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Koppers Company, Inc., Charleston Plant

Charleston, South Carolina

CERCLIS #SCD980310239

Site Exposure Potential

The Koppers Company, Inc., Charleston Plant is located in the Charleston Heights district of Charleston, South Carolina. The southern part of the site is built on part of an estuarine emergent wetland that extends south of the site (Figure 1). The site is bordered to the west by the Ashley River, to the east by Interstate Highway 26, to the north by private industrial facilities, and to the south by the wetland. The site is 8 km upriver of Charleston Harbor, which opens into the Atlantic Ocean about 14 km downstream of the site (NUS 1986).

From 1925 to 1975, the Koppers Company Forest Product Facility conducted milling, wood preserving, and wood pole storage operations at the site. The wood preservative process generated oily sludge, fungicide, and trace element wastes that were disposed in on-site landfills. In 1975, the site was sold to Braswell Shipyard Company, who leased portions of the property to Pepper Industries Inc. and Federal Services Industries of Waldorf, Maryland. Pepper Industries Inc. transported and stored hazardous wastes at the site until 1983, when the corporation abandoned the property, leaving behind 980,000 l of hazardous wastes in seven storage vessels. Federal Services

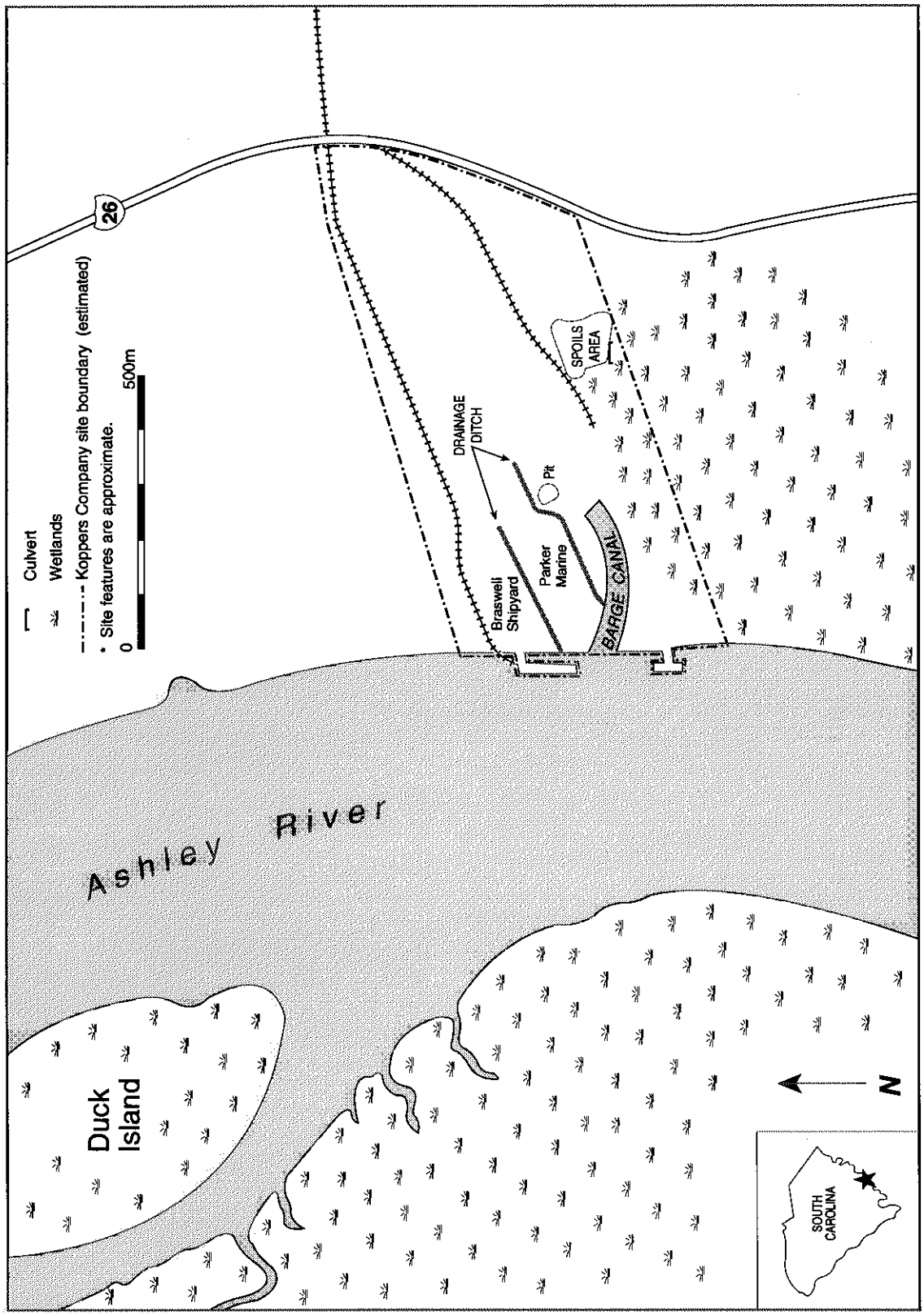

Figure 1. The Koppers Company site in Charleston, South Carolina (U.S.G.S. 1979; NUS 1991).

Industries used their portion of the property to store oily wastes in tanks. A South Carolina Department of Health and Environmental Control site inspection conducted at an unknown date during the early 1980s discovered a hole in the containment wall surrounding the tanks; oily wastes had saturated the soil and pooled in several areas. Cleanup of the Federal Services Industries property began in May 1985 with unknown results (NUS 1986). Southern Dredging Company and Parker Marine are believed to be the current tenants of the site (NUS 1991).

Three major contaminated areas have been identified based on sampling and aerial photographs. The area east of the Southern Dredging office probably served as an unlined pit for dipping poles in wood preservative (pit in Figure 1). The region now occupied by Parker Marine was likely a drip pad and storage area for poles after treatment with preservatives. The third region is the spoils area where sediments from dredging of the Barge Canal are impounded (Figure 1; NUS 1991).

The site is located on a relatively flat, brackish, tidal marsh area with a change in elevation of 3 m (NUS 1986). Surface water runoff is the major migration pathway for contaminants. Surface water runoff flows to storm water drainage ditches on the site, which lead to a canal directly connected to the Ashley River (NUS 1986). There have been no known direct discharges of wastes to the Ashley River. A 120-cm diameter culvert diverts excess runoff from the sediment impoundment area to the wetland south of the site. Dark stains were observed on the soil outside the bermed area (NUS 1988).

