AMPLIFIED GEOCHEMICAL IMAGING LLC

CASE HISTORY

COMBINING PASSIVE AND ACTIVE VAPOR SAMPLING TO INVESTIGATE VAPOR INTRUSION

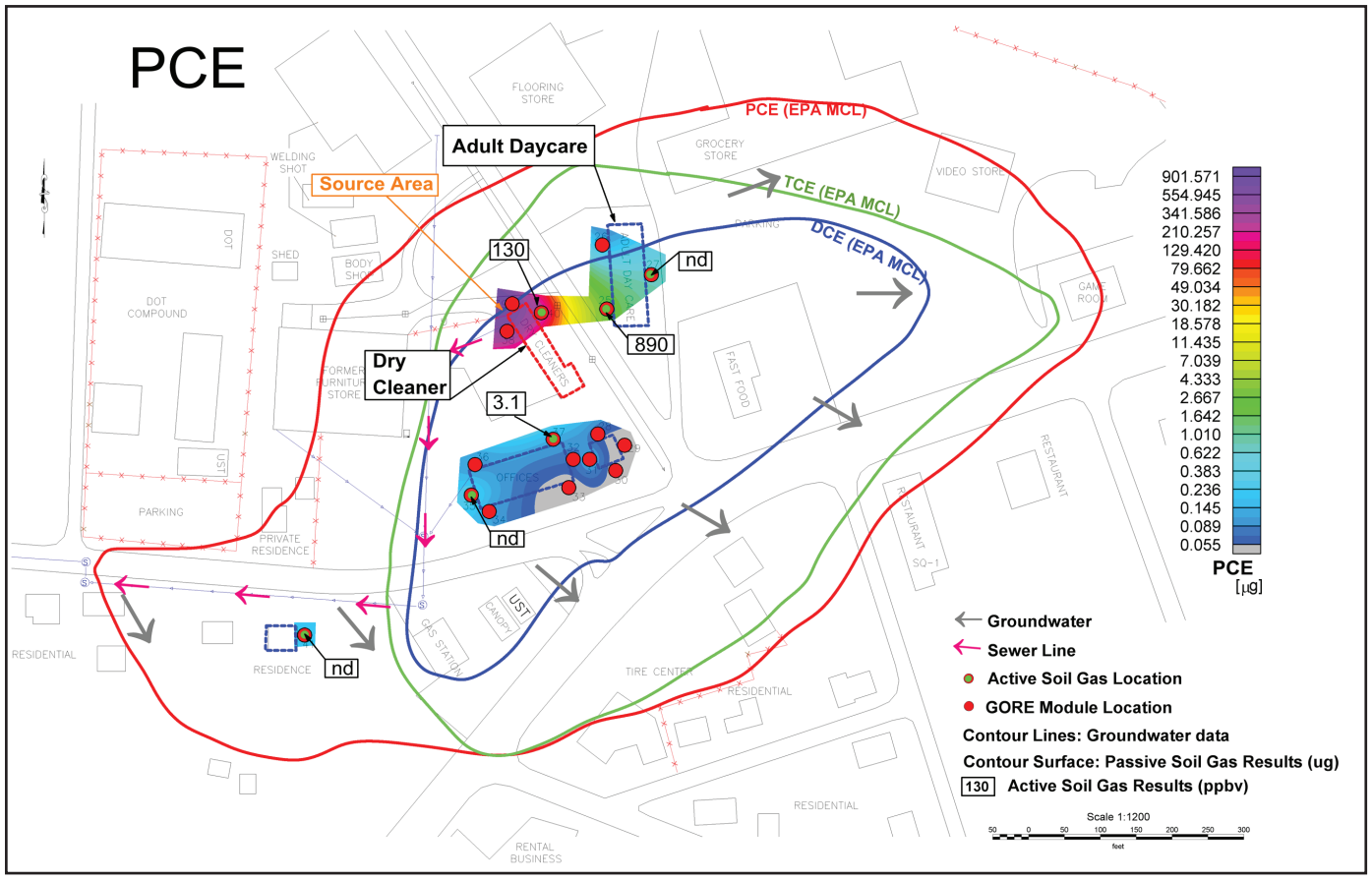

Figure 1. Passive soil gas results contoured (µg) with active soil gas results posted (ppbv).

Survey Summary

Location: Southeastern US

Property: Operating dry cleaner

Objective: Demonstrate a rational, cost-effective, phased investigation to determine the extent and severity of vapor intrusion (VI).

