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Chemfax, Inc.

Gulfport, Mississippi
CERCLIS #MSD008154486

Site Exposure Potential

The Chemfax, Inc. site, established in 1955, occupies approximately four hectares in a heavily industrialized area of Gulfport, Mississippi (Figure 1). About 200 m south of Bernard Bayou, the facility produces synthetic hydrocarbon resins and waxes from petroleum. The primary operation is a paraffin-blending process in which different grades of paraffin wax are melted together, blended, and subsequently cooled with non-contact cooling water.

On-site features include a processing building, warehouse; an unspecified number of deteriorating storage tanks containing recovered solvents, diesel fuel, and unspecified raw materials; a cooling pond; two holding ponds; two drainage ditches; and a former lagoon (Figure 2). Some site-derived wastes are stored at the site and include polycyclopentadiene, polyhexadiene, polystyrene, and polyvinyl toluene. A glue production facility, owned and operated by Alpine Masonite, Inc., is just to the west (NUS 1991).

Contaminants can potentially migrate off the site to NOAA trust resources and habitats via surface water runoff and groundwater. The site maintains a two-percent slope over most of the property; two drainage ditch systems direct surface water runoff from the site. One ditch system at

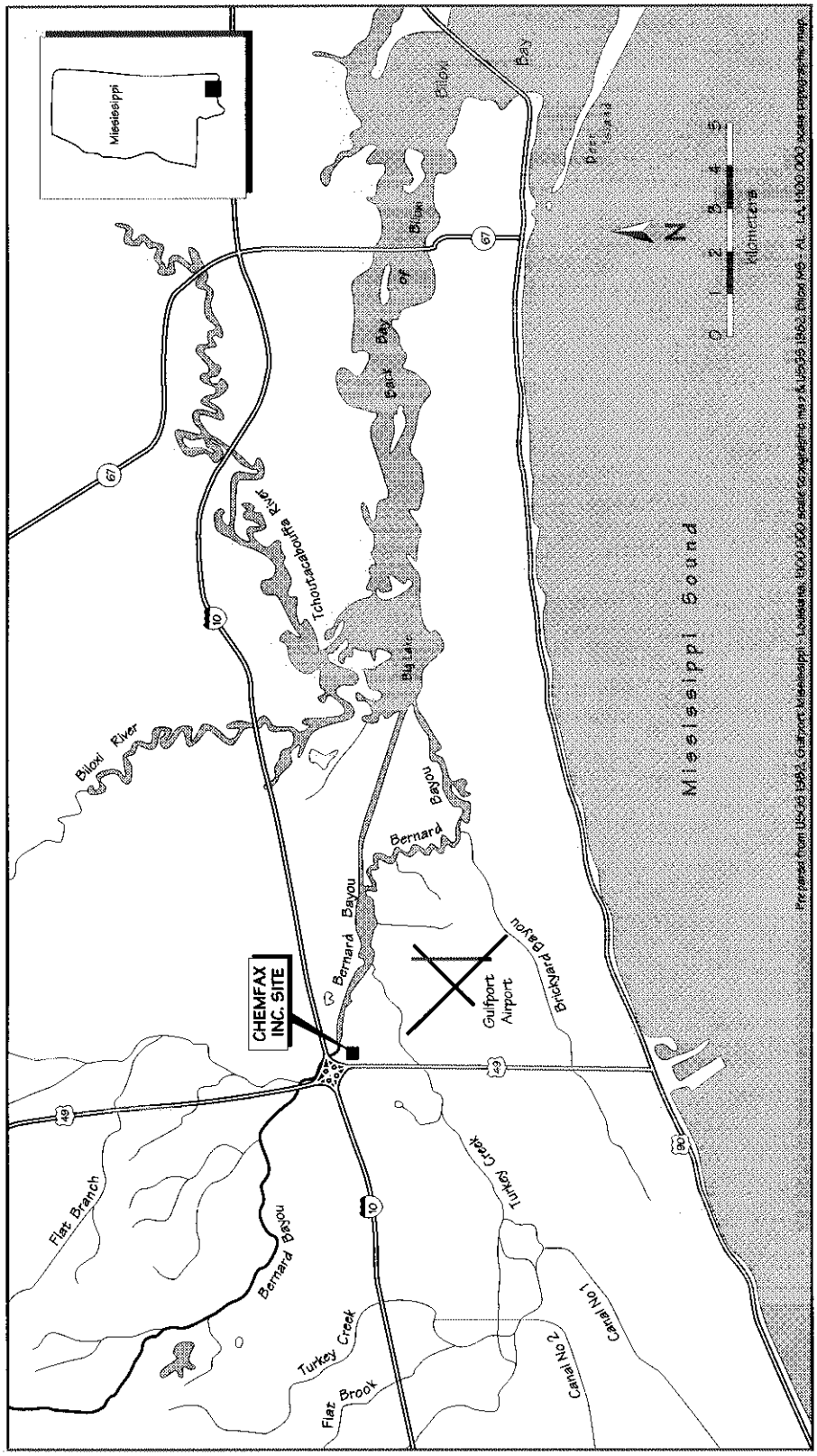

Figure 1. The Chemfax, Inc. site in Gulfport, Mississippi.

the south end of the site begins at the cooling pond and runs east, paralleling railway tracks (Figure 2). The ditch is diverted under Three Rivers Road via a culvert and then directed north parallel to the road and into Bernard Bayou about 475 m downstream from the ditch's origin. A second drainage ditch system leads from the two central site areas. The ditch is diverted under Three Rivers Road via a culvert where it joins the flow of the ditch from the southern portion of the site and discharges into Bernard Bayou approximately 350 m downstream from its origin (NUS 1991).