Groundwater is a potential pathway for migration of contaminants to trust habitats, but this has not been confirmed. Shallow groundwater of unknown depth at the site is likely to flow west, potentially discharging to the Ashley River at the western boundary of the site. This shallow aquifer may be tidally influenced. There are four formations below the shallow groundwater aquifer. The Black Mingo Formation, at 82 m to 365 m below ground surface, is composed of alternating sandstone, limestone, and clay that contains potable water. The gradient is to the southeast with unknown discharge points. Removal of groundwater by industries has resulted in a zone of depression and subsequent saltwater intrusion. Below the Black Mingo Formation, the Peedee Formation, Black Creek Formation, and Middendorf Formation contain potable water that is not used as drinking water in the study area (NUS 1988).

NOAA Trust Habitats and Species

Habitats of primary concern to NOAA are Ashley River surface water, bottom substrate, and wetlands. Habitats of secondary concern are the surface water and substrate of Charleston Harbor.

Salinities in the river near the site range from 17 to 22 ppt and fluctuate throughout the year depending on rainfall, saltwater intrusion, and urban runoff. Ashley River substrate is primarily mud and sand (Van Dolah personal communication 1992).

The lower Ashley River supports diverse, abundant populations of NOAA trust resources that are likely to migrate close to the site where sensitive early life stages may reside for extended periods. There are estuarine emergent wetlands contiguous to the southern perimeter of the site and the opposite bank of the Ashley River. This wetland provides nursery and adult habitat for numerous fish and invertebrate species (Table 1; NOAA 1991; Van Dolah personal communication 1992). The dominant vegetation includes smooth cordgrasses (*Spartina alterniflora*) and rushes (*Juncus spp.*; Van Dolah personal communication 1992).

Trust resources in significant numbers near the site include spot, Atlantic croaker, spotted sea trout, red drum, American oyster, and blue crab. Spot and Atlantic croaker are commonly present in the area from early spring to early winter and occur in greatest numbers during the spring and summer. Spotted sea trout are present year-round and may spawn near the site from April to October. Red drum commonly use the river from late August to late October. Bay anchovy spawn in the river, and American oyster are abundant in both the Ashley River and Charleston Harbor. Blue crab use the Ashley River and the wetlands near the site for mating. There are catadromous American eel throughout the area (NOAA 1991; Van Dolah personal communication 1992).

