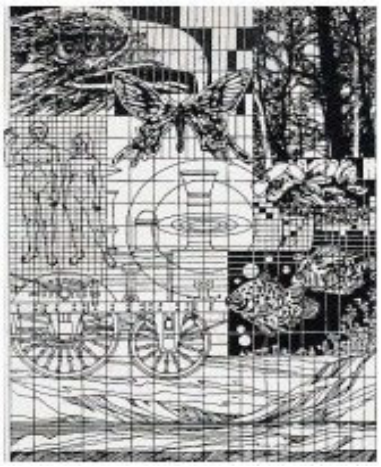

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EEA services include Phase I ESAs, Haz-Mat Testing and Remediation, Wetlands Delineation and Creation, Natural Resources Inventories, Marine Ecology Studies, Air Quality and Noise studies, and Environmental Management System (ISO 14000) implementation.

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Environmental Consulting

INSIGHTS

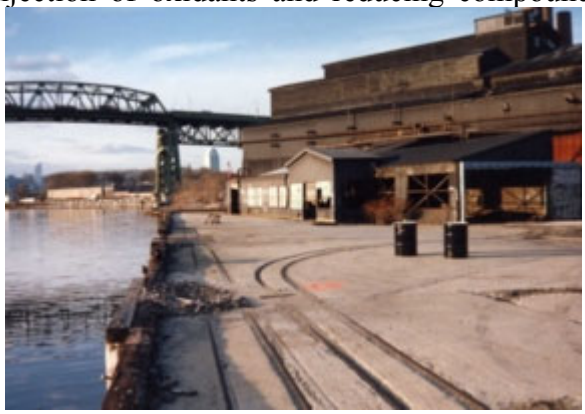
CONTAMINATED SITE AND BROWNFIELD CLEANUPS

Approaches: High Tech versus Excavate and Haul

(printer friendly version uses Acrobat Reader)

During the 1980s, the primary approach to cleanup of contaminated "urban fill" materials was to physically remove the source contamination in areas of concern, such as leaking underground storage tanks (USTs), industrial leaching pool structures, and contaminated fill materials. Groundwater was remediated by pump and treat methods. Although these methods currently are used, new technology and a more liberal regulatory atmosphere are yielding many more alternatives.

Since 1980, federally funded research has led to more high-tech remediation approaches, such as in place (in-situ) biological and chemical degradation of contaminants. The chemical injection of oxidants and reducing compounds has been demonstrated to be a promising alternative to the conventional "dig and haul" of soils followed by "pump and treat" practices applied to groundwater for some contaminants, such as solvents. Fixation or bonding agents have also been utilized with some metals contamination such as lead in soils. The lead or metals are affixed to the soil particles and subsequently do not migrate to sensitive environmental receptors.



Treating contaminants often takes varying and somewhat unpredictable time periods to render the remediation complete. While these chemical-biological approaches may be more cost-effective for large areas or sites with extensive volumes of contamination, for some Brownfield redevelopment projects the time required to complete remediation may be more of a priority. See EEA's Fall 2003 Newsletter on Brownfield legislation.

In today's environment, it is necessary to perform a feasibility study to consider the relative effectiveness and cost benefits of different approaches to the remediation of contaminated property. Factors that affect the choice of treatment technologies for soils and groundwater are typically pH, nature

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of organic matter (nom), permeability, and depth of contamination.

Soil Gas Vapor and Air Sparging

EEA has successfully used soil gas vapor systems and air sparging to remove chlorinated solvents that have contaminated the subsurface soils and groundwater at industrial sites. This approach was chosen over the excavation of soils to an approved facility, since the contamination was pervasive and at levels that would classify the soil material as hazardous. Thus, the gas vapor system was a more economic solution. After two years of operation, the system successfully remediated the contamination.

Hydrogen Peroxide Injection

Hydrogen peroxide has been used by EEA to remediate groundwater contaminated by petroleum products at service stations. Hydrogen peroxide injections at five locations over a two-month period reduced groundwater contamination by 95 percent. Hydrogen peroxide injection is a cost-effective approach to groundwater remediation if the contamination is localized.

Hydrogen Release Compounds

Hydrogen Release Compounds (HRC), provided by Regenesis Corporation, are used by EEA to remediate groundwater contaminated by chlorinated hydrocarbons at dry cleaning facilities on Long Island and in New York City. HRC Compounds offer a passive, low-cost option for in-situ anaerobic bioremediation of chlorinated hydrocarbons. HRC is proprietary polyacetate ester specially formulated for the slow release of lactic acid upon contact with water.

