



Naval Air Station Fallon

*Restoration Advisory Board Meeting
July 23, 2009*

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Remedial Project Manager
Naval Facilities Engineering
Command, Southwest

Meeting Agenda



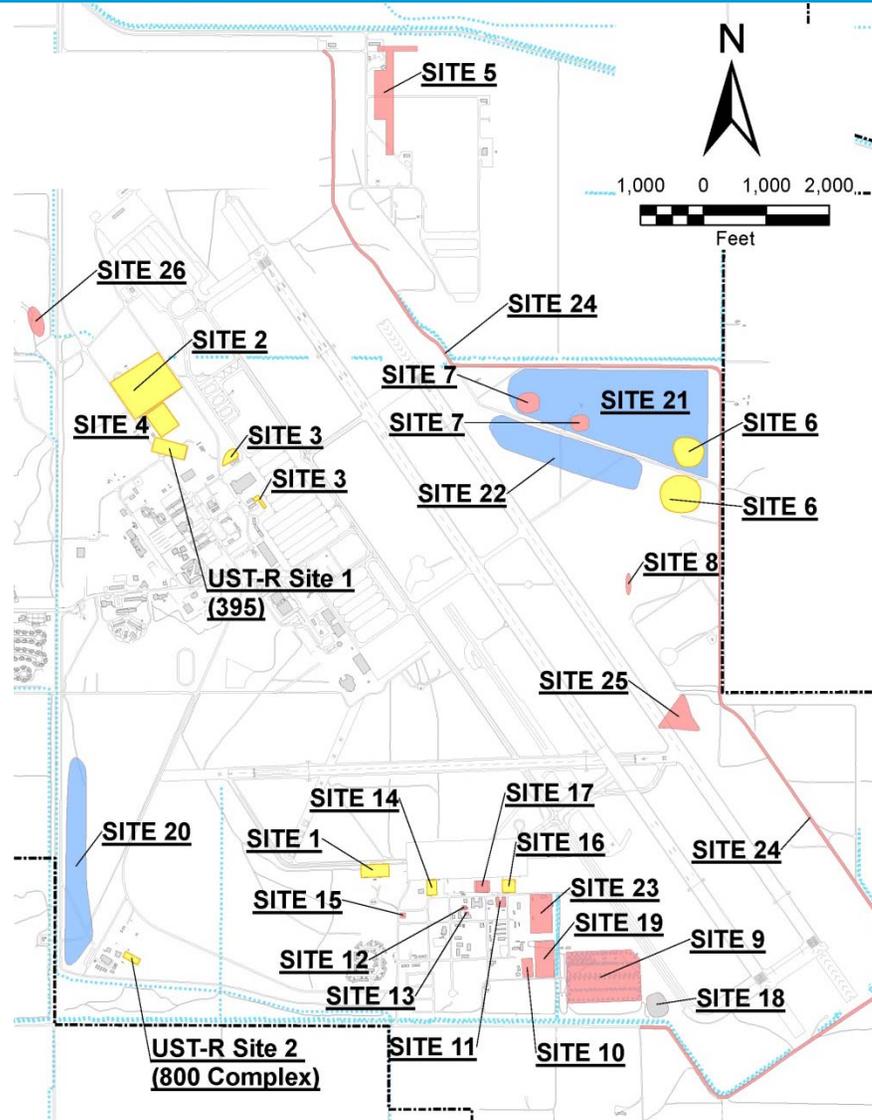
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|------------------------------------|-------------------------|
| ➤ Welcome – Introduction | 6:30 – 6:35 p.m. |
| ➤ Current Projects | 6:35 – 7:40 p.m. |
| • Remedial Investigations | 6:35 – 6:45 p.m. |
| • Landfills – Sites 20, 21, and 22 | 6:45 – 6:55 p.m. |
| • Basewide Investigations | 6:55 – 7:20 p.m. |
| • Pilot Studies – Site 16 | 7:20 – 7:30 p.m. |
| • Removal Actions – Site 2 | 7:30 – 7:40 p.m. |
| ➤ Looking Forward | 7:40 – 8:00 p.m. |
| • Schedule - Upcoming Activities | 7:40 – 7:50 p.m. |
| • Budget | 7:50 – 8:00 p.m. |
| ➤ Question & Answer | 8:00 – 8:15 p.m. |

Installation Restoration Program Site Status Map



SITE BOUNDARY

- Closed with No Further Action
- Limited Action
- Currently in Feasibility Study Process
- Remedial Investigation and Underground Storage Tank Sites Currently Under Investigation



Current Projects - Installation Restoration Program



- **Remedial Investigation (RI), Active Sites**
 - **Sites 1, 2, 3, 4, 6, 14, and 16**
 - **UST- R Site 1 (395) and UST- R-Site 2 (800 complex)**

- **Landfill Sites – Limited Action**
 - **Sites 20, 21, and 22**

- **Basewide Groundwater Investigation**

- **Fuel Removal Action – Site 2**

- **Air Sparge Pilot Study – Site 16**

- **Site 18 – Feasibility Study**

Current Projects – Remedial Investigation (RI), Active Sites



➤ **Field Investigation**

- **Conducted in 2007, 2008, 2009**

➤ **RI and Petroleum Sites Reports – current activities**

- **Evaluate soil and groundwater data**
- **Delineate soil and groundwater contamination**
- **Assess human health and ecological risks**
- **Update conceptual site models**
- **Determine whether remedial actions are required**

➤ **Soil Gas Field Investigation (Fall 2009)**

➤ **RI and Petroleum Sites Reports (2009/2010)**

Current Projects – Remedial Investigation Operable Units (OU)



- **What are operable units?**
 - **Site management tool for Navy to respond to contamination**
 - **Allows for comprehensive and efficient response**
- **Rationale for OU site groupings**
 - **Contamination is commingled**
 - **Contaminants are similar**
 - **Response action will be similar**
 - **Allows for more efficient response**
 - **Allows for risk reduction if warranted**

Current Projects – Remedial Investigation - OU



➤ **Northern OU**

- **Site 2 – New Fuel Farm**
- **Site 3 – Hangar 1 Area**
- **Site 4 - Transportation Yard**
- **Site 6 – Defuel Disposal Area**
 - Site 6 will be included in Northern OU; however, it will be evaluated as a stand-alone site

➤ **Southern OU**

- **Site 1 – Crash Crew Training Area**
- **Site 14 – Old Vehicle Maintenance Shop**
- **Site 16 – Old Fuel Farm**

