Winning with Green Remediation Practices at the Former McClellan AFB, Sacramento CA

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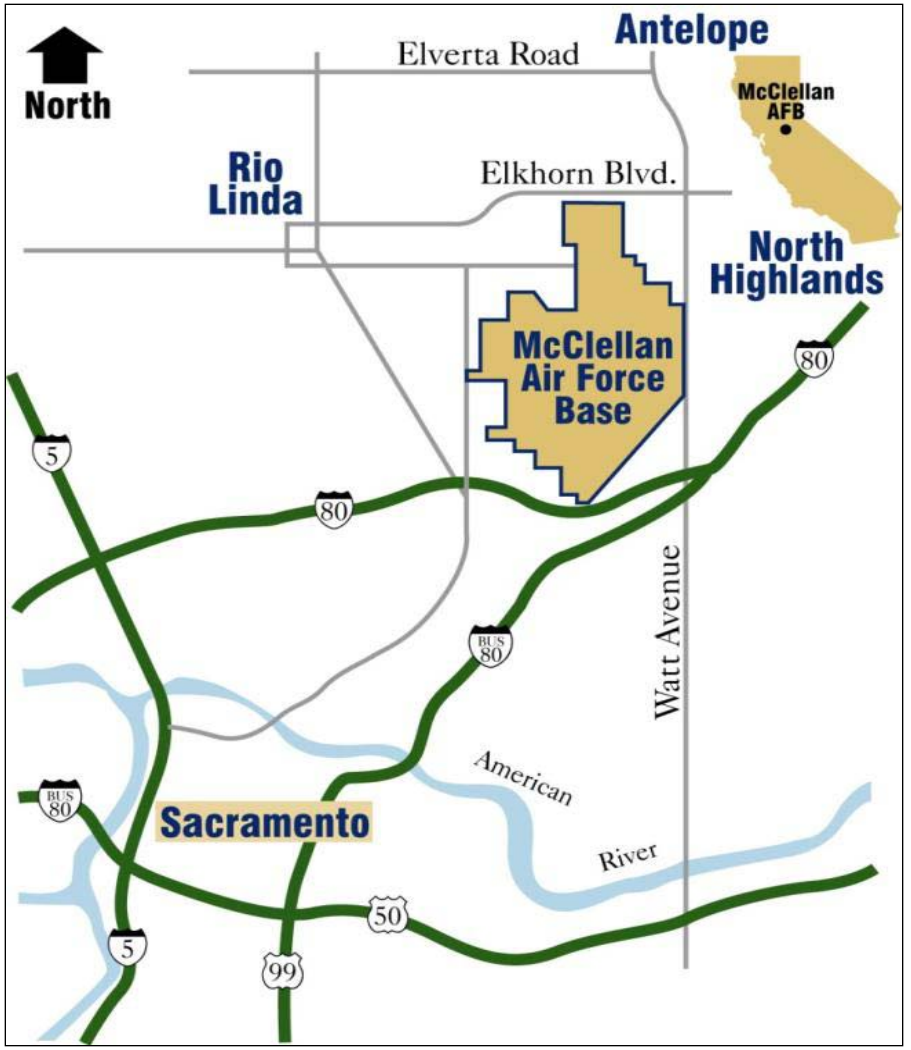
Overview

- McClellan History
- Remediation Programs
  - Groundwater
  - Soil vapor extraction
  - Fuels bioventing
  - Soil Cleanup
- Right Sizing
  - Reduces environmental impacts
  - Reduces energy demands
  - Increases sustainability
  - Saves taxpayers' money

Location and History

- McClellan was a large, industrial city
  - Sept. 1936 base opened
  - 1995 BRAC listed
  - July 2001 base closed



McClellan History

- McClellan's mission was repair depot and system management
  - Aircraft
  - Communications
  - Electronics
  - Space
- 1979 groundwater contamination discovered
- 1987 placed on EPA National Priorities List

