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Controlled Methanogenesis during Remediation of a Dry Cleaning Facility in an Urban Setting

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Background/Objectives. Operations at a recently active dry cleaning facility resulted in presumably recent releases of PCE. Near the suspected point(s) of release groundwater contained, namely PCE (max. 82 ppm) and relatively low levels of TCE (1.2 ppm) and *cis*1,2-DCE (1.5 ppm) and lesser amounts of VC (<0.2 ppm). Groundwater was located ca. 10 ft bgs and the shallow aquifer was reportedly confined by dolomite bedrock at about 16 ft bgs. Contaminated groundwater migrates through interbedded silt and clay through a residential area. Remedial response was required to reduce the concentration of PCE, but given the urban setting (i.e., homes with basements), the State of Wisconsin had special interest in assuring that the remedial action did not stimulate excessive methanogenesis which could create indoor air/vapor intrusion issues (methane will induce contaminant migration) and cause other potential safety issues associated with high levels of methane.

Approach/Activities. A thorough analysis of various remedial amendments (EHC®, EHC-L®, EZVI, Ferox-Plus™ and Provect-IR®) considered cost, injection capabilities, and predicted performance. In addition to multiple technical advantages, only Provect-IR offered the ability to actively control methane production and it was identified as the best alternative for this site. Initial treatment consisted of 3,200 lb Provect-IR applied via 24 direct push injection points spaced about 10 ft apart through a targeted treatment area. Between 100 to 150 lb of reagent were applied per point as 20 to 25% slurry at a flow rate of between 5 to 10 gpm using up to 150 psi. Field monitoring consisted of measurements of multiple parameters (DO/ORP, pH, temperature, water level, well-head gasses, indoor air vapor monitoring, vadose zone gas monitoring) and quarterly measurements of contaminant concentrations in groundwater.

Results/Lessons Learned. After 120 days of treatment, the concentration of PCE in the source area was reduced from 81,800 ppb to 14,100 ppb, with some transient production of DCE (47 ppb). Proximal to the source area, total contaminant concentrations were reduced by 59% (TCE reduced from 677 ppb to < 5 ppb) and 89% (TCE reduced from 92 ppb to 56 ppb) without the accumulation of any catabolic intermediates. To date, no excessive methane production was observed, there were no vapor intrusion issues immediately noted, and there was no noted induced migration of solvents . Detailed information on reagents applied and lessons learned during their full-scale field implementation will be presented along with results of field performance monitoring and costs for full-scale application.