The endangered anadromous shortnose sturgeon may migrate into Charleston Harbor and the Ashley River. Details about resource use of the area by this species were unavailable (Van Dolah personal communication 1992).

Blue crab is the only commercial fishery in the area. Charleston Harbor and the Ashley River provide significant nursery and adult forage habitat for penaid shrimp, which represent a significant offshore commercial fishery. Popular sport fisheries near the site include striped bass, spot, Atlantic croaker, flounder, spotted sea trout, and blue crab. There are no restrictions on fisheries other than general regulations on take limit and minimum sizes (Van Dolah personal communication 1992). However, shellfishing is closed in the Ashley River due to excessive levels of fecal coliform.

Site-Related Contamination

Data collected during site screening activities indicated that on-site soil, surface water, and sediments contain elevated concentrations of contaminants of concern to NOAA (NUS 1986). The primary contaminants of concern are trace elements, PAHs, and PCBs. The maximum concentrations of trace elements and PAHs

Table 1. NOAA fish and invertebrate species commonly found in Charleston Harbor and the Ashley River, Charleston, South Carolina.

Species		Habitat			Fisheries	
Common Name	Scientific Name	Spawning Ground	Nursery Ground	Adult Forage	Comm.	Recr.
ANADROMOUS/CATADROMOUS SPECIES						
Shortnose sturgeon [1]	*Acipenser brevirostrum*					
Atlantic sturgeon	*Acipenser oxyrhynchus*			♦		
Blueback herring	*Alosa aestivalis*			♦		
American shad	*Alosa sapidissima*			♦		
American eel	*Anguilla rostrata*		♦	♦		
Striped bass	*Morone saxatilis*		♦	♦		♦
ESTUARINE SPECIES						
Bay anchovy	*Anchoa mitchilli*	♦	♦	♦		
Sheepshead	*Archosargus probatocephalus*		♦	♦		
Atlantic menhaden	*Brevoortia tyrannus*		♦	♦		♦
Atlantic spadefish	*Chaetodipterus faber*		♦	♦		
Spotted sea trout	*Cynoscion nebulosus*	♦	♦	♦		♦
Sheepshead minnow	*Cyprinodon variegatus*	♦	♦	♦		
Mummichog	*Fundulus heteroclitus*	♦	♦	♦		
Spot	*Leiostomus xanthurus*		♦	♦		♦
Atlantic silverside	*Menidia menidia*		♦	♦		
Southern kingfish	*Menticirrhus americanus*		♦	♦		
Atlantic croaker	*Micropogon undulatus*		♦	♦		♦
Striped mullet	*Mugil cephalus*		♦	♦		
Summer flounder	*Paralichthys dentatus*		♦	♦		♦
Southern flounder	*Paralichthys lethostigma*		♦	♦		♦
Black drum	*Pogonias cromis*		♦	♦		
Bluefish	*Pomatomus saltatrix*		♦			♦
King mackerel	*Scomberomorus cavalla*		♦	♦		
Spanish mackerel	*Scomberomorus maculatus*		♦	♦		
Red drum	*Sciaenops ocellatus*		♦	♦		♦
INVERTEBRATE SPECIES						
Blue crab	*Callinectes sapidus*	♦	♦	♦	♦	♦
American oyster	*Crassostrea virginica*	♦	♦	♦		
Hardshell clam	*Mercenaria mercenaria*	♦	♦	♦		
Grass shrimp	*Palaemontes pugio*	♦	♦	♦		
Brown shrimp	*Penaeus aztecus*		♦	♦		
Pink shrimp	*Penaeus duorarum*		♦	♦		
White shrimp	*Penaeus setiferus*		♦	♦		
Common rangia	*Rangia cuneata*	♦	♦	♦		

1. This species is federally endangered.

detected in soils, surface water, and sediments along with their respective screening guidelines are presented in Tables 2 and 3 (Lindsay 1979; U.S. EPA 1986; Long and Morgan 1990). No groundwater samples were collected at the site.