Background

- Extensive soil and groundwater contamination
  - Primarily solvents (TCE, PCE)
  - Metals (lead, cadmium, chromium)
  - Fuels (gas and diesel)
  - Radiological (Radium 226)
- Largest cleanup effort in the Air Force
  - 318 sites
- Interbedded (sand, silt, clay) geology presents challenges (low permeability)
- BRAC cleanup Team
  - Air Force
  - EPA Region IX
  - State of California

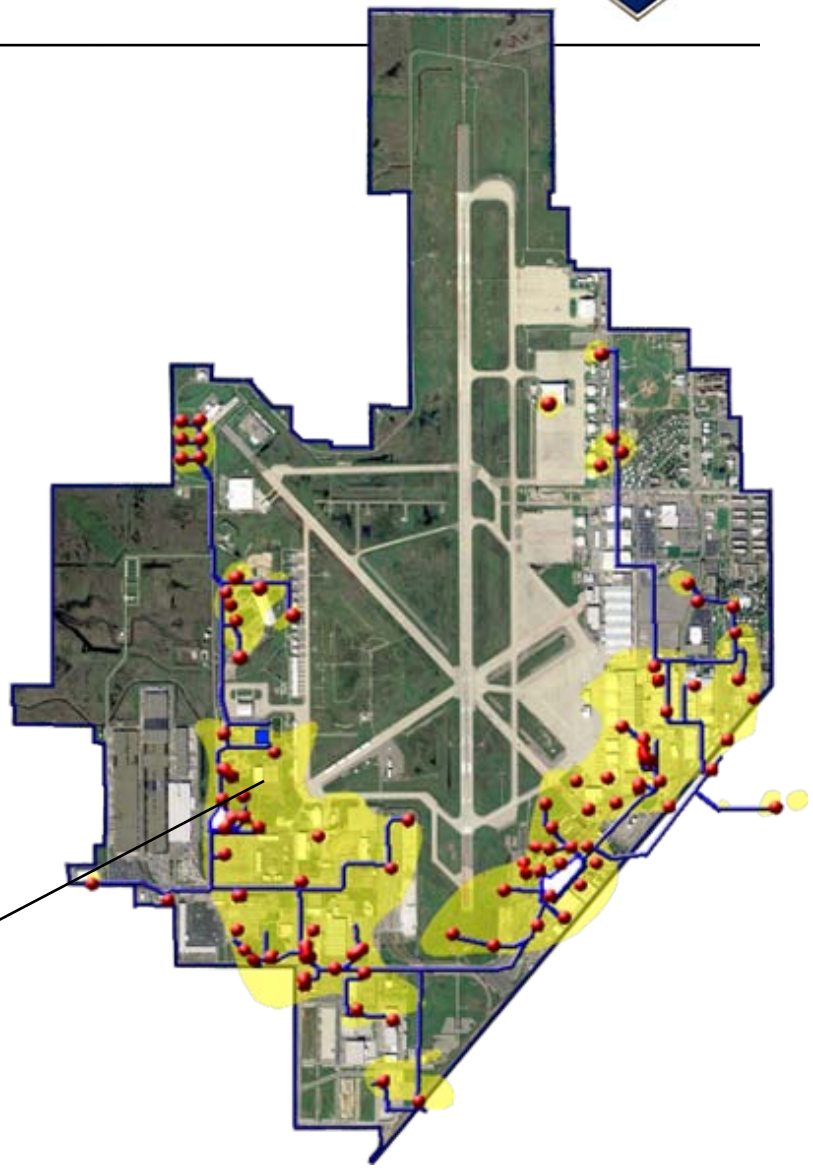
Remediation Programs

- Groundwater
- Soil vapor extraction
- Fuels bioventing
- Soil

"Right sizing" of programs has resulted in green successes in all four

Groundwater Cleanup

- 100 extraction wells
- 500 monitoring wells
- Approximately 1,450 gallons per minute
- More than 65,000 lbs of VOCs removed from 16 billion gallons of water



Right Sizing Groundwater Treatment

- Implemented air stripping alone as treatment for meeting de minimus VOC discharge standards (<2 lbs/day)
  - Eliminated energy-intensive thermal processes
  - Eliminated liquid-phase granular activated carbon (LGAC) to polish air stripper effluent
- Reduced overall carbon footprint
  - LGAC backwash
  - Carbon reactivation
- Saves more than $200,000/year in utility costs

Right Sizing Groundwater Treatment

- Eliminated satellite groundwater treatment system
  - Air stripper pre-treated hot spot before transporting water to main GWTP
  - As VOC concentrations were reduced, system became redundant
  - Reduced greenhouse gas production and realized energy savings of $40,000/yr.

