Highlands Acid Pits
Highlands, Texas
Region 6
TXD980514996

Site Exposure Potential

The Highlands Acid Pits site is 2 km west of Highlands, Texas, and 13 km southeast of the San Jacinto Dam at the south end of Lake Houston (Figure 1). During the early 1950s, the site was used for the disposal of an unknown quantity of industrial waste sludge, believed to be spent sulfuric acid from oil refinery processes. Such waste materials are characterized by low pH values and elevated concentrations of heavy metals and organic compounds, principally benzene, toluene, xylene, and methylene chloride. The site investigation showed extensive contamination across broad areas of the site with very limited off-site impacts. The site extends over 0.6 hectares and includes an estimated 10,700 m^3 of wastes and contaminated sands above the water table. The shallow groundwater is also contaminated: based on a surface area covering the entire site and total saturated thickness of six meters, a total of 18 million liters of contaminated groundwater underlie the site (EPA 1987).

The site is situated on a 2.4-hectare peninsula extending into Clear Lake, an embayment of the San Jacinto River (EPA 1987). To the north, the site is bordered by the San Jacinto River, to the west by a part of Grennel Slough, to the south by Clear Lake, and to the east by sand pits. The site is less than 30 meters from Clear Lake, less than 7 meters from the San Jacinto River, and within the 10-year floodplain of the river. The site is 1.5 to 3 meters above mean sea level, although nearly 1.5 meters of subsidence has been recorded in the general area between 1890 and 1973 (0.73 meters since 1964). The site was flooded in 1961 by Hurricane Carla. The San Jacinto River flows 19 km before it enters Galveston Bay, on the Gulf of Mexico.

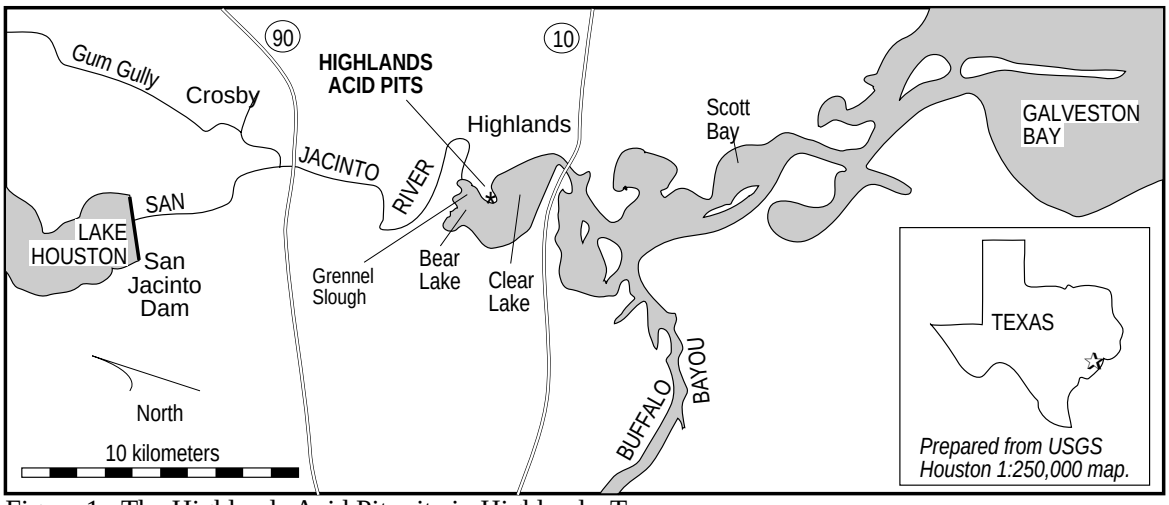

Figure 1. The Highlands Acid Pits site in Highlands, Texas.

The site has been divided into the Source Operable Unit and the Groundwater Operable Unit. The 1984 Record of Decision calls for excavation and off-site transport of contaminated materials above the groundwater table in the area of the main pits and backfilling with clean material for the Source Operable Unit (EPA 1984). The 1987 Record of Decision states that, upon completion of the source removal action, a long-term

monitoring program will be implemented for the upper and middle sand aquifers and for surrounding surface water bodies (EPA 1987).

Groundwater in the upper sand aquifer flows radially from the site and discharges to Grennel Slough, Clear Lake, and the sand pits. Surface water runoff conforms to the site topography and drains into Grennel Slough, Clear Lake, and the sand pits. About 14.2 metric tons of sediment per year is eroded from the bare portion of the waste area by surface water runoff. The sediment collects in a swamp near the north shore of Clear Lake.

Possible contaminant migration pathways to NOAA trust resources are groundwater discharge, surface water runoff, and sediment erosion to the San Jacinto River (EPA 1987).

