

CASE STUDY

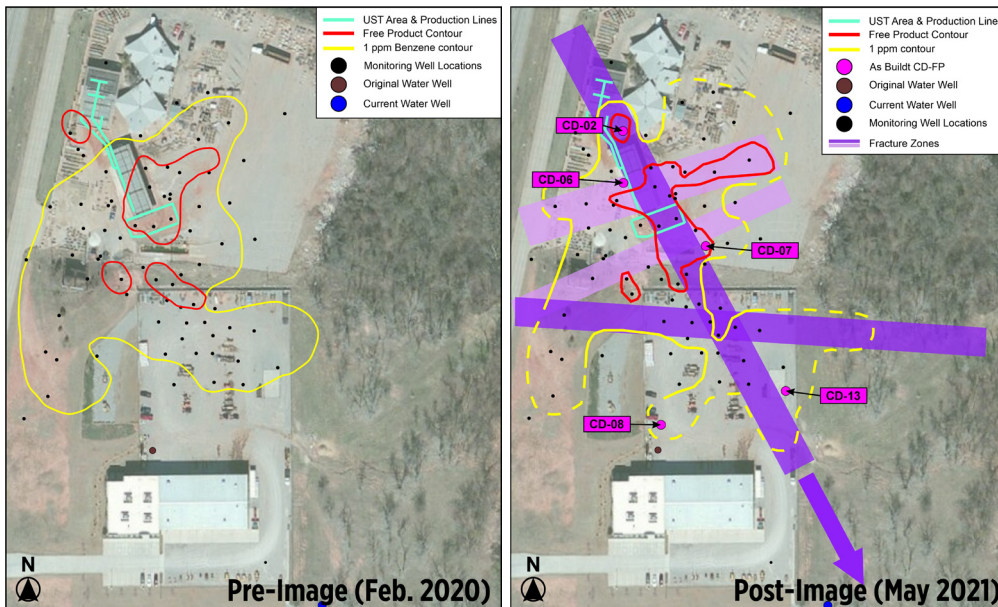
MAPPING FAULT ZONES AND LNAPL DISTRIBUTION

The FFP Travel Mart Site (Site) in Oklahoma City had two documented LNAPL releases in 1990 resulting in a persistent LNAPL plume. Regional geological cross-sections showed faulting around the Site, but it was unknown the extent of how these structures were impacting the transport of contaminants. The project team was tasked with characterizing and remediating the free product and related dissolved-phase plume with a remedial concentration goal of 1 ppm or less of benzene.

The Problem:

Previous remedial efforts at the Site included a free product recovery system, enhanced fluid recovery via high vacuum event, and surfactant injections – but these did not sufficiently reduce measured free product in wells across the Site.

An updated conceptual site model (CSM) with a firm understanding of fault zones throughout the Site was essential for informing future remedial design. Aestus' specialty electrical resistivity subsurface scanning technology, GeoTrax Survey™, was leveraged to provide ultra-high data density across the Site to infill data gaps, map fracture zones and contaminant distribution, and inform critical zones for further investigation.



Left graphic shows where free product (red) and 1ppm concentrations of benzene (yellow) were prior to scanning. Right graphic shows updated plumes with mapped fracture zones as a result of the imaging and targeted drilling locations (wells with pink labels).

Solution:

Through collaboration and application of Aestus' Electrical Hydrogeology™ process and use of 3D visualization software, an updated CSM was created with integrated GeoTrax Survey™ data, geology, groundwater analytical data, PID measurements, boring logs, and confirmation drilling results targeted from the electrical resistivity images.

RESULTS

- ✓ Delineated 4 fracture zones controlling vertical and horizontal migration of LNAPL related impacts
- ✓ Determined the vertical and horizontal extent of LNAPL and dissolved phase impacts
- ✓ Targeted well installation in critical areas (one measured free product thickness of up to 12 feet), based on electrical image data
- ✓ Targeted extraction wells in the fracture zones for increased ROI and product removed

SEE BELOW. SUCCEED ABOVE.