Right Sizing Groundwater Treatment

- Downsized hexavalent chromium ion exchange treatment system in 2009
  - Replaced two 500-cubic-foot resin vessels with one 60-cubic-foot resin vessel
  - Eliminates excess resin regeneration
  - Saves more than $100,000 per year in decreased utility costs, resin subcontractor costs, and disposal fees

Right Sizing Groundwater Treatment

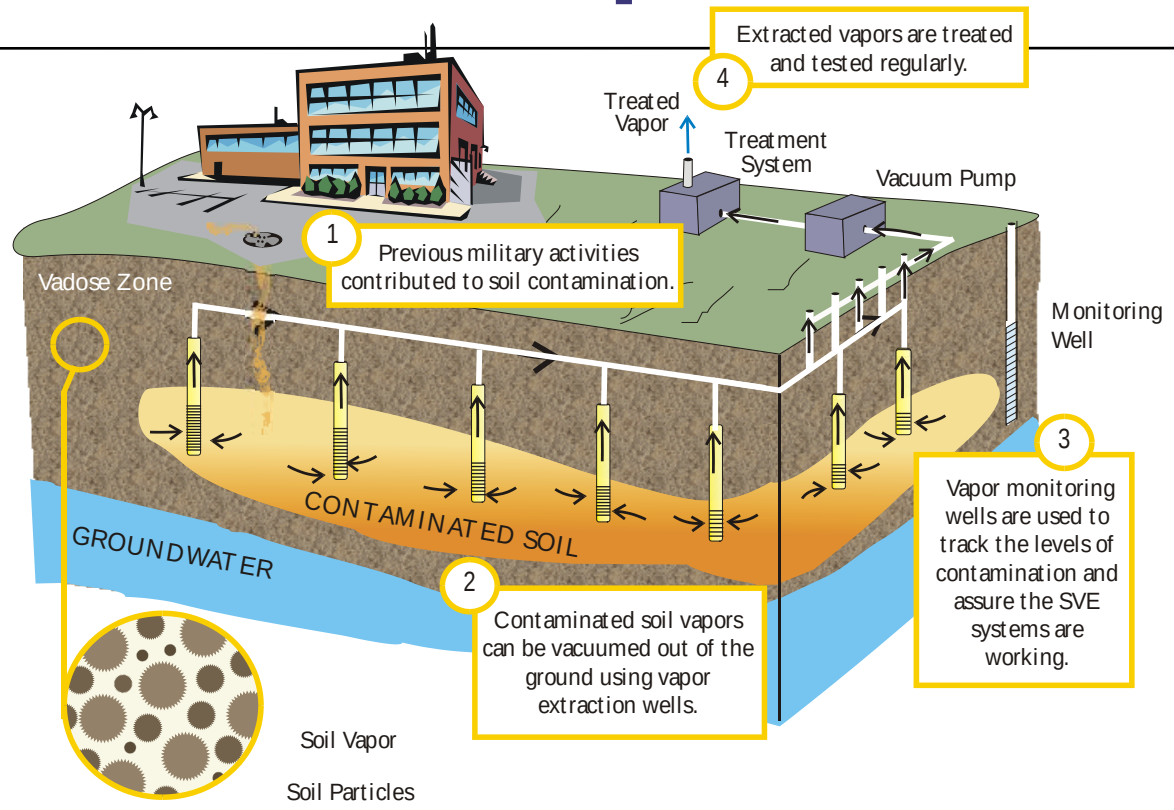
- Sampling
  - Converting from purge and bail to passive Hydrasleeve
    - Eliminates purge water generation
    - Eliminates onsite pump generator