➤ **Petroleum Sites**

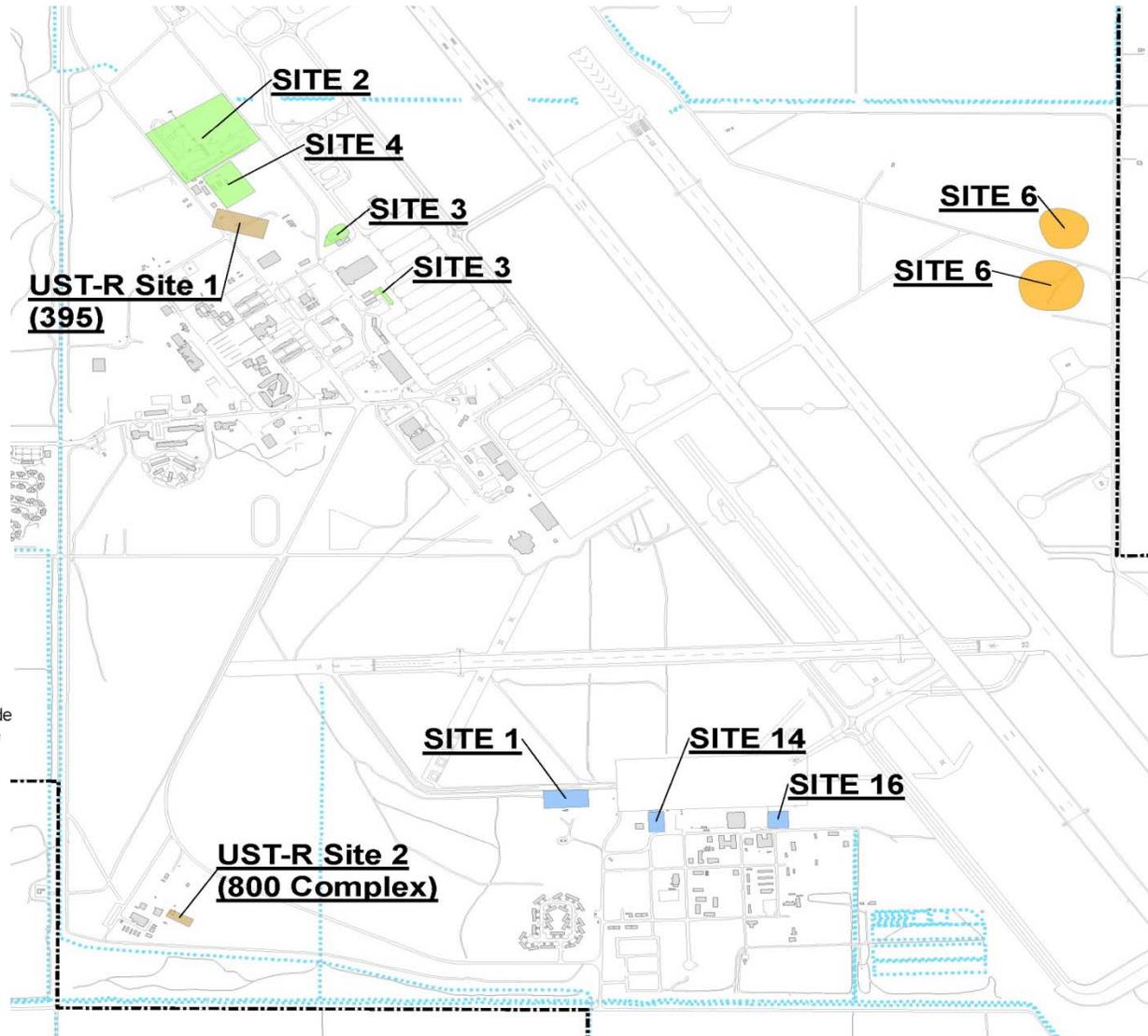
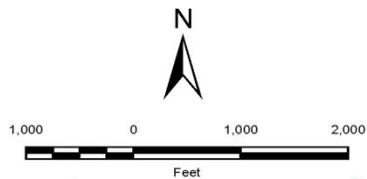
- **UST-R-Site 1 (395)**
- **UST-R-Site 2 (800 Complex)**

Current Projects – Remedial Investigation OU



SITE BOUNDARY

- Northern Operable Unit
- Southern Operable Unit
- Petroleum Sites
- The Northern OU RI Addendum Report Will Include Site 6, Which Will be Evaluated as a Discrete Site

