

DESIGN/BUILD

Remediation Systems for VOC Contaminated Groundwater, Soil Gas, and Indoor Air

Naval Base Point Loma, CA



2016 Excellence in Environmental Engineering and Science Nomination | **GRAND PRIZE WINNER**

DESIGN/BUILD Remediation Systems for VOC Contaminated Groundwater, Soil Gas, and Indoor Air at Naval Base Point Loma, CA



Team Profile



Navy Region Southwest and **Naval Base Point Loma** are the project owners.



Naval Facilities Engineering Command Southwest is the Facilities Engineer to design, construct, and operate capital improvements, real property assets, public works, and environmental projects and services.



TETRA TECH EC, INC.

Tetra Tech EC, Inc. provides environmental remediation, munitions response, and engineering/procurement/construction services.



CH2M HILL-Kleinfelder Joint Venture (KCH) supports the Navy's Installation Restoration Program (IRP) and Base Realignment and Closure (BRAC) programs.



CB&I is an environmental remediation contractor for government agencies and private-sector clients worldwide.



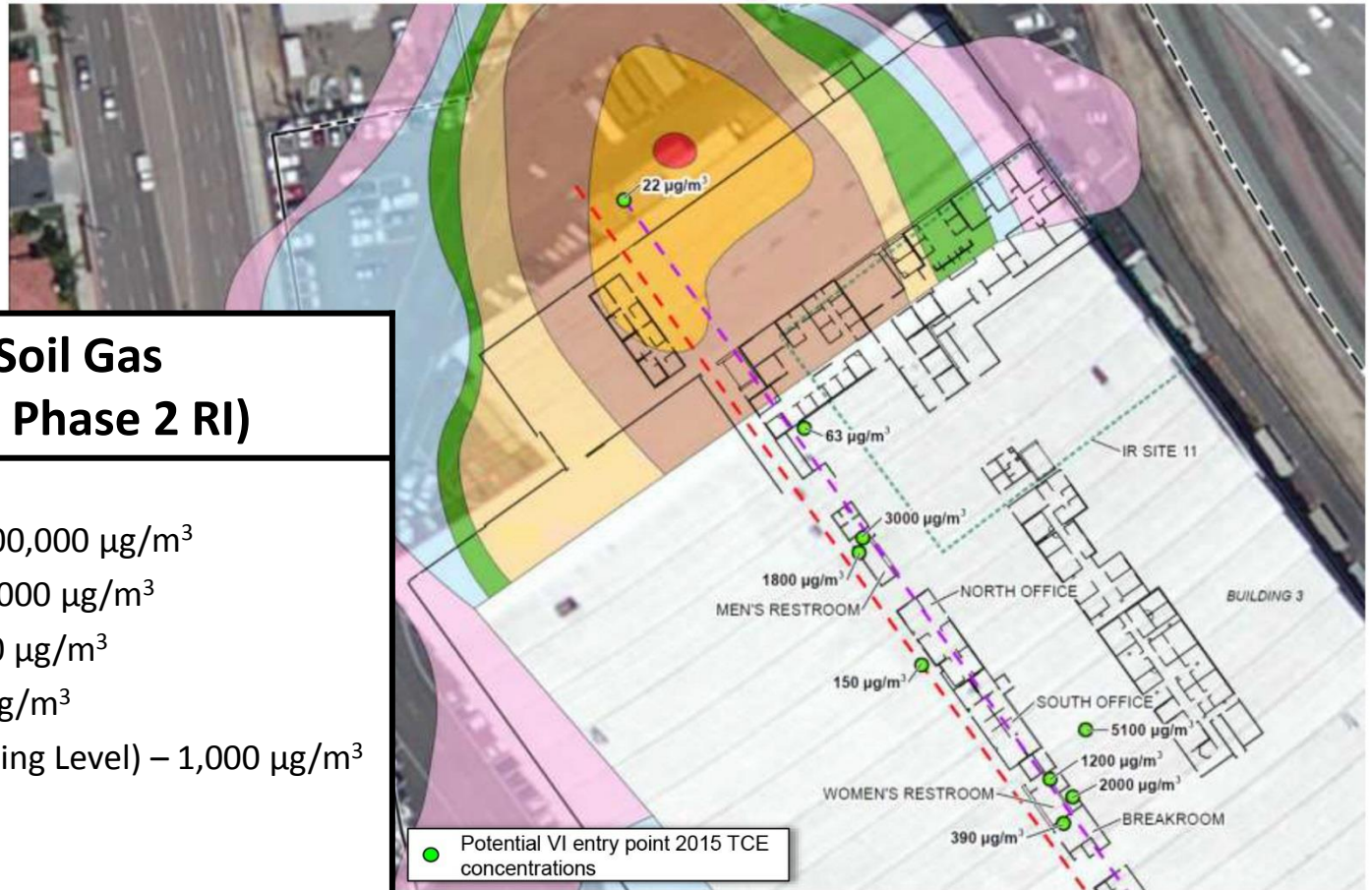
NOREAS, Inc. is a small business providing remediation, natural resources consulting, and construction management.



