Crystal Chemical Company
Houston, Texas
Region 6
TXD990707010

Site Exposure Potential

The Crystal Chemical Company site occupies two hectares of relatively flat land in a metropolitan area of Houston, Texas (Figure 1). The company manufactured herbicides from 1968 to 1981, with the majority being arsenic-based, mono- and disodium methoanearsenic acid (MSMA and DSMA) and cacodylic acid (CAOC). During the 1970s, floodwaters transported both arsenic and phenols off-site, violating Texas Department of Water Resources standards. In 1981, Crystal Chemical Company declared bankruptcy and abandoned the site, leaving 375 m^3 of arsenic trioxide in storage tanks and 2,271 m^3 of process wastewater in the treatment ponds. EPA's site cleanup included the removal of the liquid wastes from the ponds; the removal of the top 30 cm of soil, which was treated and placed in the wastewater ponds; and the placement of a polyethylene cover over the pond with 15 to 30 cm of clay. The buildings and equipment were then decontaminated (ATSDR 1988) and the buildings subsequently removed from the site.

Site facilities included six buildings and four wastewater ponds. Dikes along the site perimeter contain production wastewater and surface water runoff to the Harris County Flood Control Channel, which flows south along the western side of the facility. Soils on the site are clayey and are generally poorly drained; subsurface soil is mainly sandy. Groundwater is shallow. The surrounding land is zoned industrial and/or commercial.

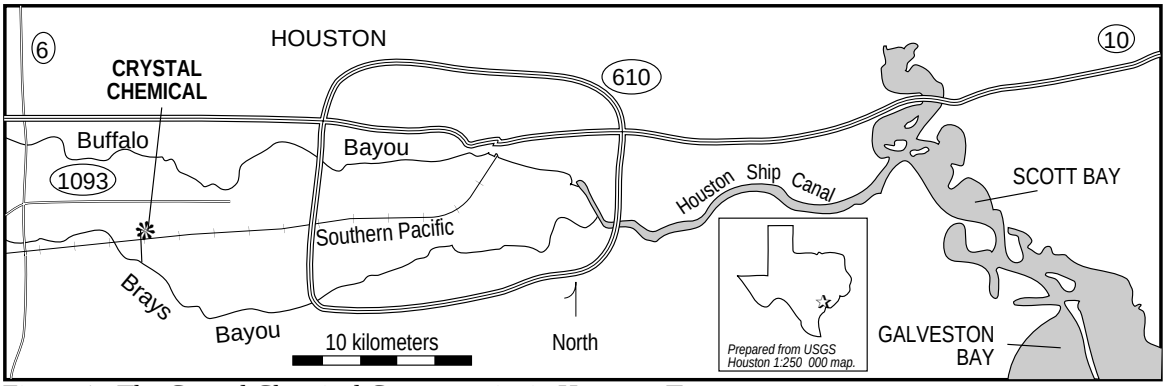

Figure 1. The Crystal Chemical Company site in Houston, Texas.

The major surface waters of interest include the Harris Flood Control Channel, which discharges into Brays Bayou 1.6 km from the site. Brays Bayou flows eastward for 31 km, at which point it merges with Buffalo Bayou, also known as the Houston Ship Canal. Buffalo Bayou flows for 20 km before discharging into Scott Bay, an embayment of Galveston Bay (D'Appolonia 1983).

Contaminant migration pathways to NOAA trust resources are groundwater discharge and surface water runoff to the Harris County Flood Control Channel and Brays Bayou.

Site-Related Contamination

Arsenic is the contaminant of concern (Table 1). While phenolics have been detected, concentration levels are relatively low. In contrast, arsenic levels (organic and inorganic) are high in both sediment/soil and water. High levels of arsenic (1,340 mg/kg) were detected in Harris County Flood Control Channel sediments adjacent to the site. High levels of arsenic were also found in stormwater (3,740,000 μg/l), flood control channel surface water (510 μg/l), and on-site groundwater (917,000 μg/l). Dissolved arsenic concentrations (up to 270 μg/l) exceeding AWQC have been detected at a U.S. Geological Survey gauging station on Brays Bayou 7 km below the site (Ferguson 1989).

Table 1. Maximum levels of selected contaminants at the Crystal Chemical Company site (Life Systems 1988); AWQC for the protection of saltwater aquatic life (EPA 1986); concentrations for sediment and soil in mg/kg and for water in μg/l.

		Off-Site	On-Site	Storm	Harris Channel	Shallow	AWQC	
Chemicals	Sediment	Soils	Soils	Water	Water	Groundwater	Acute	Chronic
arsenic	1,340	1,570	27,310	3,740,000	510	917,000	69	36
phenolics	<2.6	110	142	300	90	600	5800†	N/D

† LOEL (phenol)

NOAA Trust Habitats and Species in Site Vicinity

Scott Bay is a low-salinity, estuarine habitat physically connected with the much larger Galveston Bay (Table 2). There is little available data on Brays Bayou, so it is difficult to assess its relative importance to NOAA trust resources. Habitats with resources of concern to NOAA include Buffalo Bayou and Scott Bay. Buffalo Bayou is a major waterway in southeast Texas and, due to its physical connection with Scott Bay, is tidally influenced in

Table 2. NOAA trust resource use of Buffalo Bayou and Scott Bay (USFWS 1982).

Species	Lower Buffalo Bayou*	Scott Bay*
INVERTEBRATES		
blue crab	N	N
brackish water clam		
brown shrimp	N	N
eastern oyster		
white shrimp	N	N
FISH		
Atlantic croaker		
black drum		N
gulf kingfish		
menhaden	C	C
red drum	R	R
sand seatrout		
sea catfish		
sheepshead		N
southern flounder		N

N: nursery C: commercial fishery R: recreational fishery M: migratory route
* low salinity estuarine habitat (0.5 - 5.0 ppt)

its lower reach. The reach of Buffalo Bayou above its confluence with Brays Bayou is considered poor habitat quality with no coastal resources of concern to NOAA. The reach of Buffalo Bayou from its confluence with Brays Bayou downriver is classified as an industrial/shipping waterway, is dredged to 12 meters, and is 30 to 60 meters wide. Habitat quality generally improves toward Scott Bay, where is an increased presence of shrimp, crab, and fish (Guillen 1989).

Response Category: Federal Enforcement

Current Stage of Site Action: RI/FS Workplan

EPA Site Manager

Lou Barinka	214-655-6735

NOAA Coastal Resource Coordinator

Sharon Christopherson	206-526-6317

References

ATSDR. 1988. Health Assessment for Crystal Chemical Company Site. Houston, TX. Atlanta: Agency for Toxic Substances and Disease Registry, U.S. Public Health Service.

D'Appolonia. 1983. Site investigation report. Crystal Chemical Company. Houston, TX. Volume I. Dallas: U.S. Environmental Protection Agency, Region 6.

Ferguson, U.S. Geological Survey, Houston, Texas, personal communication, February 23, 1989.

Guillen, G., Supervisor, Biology Section, Texas Water Commission, Houston, personal communication, December 1988.

Life Systems. 1988. Endangerment/Risk Assessment for the Crystal Chemical Site. ICAIR, Life Systems, Inc. Dallas: Jacobs Engineering Group Inc.

USFWS. 1982. Gulf coast ecological inventory: Houston, TX. Washington, D.C.: U.S. Fish and Wildlife Service. No. 29094-A1-EI-250.