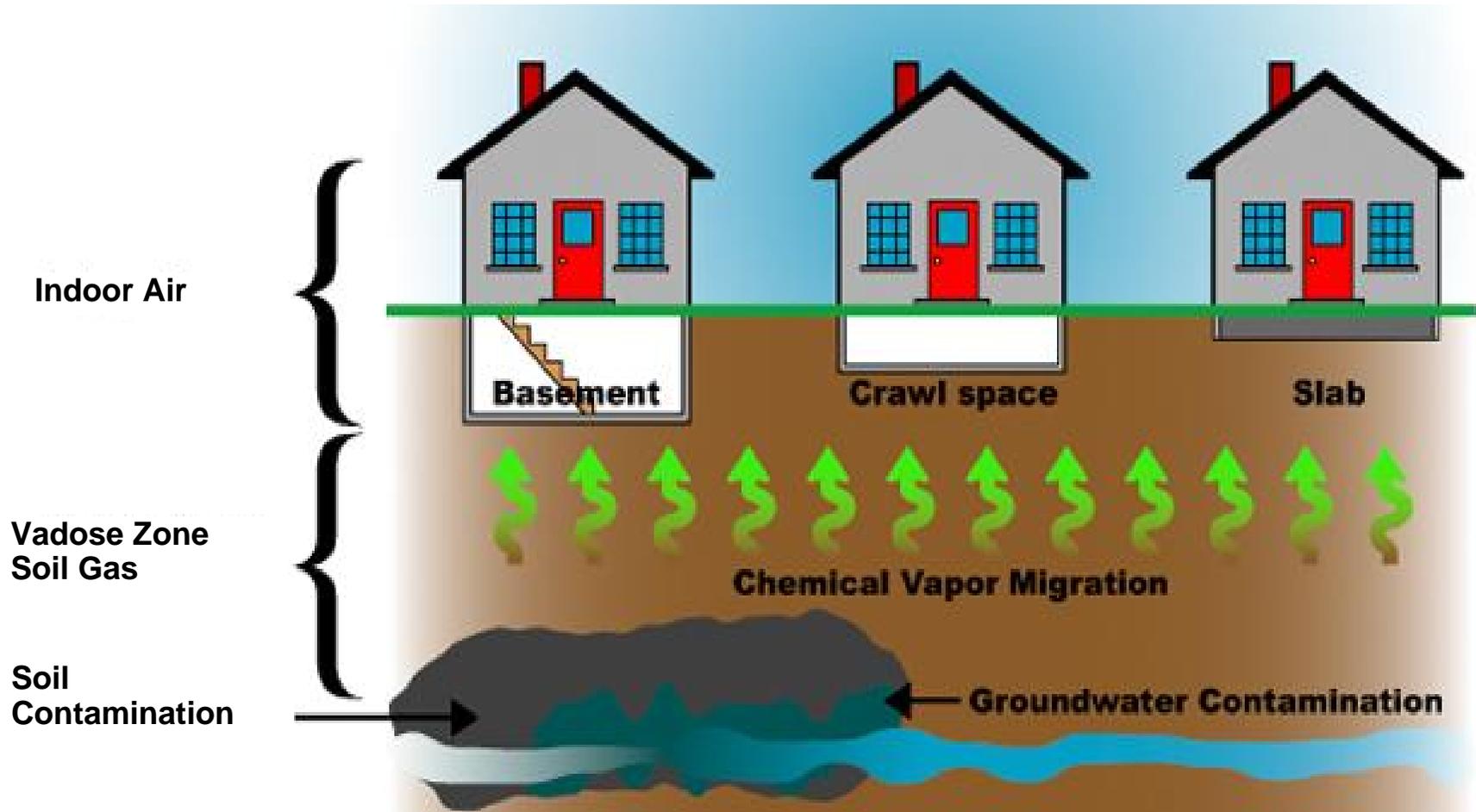


Current Projects – Soil Gas Investigation



- **Part of Remedial Investigation**
- **Evaluate human health risk**
- **Focus on occupied buildings**
- **Volatile constituents are present (Fuel, TCE, PCE)**
- **Primary Risk - migration of vapors from volatile constituents to indoor air**

Current Projects – Soil Gas Investigation Vapor Intrusion





➤ **Current Activities**

- **Complete Sampling and Analysis Plan and Work Plan (Summer 2009)**

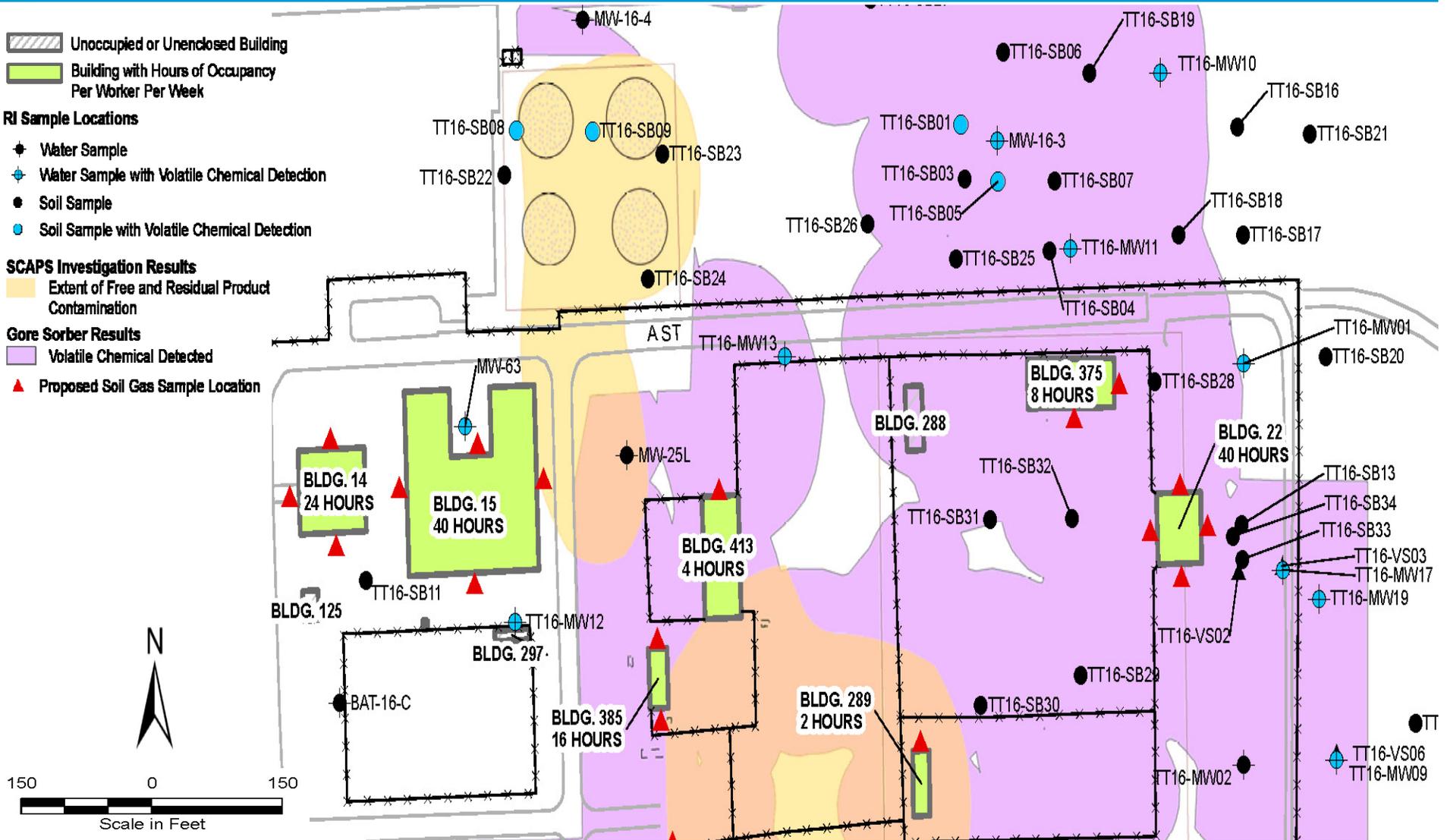
➤ **Upcoming Activities**

- **Conduct Field Investigation (Fall 2009)**
- **Incorporate soil gas results into the human health risk assessment (2009)**
- **Incorporate risk assessment results into RI and Petroleum Sites reports (2010)**

Current Projects – Soil Gas Sampling Containers



Current Projects - Soil Gas Proposed Locations



Current Projects – Landfill Monitoring and Maintenance



- **Landfills, Limited Action - Sites 20, 21, and 22**
- **Current Activities – Operations and Maintenance**
 - **Annual Groundwater Monitoring – Fall 2008**
 - **Sampled 23 wells at the three landfills**
 - **TPH, VOCs, SVOCs, and TDS**
 - **Re-vegetation**
 - **Areas that were re-graded in 2006**
 - **Native grasses, sagebrush, and plants**

Current Projects – Landfill Monitoring and Maintenance



➤ **Recent monitoring results (2007/2008)**

- **TCE slightly exceeded action level by 1 part per billion (EPA screening criteria) in one well at Site 20**
- **No significant semi-volatiles detected in any wells**
- **Fuel constituents exceeded NDEP action level in two wells (upgradient of Sites 21 and 22)**
- **TDS concentrations are elevated and consistent with previous results**