Problem Definition

- Release of solvents from aircraft manufacturing during 1940s resulted in groundwater and soil vapor contamination exceeding EPA Region 9 levels.
- Soil gas VOC contamination was above groundwater in the top 1 to 6 feet of soil.
- Indoor air TCE contamination in rooms inside building exceeded the EPA Region 9 accelerated response action level (ARAL) of $7 \mu\text{g}/\text{m}^3$.

VI Soil Vapor Sources



TCE in Soil Gas (April 2014 Phase 2 RI)

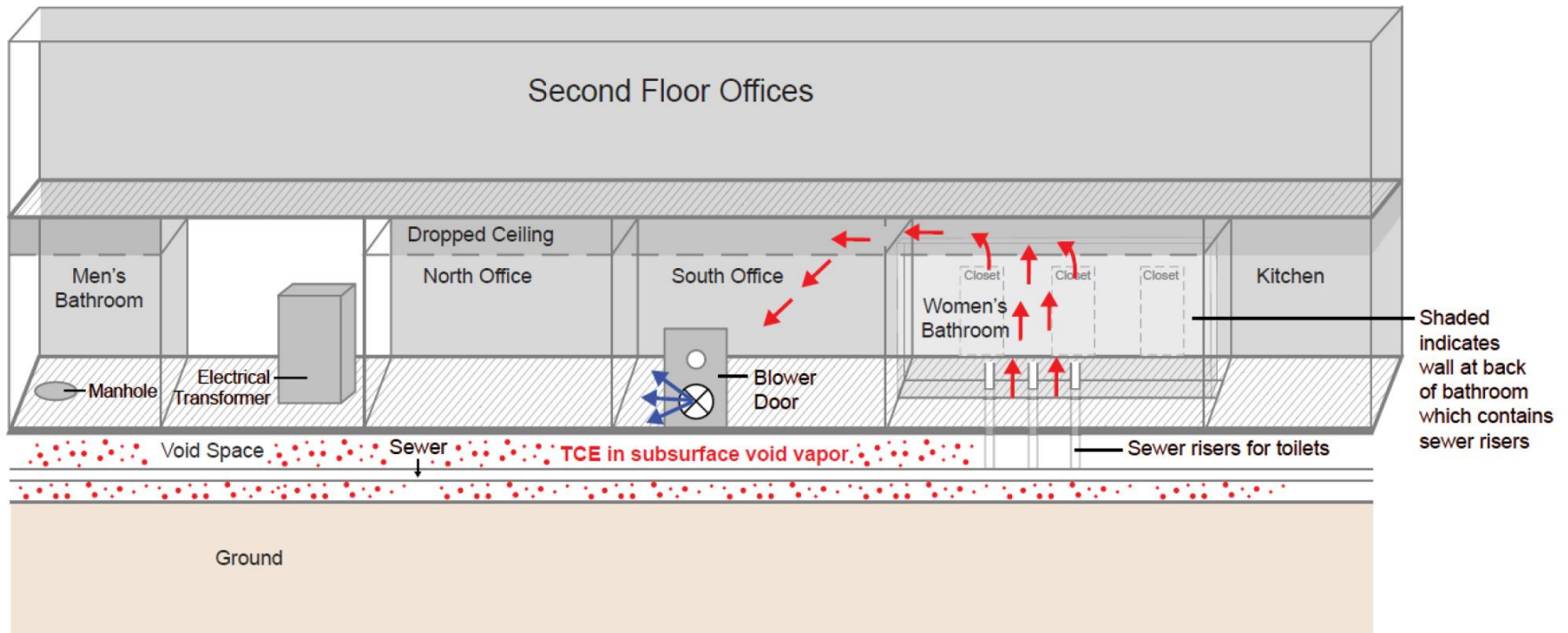
Legend

- 1,000,000.1 – 12,000,000 $\mu\text{g}/\text{m}^3$
- 100, 000.1 – 1,000,000 $\mu\text{g}/\text{m}^3$
- 10, 000.1 – 100,000 $\mu\text{g}/\text{m}^3$
- 1, 000.1 – 10,000 $\mu\text{g}/\text{m}^3$
- 528 (Project Screening Level) – 1,000 $\mu\text{g}/\text{m}^3$
- 100.1 – 528 $\mu\text{g}/\text{m}^3$
- 20 – 100 $\mu\text{g}/\text{m}^3$

● Potential VI entry point 2015 TCE concentrations

Off-gassing of TCE from vadose zone soil and/or groundwater follows utility corridors.