Our client needed more certainty in their subsurface data. We integrated existing site data, our GeoTrax Survey™ electrical images, and targeted confirmation drilling data to yield a more complete understanding of the subsurface. This allowed them to:

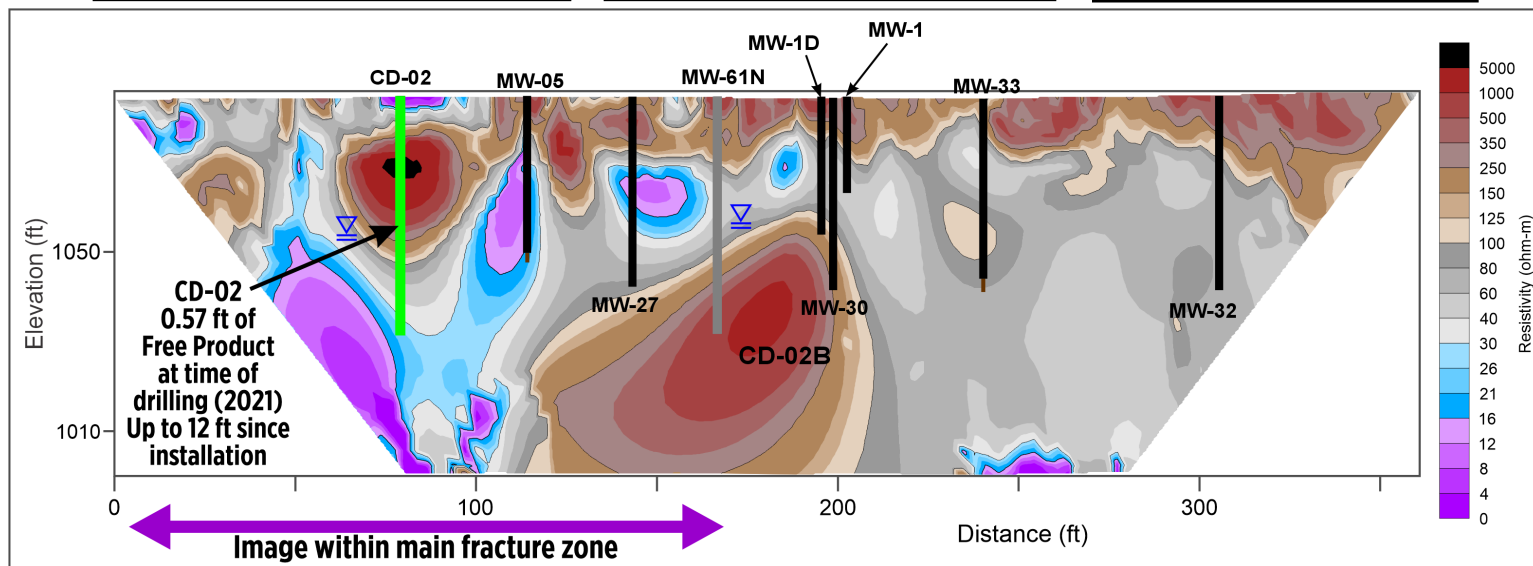
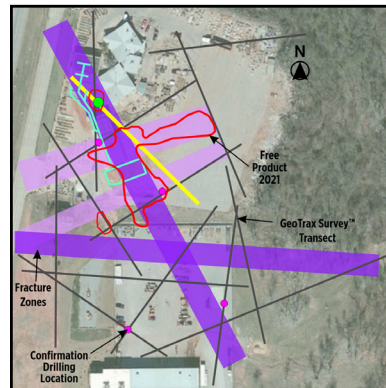
- ✓ Make better technical/business decisions
- ✓ Have clear road map for next steps
- ✓ Achieve project goals faster and cheaper

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Outcome:

This robust, updated CSM allowed extraction wells to be targeted in the delineated fracture zones for an increased radius of influence (i.e., 40 feet), with a total of 152 gallons of free product and an associated 2,914 equivalent gallons of free product vapor removed from the Site via high vacuum extraction events (a higher removal volume per well than seen in the high vacuum extraction event 11 years prior).



One survey image, FFP-02, that informed the mapped fractures and the strong, electrically resistive anomaly (red/black located ~80 feet along the image) that was targeted by well CD-02 and found to have free product upgradient from the known source zone along a main fracture.

"Aestus' resistivity survey proved instrumental in understanding hydrocarbon migration patterns within our fractured aquifer system. Their expertise provided crucial insights that traditional methods simply couldn't deliver, allowing us to:

- 1. Accurately map the extent and movement of the hydrocarbon plume, even within the complex network of fractures.**
- 2. Identify the preferential pathways of migration, which was essential for targeting remediation efforts effectively.**
- 3. Make informed decisions about drilling and remediation strategies, saving us time and resources.**

The detailed subsurface characterization enabled by Aestus gave us the confidence to proceed avoiding costly blind drilling. We highly recommend Aestus for anyone facing the challenges of hydrocarbon migration in fractured aquifers."

- Kathy Lippert, Greystone Environmental Services, Inc.

YOU DESERVE MORE CERTAINTY IN YOUR SUBSURFACE DATA

