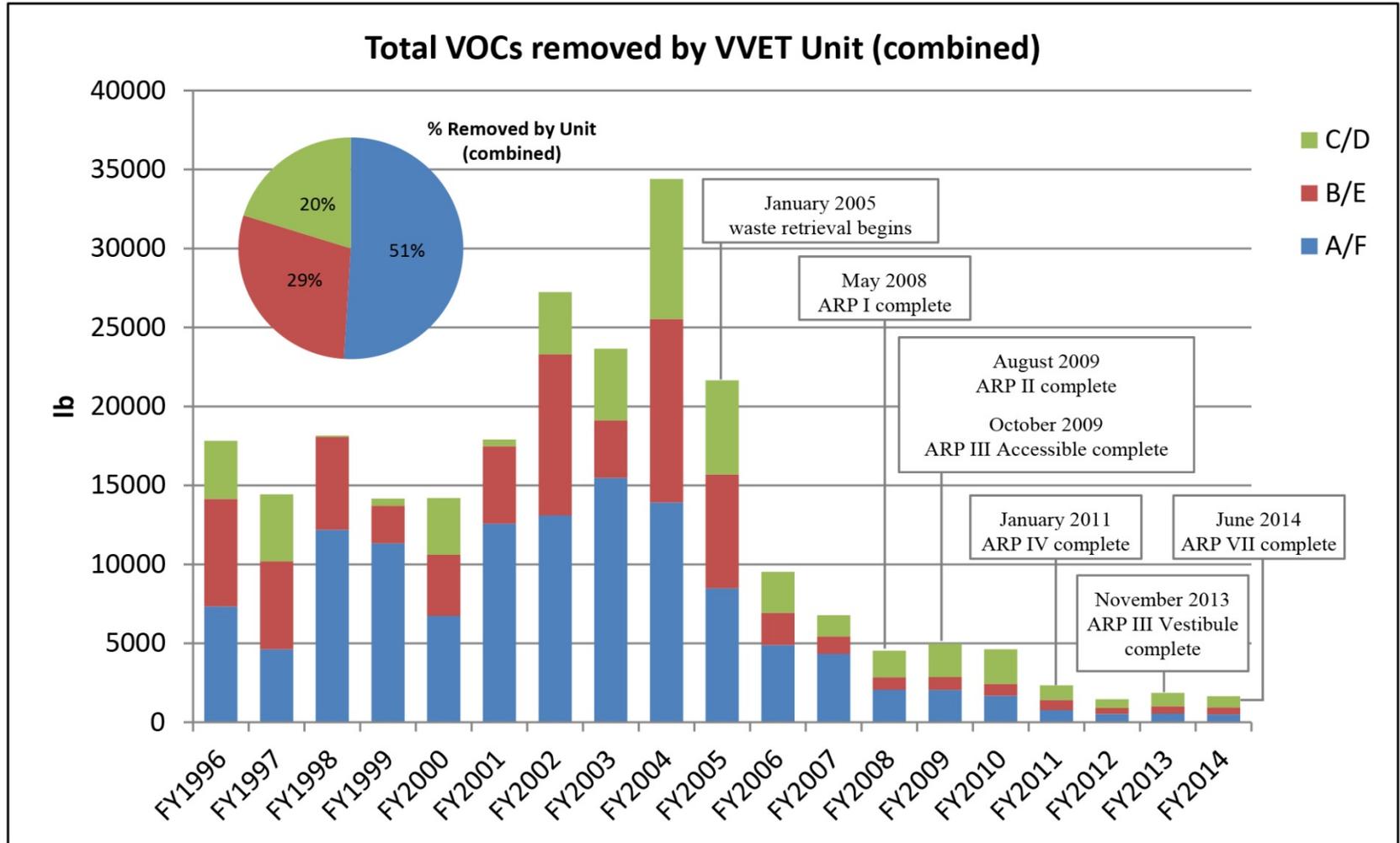
# OCVZ Vapor Vacuum Extraction System



