

# Case Study: VC17

Vertebrae AS/SVE Under a Drug Store

## SITE

Amoco #103- Former Fueling Station, Lakeland FL  
FAC.ID-8624387

## CONTAMINATION

Diesel and Gasoline range organics were assessed after four USTs were closed in place in 2000. The plume is located on-site and has spread under the roadway and under the adjacent active business (drug and convenience store).

## OBJECTIVE

The design first involved the installation of one Vertebrae™ well system for pilot testing using air sparge (AS) to estimate the radius of influence (ROI) for full scale design (shown in Figure 1). Once completed the full-scale design would be implemented to address the plume, specifically the portion on the adjacent business property. Off-site access was extremely limited thus drilling and installation from on-site was crucial.

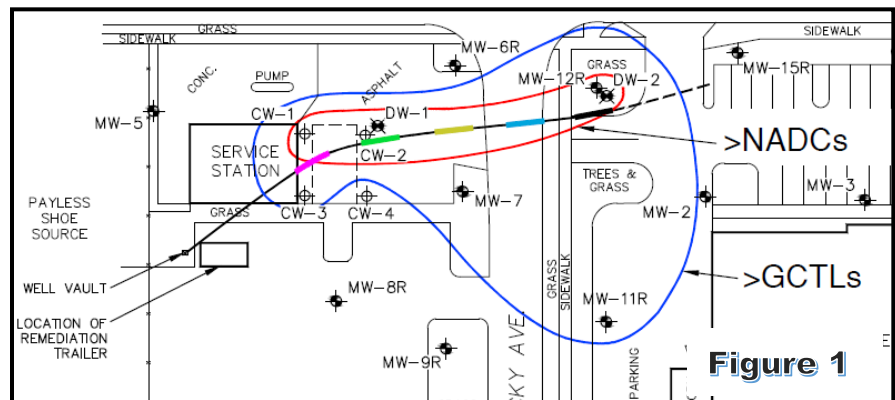


Figure 1

This case study illustrates how Vertebrae™ can be installed under multiple properties and be utilized for remediation as an air sparge and soil vapor extraction system.

## BACKGROUND

A release was reported at the former Amoco site in 1987, when free product was discovered in a utility manhole in North Kentucky Avenue. Subsequent environmental assessment results identified gasoline range organics (GRO) in soil and groundwater extending from the UST area. Initial Remedial Action consisted of pumping free product and groundwater from the manhole- a total of 1,665 gallons was removed. The four USTs were closed in place in December 2000, concluding all remedial activities until 2015. Additional installation of soil borings and monitoring wells delineated the plume which was found to have traveled deeper and under the adjacent roadway onto the Walgreens property.

## DESIGN AND INSTALLATION

The installation of the full-scale design consisted of 25 independent Vertebrae wells at the site, involved over 1,900 feet of Horizontal Directional Drilling (HDD) and was completed in two weeks. Installation took place behind the site building and went under the UST area, the side street, the neighboring property's parking area, and exited on the east end of the parking lot leaving in place six Vertebrae well systems. This was completed while maintaining full operational status of the store operations, the roadways, and the adjacent drug store.

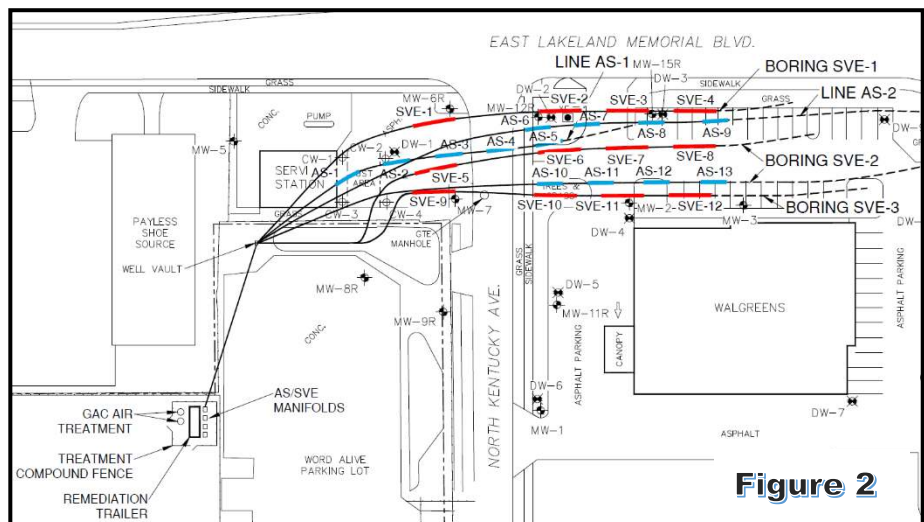


Figure 2

**LAYOUT FIGURE**

Figure 2 illustrates how the 13 AS (blue) and 12 SVE (red) wells were installed without disruption of the subject property, the adjacent roadway, and the Walgreens store.

