



AECOM

 **OAK
RIDGE**
National Laboratory

High Resolution Site Characterization for Assessment of Accelerated Anaerobic Bioremediation at Site WP21, Dover AFB, Delaware

Aleisa Bloom - Oak Ridge National Laboratory, Oak Ridge, TN, USA

TJ Deane, Robert Lyon, Holly Brown - AECOM, Germantown, MD, USA

Battelle

Fourth International Symposium on Bioremediation and Sustainable Environmental Technologies
May 22-25, 2017 | Miami, Florida

High Resolution Site Characterization for Assessment of Accelerated Anaerobic Bioremediation at Site WP21

- Site Background
- Previous Work
- MiHPT Technology
- MiHPT Survey
 - Results and Conclusions
- Groundwater Recirculation System



Introduction



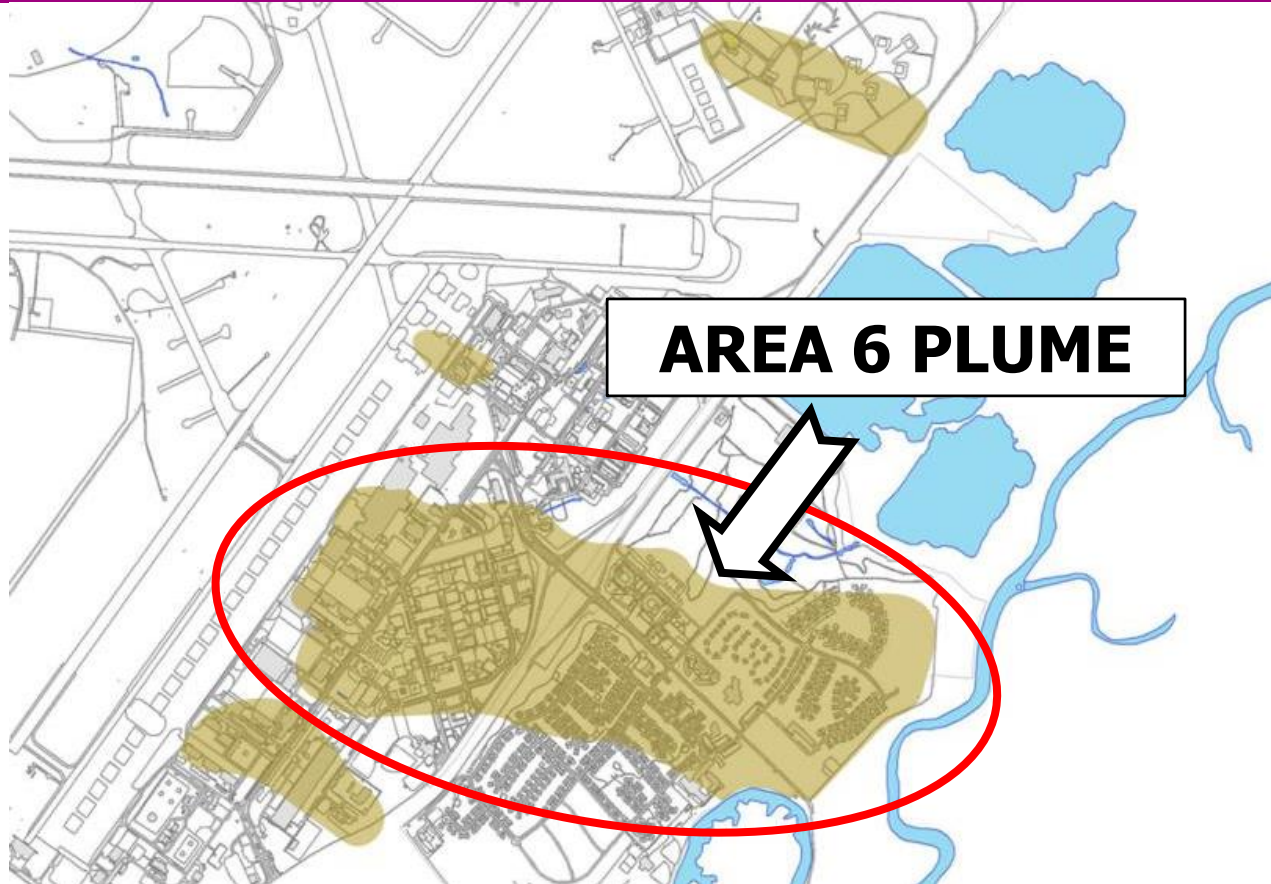
- Dover AFB is located in central Delaware on the east coast of the United States
- Dover AFB has maintained a fleet of aircraft and support vehicles for over 50 years
- PCE, TCE, and 1,1,1-TCA were commonly used solvents
- Past disposal practices resulted in the release of solvents into the environment in multiple areas

Background

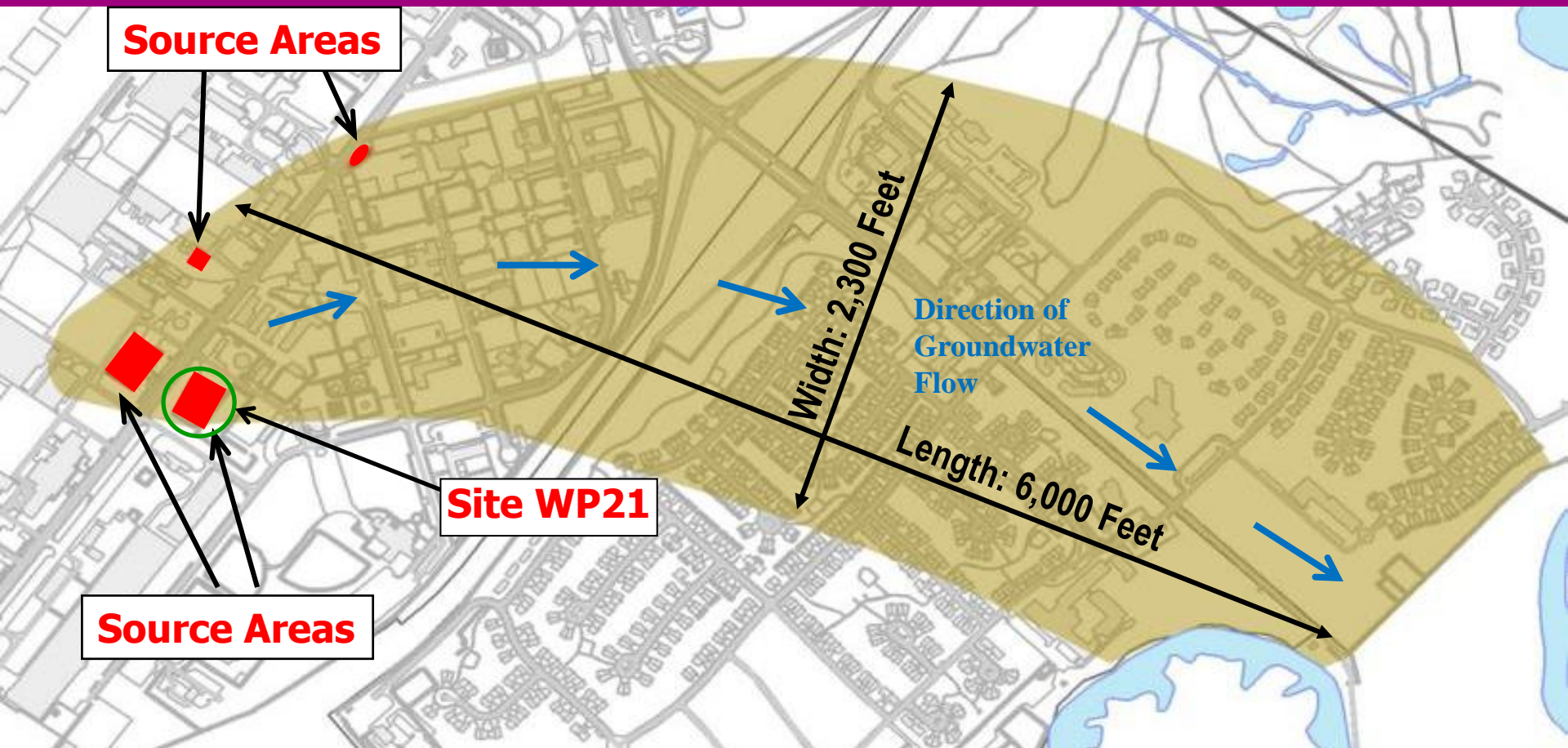
- RI/FS Recommendations
 - Accelerated Anaerobic Bioremediation (AAB) at 5 solvent plumes
 - Objective to restore aquifer to usable condition
- Implemented AAB remediation in 2006
- AAB ongoing for 11 years