Chemfax, Inc. has held a NPDES permit since 1974 authorizing it to discharge non-contact waste water, steam condensate, and stormwater runoff from a retention pond at the facility into Bernard Bayou via the drainage ditch system (NUS 1991). Temperature, BOD, TSS, COD, and oil and grease levels are regulated in the discharge. When the NPDES permit was renewed in 1979, phenol was added to the list of substances regulated. Violations of phenol levels were documented in August and November 1980, and in April 1984 (U.S. EPA 1994).

Numerous aquifers have been described near the site. The upper aquifer, the Citronelle Formation, is composed of quartz sand, chert gravel and lenses, and layers of clay. The Citronelle Formation serves as the surficial aquifer in the Gulfport area. Water levels are generally encountered at less than 3 m below ground surface. The saturated thickness of the Citronelle aquifer ranges from 6 to 31 m. The Graham Ferry Formation and Miocene Aquifer System (30 m below ground surface and deeper) underlie the Citronelle Formation and contain one of the most highly productive aquifers in the Gulfport area. Contaminants have infiltrated shallow groundwater at the site, via leaking storage tanks and on-site spills, as well as from routine discharges to the holding and cooling ponds (NUS 1991).

NOAA Trust Habitats and Species

Habitats of primary concern to NOAA are surface water, associated bottom substrates, and intertidal emergent wetlands of Bernard Bayou, Big Lake, and the Back Bay of Biloxi. Of secondary concern are surface water and substrates of Biloxi Bay. Salinities in Bernard Bayou range from 0 to 3 ppt and fluctuate throughout the year depending on rainfall, saltwater intrusion, and urban runoff. Substrate composition of Bernard Bayou, Big Lake, and the Back Bay of Biloxi is predominantly mud (Buchanan personal communication 1993; Warren personal communication 1993). From the confluence of site-related ditches with Bernard Bayou, the bayou flows east-southeast for approximately 3.5 km. At that point, surface water diverted into a canal travels about 5 km east before entering Big Lake, while the remainder of the water continues east-southeast through Bernard Bayou for about 10 km before entering

