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Using the Remediation Test Panel to Determine Contaminant Fate and Support MNA

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Background/Objectives. A large site had groundwater impacted by high concentrations of benzene, chlorobenzene (CB) and a mixture of dichlorobenzene (DCB). Monitoring of the dissolved phase concentrations of the contaminants showedthey were attenuating along a flow path. However, there was no direct evidence based explanation for the observed loss of mass. The objectives of the project were to: 1) evaluate whether the attenuation of the contaminantswas due to biodegradation or physical processes, 2) determine whether biodegradation was occurring for each of the analyzed locations and to describe the likely attenuation mechanism active at each of those locations, 3)compare degradation pathways and rates under various conditions to evaluate whether inhibiting or limiting factors to biodegradation were present, and 4) evaluate if the predominant attenuation pathways were Site-wide.

Approach/Activities. It was decided to use the “Remediation Test Panel” (RTP) to assess and document contaminant, geochemical, microbiological and isotopic conditions. The RTP included measurements for each, examples to help interpret the data, and a holistic analysis that synthesized the independent lines of evidence into a coherent conceptual model that could be used to justify an MNA remedy.

Results/Lessons Learned. The potential role of reductive dechlorination in consuming chlorobenzene and producing benzene was explored by looking at the contaminant mole percents, geochemical conditions were assessed and explainedthe effect of the peat overlaying part of the site. The presence of bacteria that could carry-out reductive dechlorination was confirmed, as was the presence of bacteria that could co-metabolically oxidize the contaminants. Isotopic evidence showed that both of these processes were occurring. A holistic review of these lines of evidence made it clear that the most robust reductive dechlorination was in areas where reducing conditions were most prominent (presumably because of the peat in those areas) while the co-metabolic oxidation was most prominent in areas that were more oxic and where not underlain by the peat.The RTP made it possible to put together a MNA request in which the mechanism of the observed attenuation was well documented and the observed attenuation rate was supported by multiple lines of evidence.