Background

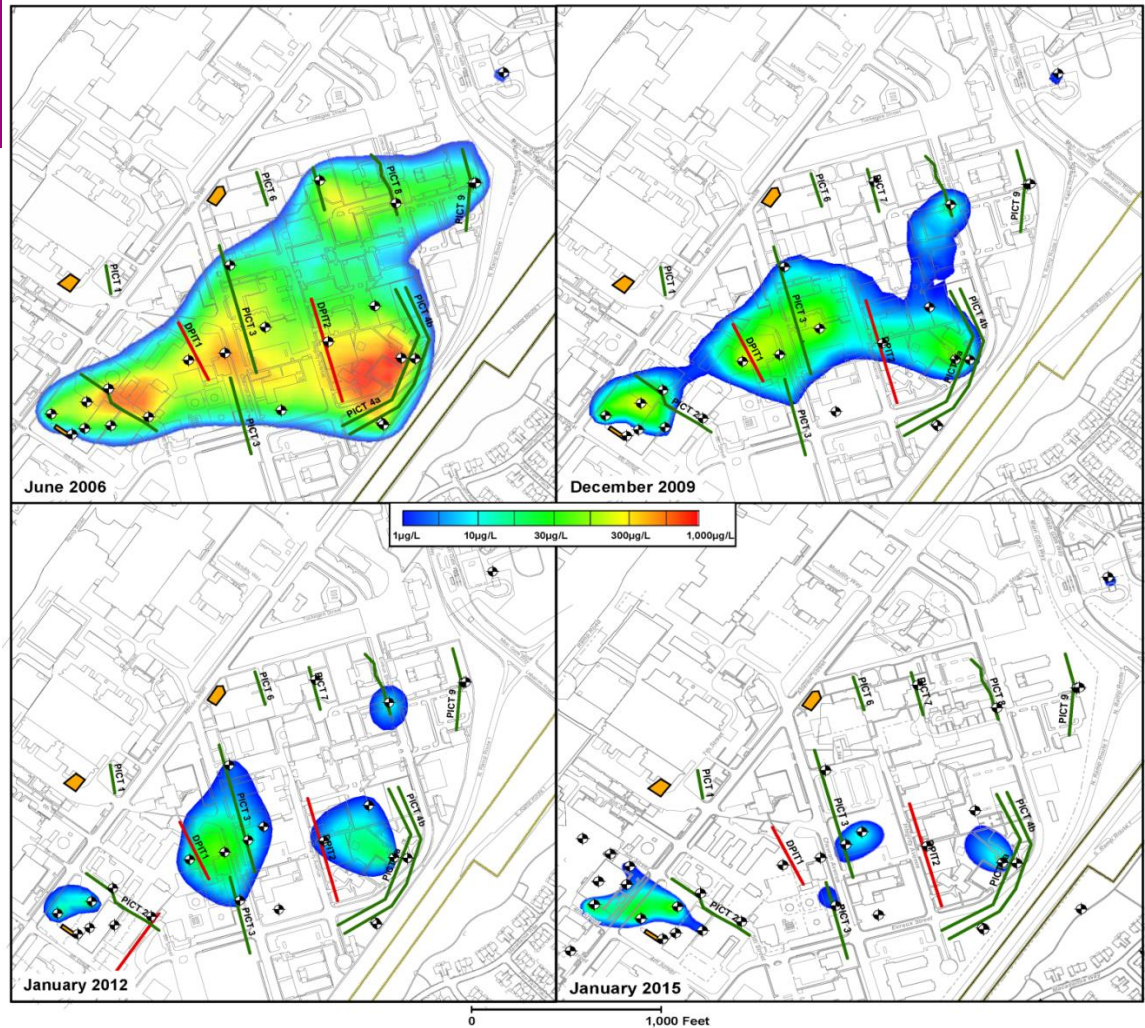


Area 6 Plume

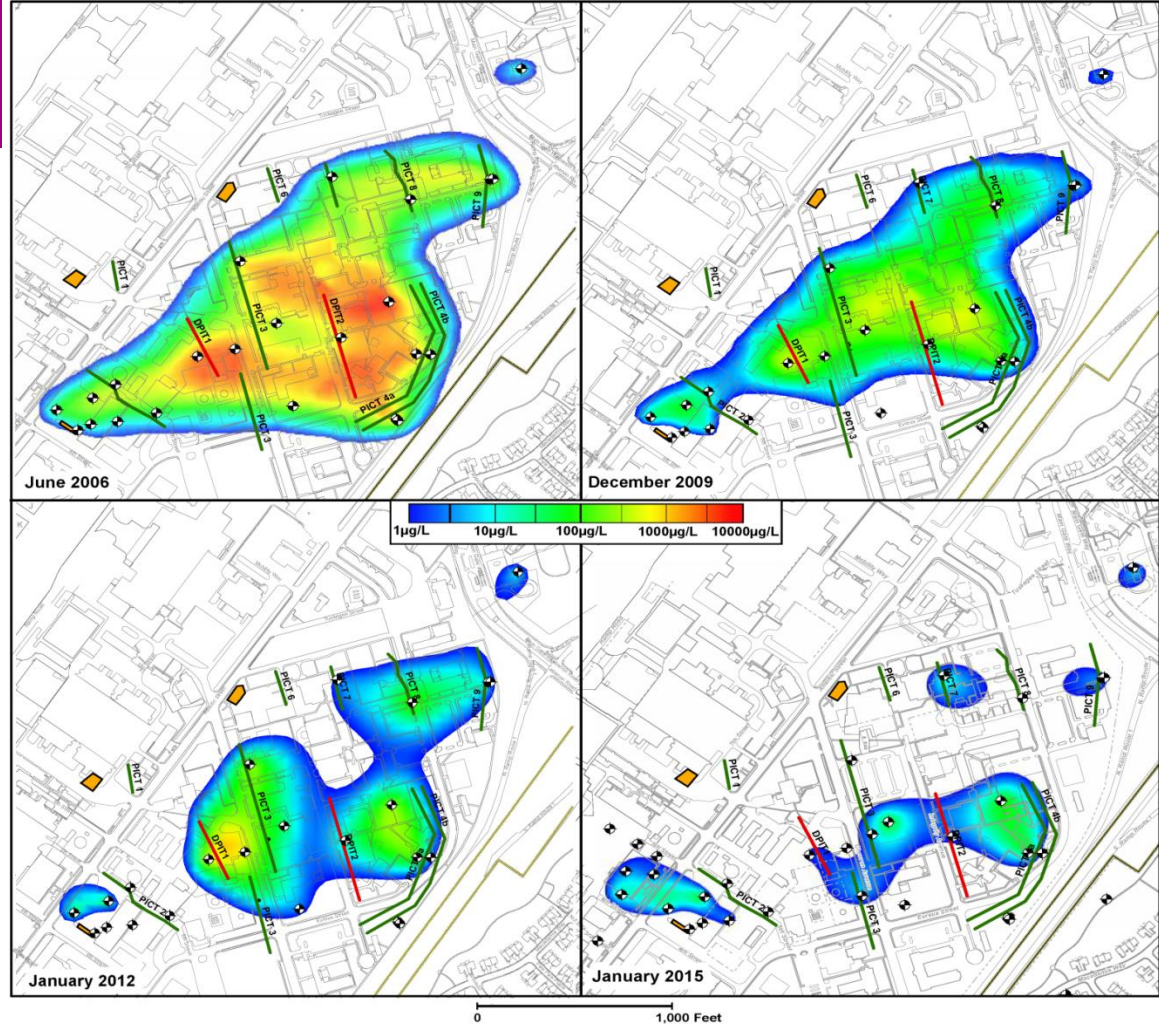


[illegible]

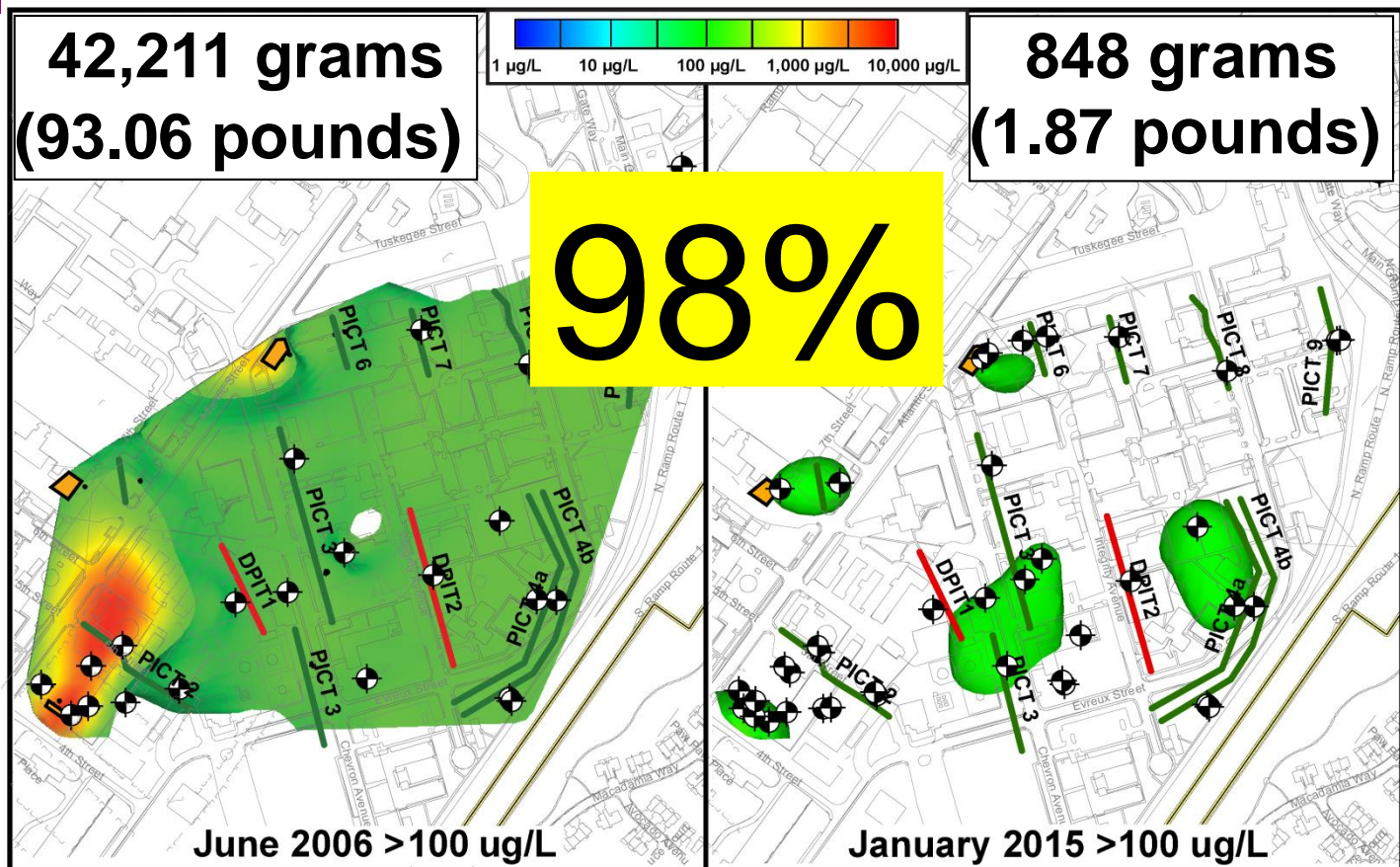
Tetrachloroethene (PCE)