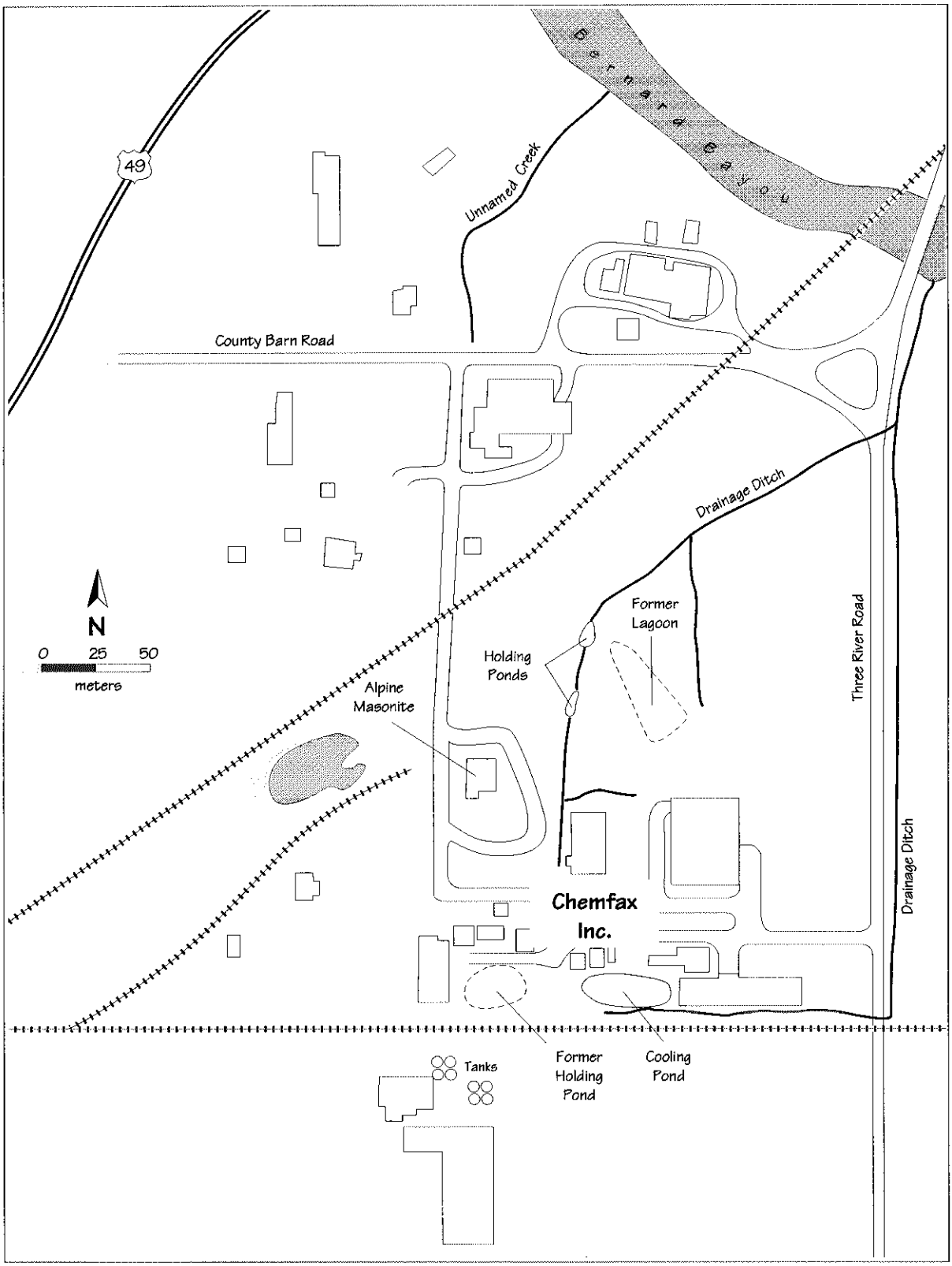

Figure 2. Detail of the Chemfax, Inc. site (NUS 1991).

Big Lake farther downstream. Big Lake surface water joins the Back Bay of Biloxi about 2.5 km farther east. Chemfax is about15 km upstream from Biloxi Bay and about 27 km upstream from the Mississippi Sound.

