Non-Intrusive and Cost-Effective Investigation of Chlorinated Solvents at a Former Dry Cleaner

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Background/Objectives. Golder Associates AB (Golder) has developed a methodology for cost effective investigations of sites contaminated by chlorinated solvents. As chlorinated solvents have characteristics that make them difficult to investigate, investigations of chlorinated solvents can be very costly. Consequently, it's of great importance that the first investigations accurately define if a site needs further investigations and if so: 1) which areas are contaminated and 2) what risk does the contamination pose. The methodology that Golder uses aims at doing this with techniques that are both inexpensive and less intrusive than ordinary ground penetrating investigations with drill rigs.

The methodology has been used at several sites during the last several years, foremost at a former dry-cleaners for which a laundry company has an environmental liability. When the company was ordered by the municipality of Vara to conduct a ground investigation at a former industrial dry-cleaner in the small village Emtunga in western Sweden, this methodology was used with partly new techniques for Sweden. The dry-cleaner was active from 1958 to 1981 and is currently used as a warehouse and garage. The Site has adjacent residential villas in one direction and arable land in the others. However, no groundwater wells are present in the area.

Approach/Activities. The investigation at Emtunga started with a thorough review of historical activities to identify where potentially contaminating processes had been performed and of the site settings. From this a first conceptual site model was developed, which helped to focus the investigation. From this the following non-intrusive sampling techniques were chosen for this particular site: tree cores, groundwater from existing monitoring wells, indoor air as well as soil gas and finally perched water that leaked into the sewer system. Drinking water from the mains were initially planned to be sampled to investigate possible permeation into the pipes, but as the water service was withdrawn long ago this was excluded. Normally the methodology includes sampling of storm water pipes or ditches, but none such bearing water was present at the Site. Gas sampling, both indoors and in the ground, was conducted with a passive sampling method that was new for Sweden and European laboratories (i.e., the Waterloo Membrane Sampler [WMS^{TM}]). This sampler gives concentra-tions and can sample the extremely volatile degradation product vinyl chloride, something most other passive samplers can't. The indoor air was parallelly sampled with the Radiello sampler (which can't sample vinyl chloride).

Results/Lessons Learned. Non-intrusive sampling is cost effective and has an advantage where the access is limited, such as in this warehouse/garage or at residential properties. At Emtunga, this sampling methodology could conclude that the current contamination does not pose a risk for health at this Site and that the spreading of the contamination is very limited.

It was also concluded that soil gas sampling with passive WMS^{TM} samplers gives more relevant results in a low permeable soil than active sampling by pumping over an adsorbent. Monitoring the concentrations of chlorinated solvents in indoor air measures the direct exposure; however, the evaluation of the results is difficult.

Our experiences of investigating chlorinated solvents shows that these investigations should be done in a tiered approach, and that these investigations in general should contain analysis of samples from several media to ensure that the contamination situation is not wrongly interpreted.