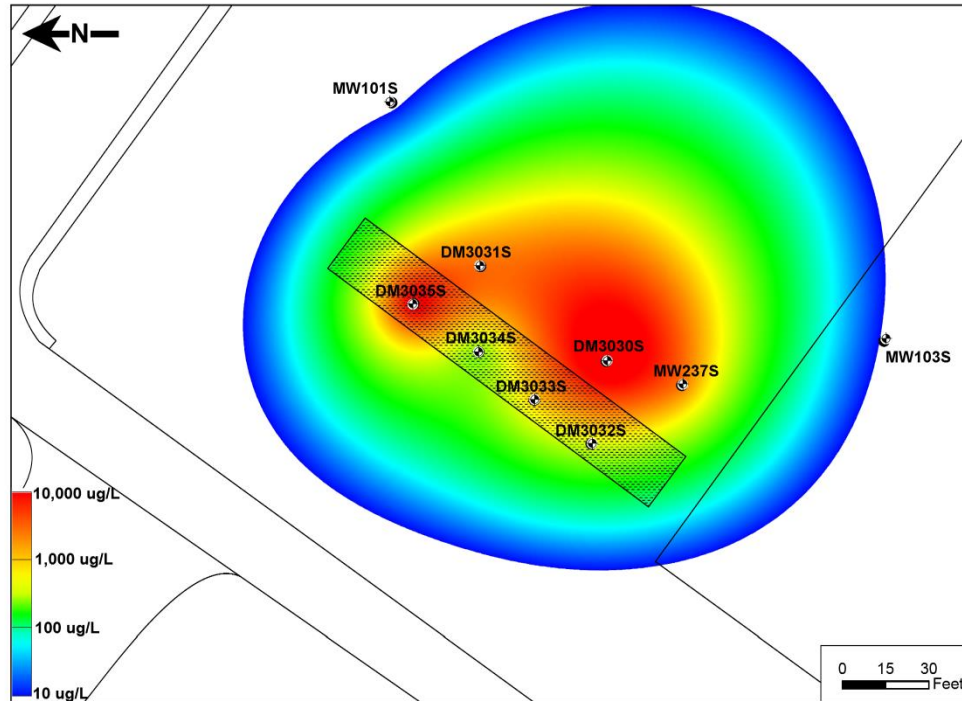
Trichloroethene (TCE)