Trace elements were detected in soil, surface water, and sediment samples. The soil samples were collected from the former wood preservative pit, the south bank of the canal near its confluence with the Ashley River, and the dredging spoils area. Trace elements detected in these

samples included arsenic, chromium, copper, and lead at concentrations higher than average U.S. soil concentrations for these substances. Mercury was detected in the dredging spoils and nickel and silver were measured in the canal soil sample at elevated concentrations. These trace elements, in addition to zinc, were also detected in the surface water and sediment samples collected from the drainage ditch at its confluence with the canal at concentrations exceeding screening guidelines. High concentrations of several of these trace elements were also measured in surface water collected from the canal, sediment from the adjacent wetland, and surface water and sediment samples from the Ashley River. The concentrations of trace elements measured in the sediment sample from the Ashley River were generally higher than those measured in sediments from the wetland and drainage ditch. It was unclear in the available documentation whether the samples from the river were collected upstream or downstream of the site.

PAHs were detected in the soil, surface water, and sediment samples. The PAH-contaminated soil samples were collected from the northeastern bank of the canal, the former wood preservative pit, and the dredging spoils. Both sediment and surface water samples collected from the drainage ditch at its confluence with the canal had elevated concentrations of PAHs. The canal surface water samples containing detectable PAHs were collected from the northeastern portion of the canal. Sediment samples from the wetland adjacent to

Table 2. Maximum concentrations of contaminants in soil and sediment samples collected on and near the Koppers site.

	Soil (mg/kg)				Sediment (mg/kg)			
	Wood preservative pit	Dredging spoils area	Barge canal	Ave. U.S.[1]	Drainage ditch	Wetland	Ashley River	ER-L[2]
INORGANIC SUBSTANCES								
Arsenic	15	39	ND	5	7.1	44	230	33
Chromium	43	71	170	100	270	300	790	80
Copper	19	210	21	30	160	310	650	70
Cyanide	ND	ND	0.35	NA	ND	ND	1.3	NA
Lead	14	140	400	10	390	63	200	35
Mercury	ND	0.29	ND	0.03	0.44	0.28	27	0.15
Nickel	ND	ND	35	40	93	130	ND	30
Silver	ND	ND	6.5	NA	ND	ND	ND	1
Zinc	66	250	48	50	540	380	2,000	120
ORGANIC COMPOUNDS								
Total PAHs	190,000	760	180	NA	3,200	140	ND	4.0
PCB (1260)	ND	ND	ND	NA	4.0	ND	ND	0.050

1: Lindsay (1979).
2: Effects range-low; the concentration representing the lowest 10 percentile value for the data in which effects were observed or predicted in studies compiled by Long and Morgan (1990).
ND: Not detected at method detection limit.
NA: Screening level not available.

Table 3. Maximum concentrations of contaminants in surface water samples collected at and near the Koppers site.

	Drainage Ditch µg/l	Barge Canal µg/l	Ashley River µg/l	AWQC[1] µg/l
INORGANIC SUBSTANCES				
Arsenic	7	12	ND	36
Chromium	44	230	27	50
Copper	76	230	49	2.9+
Cyanide	ND	16	ND	5.2
Lead	18	16	ND	8.5
Nickel	ND	180	33	8.3
Silver	11	62	13	0.92*
Zinc	190	170	150	86
ORGANIC COMPOUNDS				
Total PAHs	74	160	ND	NA

1: Ambient water quality criteria for the protection of aquatic organisms. Marine chronic criteria presented (U.S. EPA 1986).
+: Acute criteria presented; chronic criteria not available.
*: Proposed criteria.
ND: Not detected at method detection limit.
NA: Screening level not available.

the site were also contaminated with PAHs. No PAHs were found in the Ashley River surface water or sediment samples.

Additional contaminants measured in media at and near the site at concentrations exceeding available screening guidelines were cyanide and the PCB Aroclor 1260. Cyanide was detected in soil collected from the canal bank (0.35 mg/kg), in a surface water sample (16 µg/l) collected from the northeastern portion of the canal, and in sediment (1.3 mg/kg) collected from the Ashley River. Aroclor 1260 (4 mg/kg) was detected in a sediment sample collected from the on-site drainage ditch at its confluence with the canal.

Summary

Trace elements, PAHs, and PCBs were detected above screening guidelines in soil, surface water and/or sediment on the site. Drainage ditches on the site empty either directly into the Ashley River or through the Barge Canal. The Ashley River near the site supports a variety of NOAA trust resources, including spotted sea trout, spot, Atlantic croaker, red drum, and blue crab. The extent to which contamination has migrated off-site and affected NOAA resources and habitats has not been determined.

References

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