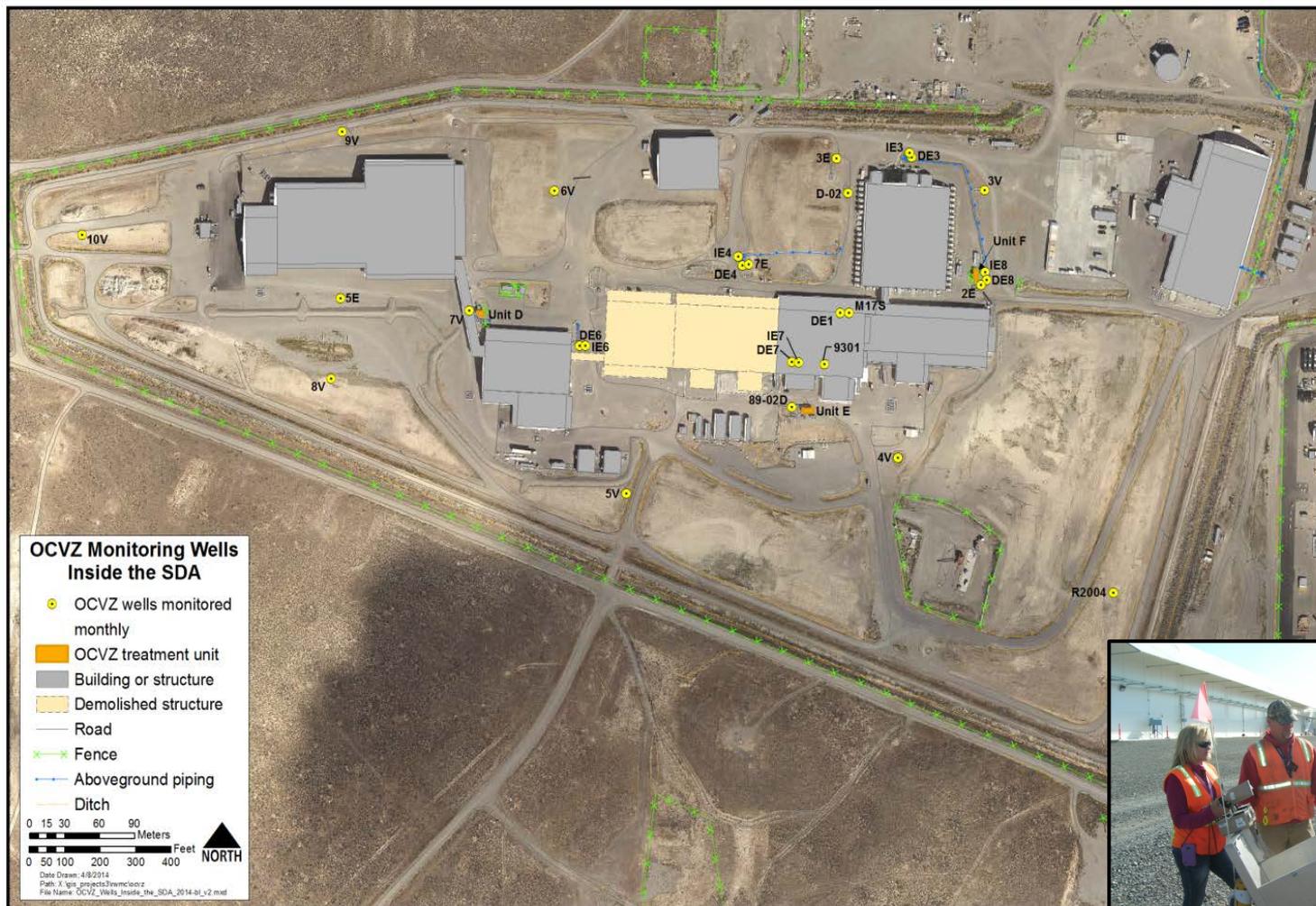
# VVET Unit Diagram



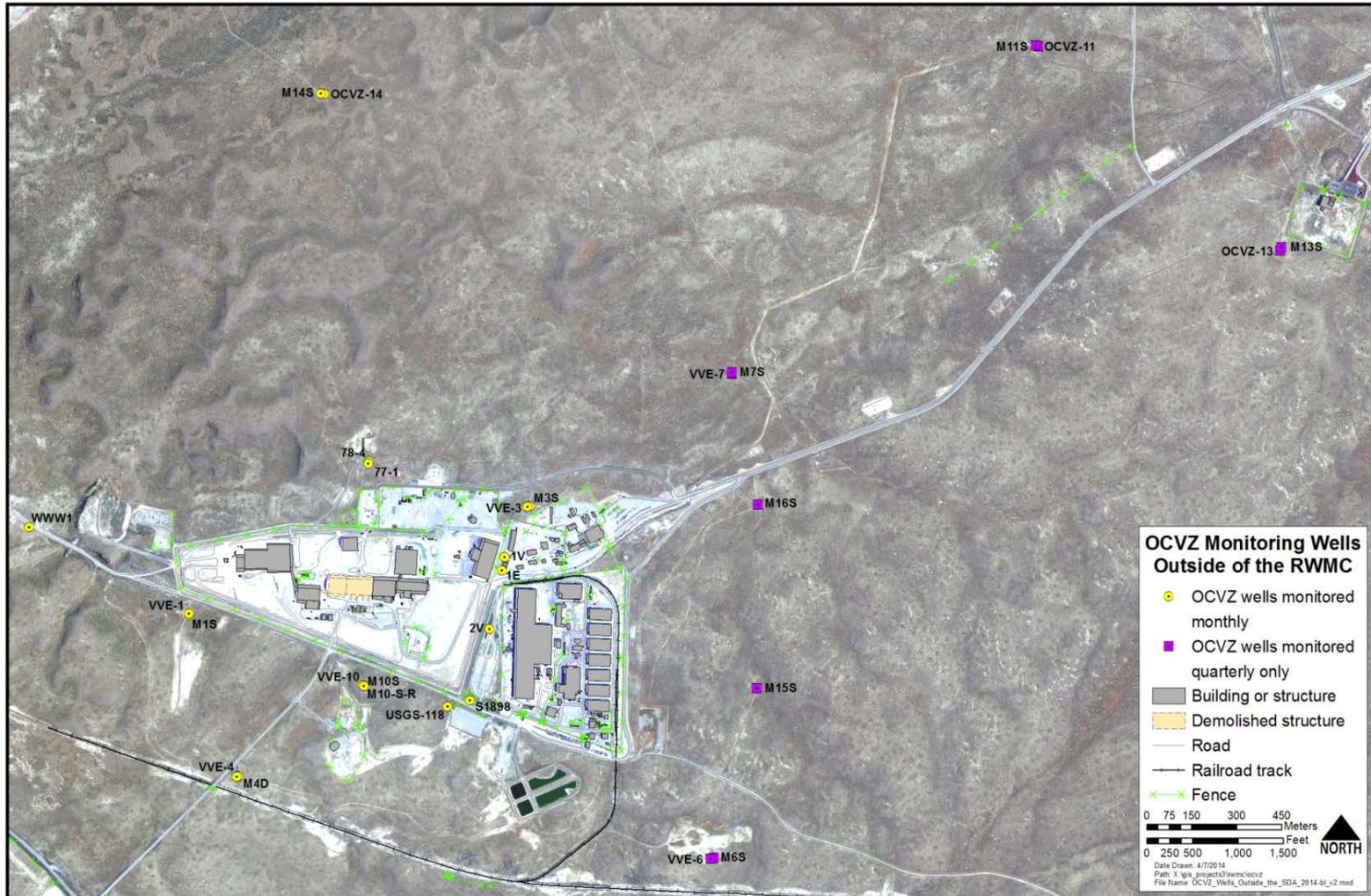
Monitoring Data