Total Dissolved Mass in Groundwater

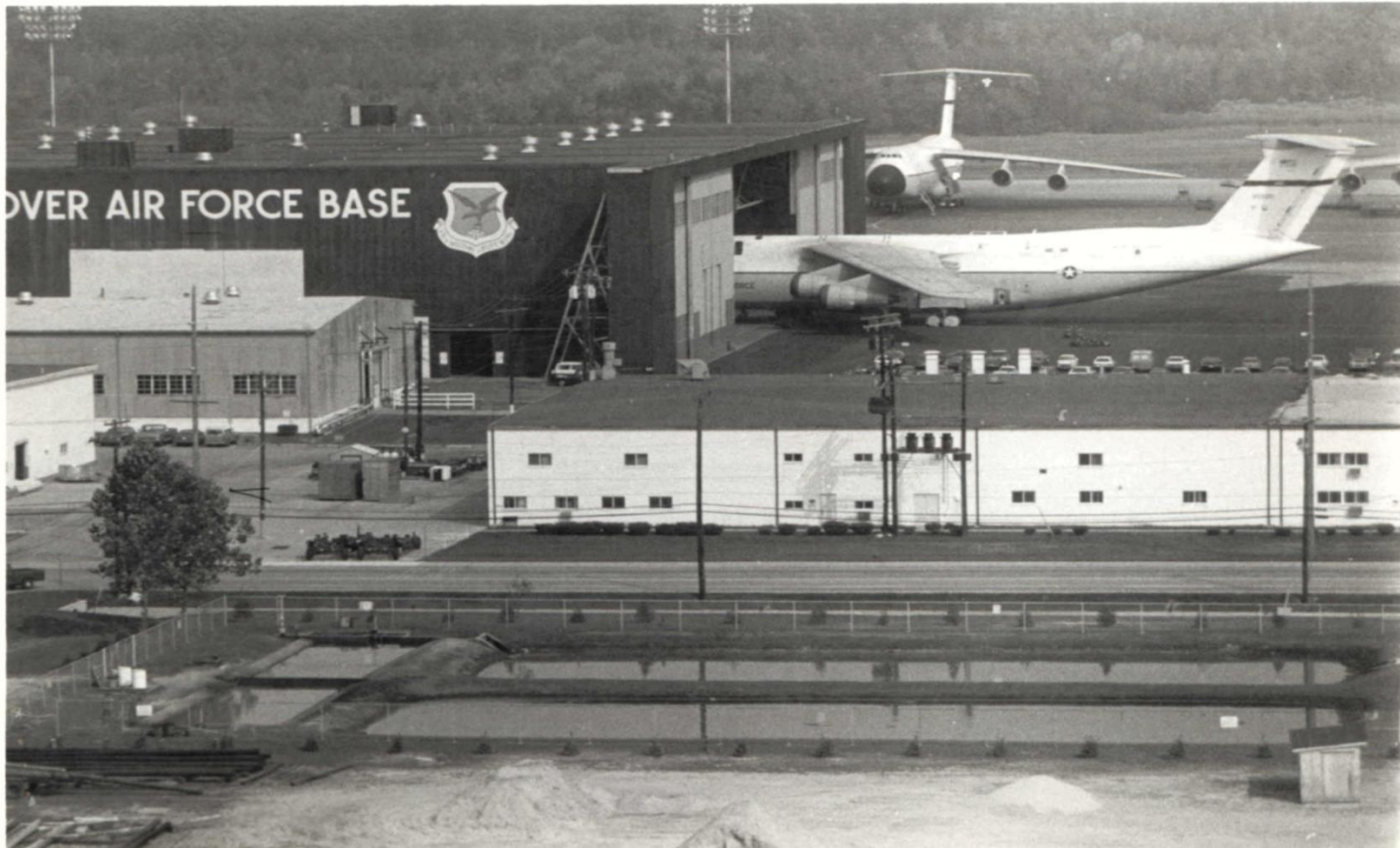


Total Dissolved Mass in Groundwater



WP21 Site History

Pre-1986

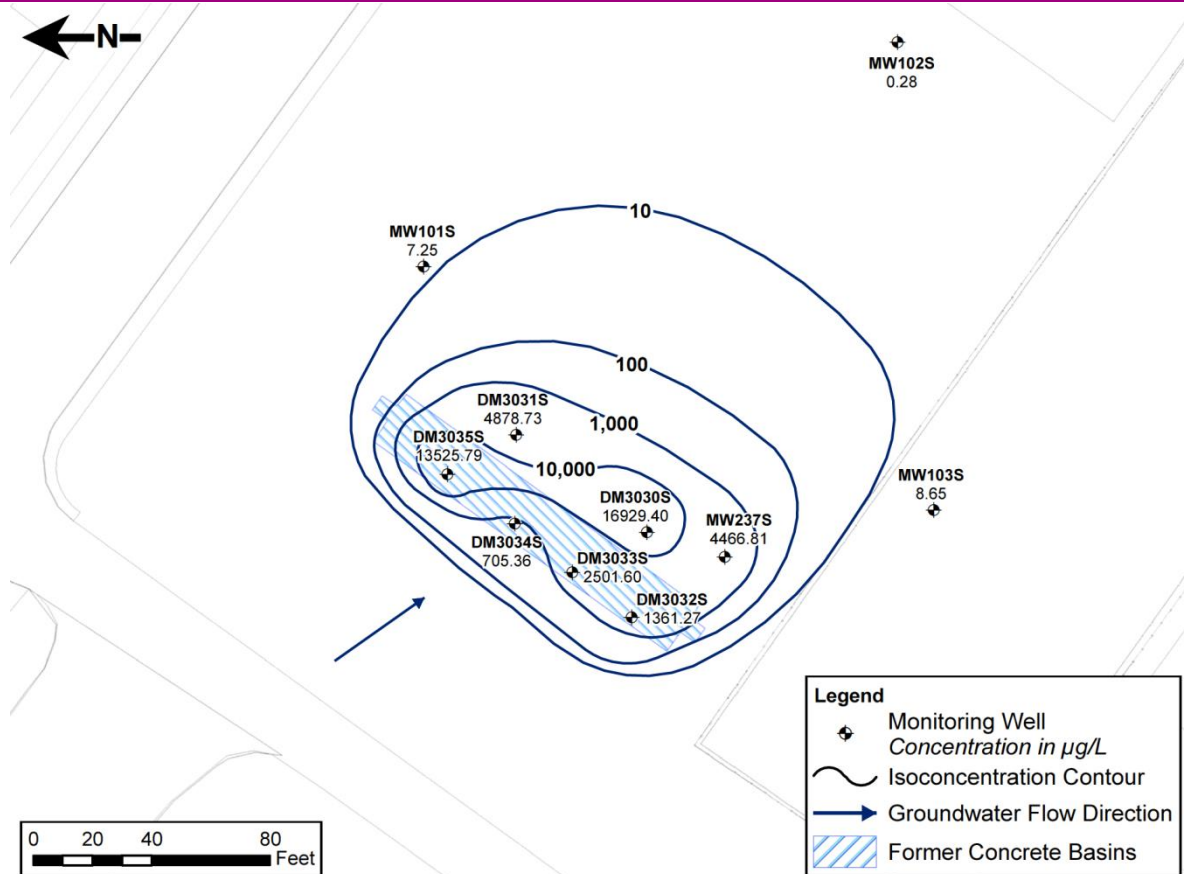


Site WP21 Historical Activities



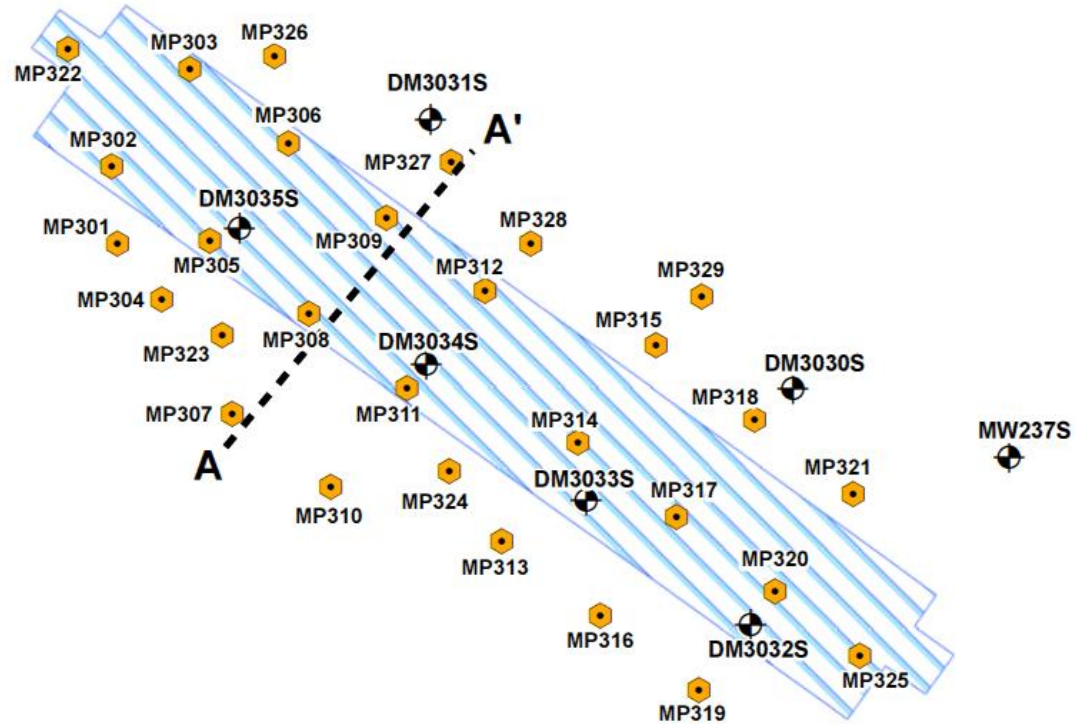
1998

WP21 Groundwater COC Concentrations



MiHPT Survey Plan