- Investigating solar power for long-term, sustainable energy
  - Private firm to install and operate solar atop capped landfill (SVE) and at GWTP
  - Air Force to purchase power through Power Purchase Agreement

Right Sizing Groundwater Treatment

- Implemented performance-based contract at former Davis Global Communication Site for groundwater cleanup
  - Existing pump and treat system replaced with sustainable in-situ bioremediation (passive vegetable oil injection)
  - Cost to complete reduced by $15,000,000, along with reduced energy usage and greenhouse gas production

Soil Vapor Extraction



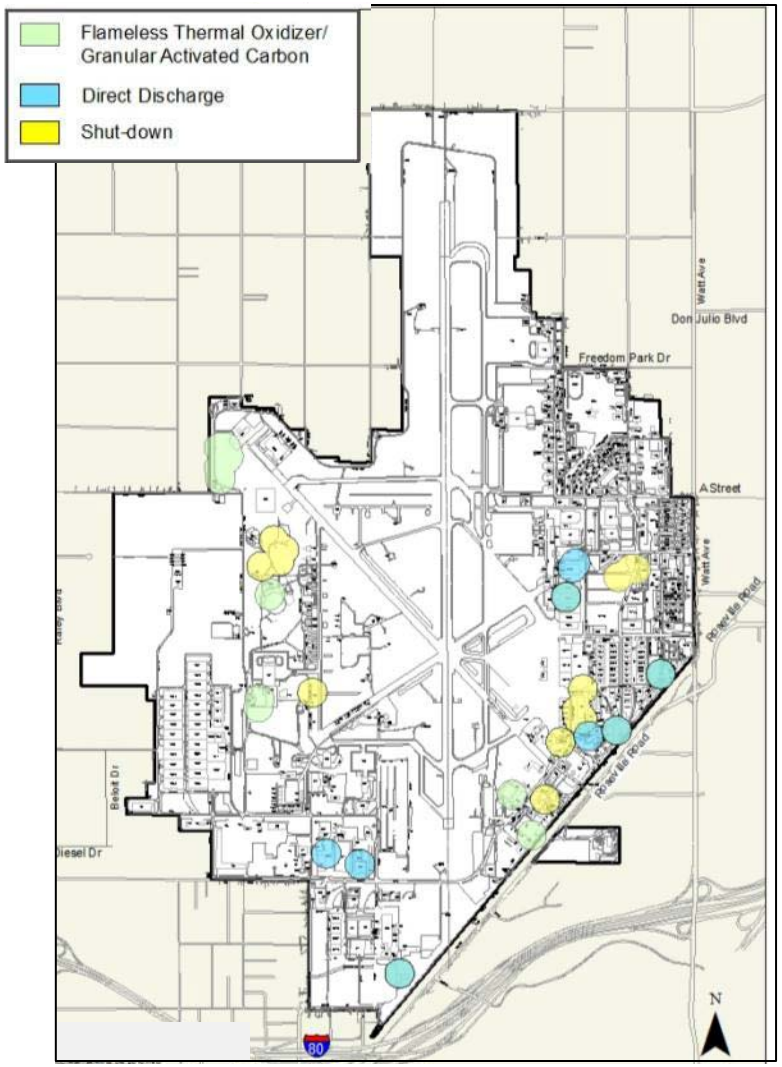
Soil vapor is the gas in the spaces between soil particles underground.

Soil Vapor Extraction vacuums vapors below ground and treats them. The byproduct is harmless.

- **Originally 16 systems pulling from 26 well fields**
  - More than 1.5 million pounds of VOC contamination removed to date
  - Many plumes reduced to the point SVE systems no longer needed
- **Projected for 2011, 12 systems pulling from 8 well fields**