- **Review of Remedial Action - required by CERCLA**
- **Landfills 20, 21, and 22, – Decision Documents signed in October 2004**
- **Limited action**
 - **Institutional (land use) control**
 - Included in base overview plan
 - **Groundwater monitoring**
 - **Re-grading or repairing (as necessary)**
 - **Re-vegetation**

Current Projects – Landfill Five Year Reviews



- **Five-year Reviews assess the following:**
 - **Was remedy constructed in accordance with Decision Documents?**
 - **Is the remedy functioning as designed?**
 - **Is remedy expected to be protective of human health and the environment through lifetime?**
 - **Is operation and maintenance as set forth in the Decision Documents being conducted?**
- **Review Status**
 - **Field visit conducted (Spring 2009)**
 - **Five-year review report upcoming (Fall 2009)**



➤ Purpose

- Assess plume stability, characteristics, and trends at active sites
- Provide continued post-closure monitoring at closed sites
- Monitor groundwater and surface water quality near base boundaries
- Provide updates to the basewide conceptual site model

➤ Scope

- Semiannual groundwater and annual surface water monitoring
- Quarterly data-logger downloads
- Continuous pressure transducer measurements
- Continuous groundwater flow sensor measurements

Current Projects – Basewide Groundwater Investigation, Recent Field Activities



- **Monitor 60 pressure transducers in selected basewide monitoring wells**
 - **Transducers to provide continuous measurements:**
 - Groundwater levels
 - Groundwater temperature
 - Six probes also measure electrical conductivity and total dissolved solids (TDS)



Current Projects – Basewide Groundwater Investigation, Recent Field Activities



- **Installed seven groundwater flow sensors in 2008**
 - Two at Site 6 – one was moved to area east of Site 16 in 2009
 - Five originally installed at Site 16 – now there are six
- **Provide continuous measurements of:**
 - Horizontal groundwater velocity
 - Vertical groundwater velocity
 - Groundwater flow direction



Current Projects – Basewide Groundwater Investigation, Recent Field Activities



Current Projects - Well Utilization Plan



- **Evaluate and establish monitoring well network, based on:**
 - Compliance with Nevada Administrative Code (NAC) 534, “Underground Water and Wells”
 - Results of redeveloping existing (historical) wells
 - Assessment of water quality results and water level measurements to ensure basewide monitoring goals are achieved

- **Monitoring well network is dynamic**
 - Modifications to monitoring well network as needs change
 - Supplemental wells will remain in-place for future monitoring
 - Track changes in plume migration
 - Monitor interim and future remedial actions, as necessary

- **Identify wells that do not meet criteria and should be plugged**

Current Projects - Well Utilization Plan



- **492 monitoring wells evaluated**
- **341 monitoring wells in monitoring well network**
 - 80 wells sampled semiannually for water quality
 - 67 observation wells for semiannual water level monitoring
 - 10 observation wells with floating product levels measured semiannually
 - 60 wells equipped with pressure transducers
 - 37 supplemental wells available for monitoring groundwater quality
 - 97 supplemental wells available for monitoring groundwater or product levels
- **7 velocity flow sensors in monitoring well network**
- **151 monitoring wells recommended for plugging**

Current Projects - Basewide Monitoring

Spring 2009



- Collected surface water samples from five locations along drains –
- Results indicated that surface water is not affected by IR site-related activities

- **Sampled 80 monitoring wells in March 2009, including:**
 - 54 monitoring wells at active RI sites
 - 6 monitoring wells at closed landfill sites
 - 20 sentinel monitoring wells located near base boundaries

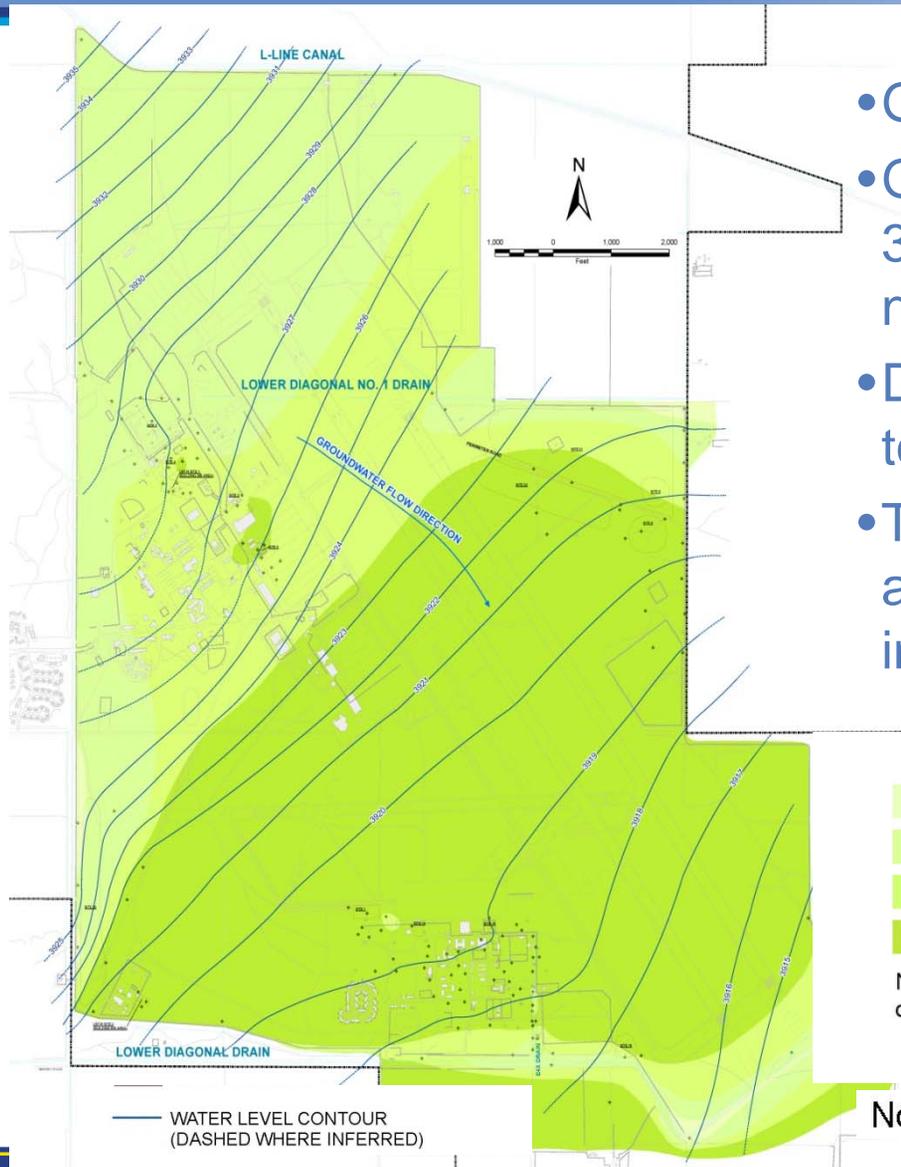
- **Monitoring wells sampled for total dissolved solids, volatile organic compounds, polynuclear aromatic hydrocarbons**