- Membrane Interface Probe - Hydraulic Profiling Tool (MiHPT)
 - record relative volatile contaminant concentrations, electrical conductivity, and hydraulic conductivity with depth
- Four COC Detectors – XSD, ECD, PID, FID



MiHPT Survey Activities

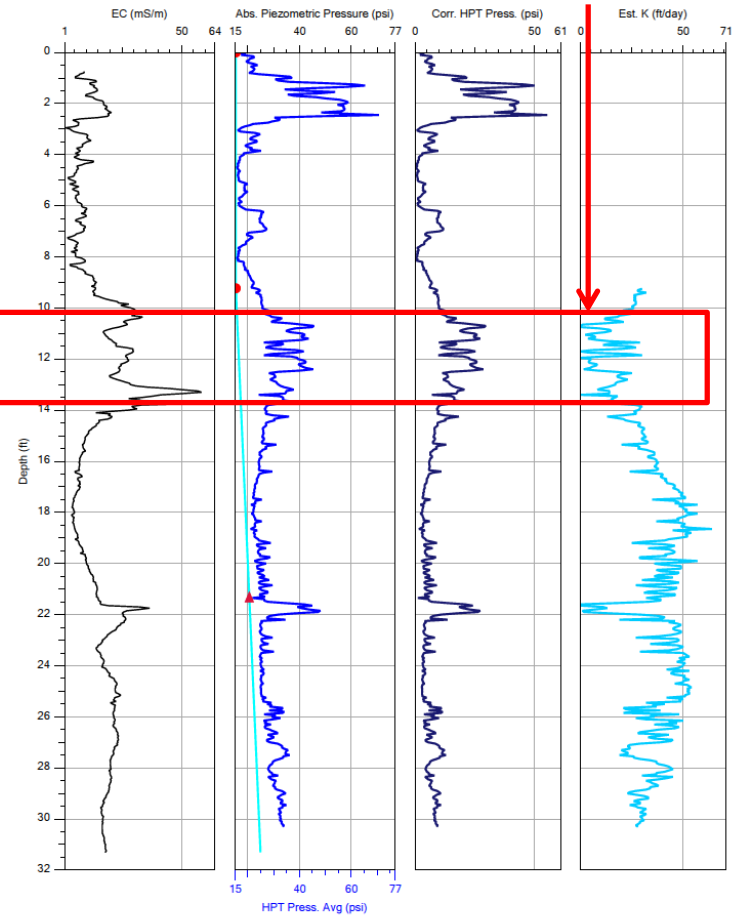
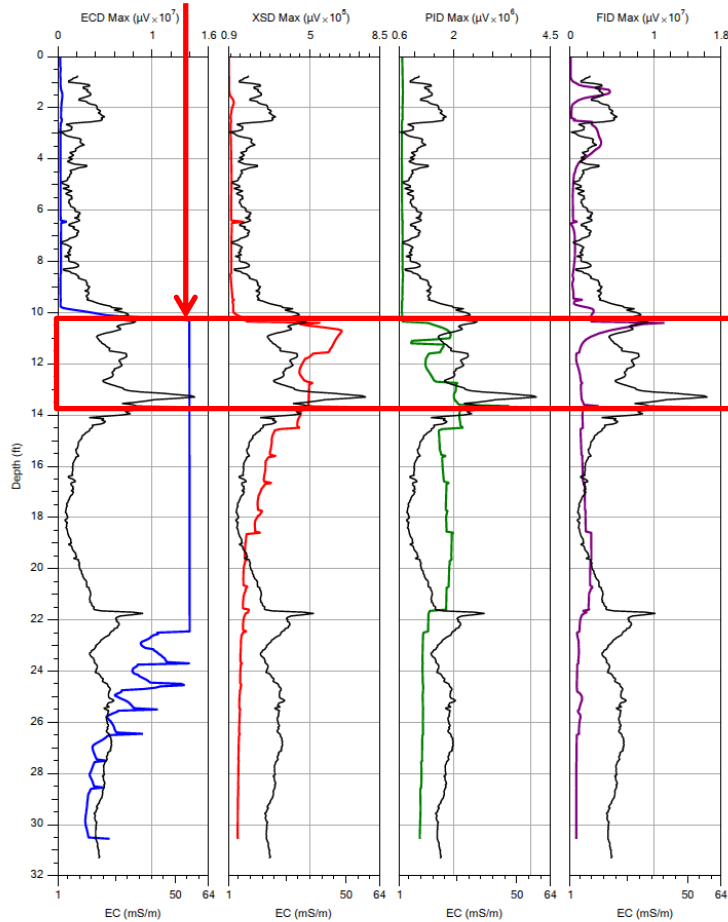