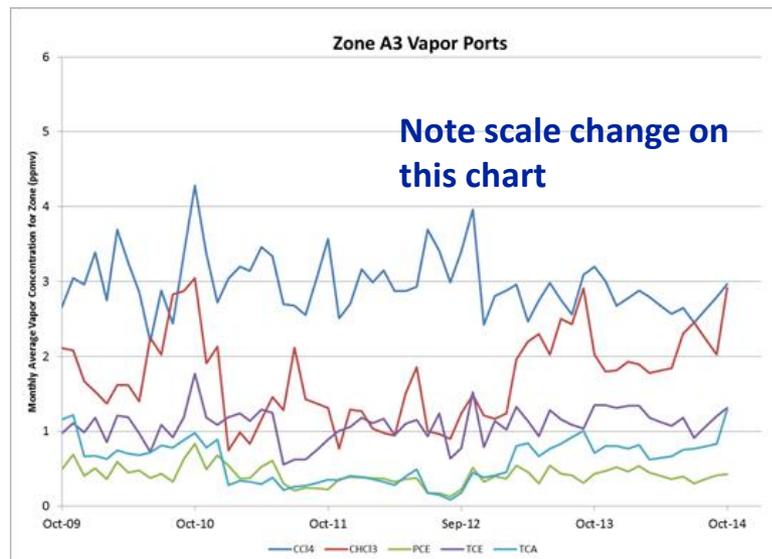
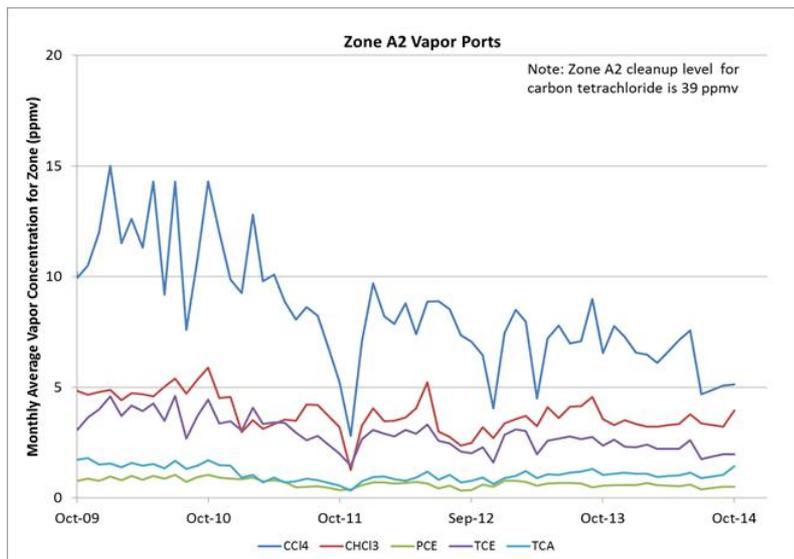
