

Hazardous Waste

ENVIRONMENTAL FIRM SEEKS GOLD FROM IRON WALLS SUNK DEEP

A SMALL ATLANTA-BASED FIRM WITH roots in petroleum exploration says preliminary results at 13 sites installed since 1999 suggest that its iron permeable reactive barriers effectively remediate groundwater contamination for as little as one-tenth the cost of a conventional pump and treat approach.

By achieving depths of 170 ft, GeoSierra LLC's IPRB technology adds a new dimension to an existing cleanup technique with limited application. Researchers at Ontario's Waterloo University found that iron filings placed near toxic plumes can transform contaminants into benign constituents as the plume comes in contact with the iron (ENR 8/15/1994 p. 34). But placing barrier walls with cut-and-cover trenches has limited the technique to shallow aquifer contamination at depths of 50 ft or less.

While developing horizontal drilling techniques for the petroleum industry in the 1980s, Grant Hocking, GeoSierra's Australian-born founder and president, by accident developed a method of inducing vertical fractures in sandy soils. "Imagine putting your hands together beneath the surface in a wet sandbox. When you pull your hands apart slightly, you form an artificial vertical fracture. That's what we do," he says.

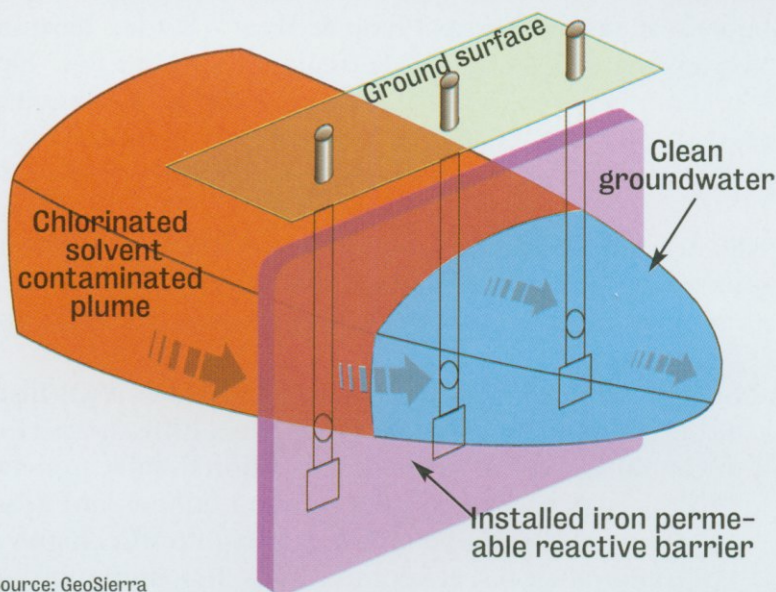
A conventional well-drilling rig bores a string of shafts, up to 9.5 in. in dia on five- to 15-ft centers, perpendicular to the plume's leading edge. Using a proprietary technique, the special shaft casings are expanded sequentially, inducing a fracture. Zero-valent iron is injected in an enzyme-based gel solution, which breaks down within an hour or two, leaving a permeable iron barrier.

At a Superfund site in Oakley, Calif., E.I. DuPont de Nemours & Co. had been spending \$1 million a year on operation and maintenance to pump and treat three contaminant plumes left by a plant that produced freon and gasoline lead additives. "It wasn't working," says Jim Vidumsky, an environmental engineer in DuPont's Wilmington headquarters. "We'd been doing it since 1989, with no discernable improvement. We'd have to pump six times as much water to make any improvement."

The company believed that an iron permeable reactive barrier was the way to go and GeoSierra offered a solution



EASY DOES IT Conventional well-drilling rig sinks casing shafts for iron wall.



Source: GeoSierra

LEADING EDGE Iron wall breaks down contaminants as plume passes.

that could reach the plume's 120-ft depth. In 2000, GeoSierra placed a test wall 6 in. thick, 60 to 120 ft below the ground surface and 110 ft across the face. The company will meet next summer with California regulators to review results and decide whether to proceed with a full-scale wall 500 ft across the face.

"We're interested in seeing how good a job it does knocking down carbon tetrachloride, freon and some of the other contaminants," says Norm Shopay,

project manager for the California Dept. of Toxic Substances, the oversight agency at Oakley.

Hocking is confident. "We know it works and nobody else can go as deep. We can get down to 300 ft if need be." Installation costs are "roughly about \$1 million per 100 ft," he says. "But after that, it's just monitoring. That's where you really beat the cost of pump and treat." □

By Andrew G. Wright