AMPLIFIED GEOCHEMICAL IMAGING LLC

CASE HISTORY

AGI SURVEY OUTPERFORMS ACTIVE SAMPLING AT DRY CLEANING SITE

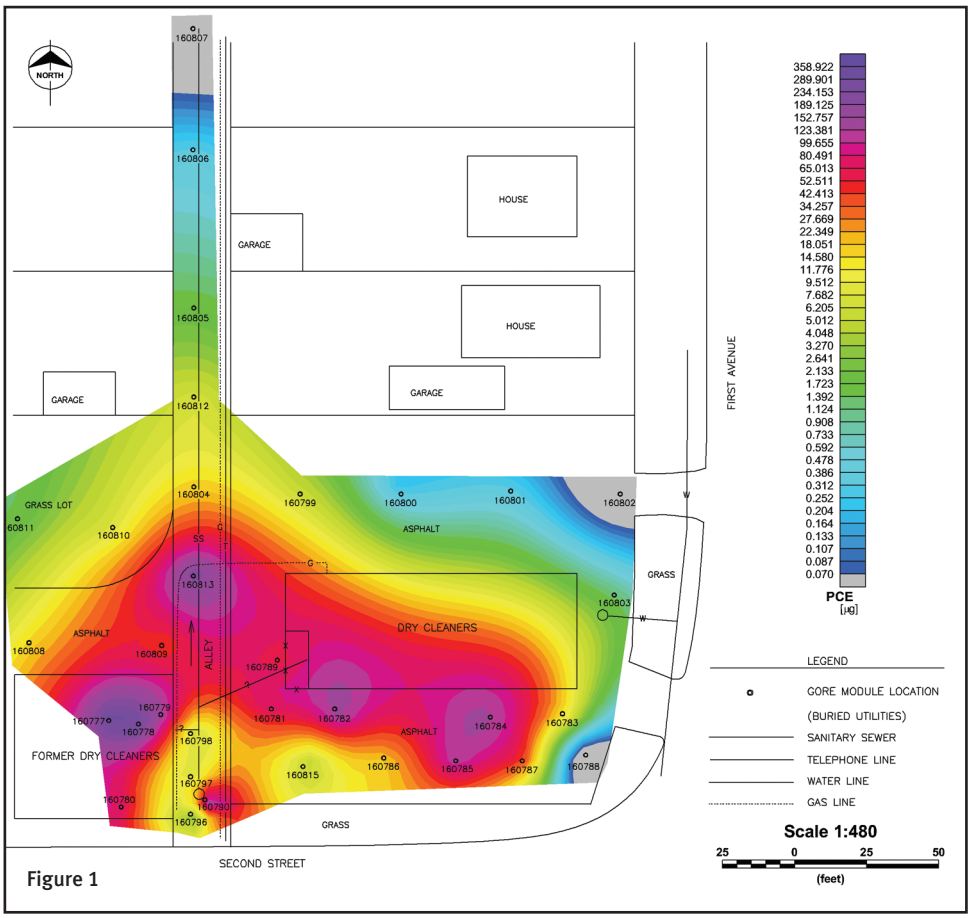

Figure 1

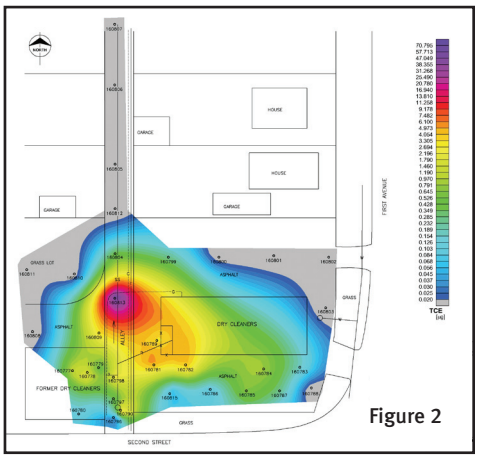

Figure 2

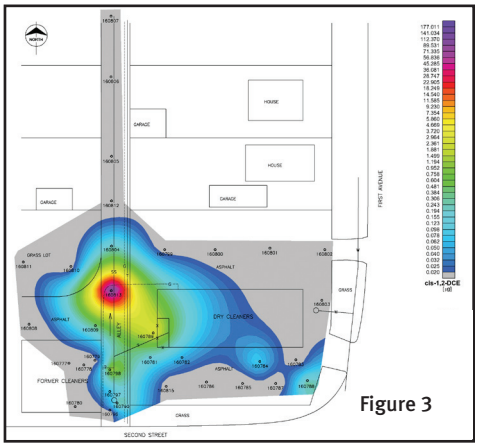

Figure 3

PCE contamination delineated in Figure 1, is further confirmed by the presence of daughter breakdown compounds TCE (Figure 2) and cis-1,2-DCE (Figure 3).