MiHPT Survey Activities



Exceeded maximum detection limit

Low Hydraulic Conductivity



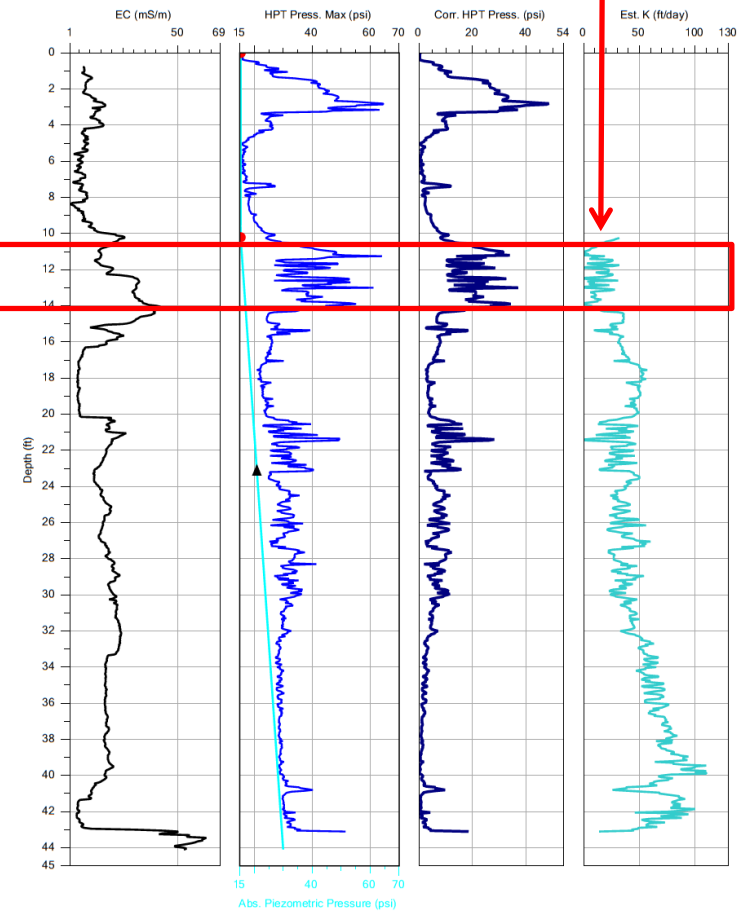
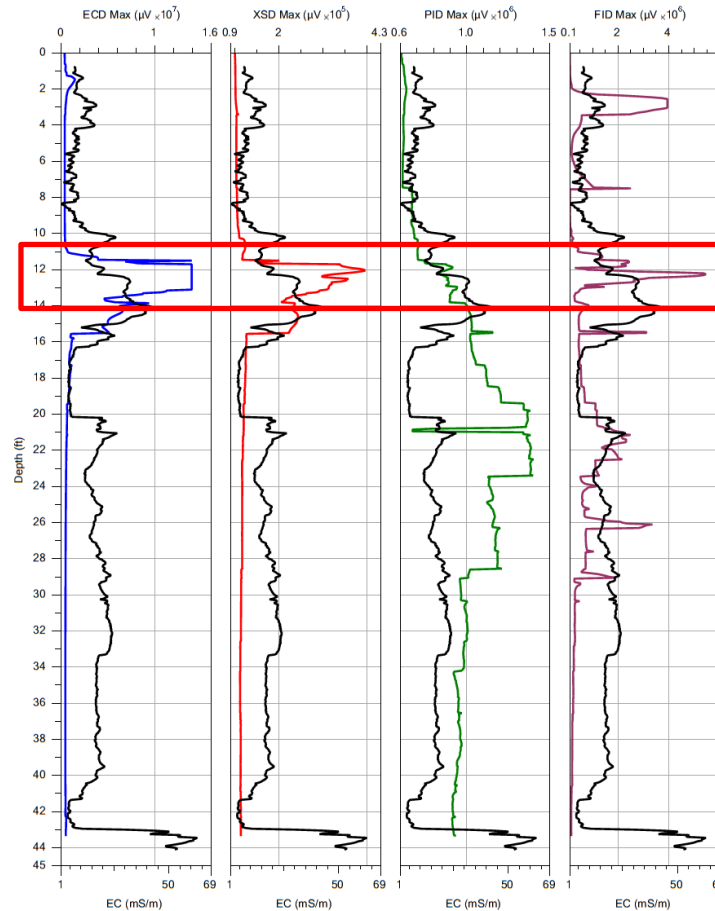
Company: Cascade Technical Services	Operator: Ethan Olson	File: MP-308 MHP
Project ID: 301.16.6272 - Dover AFB	Client: AECOM	Date: 8/3/2016
	Location:	



