

Case Study and Review of Technical Literature Regarding Cost-Effectiveness of Source Control Options

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Background/Objectives. The authors were retained to provide a technical review of the efficacy of site investigation and remediation activities to date at a former equipment manufacturing facility dating to the 1950s at which a chlorinated solvent vapor recovery operation occurred for over 20 years. The subject site was assessed as part of a lending package and real estate development plan. The presence of chlorinated solvents was discovered at and near the vapor recovery equipment during a Phase II environmental site assessment. The site was entered into the Texas Voluntary Cleanup Program. After the expenditure of over \$1.5 million, the authors were asked to identify the best approach for remediating the site and offsite ground water plume and facilitate property redevelopment. As part of this project, the authors reviewed the work completed to date, assessed its efficacy, and conducted a comprehensive review of the technical literature regarding the effectiveness of alternative remedial technologies and strategies.

Approach/Activities. As noted above, the approach entailed a technical review of the historical investigation and remediation activities at the subject property and of the technical literature regarding alternative remediation technologies, including excavation and source removal above the water table, source removal via dewatering and excavation below the water table, cut off walls, treatment walls, pumping recovery and treatment, in situ chemical oxidation and natural attenuation. The technical review entailed estimations of mass volumes above and below the water table, mass flux rates via lateral ground water movement, free phase solvent quantities and distribution, and changes in mass flux rates over time and as a result of the implementation of the different remedial measures.

Results/Lessons Learned. A brief review of the technical literature will be presented with a summary of findings. The case study and its 10 years of ground water monitoring data, along with the soil, ground water, and ground water level data associated with various phases of the site investigations, and remediation will be reviewed and summarized. The summary will focus on illustrating the evolution of the understanding of the mass volumes and extent of migration, and on the effect or lack thereof, on the extent of the plume and mass flux rates. The bottom line lesson is that removal of mass above the water table and in-situ chemical treatments often will have minimal impact on natural attenuation and mass flux rates when substantial volumes of solvent are located adhered to the underlying clayey soils in the shallow water table and when mass flux rates are diffusion controlled by releases from the residual source material. Estimates of cleanup times based on the estimated mass present are presented along with mass removal cost effectiveness per dollar expended. As will be noted in the paper and presentation, overselling the potential effectiveness of expensive remediation measures can be consequential.