Movement of TCE into Indoor Air



Long-Term Solution – Soil Vapor Extraction System



Vapor/Water
Separator

GAC Vessels

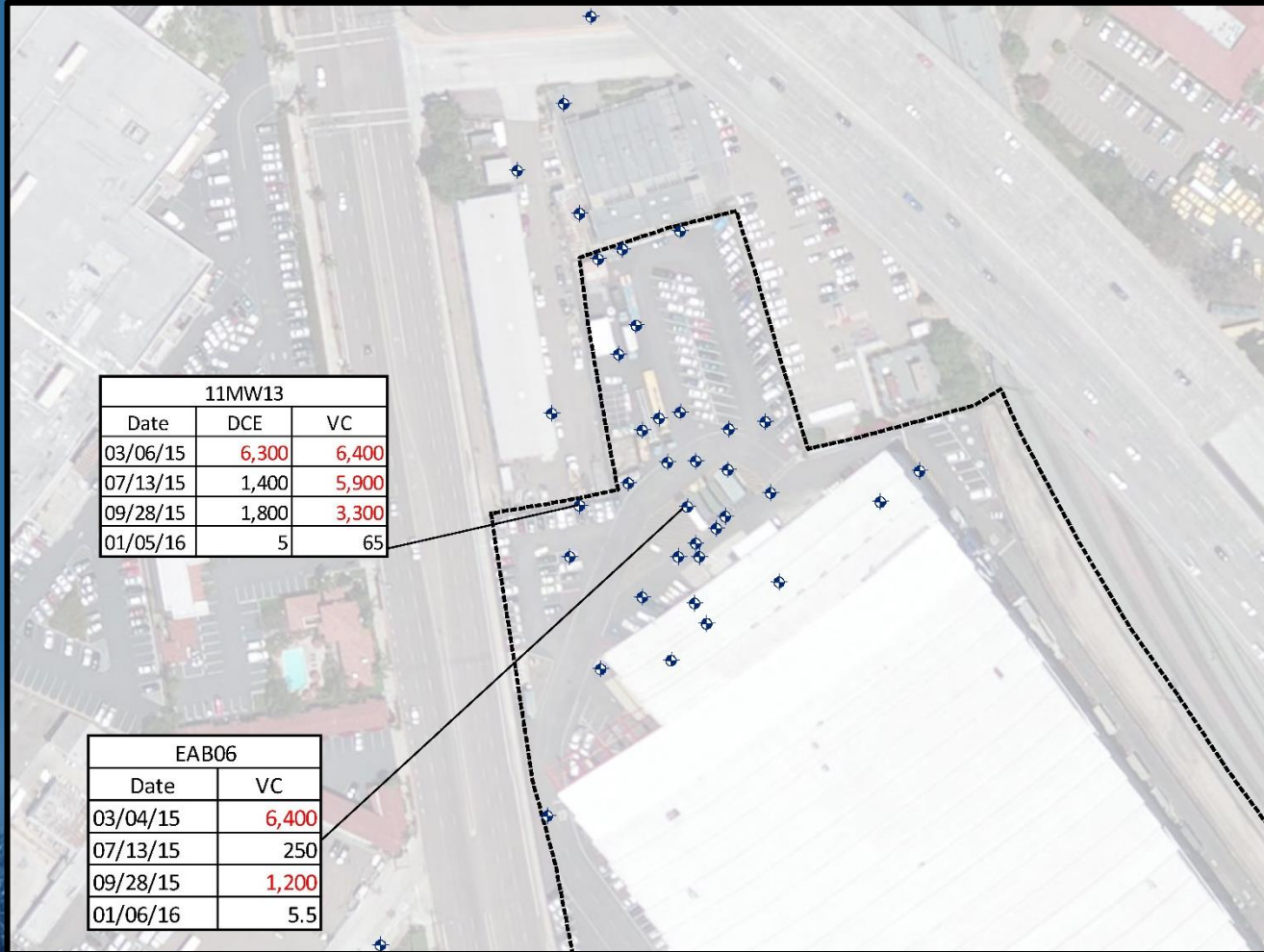
Extraction