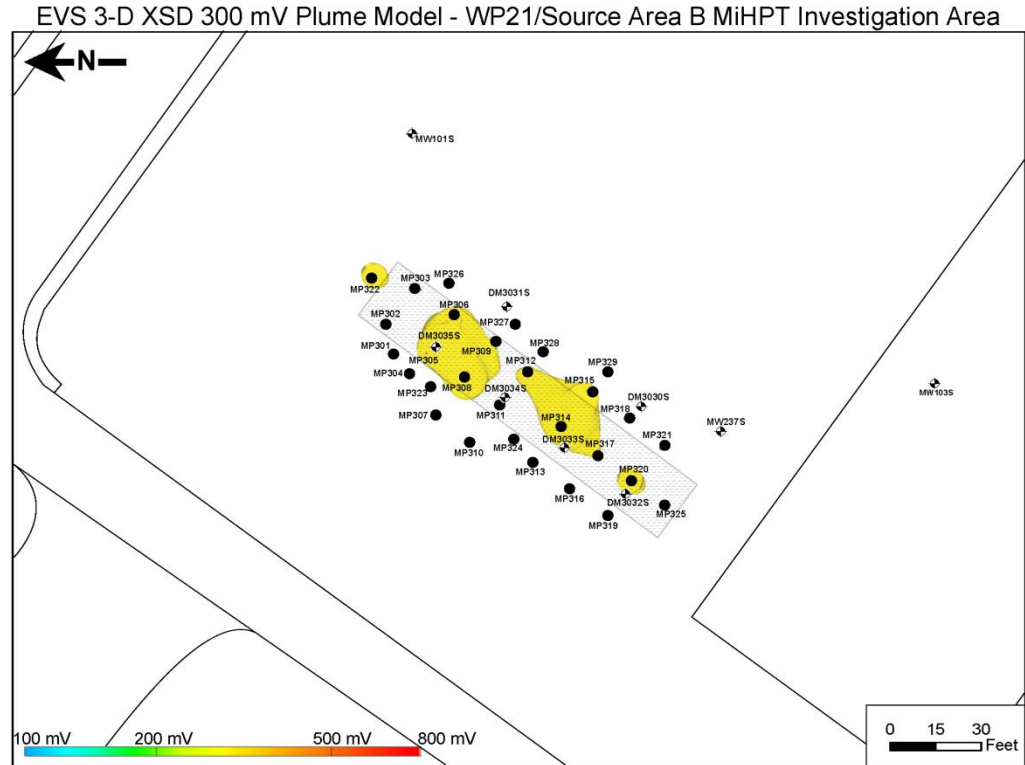
Company: Cascade Technical Services	Operator: Ethan Olson	File: MP-308 MHP
Project ID: 301.16.6272 - Dover AFB	Client: AECOM	Date: 8/3/2016
	Location:	