Bernard Bayou, Big Lake, and the Back Bay of Biloxi support diverse, abundant populations of NOAA trust resources that are likely to migrate close to the site and reside there for extended periods during sensitive life stages. Aquatic habitats, including wetlands associated with surface water near the site, provide significant nursery habitat for numerous species (Table 1; Nelson 1992; Buchanan personal communication 1993; Warren personal communication 1993). Dominant wetland vegetation in the area consists mostly of sedges (*Carex* spp., *Cyperus* spp.), black needlerush (*Juncus roemerianus*), sawgrass (*Cladium jamaicense*), tearthumb (*Polygonum* spp.), and arrowhead (*Sagittaria* spp.; Buchanan personal communication 1993).

The most abundant NOAA trust species in Bernard Bayou include brown and white shrimp, blue crab, Atlantic croaker, bay anchovy, spot, spotted seatrout, red drum, and white mullet (Nelson 1992; Warren personal communication 1992). Blue crab mate in Bernard Bayou and its surrounding wetlands. The catadromous American eel is seen throughout the area. 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 (Warren personal communication 1992).

Commercial fisheries near the site are limited to white and brown shrimp, and blue crab, which generally occur in Biloxi Bay. Popular sport fisheries in the area include Atlantic croaker, blue crab, red drum, southern flounder, spot, and spotted sea trout. There are no restrictions on these fisheries other than general regulations on take limit and minimum sizes (Warren personal communication 1992).

Site-Related Contamination

As part of a 1990 site investigation, 15 sediment samples, 14 surficial soil samples, 23 subsurface soil samples, and three surface water samples were collected. Source areas identified at the facility included a cooling pond, a former lagoon area, a former holding pond, the three drainage ditches, and eight storage tanks. All sediment, soil, and groundwater samples were analyzed under the Contract Laboratory Program and were analyzed for all parameters listed in the TCL. Only a few selected inorganic substances, two VOCs, and one unidentified compound were detected and quantified in surface water samples (NUS 1991). Detection limits were not available.

The primary contaminants of concern to NOAA are trace elements and PAHs. Other contaminants include PCBs, pesticides, and additional VOCs and SVOCs. These latter contaminants were limited in distribution and were usually not found at concentrations exceeding screening

Table 1. Important fish and invertebrate species, and habitat use for Bernard Bayou and the Back Bay of Biloxi (Nelson 1992; Warren personal communication 1992; Buchanan personal communication 1993).

Species		Habitat Use			Fisheries	
Common Name	Scientific Name	Spawning Ground	Nursery Ground	Adult Forage	Comm. Fishery	Recr. Fishery
ANADROMOUS/CATADROMOUS SPECIES						
Alabama shad	*Alosa alabamae*		♦			
American eel	*Anguilla rostrata*		♦	♦		
ESTUARINE SPECIES						
Bay anchovy	*Anchoa mitchilli*		♦			
Sheepshead	*Archosargus probatocephalus*		♦			
Hardhead catfish	*Arius felis*		♦			
Silver perch	*Bairdiella chrysoura*		♦			
Gulf menhaden	*Brevoortia patronus*		♦			
Sand seatrout	*Cynoscion arenarius*		♦			
Spotted seatrout	*Cynoscion nebulosus*		♦			♦
Sheepshead minnow	*Cyprinodon variegatus*		♦			
Gizzard shad	*Dorosoma cepedianum*		♦			
Gulf killifish	*Fundulus grandis*		♦	♦		
Longnose killifish	*Fundulus similis*		♦	♦		
Pinfish	*Lagodon rhomboides*		♦			
Spot	*Leiostomus xanthurus*		♦			♦
Atlantic silversides	*Menidia spp.*		♦			
Atlantic croaker	*Micropogonias undulatus*		♦			♦
Striped mullet	*Mugil cephalus*		♦			
White mullet	*Mugil crema*		♦	♦		♦
Southern flounder	*Paralichthys lethostigma*		♦			♦
Black drum	*Pogonias cromis*		♦			
Red drum	*Sciaenops ocellatus*		♦			♦
Hogchoker	*Trinectes maculatus*		♦	♦		
INVERTEBRATE SPECIES						
Blue crab	*Callinectes sapidus*	♦	♦	♦	♦	♦
Grass shrimp	*Palaemonetes pugio*	♦	♦	♦		
Brown shrimp	*Penaeus aztecus*		♦	♦	♦	
White shrimp	*Penaeus setiferus*		♦	♦	♦	
Common rangia	*Rangia cuneata*	♦	♦	♦		