Blower Trailer

Long-Term Solution – Groundwater and Soil Gas Remedies

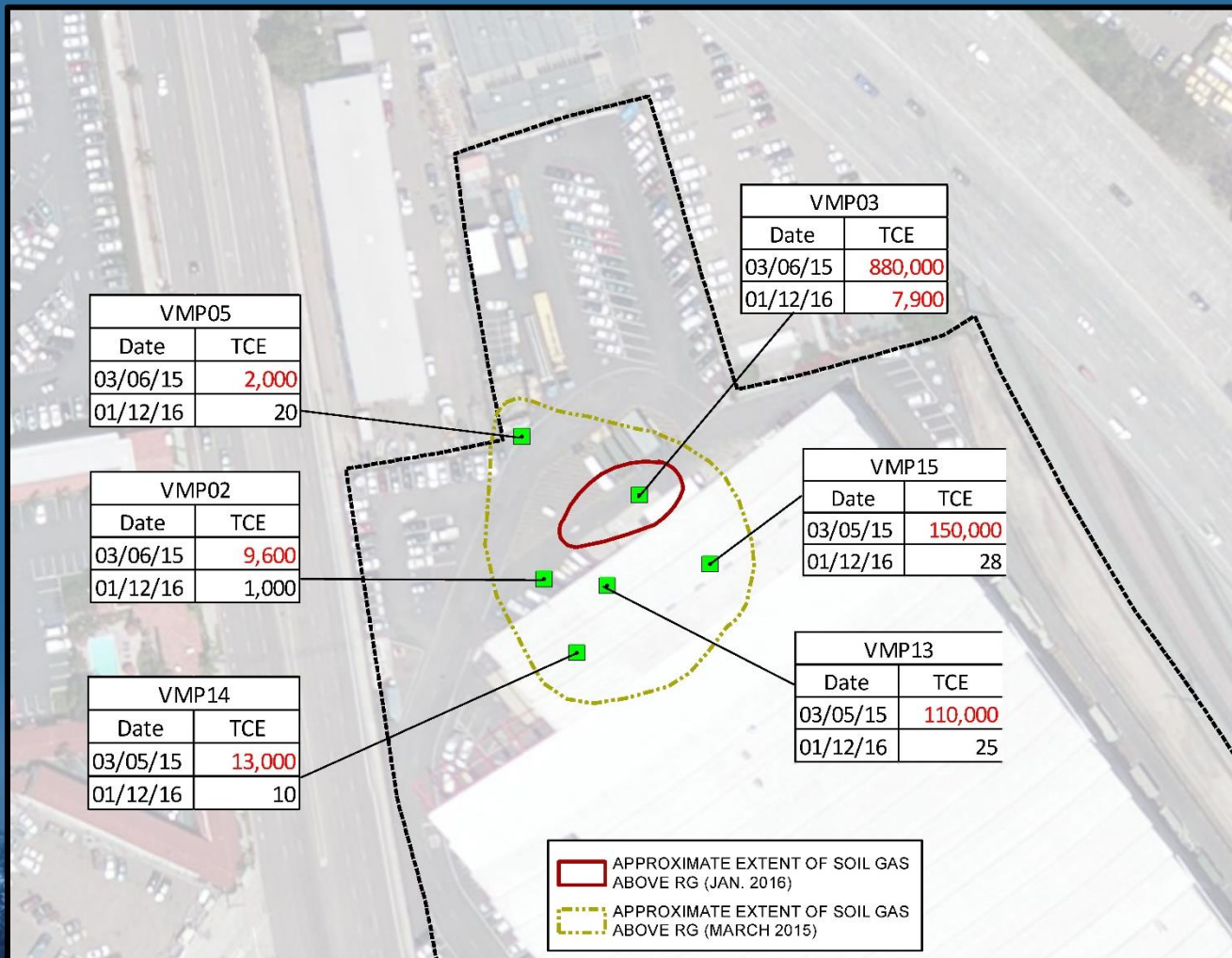


Concrete was removed to install conveyance piping and an SVE well.

