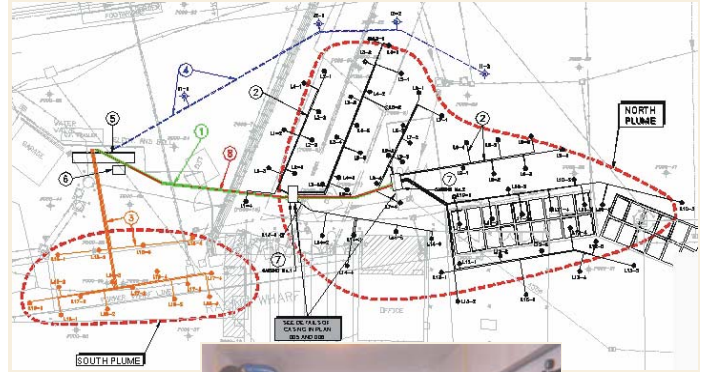


PROJECT DESCRIPTION

<input checked="" type="checkbox"/> Characterization	<input checked="" type="checkbox"/> Restoration	<input checked="" type="checkbox"/> Hydrogeology	<input checked="" type="checkbox"/> Modeling	<input type="checkbox"/> Risk Analysis
<input type="checkbox"/> Drinking Water Treatment	<input checked="" type="checkbox"/> Research and Development			

VACUUM EXTRACTION OF LNAPL

Parameters of Concern	Petroleum hydrocarbons, BTEX, Creosote
Project Duration	6 years, current
Performance :	Recovery of LNAPL and significant reduction of impacted plumes
Cost:	1 500 000 \$
Client :	Port site



Issue

A Phase III environmental and hydrogeologic characterization study and complementary studies performed between 1999 and 2001 at a port site revealed the presence of two free phase hydrocarbon (LNAPL) plumes, containing five different products (gasoline, diesel, lubricating oil, motor oil and altered creosote). The total volume of LNAPL was estimated at 200,000 liters. The LNAPL plumes are located underneath an industrial site, the container handling activities of which can not be disturbed.

Work Performed

Enhanced vacuum extraction was selected as the most appropriate technology for the site conditions. A pilot study confirmed the efficiency of the technology and allowed determination of parameters for the system design at the field scale. The system was installed in 2002 and included 76 vacuum-enhanced pumping wells, 4 water injection wells, over 1,000 meters of underground lines, 2 underground utility control substations and one vacuum-enhanced recovery unit, in which LNAPL is separated from water and gas phase, and securely stored in a tank. The LNAPL recovered is periodically disposed off-site. The gas phase is treated through activated carbon vessel before being rejected to the atmosphere after verifying compliance to applicable regulation. The system, which is automated and remote-controlled, is operating on a semi-annual basis.

The recovery dynamics was modeled as part of a research and development project to simulate a variety of operating scenarios and optimize the system parameters in the actual site conditions.

Results

The system operates since fall 2002, with a total volume of LNAPL of 47,000 liters recovered in 15 months. The system is more efficient than what was predicted during the design. In addition, the periodic monitoring of the free phase thicknesses indicates a significant reduction of plume extent. The results of the mathematical modeling will soon be completed and model application to the actual conditions be tested during 2005.