Survey Objective

An operating dry cleaner in the southeastern US had impacted groundwater and soils with chlorinated solvents. Preliminary soil and groundwater data and subsequent modeling suggested that a large area of vapor impact existed. A vapor intrusion investigation was initiated to determine vapor pathway and potential solvent exposure to occupants of nearby residences, an adult daycare and office buildings.

Passive soil gas sampling with the AGI Survey was implemented to refine and focus subsequent active soil gas and indoor air sampling.

Investigators concluded that vapor intrusion into the adult daycare was not occurring.

COMBINING PASSIVE AND ACTIVE VAPOR SAMPLING TO INVESTIGATE VAPOR INTRUSION

Site Background & Geology

- Operating dry cleaner, southeastern US.
- Medium to fine-grained sands, some silt, clay layers interspersed.
- Groundwater: depth, 5 to 17 feet deep; multiple hydraulic zones; southeast flow.
- Previous soil and groundwater investigations revealed source area and extent of solvent impact in groundwater.
- J & E modeling suggested large area of potential VI risk.

Sampling Plan

AGI passive samplers were placed at 17 locations on the site. The modules were installed in holes drilled outside of the buildings and angled beneath the slabs to a vertical depth of approximately 5 feet. The modules were exposed for 10 days and analyzed by EPA 8260/8270 methods. Based on the data reported from the AGI passive samplers, active (quantifiable) soil gas sampling was conducted using 6 canisters attached to probes inserted at an angle beneath the slabs to a depth of approximately 5 feet, and operated for 4 hours. Indoor air sampling was then conducted using 4 canisters for 24 hours in the adult daycare. TO-14 analysis was conducted on the canister samples.

Survey Results

The AGI Survey reported elevated mass levels for PCE (Figure 1). The TCE and cis- and trans-1,2-DCE results were similar to the PCE result. The greatest PCE vapor mass was reported from the source area with declining levels down-gradient, which correlated with the soil and groundwater data. These results focused the subsequent active soil gas sampling to fewer, but more productive sample locations.

The active soil gas sampling reported elevated levels of these compounds at the dry cleaner and the adult daycare center. The PCE results revealed a higher vapor concentration downgradient from the source instead of at the source. Indoor air sampling conducted at four locations within the adult daycare revealed TCE, but not PCE or DCE, both of which were found in elevated concentrations in the soil gas.

Survey Conclusions

Soil sampling had identified the source area, and in conjunction with groundwater sampling, the source and extent of impact by chlorinated solvents was delineated. Vapor intrusion modeling suggested a large area of vapor impact and potential vapor intrusion into buildings.

The passive soil gas results from the AGI Survey confirmed the source area location and showed decreasing mass levels in the soil gas downgradient from the source, correlating with the soil and groundwater data. Elevated levels were observed in the active soil gas results (through canister sampling), but revealed a higher level adjacent to the daycare than in the source area. Indoor air sampling was conducted inside the adult daycare based on the soil gas results. The high levels of PCE and DCE observed in the soil gas outside of the daycare were not present in the indoor air samples. TCE observed within the daycare was likely due to custodial activities. Therefore, vapor intrusion from impacted groundwater beneath the daycare was ruled out. Routine indoor air sampling was recommended due to the sensitivity of the daycare clients and the presence of elevated solvents in the groundwater.

The results of the AGI Survey guided the subsequent quantified (active) sampling, while minimizing the overall number of samples. The combination of active and passive sampling resulted in an overall cost savings of almost 60% when compared to the cost of a sampling program using only active sampling.

The Importance of Effective, Efficient Vapor Intrusion Investigations

Vapor intrusion, the migration of volatile chemicals from the subsurface into overlying buildings potentially representing a health risk to occupants (US EPA), has moved from an emerging concern to one of intense study by state and Federal regulators, environmental consultants, site owners, and other stakeholders. Revised regulations and updated toxicity are fueling the need to understand the vapor intrusion process and the potential risk to humans.

Passive vapor sampling represents an economical, accurate, and easy-to-use means of collecting chemical data and establishing the presence of a vapor intrusion pathway. In the past, chemical data collected by passive methods was considered semi-quantitative (not in units of concentration) and has played a limited role in determining risk to occupants. However, even at a qualitative level, passive methods have been proven useful in delineating source and extent of subsurface impact, which in turn, can guide subsequent sampling activities with quantified (active) methods. Applying a rational, step-by-step approach to investigating a vapor intrusion issue yields a more robust, accurate, and cost-effective result.

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