Long-Term Solution – Groundwater and Soil Gas Remedies



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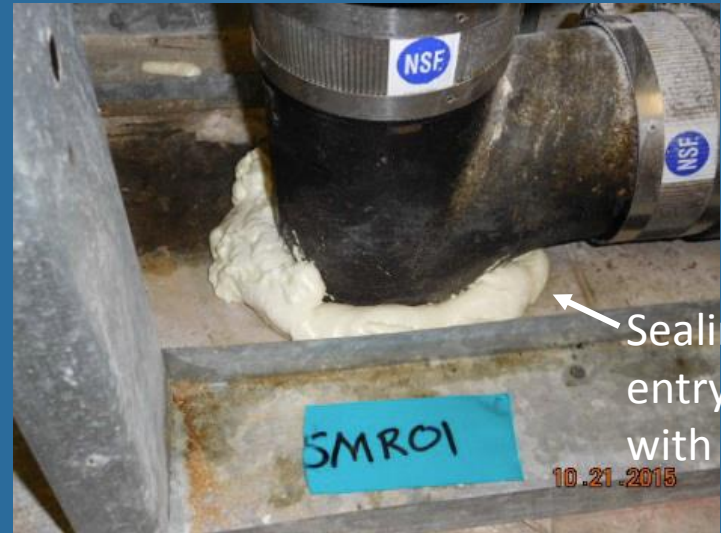


Immediate Solution – Vapor Intrusion Mitigation Measures



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Primary VI entry point

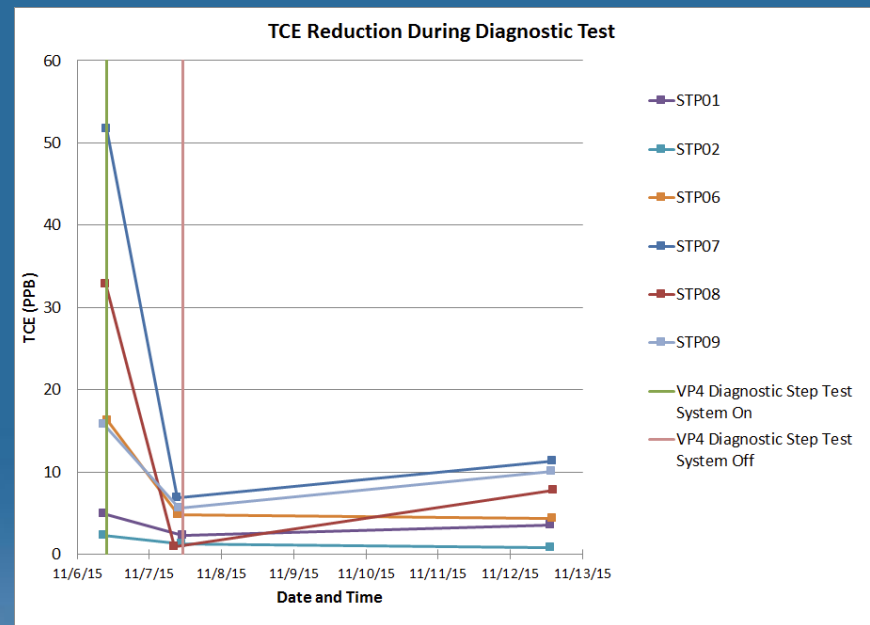
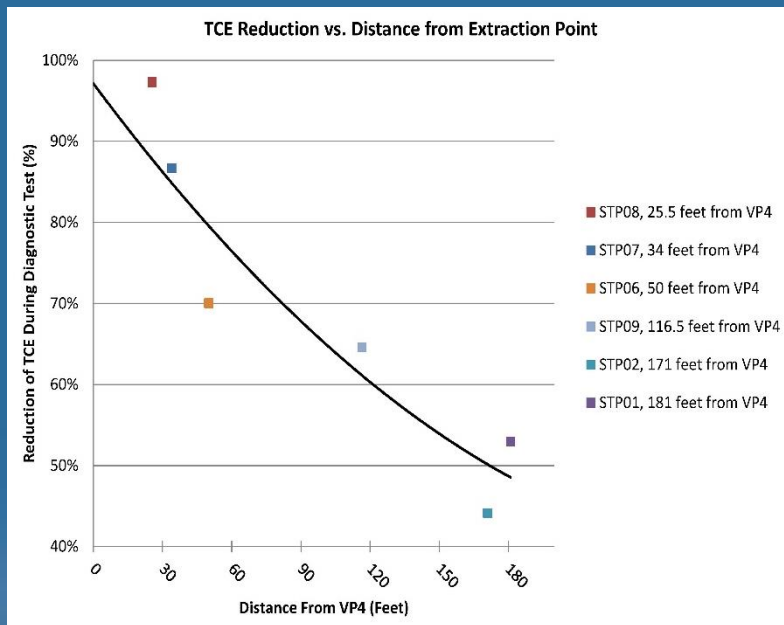