Site-Related Contamination

The contaminants of concern to NOAA include the trace metals arsenic, cadmium, chromium, and lead, and VOCs. Trace metals were measured in on-site groundwater in concentrations exceeding AWQC for the protection of saltwater aquatic life (Table 1) (EPA 1986, 1987). In addition, benzene was observed in groundwater at concentrations exceeding LOEL. Contaminants in groundwater were found to be highest in the well on the eastern side of the site toward Grennel Slough. Information on the groundwater contamination pattern across the site was not provided in the documents reviewed. Concentrations of cadmium measured in the on-site soil and waste mixture exceeded that observed in natural soils.

Table 1. Maximum concentrations of contaminants at the Highlands Acid Pits site (EPA 1983); range in natural soil (EPA 1987); AWQC for the protection of saltwater aquatic life (EPA 1986); concentrations for water in μg/l and for soil in mg/kg.

		Range of Content		AWQC	
Contaminant	Soil/Waste	in Natural Soil	Groundwater	Acute	Chronic
ORGANIC COMPOUNDS					
Volatiles					
benzene	822	N/A	210,000	5,100*	700*
toluene	21.2	N/A	202	6,500*	5,000*
xylene	23.6	N/A	417,000	N/D	N/D
pyrene	13	N/A	3,200	N/D	N/D
INORGANIC SUBSTANCES					
Trace Metals					
arsenic	12	1-50	1,200	69	36
cadmium	2.9	0.01-0.7	19	43	9.3
chromium	44	1-1,000	2,699	1,100	50
lead	185	2-200	820	140	5.6
* LOEL	N/A: Not available		N/D: Criteria not developed		

With the exception of chromium, no contamination was detected in the San Jacinto River, Grennel Slough, Clear Lake, or the sand pits. Total chromium was detected at 5 μg/l in Grennel Slough, an order of magnitude less than AWQC (Espey, Huston & Assoc. 1986). Sediments sampled at the same locations as the surface waters were reported to have levels not much greater than background concentrations, although no data were presented in the reports reviewed.

NOAA Trust Habitats and Species in Site Vicinity

The San Jacinto River is a continuously flowing, low-gradient river system. The San Jacinto Dam, 17 km above the site, releases only limited freshwater and, as a result, the San Jacinto River is tidal and brackish up to the base of the dam (Guillen 1988). The stretch of river at the site is a drowned river valley with wetlands, submerged trees, sand banks, and channels. The river ranges from 100 to 400 meters wide at the site and is a maximum of two meters deep, with a sandy silt substrate and good water quality.

NOAA trust resources use the aquatic habitats near the site (Table 2) (USFWS 1982). A reported fish kill in Clear Lake adjacent to the site was possibly associated with contaminants released from the Highlands Acid Pits (time of fish kill undocumented). However, an investigation of the benthic community near the site found no adverse effect to the community (EPA 1984).

Table 2. NOAA trust resource use of Clear Lake and the San Jacinto River (USFWS 1982).

Species	Spawning Area	Nursery Area	Adult Area	Recreational Fishery
INVERTEBRATES				
blue crab		X		X
brown shrimp		X		
white shrimp		X		
FISH				
Atlantic croaker		X		X
black drum		X		X
gar	X	X		
killifish	X	X	X	
mullet		X		X
red drum		X		
sand seatrout		X		X
sheepshead		X		X
southern flounder		X		
silverside		X	X	
spotted seatrout		X		X

Response Category: Federal Fund Lead

Current Stage of Site Action: Operation and Maintenance (O/P)

EPA Site Manager

Deborah Couchman-Griswold	214-655-6715

NOAA Coastal Resource Coordinator

Sharon Christopherson	206-526-6317

References

EPA. 1983. Hazardous Waste Land Treatment. Washington, D.C.: Office of Water Regulations and Standards, Criteria and Standards Division. SW-874.

EPA. 1984. Record of Decision, Highland Acid Pits, Harris County, Texas. Dallas: U.S. Environmental Protection Agency, Region 6.

EPA. 1986. Quality Criteria for Water. Washington, D.C.: Office of Water Regulations and Standards, Criteria and Standards Division. EPA 440/5-86-001.

EPA. 1987. Abbreviated Record of Decision, Highlands Acid Pits, Groundwater Operable Unit. Dallas: U.S. Environmental Protection Agency, Region 6.

Espey, Huston & Associates, Inc. 1986. Highlands Acid Pits Site-Post Closure Monitoring & Maintenance Plan. Austin, Texas: Texas Water Commission.

Guillen, G., Texas Water Commission, Deer Park, Texas, personal communication, December 16, 1988.

USFWS. 1982. Gulf coast ecological inventory: Houston, Texas. Washington, D.C.: U.S. Fish and Wildlife Service. 1:250,000-scale map.