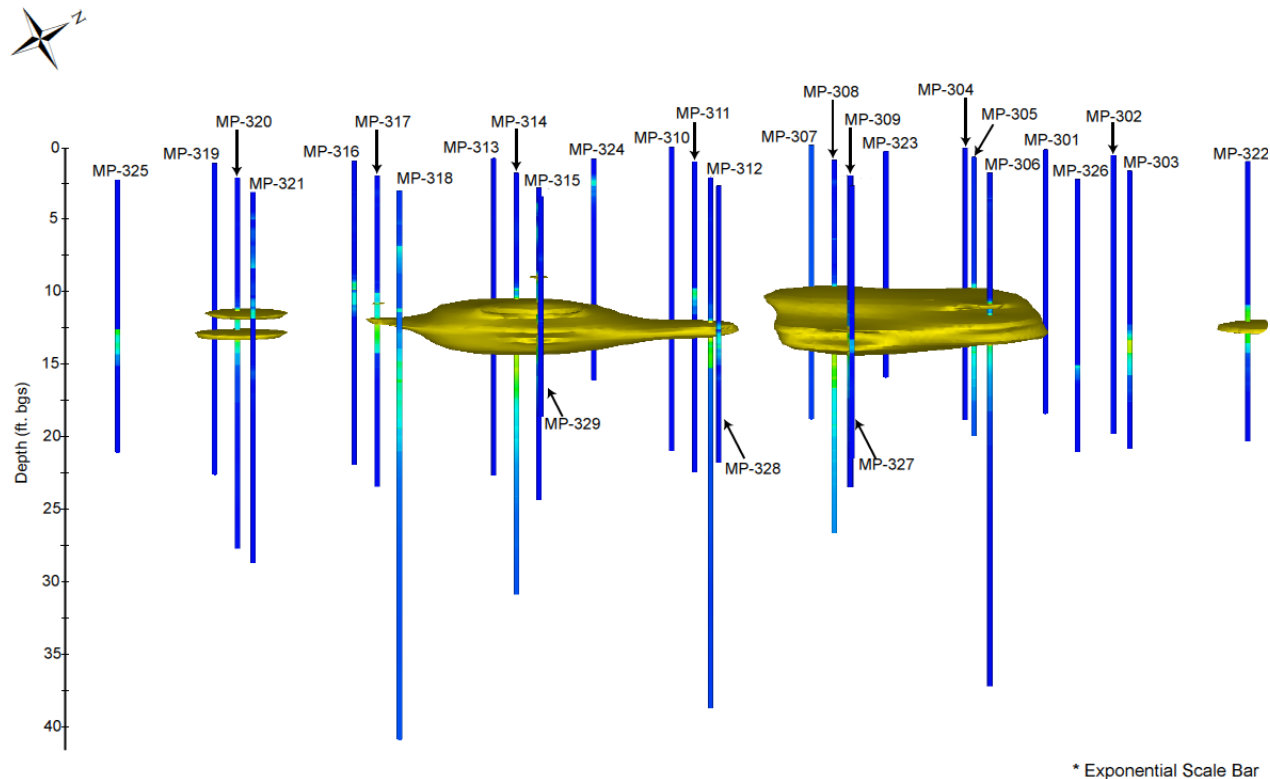
MiHPT Results



Modeled Contaminant Plume



Modeled Contaminant Plume



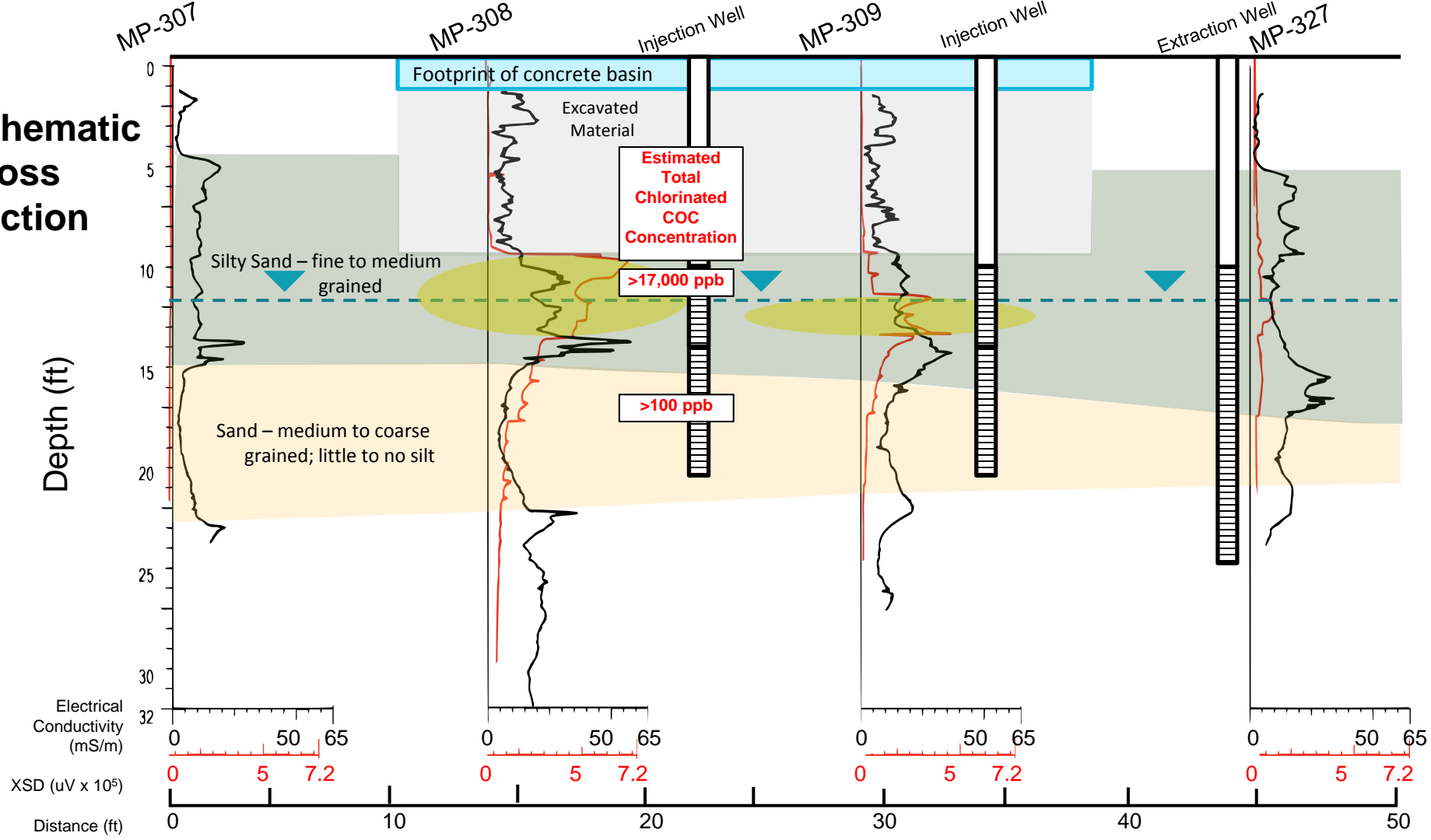
EVS 3-D XSD 300 mV Plume Shell Model - WP21/Source Area B MiHPT Investigation Area

LOCATION

Dover Air Force Base

100 mV 200 mV 500 mV 800 mV

Schematic Cross Section

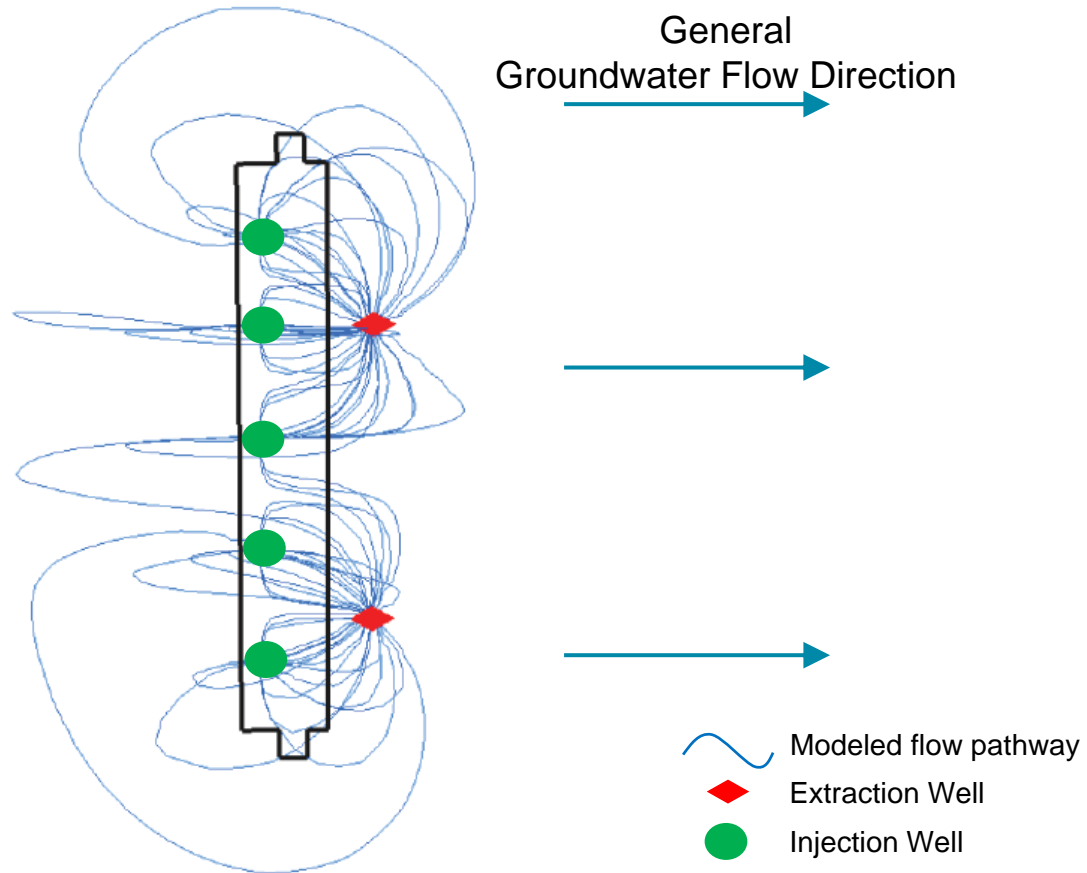


Groundwater Modeling

Injection Wells – 5 foot screens from 10 to 15 feet bgs

Extraction Wells – 10 foot screens from 10 to 20 feet bgs

- Modeled groundwater flow pathways
- 6 gallons/minute flowrate
- Modeled using low conductivity horizon b/w 10-15 feet



Completed Injection Wells



Summary

- MiHPT survey used to locate and delineate residual source material vertically and horizontally at Site WP-21, DAFB
- Survey identified 2-4' thick silty horizon with elevated residual parent material
- Optimized targeted injection/extraction wells to flush water through silty horizon to mobilize contamination
- High Resolution Site Characterization studies can be very effective tools to better understand site conditions, optimize remediation plans, and lower long-term costs of projects



AECOM



OAK
RIDGE
National Laboratory

Thank You!

Questions?

TJ Deane
Geologist
301-820-3478
tj.deane@aecom.com



Battelle

Fourth International Symposium on Bioremediation and Sustainable Environmental Technologies
May 22-25, 2017 | Miami, Florida