- **All samples collected prior to release of water from Lahontan Reservoir into irrigation drains (baseflow conditions)**

- **Semiannual water level and floating product measurements**

- **Quarterly datalogger downloads**

Results – Basewide Range of Total Dissolved Solids in Groundwater



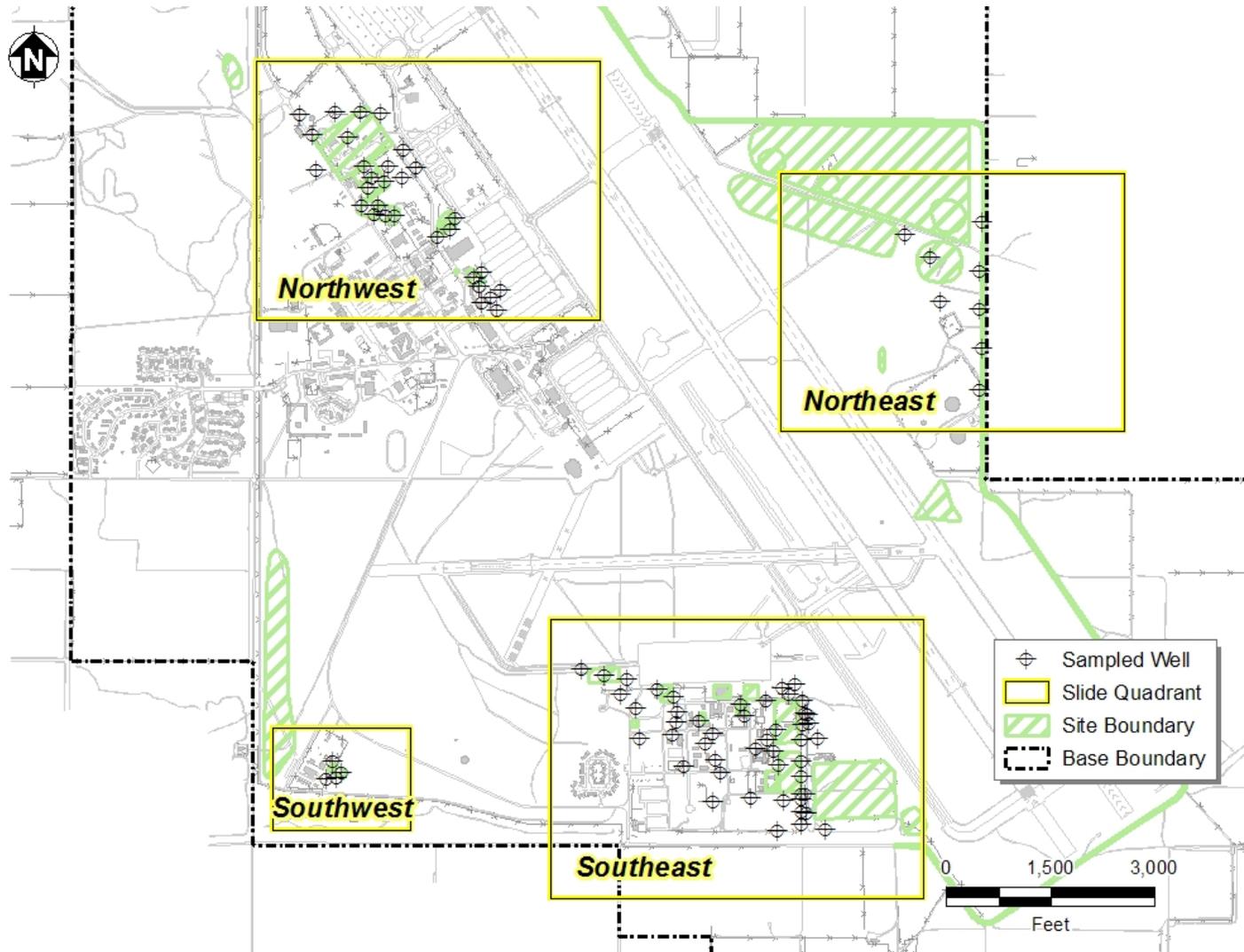
- Groundwater flows to southeast
- Groundwater elevations range from 3,935 mean sea level (msl) in northwest to 3,914 msl in southeast
- Depths to groundwater range from 5 to 13 feet below ground surface (bgs)
- Total dissolved solids are lowest adjacent to drains and appear to increase with distance from drains

- ◆ TOTAL DISSOLVED SOLIDS (TDS) < 1,000 mg/L
- ◆ TDS 1,000 - 10,000 mg/L
- ◆ TDS 10,000 - 20,000 mg/L
- ◆ TDS > 20,000 mg/L

Note: TDS concentration is posted next to well location in mg/L followed by the sample date in parenthesis.

Note: Water levels were measured in May/June 2008.

Results – Spring 2009 Groundwater Monitoring Quadrants in the Following Slides



Results – Spring 2009 Groundwater Monitoring Northwest Quadrant



- **Depths to groundwater range from about 7 to 13 feet bgs**
- **Groundwater temperatures range from 50 to 70 degrees Fahrenheit (°F)**
- **Groundwater levels and temperature trends indicate that groundwater and surface water from the Lower Diagonal No. 1 Drain are interconnected**
- **Contaminants of potential concern in groundwater include naphthalenes, fluorene, pyrene, benzene compounds, toluene, ethylbenzene, xylenes, and chlorinated solvents**
- **Floating fuel product exists in the vicinity of the Fuel Farm**

Results – Spring 2009 Groundwater Monitoring Northeast Quadrant



- **Depths to groundwater range from about 5 to 12 feet bgs**
- **Groundwater temperatures range from 50 to 70 degrees °F**
- **Groundwater levels and temperature trends indicate that groundwater and surface water from the Lower Diagonal No. 1 Drain are interconnected**
- **Contaminants of potential concern in groundwater include naphthalenes, benzene compounds, carbon disulfide, and xylene**

Results – Spring 2009 Groundwater Monitoring Southwest Quadrant



- **Depths to groundwater range from about 5 to 8 feet bgs**
- **Groundwater temperatures range from 54 to 67 degrees °F**
- **Contaminants of potential concern in groundwater include naphthalenes, anthracene, fluorene, benzene compounds, DCE, and TCE**

