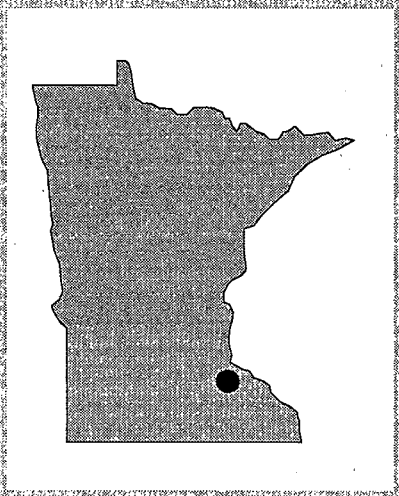
United States Environmental Protection Agency
Office of Research and Development Washington, DC 20460
Office of Solid Waste and Emergency Response Washington, DC 20460
EPA/540/F-93/510H
September 1993

EPA

Bioremediation Field Initiative Site Profile: Reilly Tar and Chemical Corporation Superfund Site

SITE FACTS



Location: St. Louis Park, Minnesota

Laboratories/Agencies: U.S. EPA Risk Reduction Engineering Laboratory (RREL), Superfund Innovative Technology Evaluation (SITE) Program, U.S. EPA Region 5, Minnesota Pollution Control Agency

Media and Contaminants: Polycyclic aromatic hydrocarbons (PAHs) in soil

Treatment: Bioventing

Date of Initiative Selection: October 1992

Objective: To evaluate the effectiveness of bioventing PAH-contaminated soil

Bioremediation Field Initiative Contacts: Paul McCauley and Richard Brenner, U.S. EPA RREL, 26 West Martin Luther King Drive, Cincinnati, OH 45268

Regional Contact: Daryl Owens, U.S. EPA Region 5, Waste Management Division, 77 West Jackson Boulevard, Chicago, IL 60604

Background

This Bioremediation Field Initiative project is under way in St. Louis Park, Minnesota, at the former site of Reilly Tar and Chemical Corporation's coal tar distillation and wood preserving plant. From 1917 to 1972, wastewater discharges and dumping from this plant contaminated about 80 acres of soil and the underlying ground water with wood preserving wastes. In 1978, the Minnesota Department of Health discovered significant concentrations of polycyclic aromatic hydrocarbons (PAHs) in six municipal drinking water wells neighboring the Reilly Tar plant. St. Louis Park currently is pumping and treating the contaminated ground water plume, but without an effort to control the source of PAHs, pumping and treating might be necessary for several hundred years.

This Initiative project is evaluating bioventing of PAH-contaminated soil through the U.S. EPA Superfund Innovative Technology Evaluation (SITE) Program and the U.S. EPA Risk Reduction Engineering Laboratory's (RREL's) Biosystems Program. Bioventing has proven effective at remediating lightweight petroleum distillates such as JP-4 jet fuel; this is the first evaluation of bioventing's effectiveness for remediation of larger molecular weight hydrocarbons.

Characterization

The SITE program conducted a preliminary site characterization, including soil sampling, soil gas monitoring, and in situ respiration testing, in August 1992. Soil sampling revealed PAH contamination in sandy vadose soil ranging from 2 to 10 ft below the surface. Soil gas monitoring and respiration tests indicated that the soil's aerobic microbial activity and air permeability are high enough for successful bioventing.

Field Evaluation

In November 1992, baseline soil sampling was conducted and a full-scale bioventing system installed on a 50-ft by 50-ft plot (see Figure 1). A control plot of equal size and contaminant levels also was established to gauge the effectiveness of the bioventing system. The

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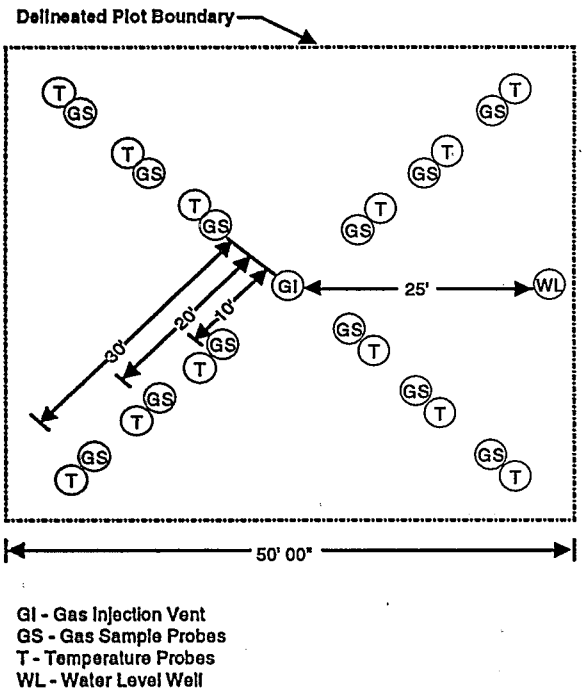

Figure 1. Layout of bioventing installation on experimental plot.

