In Situ Remediation at a Brownfield Site in Pennsylvania using Reinjectable Points

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Abstract: Over the past five years the use of in-situ remediation methods have gained acceptance for the biological degradation of groundwater remediation of petroleum hydrocarbons and chlorinated solvents. Application of slow release compounds such as Oxygen Release Compound (ORC®) and Hydrogen Releasing Compound (HRC®) have now been routinely used as a remediation tool.. The application of ORC® at a brownsfield sites in Pennsylvania will be discussed. While direct injection techniques are preferred for plume treatment, the use of treatment barriers have gained favor as a means to continue treatment particularly in cases of property transfers, urban settings, confined space and redevelopment projects. Uses of treatment barriers to cut-off groundwater plume and the containment of plumes on-site will be illustrated. Funding for these types of projects particularly with respect to public grants will also be discussed.

Introduction: In many cases the main hurdle to a successful brownfield redevelopment is the completion of any environmental activities at the site. Whereas funding in the form of grants, loans and tax credits are available for the other components of the redevelopment, remediation dollars are the most difficult to come by. In many deals the speed of the project completion dictates the selection of technologies to be used in the remediation process. Thus, "scrape and pave" approaches offer a strong appeal in many cases. Likewise, the time needed for the approval of a project approach particularly one that involves an innovative technology can influence a redeveloper in deciding how to proceed with the environmental activities. This line of thinking often results in either a more expensive remediation or one that does not address the entire problem thus leaving some on-going liabilities. This is manifested either through reduced property values or by limiting the use of the property for future development.

This presentation will describe an example where innovative approaches have been utilized. The presentation will also describe the funding mechanisms used to implement the remediation.

Technology Description: Regenesis Bioremediation Products, Inc. has developed 2 slow release compounds for the *in-situ* treatment of contaminated groundwater that contain petroleum hydrocarbons from compounds such as gasoline and fuel oil, chlorinated solvents such as PCE, TCE and TCA, and heavy metals such as lead, hexavalent chromium and arsenic. The products are applied into the ground using a high pressure injection pump. The ORC® chemically reacts with the groundwater to release oxygen for the treatment of the petroleum products through an aerobic degradation process. The HRC® releases lactic acid when it contacts the groundwater. Through fermentation hydrogen is then produced and release thus providing a mechanism for an accelerated

breakdown of the chlorinated compounds. Both processes are accomplished with a minimum disruption of site activities. The equipment used for the installation is typically a direct push rig that injects the appropriate product into the saturated zone using a high-pressure positive displacement pump. For brownfields sites a reinjectable point can be constructed to permit multiple applications without business disruption.

Case History: In Pennsylvania, ORC was applied at a former gas station that was converted to a bank branch. The remediation in this case was funded through the state underground storage tank cleanup fund. The new owner did not want an active operating treatment system on the site. Here the main driver in the technology selection process was perception. The bank did not want its customers to feel uncomfortable about the fact that the bank branch was located on a contaminated site that was undergoing remediation. Typical remedial systems such as pump and treat or air sparging/soil vapor extraction involved the operation of mechanical systems at the site. These both involve noise problems as well as create aesthetic concerns for the bank and its customers. The solution was to utilize ORC to treat the heart of the plume through a series of injection points. Additionally about 35 reinjectable points were installed along three sides of the property to continue treatment as needed.

Where direct push injection is not practical due to formation characteristics, the application of a remedial material will occur repeatedly throughout the life of the project or when repeated access with drilling equipment is an issue, the use of re-injectable points should be considered. Re-injectable points are generally constructed as micro wells. Most commonly, in the unconsolidated or shallow weathered rock formations, re-injectable points have been constructed of 1" diameter screen and riser screening only the targeted injection zone. Screen lengths over 10' need to be carefully evaluated as they increase demands on system pressures. Materials of construction can be stainless steel, schedule 80 PVC or schedule 40 PVC dependent upon screen length, formation conditions, and anticipated service life and injection pressures. The re-injectable point may be installed by direct push, hollow stem auger or air rotary drilling methods depending upon formation characteristics.

Reapplication of the ORC is performed every six months after dark while the bank is closed for operation Funding for this project came from the Pennsylvania State Tank Cleanup Fund. In other states a wide variety of funding options are available such as state grants, low interest loans and tax rebates (as much as 15 years in New Jersey). Reapplication of the ORC is performed every six months after dark while the bank is closed for operations. Two reapplications have occurred to date and a third is planned for mid 2001. Migration of the contaminants is monitored at MW-2 where control was established beginning with the June 2000 sampling event. At the sentinel well MW-2, the dissolved concentrations for the compounds exceeding cleanup standards for the site have declined from an average background value of 1.425 mg/L to .026 mg/L for Benzene and from 2.072 mg/L to .070 mg/L for MTBE. In the heart of the plume dissolved BTEX concentrations have been reduced on average from 38.0 mg/L to 25.8 mg/L and MTBE has been reduced from 14.554 mg/L to 2.624 mg/L.

Conclusions: Innovative technologies have a place in brownfield redevelopment projects. This is the case particularly where conventional treatment methods may be aesthetically unsightly or where additional treatment is required after the property has been developed. Funding mechanisms for remediation are now becoming available from a wide number of sources. Because of the different approaches being taken in the various states the redeveloper must become familiar with the local programs to best take advantage of these funding sources.

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