Survey Summary

Location: Midwestern US (Kansas)

Property: Dry cleaner (indoor and outdoor)

Objective: Identify PCE 'hot spots'

- Active soil gas results were inconsistent with other sites
- Target areas for vadose zone remediation were unknown
- Sites for SVE wells and chemical oxidation injection points needed to be determined
- Sampling inside and outside of building required simplified collection methodology

Survey Objective

The Kansas Department of Health and Environment's Dry Cleaning Program had identified a site in which active soil gas data were inconsistent with that of other, similar sites. The AGI Survey was initiated to help identify PCE 'hot spots' in the vadose zone contamination, and to pinpoint optimized remediation sites.

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Site Background & Geology

- Dry cleaner, Midwestern US (Kansas)
- Clay-silt to 12 ft., then silty sand grading to sand/gravel to 37 ft., shale underlying
- Groundwater depth – 15 ft.
- Known heavy PCE usage from 1958 – 1994
- Regional assessment identified contaminated plume on site
- TCE, cis-1,2-DCE and vinyl chloride were observed in the contaminated areas
- Monitoring wells at gas station across the street identified chlorinated VOC contamination

AGI Survey

- 27 AGI passive samplers
- Avg. 30 - 45 foot sample spacing in grid pattern, with focus over outside sewer lines and known source areas inside building
- Modules installed in asphalt parking area, alley and grass; interior facility slab
- 3-ft. install depth
- 14-15 day exposure
- Modified EPA method 8260/8270 GC/MS analysis at AGI labs

Survey Results

The AGI Survey identified a 'hot spot' in the back alley, later determined to be the result of a sewer line leak. In addition, chlorinated breakdown compounds including TCE and cis-1,2-DCE were observed in the soil gas data. The plume geometry of the PCE and the daughter compounds were similar, suggesting natural attenuation is occurring at depth.

Survey Conclusions

Data obtained through active sampling at this site did not provide the information needed to develop an accurate conceptual site model of the subsurface impact by dry cleaner solvents at this location. The AGI Survey helped to focus remediation efforts by pinpointing a previously unknown contamination source. Further, breakdown compounds identified through AGI's broad range of analytical capability, well correlated with the PCE spatial distribution, helped to confirm the presence of PCE contaminants.

Information obtained through the AGI Survey enabled the Kansas DHE to develop a focused remediation plan, which consisted of a combination of soil vapor extraction and sodium permanganate injection. The survey results were accurate in identifying source areas, thereby minimizing the number of soil samples collected. The locations of the soil vapor extraction wells and the chemical oxidation injection points were optimized based on the soil gas data as well. Future soil and groundwater remediation efforts will focus on the 'hot spots' identified around the dry cleaning facility.

Why Passive Soil Gas?

Like all environmental screening level methods, the primary objective of employing passive soil gas technology is to reduce the overall cost of an investigation (or long-term monitoring program) by developing a more accurate site conceptual model at the beginning of any investigation.

Soil permeability, soil saturation, depth to source, temporal variability, and compound volatility can adversely impact the data quality of active soil gas sampling. Low permeability and/or poorly-drained soils, for example, limit the amount of detectable soil gas within the brief sampling interval of active collection. Similarly, semi-volatile organic compounds, which by their nature are limited in soil gas, are also difficult to capture within an isolated sampling interval.

The time-integrated, sorbent-based approach of passive sampling employed by the AGI Survey overcomes these limitations. The AGI passive sampler, in particular, with its waterproof, vapor-permeable membrane, can be placed in unsaturated and saturated zones. The module protects the sorbent, and allows for direct detection of a wide range of organic compounds present in lower concentrations.

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