**SYSTEM OPERATION RESULTS**

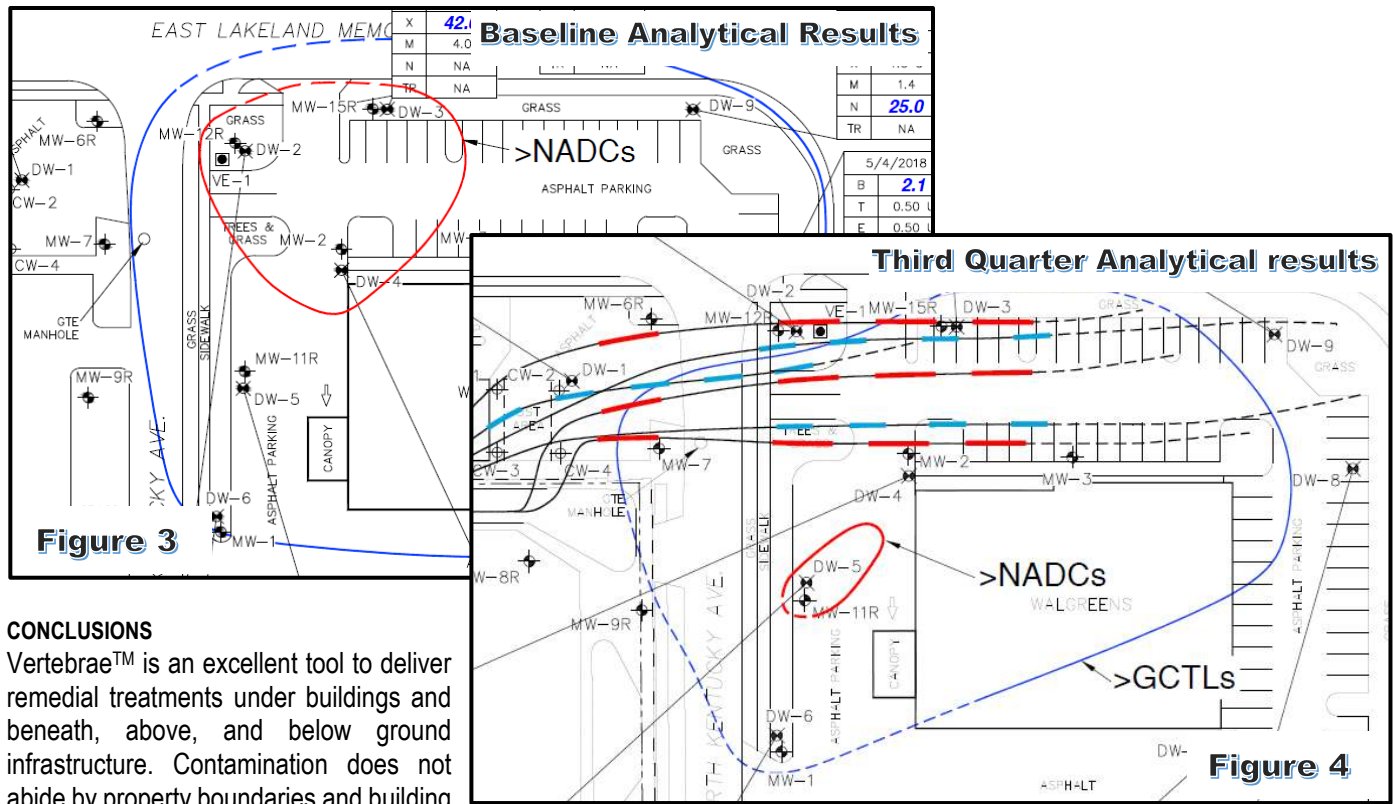
The system became fully operational in April 2020. The Vertebrae AS segments were designed to carry a flow of 8-10 cfm, and the SVE segments to carry 22 cfm. The systems have had a run time of approximately 97% since being in operation. Based on field data the air sparge and soil vapor extraction wells are performing at or near the desired flow.

Recent Measure Flow Rates from Select AS Wells and the Average SVE Flow					
Well	AS-2	AS-5	AS-6	AS-10	SVE (Ave.)
Jan-21	16.9	4.2	8.6	10.4	15

Rates shown in cubic feet per minute (cfm). Estimated based on pitot tube measurements reported in the 3<sup>rd</sup> Quarter report.

**PERFORMANCE MONITORING RESULTS**

During the first three quarters of system operation a dramatic reduction to below Natural Attenuation Default Concentrations (NADCs) has been observed in the groundwater plume in the intermediate zone located on the drug store property. Specifically, DW-2 ethylbenzene reportedly dropped from 192 ug/L to non-detect, DW-3 showed slight increases which are still below NADCs, and DW-4 ethylbenzene reportedly dropped from 328 ug/L to non-detect. A reduction of ~88% in the on-site shallow plume source well (CW-2) has also been reported. Continued monitoring and operation are scheduled. The designed layout effectively addressed the NADC plume and continued progress is being made, however a more robust approach is possible to go directly under the building for full plume treatment. In this case because of the limited exceedances, the current application may reduce the source mass significantly enough to allow natural attenuation to remedy the DW-5 location.



**CONCLUSIONS**

Vertebrae™ is an excellent tool to deliver remedial treatments under buildings and beneath, above, and below ground infrastructure. Contamination does not abide by property boundaries and building footprints. The VWS is the ideal solution to fully address the entire groundwater plume. Cost effectively, it can be constructed with higher density to provide complete **adjustable** plume coverage, with one convenient access point. VWS have the benefit of minimizing or eliminating both on-site and off-site disruption, during both system installation and operation.

**As more sites utilize Vertebrae™ for remediation, and experience the added control and improved efficiency, more sites choose Vertebrae™ as the preferred “tool” to implement the selected remedial approach.**