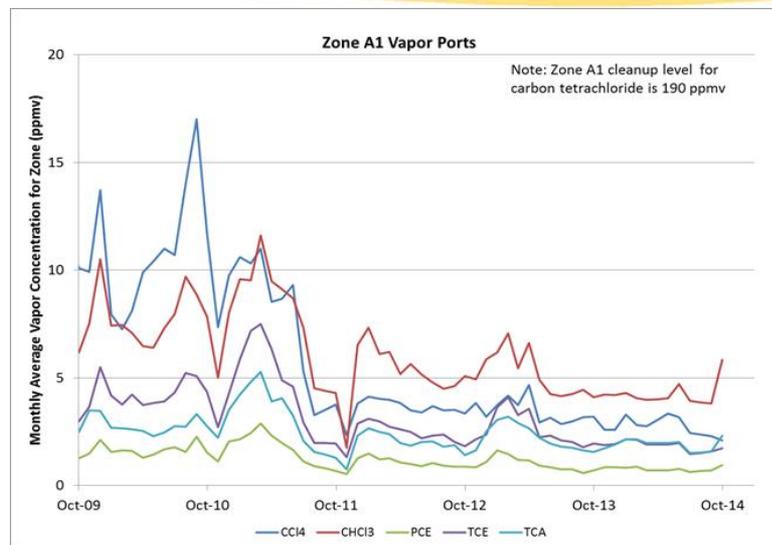
# Vadose Zone Vapor Monitoring Locations Inside the SDA (Region A)



