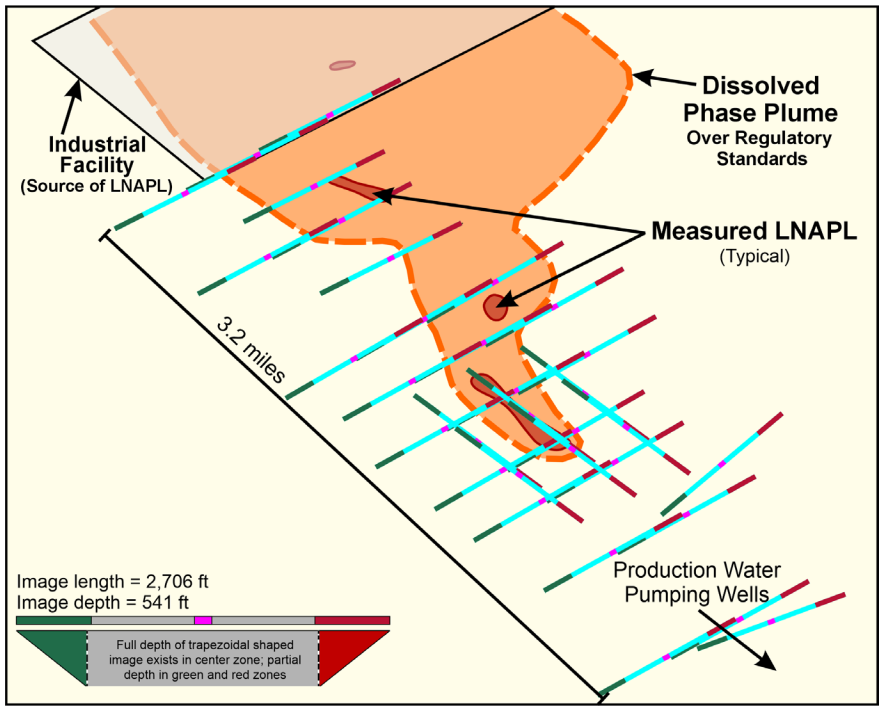
Case Study

Focused Remediation Saves Refinery $20+ Million

A refinery site in the southern United States identified potential past petroleum hydrocarbon releases into the ground in proximity to the local aquifer. Significant time and costs were incurred to characterize the relevant area and remediate LNAPL impacts for 15+ years. Aestus and its client determined it to be impractical and financially challenging to continue trying to characterize the subsurface with monitoring wells alone, given that they needed to be installed to ~500 feet BGS at an approximate cost $180K per well.

The Problem:

The relevant aquifer consisted of gravels, sands, silts, and clay sediments deposited by ancient river systems in paleochannels, which provide preferential subsurface flowpaths. LNAPL thicknesses had been measured at 10+ feet in some locations (groundwater table depth of ~320 feet BGS) and as distal as two miles from the suspected source zones. Characterizing the groundwater plume at this site was complicated by constituents moving through discrete and mostly unidentified paleochannel flowpaths, a large scope area (i.e., square miles), and lack of sufficient CSM data density due to the technical and financial impracticability of using conventional industry techniques with untargeted 1-D monitoring wells.



Solution:

The refinery's project team recognized the importance of characterizing suspected paleochannels and stratigraphy at the site to have an accurate CSM and to formulate a successful, practical, and fiscally sound remedial strategy. The project team decided to employ Aestus' electrical hydrogeology tools for remedial design characterization (RDC) and updating the CSM to optimize characterization and remediation efforts. Aestus used its surface-deployed specialty electrical resistivity imaging to visualize the subsurface, covering an area of approximately 4.2 square miles (roughly 3.2 miles long by 1.3 miles wide) and to depths of 540 feet BGS.

Results

- ☑ Located channels with preferential LNAPL flow/migration as areas for focused remediation
- ☑ Delineated deeper clay formation, which was determined to impede vertical migration of contaminants
- ☑ Targeted distal, downgradient sentinel wells to monitor groundwater impacts along paleochannel flowpaths (the most likely location of contaminant migration)

The client's collaboration with Aestus resulted in ~$20+ million saved via the scan first, then drill approach, which created more certainty for making decisions on the project.

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 roadmap for next steps
- ☑ Achieve project goals faster and cheaper