Sealing entry points with foam



Sealing floor cracks with epoxy

Immediate Solution – Vapor Intrusion Mitigation Measures

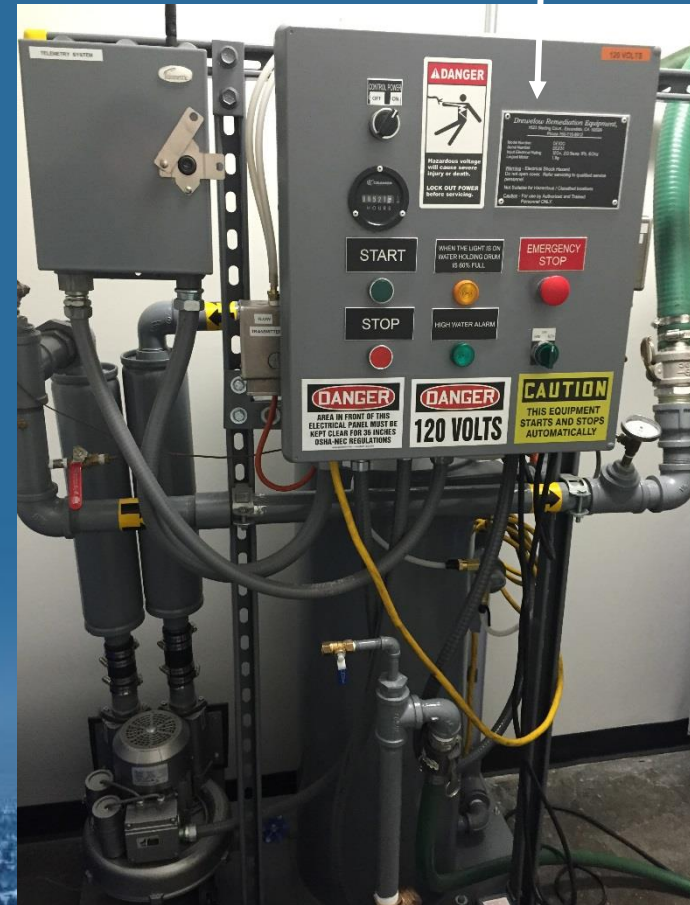


Immediate Solution – Subfloor Ventilation System

Control panel
subfloor
ventilation
system

GAC units

Water
containment
drum



Project Success

- Groundwater and soil gas VOCs reduced below EPA Region 9 action levels
- Innovation through flexibility
 - Placement of horizontal well decreased indoor air VOC levels 90% in 3 months
 - Primary vapor entry point converted to extraction point for subfloor ventilation system
- Vapor intrusion mitigation measures effective
- Affected rooms reoccupied

What's Next?

- Optimize SVE
- Maintain vapor intrusion mitigation measures
- Continue monitoring groundwater, soil gas, and indoor air



Customer Satisfaction

“...dramatic reductions of VOCs have been observed in the past 6 months...equally impressive has been the effectiveness of the groundwater treatment” - CAPT H.C. Warner III, Commanding Officer, Naval Base Point Loma

“Best support ever!” – Rear Admiral David Lewis, SPAWAR

“The Project has proceeded according to approved plan and schedule and the remedies are working effectively to date.” - Alan Hsu, Project Manager, California Department of Toxics and Substances Control

*Thank you for selecting our project for a
Grand Prize in the Industrial Waste Category.
We appreciate the honor of this award.*



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