Results – Spring 2009 Groundwater Monitoring Southeast Quadrant



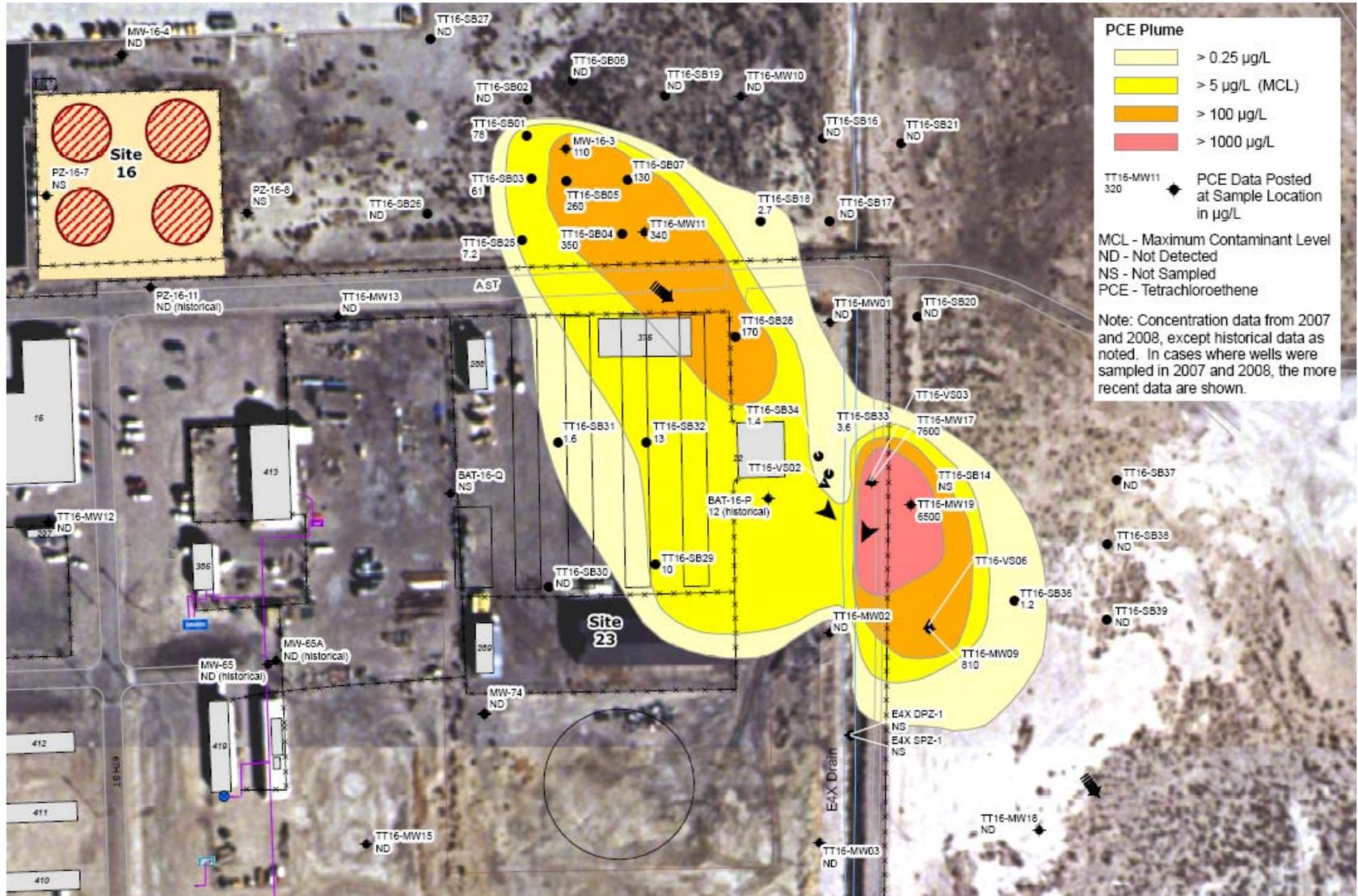
- **Depths to groundwater range from about 5 to 9 feet bgs**
- **Groundwater temperatures range from 54 to 67 degrees °F**
- **Groundwater levels and temperature trends indicate that groundwater and surface water from the E4X Drain are interconnected**
- **Contaminants of potential concern in groundwater include naphthalenes, anthracene, pyrene, fluorenes, lead, benzenes, toluene, ethylbenzene, xylenes, and chlorinated solvents**
- **Floating fuel product exists in the vicinity of the Southern OU**

*Current Projects - Site 16 Old Fuel Farm
Chlorinated Solvent Plumes – Status update*



- **Chlorinated solvent plume first discovered in 2005**
- **Delineated in 2007 and 2008**
- **Two distinct plumes**
- **Not related to the Site 16 Old Fuel Farm**