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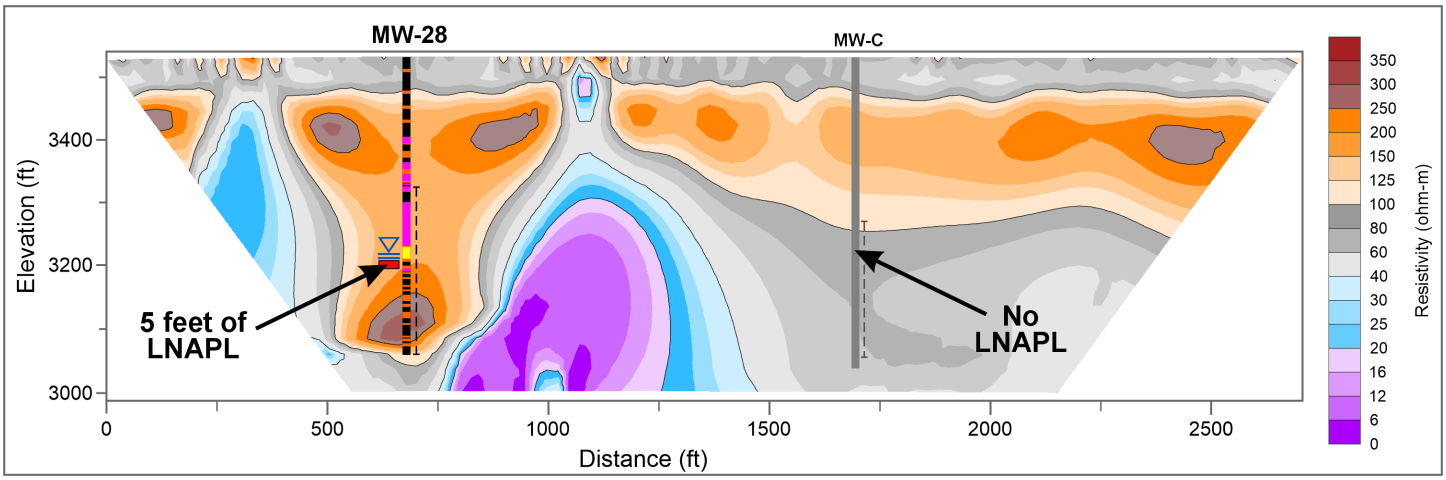
Outcome:

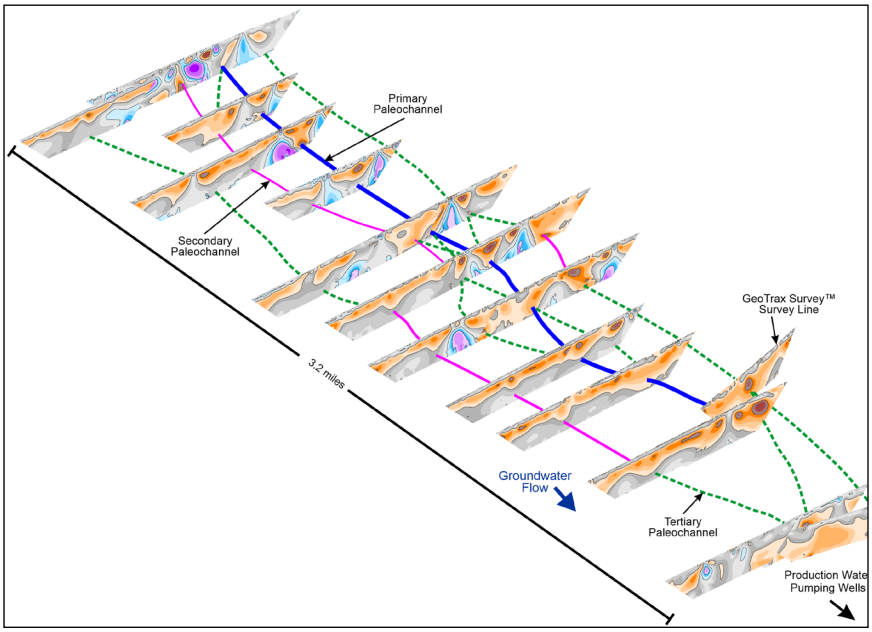
Aestus' electrical imaging techniques yielded suspected locations of paleochannels across the site (i.e., blue and dashed-blue lines in the graphic) a number of which were drilled and confirmed via targeted drilling/wells. A primary paleochannel was confirmed as a major transport mechanism of LNAPL based on the installation of targeted monitoring well MW-28 (shown in the accompanying graphic). MW-28 confirmed the presence of LNAPL and identified large intervals of gravels, sands, and instances of rounded gravel (indicative of river deposition) in the boring log.



In addition to mapping paleochannel flowpaths and identifying areas for focused remediation, the project team leveraged Aestus and its integrated data sets in 2D and 3D to achieve additional project outcomes:

1. Facilitate data dense inputs to help constrain numeric groundwater model boundaries (work performed by others). The output of this model was used by our client to determine which downgradient water supply wells should be shut off to avoid influencing plume movement through paleochannel flowpaths.

2. Start evaluating levels of naturally occurring bioactivity in impacted zones; data collected to date indicates elevated bioactivity is likely occurring within the relevant subsurface plume center of mass and less so on the downgradient distal end of the plume.



Project Financial Outcomes:

The refinery's project team estimated that roughly $20+ million was potentially saved on RDC facilitated by the use of Aestus' technologies and processes, versus traditional site characterization efforts coupled with the installation of additional untargeted, high-cost monitoring wells. Updating the CSM with continuous electrical image data and targeted well installation increased certainty in the subsurface structure and contaminant extents, providing better data for our clients to make better decisions relative to remediation strategy.

You Deserve More Certainty in your Subsurface Data

Aestus