

Terra Systems, Inc. (TSI) offers feasibility and field remediation services to solve a wide variety of industrial groundwater and soil contamination problems.

TSI is committed to achieving the goal of economical and efficient remediation while insuring total safety for human health and the environment. The principles of integrity, excellence and protection of the environment are the foundation of the TSI mission.

The TSI advantage is its broad base of technical resources as well as a dedicated team of remediation professionals. An additional strength for the company is that TSI scientists pioneered the development of in-situ bioremediation technologies 20 years ago. Applied at numerous sites primarily for hydrocarbon cleanup, bioremediation technology is being used today to attack more complex compounds.

TSI combines priorities for cost, safety, and timely compliance issues with the technical expertise of an experienced team of remediation specialists.

For more information, please review the following:

IN-SITU AND EX-SITU BIOREMEDIATION CASE HISTORIES

Terra Systems, Inc. and its predecessor company, Biosystems, Inc., has practical experience in designing, implementing, operating and maintaining in-situ and ex-situ bioremediation systems across the United States.

Our outstanding team of scientists and technicians includes a senior environmental scientist (V.W. Jamison) who is one of the acknowledged pioneers in this field having been actively involved since 1971. The following selected project summaries are representative of our experience in the field of bioremediation. R.L. Raymond, Sr. and V.W. Jamison were granted a patent for their process. (U.S. Patent No. 3,846,290 Nov. 5, 1974)

Project 3 is in the final monitoring stage for closure. Project 4 was one of the first bioremediation projects successfully closed in California. Projects 5, 6, and 7 are examples of ex-situ bioremediation. Projects 8 to 11 are examples of accelerated anaerobic bioremediation projects for clean-up of chlorinated solvent-contaminated groundwater.

Project 1

LOCATION: Ambler, PA

PROJECT DATE: July, 1972 to January, 1974

CLIENT: Sun Oil Company

BACKGROUND: A pipeline break spilled an estimated 3,186 barrels of high octane gasoline into an aquifer composed of a highly fractured dolomite. The gasoline was

contained by pumping nearby wells. Physical recovery of the gasoline continued until no longer productive an estimated 1,000 barrels (42,000 gallons) remained.

ACTION TAKEN: The gasoline-utilizing microbial population was stimulated by the addition of nitrogen, phosphorus, and dissolved oxygen. Dissolved oxygen was supplied by sparging air into wells with diffusers connected to paint sprayer-type compressors. Ground water flow was controlled by a series of injection and withdrawal wells.

EFFECTIVENESS: Estimates based on the amount of nitrogen and phosphate retained in the aquifer suggested that from 744 to 944 barrels of gasoline were degraded. The amount of free gasoline in the wells declined as the nutrient addition program continued. The levels of gasoline in the produced water were not reduced during the period of nutrient addition, but no gasoline was found in the produced water ten months later. Bacterial levels increased greatly in the ground water. The biostimulation programs met its objective of removing the hydrocarbons from the ground water to the satisfaction of the governmental agency overseeing the project.

The desirable remedial alternative identified in the RI/FS is selected in consultation with our client. Detailed remedial design is then conducted by our remedial design team under the supervision of one of our senior engineers.

Some of the remedial alternatives considered are:

Evaluation of Natural Attenuation through the use of health risk assessment and/or evaluation of contaminant mobility, fate, and transport.

Remedial Design of soil and groundwater remediation systems.

In-Situ Soil and Groundwater Remediation including soil vapor extraction, two-phase vacuum extraction, bioventing, and in situ aerobic and anaerobic bioremediation.

On-Site Soil Treatment including aeration, bioremediation, and low temperature thermal desorption.

Off-Site Soil Treatment/Disposal including incineration, landfilling, and recycling.

Treatment of Vapor Effluent and Waste Water by the use of air stripping, carbon absorption, catalytic incineration, thermal incineration, and bioreactors.