This source of lactic acid is then metabolized by microbes to produce hydrogen, which is then used in a natural process known as reductive dechlorination. Reductive dechlorination results in the step-by-step biological degradation of chlorinated contaminants. HRC can be used to degrade a range of chlorinated compounds including degreasing agents (PCE, TCE, TCA and their breakdown products).

Application of HRC is accomplished inexpensively using push-point or borehole

delivery methods. Once in the subsurface, HRC continues to stimulate the biodegradation of contaminants for an extended period of time (up to 18 months) eliminating the need for multiple, more frequent injections. A combination of low-cost application, an extended release profile, no operations and maintenance, minimal site disturbance and lack of dependence on external power source gives HRC a substantial cost advantage over other treatment technologies. HRC is a sensible, economical solution for treating chlorinated contaminants in saturated soils and groundwater.

Bioventing

Bioventing has been used by EEA for deep soils contaminated by fuel oil. At some locations, soil contamination, resulting from leaking tanks, extended to depths of over 40 feet. EEA has employed a bioventing system to biologically reduce the levels of contamination. Bioventing is an in-situ remediation technology that uses indigenous microorganisms to biodegrade organic constituents adsorbed to soils in the unsaturated zone. Soils in the capillary fringe and the saturated zone are not affected. In bioventing, the activity of the indigenous bacteria is enhanced by inducing air (or oxygen) flow into the unsaturated zone (using extraction or injection wells) and, if necessary, by adding nutrients.

Scheduling Constraints Often Dictate Choices

Often, the primary consideration for contaminated properties is to complete the cleanup as quickly as possible in order for planned development to proceed. In many cases, the financing agreements require the completion of remediation (i.e., obtaining No-Further Action letters from regulatory agencies) as a prerequisite to obtaining construction loans. The consideration of longer-term remediation approaches is discounted in favor of direct removal of as much contamination as is required to obtain a No Further Action letter.

For those conditions, “dig and haul” of contaminated soils to disposal sites and pump and treat contaminated groundwater are the preferred alternatives by the property owners, particularly if the property is a planned residential redevelopment.

Typical “Dig and Haul” Projects

EEA is completing the remediation of contaminated soils at the 12-acre former Smithtown Hospital site in Suffolk County. The onsite waste treatment system effluent was directed to 106 leeching pools. The most expedient approach to cleanup was to remove all the leeching pools and the contaminated soils (~ 1,000 tons) as negotiated by EEA in an Order of Consent. The owner desires to proceed with a townhouse residential development as soon as remediation is complete.

EEA is under contract to manage the cleanup of a waterfront site in Queens that formerly was a petroleum bulk storage terminal. The site has extensive petroleum product contamination; however, the owners desire to expedite the cleanup in order to proceed with a high-rise residential development (spectacular views of Manhattan) led to a decision not to pursue remediation under the NYS Brownfields Program (time constraints) or to propose lengthy chemical-

biological remediation approaches. As a result, the chosen method became a Dig and Haul mass excavation project.

Brownfields Benefits Are Attractive to Some Developers

EEA is proceeding on another cleanup under the State's new Brownfield Program for a client who acquired the former Time Warner Multiplex Center (and dry cleaner) at the Horace Harding Expressway in Queens. Soil and groundwater must be remediated for this site for a hotel and office redevelopment. The tax incentives and benefits under the Brownfield Program led to the application and acceptance of this remediation by the NYSDEC under the Brownfield Act of 2003 (see Fall 2003 edition of Insights). The proposed action is proceeding through the Brownfield process, which is still uncertain in terms of length of time to complete.

Successfully Achieving Redevelopment of Contaminated Sites is a Road with Many Optional Paths

It is important to have an experienced team working with you in defining the priorities of time and cost efficiencies. Sometimes, during the remediation effort, unanticipated contingencies can occur. Decisions have to be made quickly regarding contingency plans for dealing with changed assumptions. These must be carefully considered along with the consequences of alternative action plans, which could incur unexpected costs and/or extensive delays. Guidance from EEA's capable and experienced team helps to minimize the unexpected, and enables timely and cost effective decisions.

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EEA, Inc., Celebrating 25 Years as Consultants to Industry and Government

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