Current Projects – Site 16 - Extent of PCE Plumes



Current Projects – Site 16 -Sources of Contamination

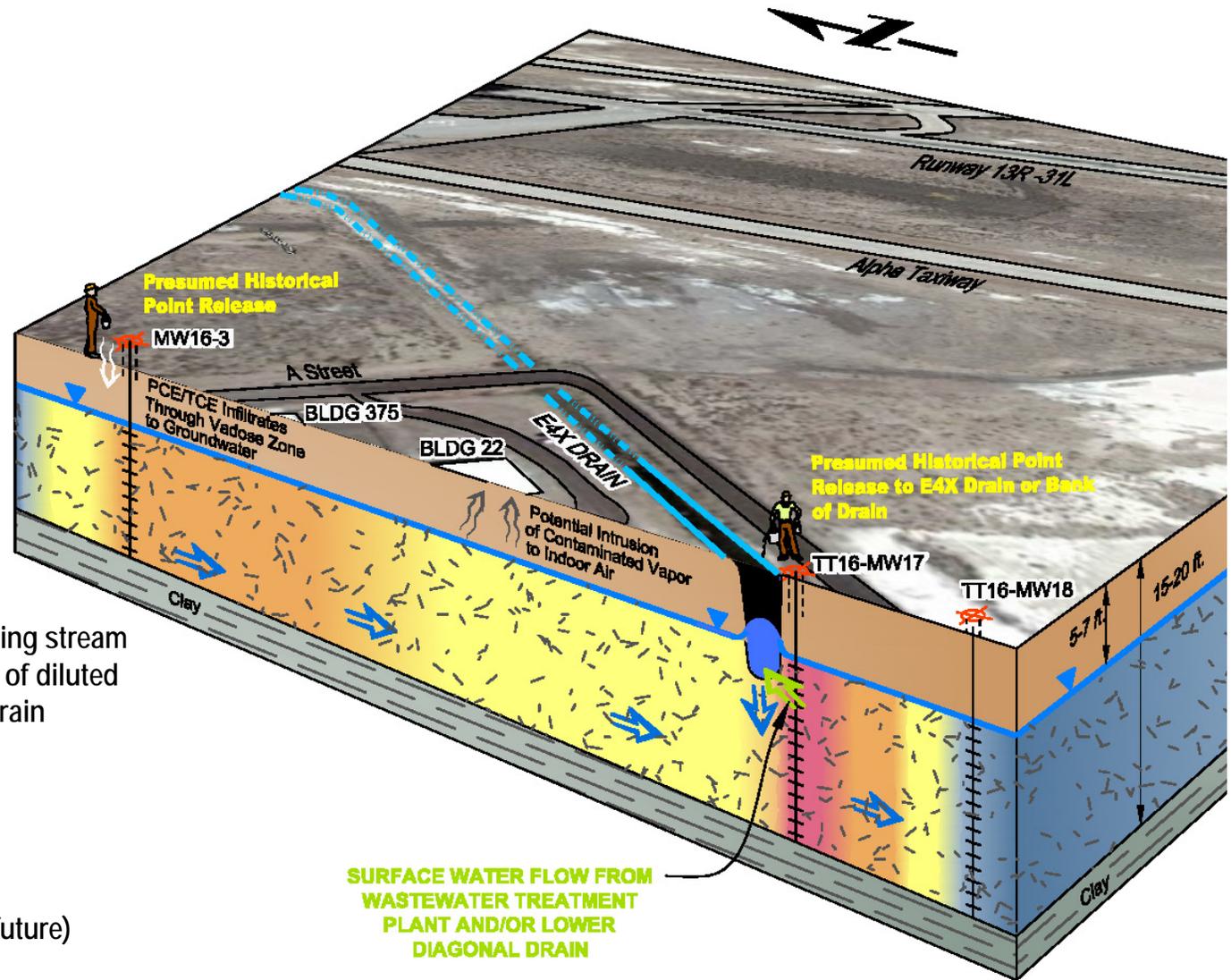


- **Exact sources of plumes are not known**
 - No tanks, no pipelines, no former storage areas are known to be in either source area

- **Despite large plume extents and high concentrations of PCE and TCE in groundwater**
 - Total volume only 2.5 gallons of PCE and 0.3 gallon of TCE

- **Such small volumes may have resulted from a single event, past employees discarded spent solvent on the ground**

Current Projects – Site 16 – Updated Conceptual Site Model



PRIMARY MIGRATION PATHWAY

- Infiltration to groundwater
- Vapor intrusion to indoor air
- Migration to E4X Drain during gaining stream condition, only potential migration of diluted contaminants to Lower Diagonal Drain

POTENTIAL RECEPTORS

- Site worker (current and future)
- Hypothetical resident (future)
- Construction worker (current and future)
- Plants, wildlife

Next Step – Site 16 -Air Sparge Pilot Test

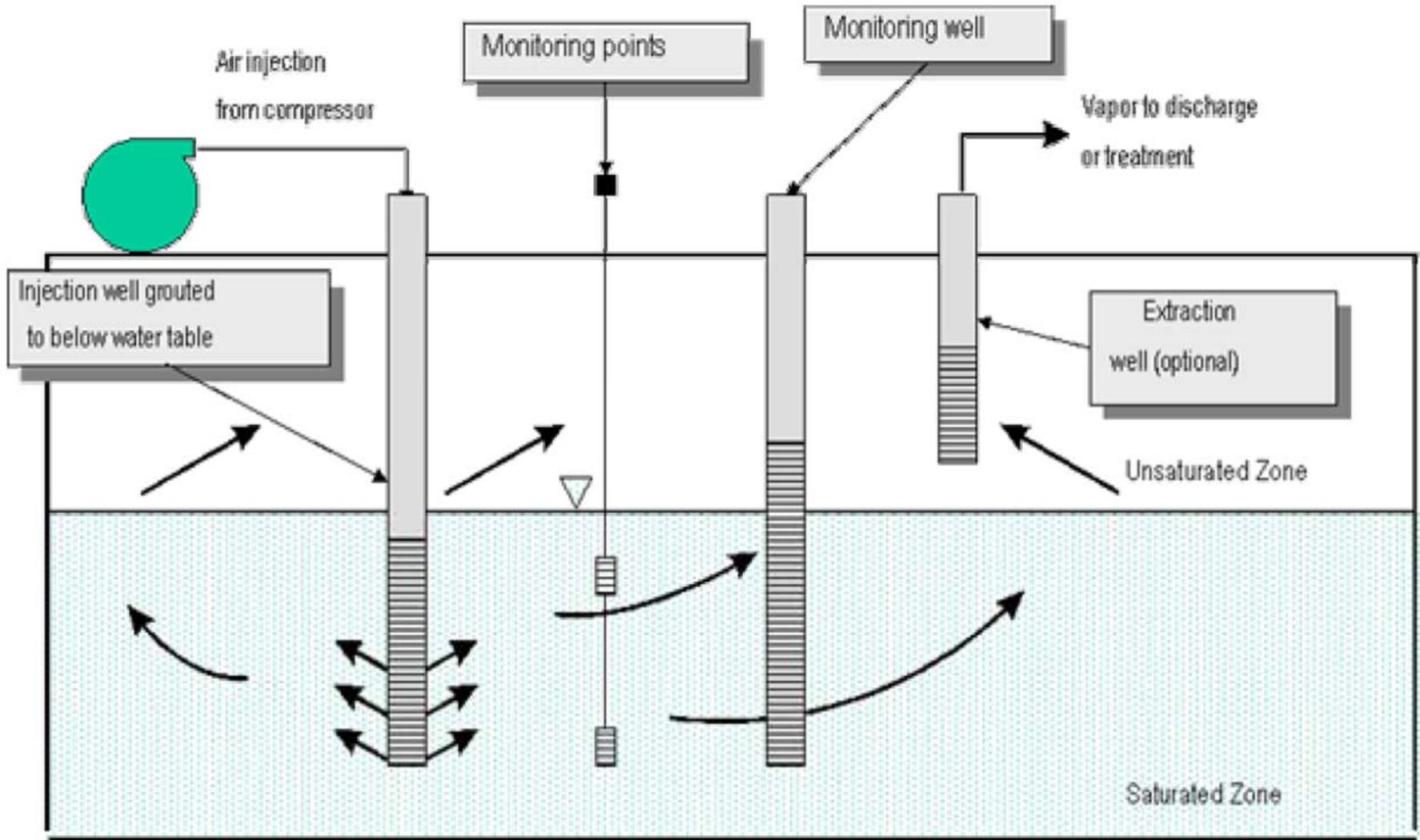


- **Pilot test will be used to assess the feasibility and cost-effectiveness of a full-scale air sparge remediation**