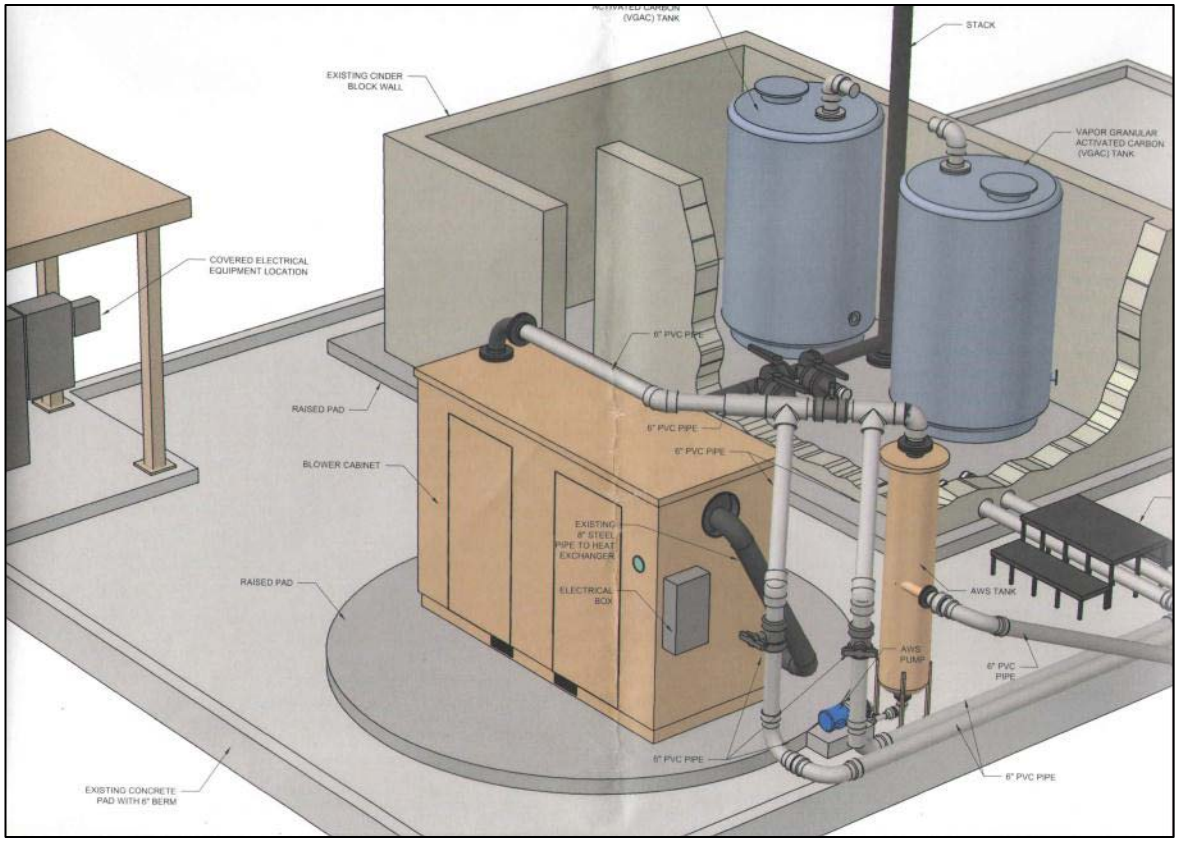
Right Sizing
Soil Vapor Extraction

- Optimizing well locations and shutting down units
- Aggressively reducing carbon footprint
  - eliminating thermal treatment processes
  - eliminating granular activated carbon for end stream polishing
- Some plumes meeting de minimus and using direct discharge



Right Flow
Soil Vapor Extraction

Optimize soil vapor treatment by modifying flow route through blower either pre- or post-carbon treatment



Right Flow
Soil Vapor Extraction

- Post-treatment flow through blower in summer reduces heat exchanger water use
  - Saves 450,000 gallons of water per system per year
  - Maintains optimal carbon adsorption

Fuels Bioventing

- In-Situ treatment of fuel contamination
  - Low carbon footprint
    - Small blower
  - Avoids excavation, transportation, and landfill disposal
  - Uses less energy than thermal desorption

Soil Remediation

AFCEE Sustainable Remediation Tool Model

- Alternatives analysis in feasibility study phase for more than 200 sites
  - Greenhouse gas generation and energy consumption
    - Off-site disposal vs. on-site consolidation of contaminated soil

  - Habitat impact in sensitive habitats
    - Excavate of contaminants vs. leave in place

Questions?

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