Why the Historical VOC Production Trends Necessitate the Use of High-Resolution Site Characterization Techniques

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Background/Objectives. Chlorinated solvent production in the US began to grow in the early 1940s, as petroleum-based products were diverted to meet the fuel demands of World War II. Following World War II, an increased demand for consumer goods and a shift from flammable petroleum-based fluids to non-flammable chlorinated solvents resulted in a dramatic increase in chlorinated solvent production during the 1960s, 1970s, and 1980s. For nearly a decade during that period, carbon tetrachloride, for example, was being produced at a rate of over a billion pounds (~500 million kilograms) per year. During this "golden age", chlorinated solvents found their way into almost every industry. With the advent of environmental laws in the 1990s, production of solvents rapidly declined to pre-World War II levels, essentially ending the golden age of solvents.

Prior to the 1990s, standard disposal practice was to bury solvents and sludges or pour them onto the ground so that they could volatilize to the atmosphere. As a result, direct releases of solvents to the soils of industrial sites and the entombment of solvents and sludges in unlicensed landfills mimicked production trends.

As an environmental professional, one must be cognizant of this history and approach site assessment in a scientific manner. A key issue today is that the current workforce's first-hand knowledge of historic solvent use and disposal at any given facility does not extend far enough into the past to provide a complete depiction of how solvents may have been used and disposed of at their sites. Relying on their input alone, as guidance for your assessment, will likely result in an inaccurate assessment of the situation.

Approach/Activities. Active soil gas sampling has been used for many years to locate solvent release areas. However, recent advances in active soil gas sampling techniques allow for the cost-effective collection of high-resolution datasets in a matter of days. These datasets, when leveraged with GIS techniques, provide greater insight into the types of solvents used, where they were released, and when they were likely released. Using these techniques, the environmental professional can streamline the assessment process and focus the use of more expensive and intrusive methods (drilling, soil sampling, groundwater sampling) in targeted areas.

Results/Lessons Learned. A case study is presented that discusses the how these techniques were used to locate tetrachloroethene and tricholorethene sources released in approximately 1950 near a loading dock, and along what was the outer edge of the facility. Post-1950, the facility tripled in size, covering its previous disposal history. These DNAPL sources, which had migrated to a depth of 15 feet, were discernible by the high-resolution active sub-slab soil gas dataset. Relying on the high-resolution dataset, a targeted drilling process was undertaken, and the sources remediated. The presentation will present a detailed history of solvent production in the US and discuss the necessity to change our investigative approaches to accommodate the loss of an aging industrial work force having firsthand knowledge of per 1990s disposal practices.