- **Pilot test will collect the following information:**
 - **Air flow rate and pressure**
 - **Radius of influence of a sparge well**
 - **Potential air emissions**

- **Pilot test will be conducted over a one week period**
- **If pilot test demonstrates that air sparging is feasible, this information will be used to design a full-scale system**

Typical Air Sparge System

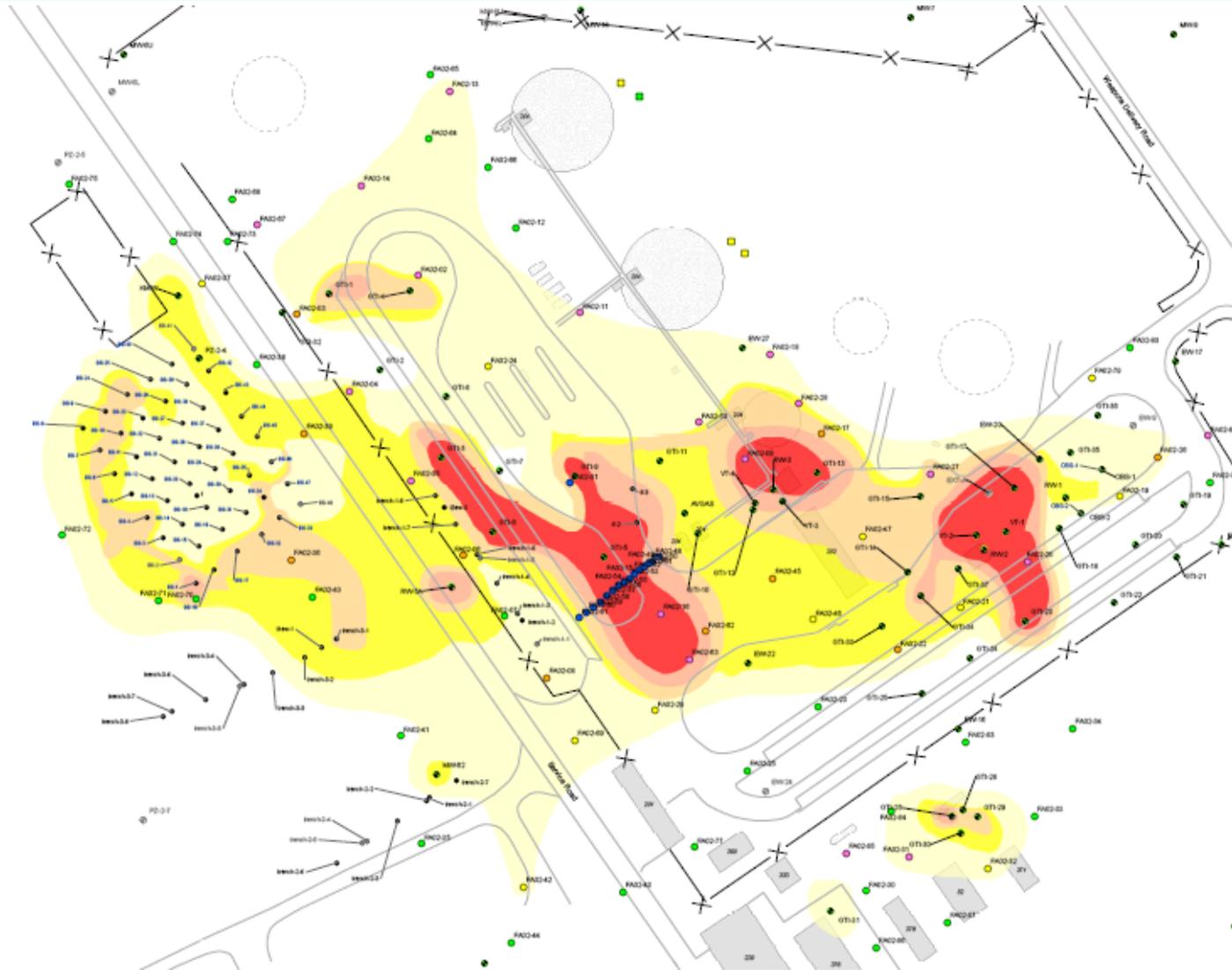


Current Projects – Removal Action -Site 2 Fuel Farm



- Large volume of JP-5 and JP-8 from historical leaks from former underground storage tanks and piping remains at the groundwater/vadose zone interface
- Plume is stable:
 - Free product has been monitored for 20 years
 - Free product is not moving, thickness is gradually decreasing
 - Dissolved phase hydrocarbons naturally attenuate via biodegradation at fringes of plume
- 2,336 gallons of free product collected in the past 1.5 years from two continuously operating skimmer pumps and weekly collection from about 15 wells
- In August 2009, the Navy will
 - Install one new skimmer and resume skimming operations
 - Resume weekly skimming operations at up to 25 wells and three trenches

Current Projects – Removal Action – Site 2 Fuel Farm



*Installation Restoration Program –
Looking Forward - Schedule*



➤ **Remedial Investigation – Operable Units**

- **Fall 2009 - Complete Soil Gas Investigation**
- **2009/2010 - Complete Remedial Investigation Reports**
- **2010/2011 - Feasibility Studies/Corrective Action Plans**
- **2012 - Removal Actions/Remedial Actions**

Installation Restoration Program – Looking Forward - Schedule



- **Landfill Sites – Limited Action**
 - **2009 - Complete 5-year reviews**
 - **2009/2010 - Continue landfill monitoring and maintenance**
 - **2010 - Complete Land Use Control Remedial Design**

- **Site 18**
 - **2010 - Complete FS and Decision Documents**

Installation Restoration Program – Looking Forward - Schedule



- **Basewide Groundwater Investigation (2009 – 2011)**
 - **Continue to obtain semiannual analytical data and quarterly hydrogeologic data**
 - **Continue to obtain quarterly hydrogeologic data**
 - **Continue to evaluate groundwater and surface water at base boundaries**
 - **Continue semiannual reporting**
 - **Incorporate and consider basewide monitoring data in developing remedial actions for OUs**



➤ **Pilot Studies/Removal Actions**

- **Fall 2009 - Complete Site 16 pilot study field work**
- **2010 - Complete Site 16 pilot study summary report**
- **2009/2010 - Continue to optimize fuel removal action at Site 2**
- **2010/2011 - Incorporate and consider pilot study results in developing remedial actions**

Installation Restoration Program – Budget



- **FY 09 - \$2.3 Million**
- **FY 10 - \$2.4 Million**
- **FY 11 - \$1.9 Million**
- **FY 12 - \$920,000**
- **FY 13 – \$645,000**

Question and Answer - ??