# Vadose Zone Vapor Monitoring Locations Outside the SDA (Region B)



- Volatile organic compound concentration trends in vadose zone: **level of hazardous vapors is going down, and are well-below regulatory targets.**

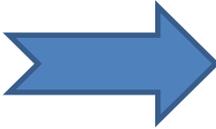


# Monthly Status Reporting

OCVZ reporting to IDEQ and EPA Region 10 consists of:

- Monthly status reports (example is end of March 2016 report)
- Annual letter reports
- Every 5 years an O&M report in support of CERCLA 5-year review.

| Vapor Vacuum Extraction and Treatment of Organic Contamination in the Vadose Zone |  |             |
|---|--|-------------|
| Period of Performance   | February 22, 2016 – March 27, 2016   |             |
| Control system CPU replaced in all units as part of a system upgrade.             |  |             |
| Unit D: Wells in use: 7V, SE-6, IE-6, DE-6.                                       |  |             |
| Run time (%)  | 100%   |             |
| Current month mass removed  | TVOC   | 88 lbs      |
|   | CCl <sub>4</sub>   | 19 lbs      |
| Total <sup>a</sup> mass removed   | TVOC   | 49,693 lbs  |
|   | CCl <sub>4</sub>   | 21,557 lbs  |
| Status, maintenance, and issues   | All maintenance is up to date.   |             |
| Unit E: Wells in use: SE-7, IE-7, DE-7, 8901D                                     |  |             |
| Run time (%)  | 100%   |             |
| Current month mass removed  | TVOC   | 66 lbs      |
|   | CCl <sub>4</sub>   | 22 lbs      |
| Total <sup>a</sup> mass removed   | TVOC   | 70,152 lbs  |
|   | CCl <sub>4</sub>   | 41,566 lbs  |
| Status, maintenance, and issues   | All maintenance is up to date.   |             |
| Unit F: Wells in use: IE-3, SE-3, DE-3, IE-8, SE-8, DE-8, 2E                      |  |             |
| Run time (%)  | 100%   |             |
| Current month mass removed  | TVOC   | 98 lbs      |
|   | CCl <sub>4</sub>   | 37 lbs      |
| Total <sup>a</sup> mass removed   | TVOC   | 123,967 lbs |
|   | CCl <sub>4</sub>   | 75,606 lbs  |
| Status, maintenance, and issues   | All maintenance is up to date.   |             |
| Summary for All Units   |  |             |
| Current month mass removed <sup>b</sup>   | TVOC   | 252 lbs     |
|   | CCl <sub>4</sub>   | 78 lbs      |
| Total <sup>a</sup> mass removed <sup>b</sup>                                      | TVOC   | 243,812 lbs |
|   | CCl <sub>4</sub>   | 138,729 lbs |
| a.  | Total since beginning of operations in January 1996. Total includes mass removed by the original units (i.e., Units A, B, and C). Unit D replaced Unit C in 2001. In 2004 Unit E replaced Unit B and Unit F replaced Unit A. |             |
| b.  | Summary totals may not agree with the sum of unit totals due to rounding.  |             |
| CCl <sub>4</sub>  | carbon tetrachloride   |             |
| TVOC  | total volatile organic compounds   |             |
| Pad A   |  |             |
| Inspection date   |  |             |
| Status, maintenance, and issues   | Pad A was inspected on 3-16-16. The report is attached.  |             |

| Key Questions                             | Dashboard Indicator   | Comments  |
|---|---|---|
| Percent of project completed              | 54%<br> | Project on schedule for FY 2016.                                      |
| Percent of budget expended                | 77%<br> | Project on budget for FY 2016.  |
| Impact on employment/economic development |         | Project will continue at a similar level of effort for several years. |
| Affect on agreements                      |        | Project continues to meet regulatory milestones.                      |
| Impact on safety and environment          |       | No ongoing safety issues; Safety goals are being met.                 |
| Impact on cleanup DOE-wide                |       | No impact on DOE-wide cleanup.  |