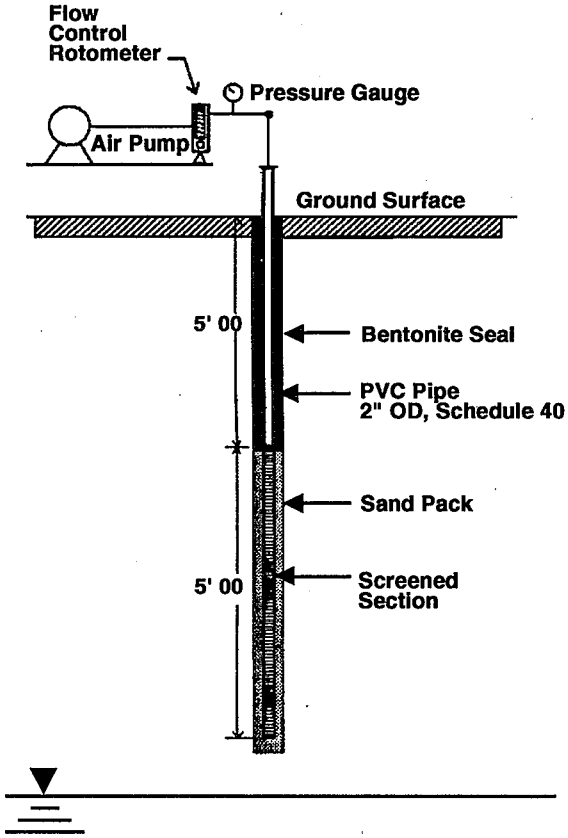

Figure 2. Schematic of air injection vent well.

system consists of one air injection well with screening 5 to 10 ft below ground level (see Figure 2), a 2.5 hp blower, a network of 48 soil gas sampling probes, and a system to monitor soil temperature and ground water elevation. The blower and vent well deliver 100 ft^3 of air per hour to the contaminated soil.

Personnel from the City of St. Louis Park will monitor subsurface temperature, as well as oxygen and carbon dioxide levels, every 2 weeks. In situ respiration tests will be conducted four times per year. At the completion of the project, final soil samples will be collected from the experimental and the control plots.

Status

The demonstration project is expected to last 3 years, at which point it is estimated that soil core samples will show at least a 27 percent reduction in PAH levels. If bioventing successfully remediates PAHs at this rate, complete remediation of the site would take 10 to 15 years should large-scale bioventing be undertaken. The results of this study will determine whether bioventing can be considered at Superfund sites as a cost-effective treatment technology for remediating PAH-contaminated soil.

The Bioremediation Field Initiative was established in 1990 to expand the nation's field experience in bioremediation technologies. The Initiative's objectives are to more fully document the performance of full-scale applications of bioremediation; provide technical assistance to regional and state site managers; and provide information on treatability studies, design, and operation of bioremediation projects. The Initiative currently is performing field evaluations of bioremediation at eight other hazardous waste sites: Libby Ground Water Superfund site, Libby, MT; Park City Pipeline, Park City, KS; Bendix Corporation/Allied Automotive Superfund site, St. Joseph, MI; West KL Avenue Landfill Superfund site, Kalamazoo, MI; Eielson Air Force Base Superfund site, Fairbanks, AK; Hill Air Force Base Superfund site, Salt Lake City, UT; Escambia Wood Preserving Site—Brookhaven, Brookhaven, MS; and Public Service Company, Denver, CO. To obtain profiles on these additional sites or to be added to the Initiative's mailing list, call 513-569-7562. For further information on the Bioremediation Field Initiative, contact Fran Kremer, Coordinator, Bioremediation Field Initiative, U.S. EPA, Office of Research and Development, 26 West Martin Luther King Drive, Cincinnati, OH 45268; or Michael Forlini, U.S. EPA, Technology Innovation Office, Office of Solid Waste and Emergency Response, 401 M Street, SW., Washington, DC 20460.