guidelines in the sampled media. The maximum concentrations of contaminants detected in media collected from the site are presented in Table 2.

Trace elements were sporadically detected at elevated concentrations in soil, sediment, and groundwater. Concentrations of arsenic, lead, mercury, and zinc were detected at concentrations exceeding their respective average U.S. soil concentrations (Lindsay 1979). Chromium, copper, lead, and mercury were detected in groundwater samples at concentrations above their respective freshwater chronic AWQC by

Table 2. Maximum concentrations of contaminants of concern at Chemfax, Inc.

	Sediment (mg/kg)					Soils (mg/kg)		Water (µg/l)		
Contaminants	Tank Area	Cooling Pond	Drainage Ditch	Bernard Bayou [a]	ERL [b]	On-site Soils	Average US [c]	Ground-water	Surf. Water	AWQC [d]
TRACE ELEMENTS										
Arsenic	ND	ND	6.7	ND	8.2	5.9	5	39	NT	190
Cadmium	NT	NT	NT	NT	1.2	NT	0.06	NT	NT	1.1+
Chromium	35	ND	23	ND	81	21	100	210	NT	11
Copper	19	12	19	3.8	34	18	30	250	ND	12+
Lead	210	31	21	20	46.7	53	10	190	6	3.2+
Mercury	ND	0.43	ND	0.54	0.15	1.3	0.03	0.38	NT	0.012
Nickel	31	3.7	2.5	ND	20.9	7.6	40	210	NT	160+
Silver	ND	ND	ND	6.3	1.0	ND	0.05	NT	NT	0.12
Zinc	450	160	86	27	150	230	50	610	NT	110+
PAHs										
Acenaphthene [e]	ND	ND	30	ND	0.016	24	NA	190	NT	520*
Fluorene	0.4	ND	33	ND	0.019	38	NA	20	NT	NA
Phenanthrene	1.4	ND	97	0.1	0.240	180	NA	410	NT	6.3**
Anthracene	0.7	ND	18	0.05	0.0853	40	NA	38	NT	NA
Fluoranthene	0.2	ND	18	0.3	0.600	35	NA	11	NT	NA
Pyrene	1.4	ND	22	0.3	0.665	120	NA	120	NT	NA
Benzo(a)anthracene	ND	ND	4.5	0.1	0.261	55	NA	4	NT	NA
Chrysene	0.8	ND	6.4	0.2	0.384	79	NA	22	NT	NA
Benzofluoranthenes	ND	ND	1.6	0.2	NA	18	NA	NT	NT	NA
Benzo(a)pyrene	ND	ND	2.0	ND	0.430	25	NA	NT	NT	NA
Indeno(1,2,3-c,d)pyrene	ND	ND	0.1	ND	NA	0.06	NA	NT	NT	NA
Benzo(g,h,i)perylene	ND	ND	0.9	ND	NA	0.09	NA	NT	NT	NA
Naphthalene [f]	10	200	200	0.5	0.160	380	NA	10,000	NT	NA
2-Methylnaphthalene	5.8	27	120	0.07	0.070	170	NA	1,800	NT	NA
Total PAHs	17.2	230	25.8	1.8	4.0	NR	NA	NR	NT	NA

a: Actual sampling location was situated in the area where the Chemfax drainage ditch discharges to Bernard Bayou.
b: 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 (1991; for the organic compounds) and Long and MacDonald (1992; for the inorganic substances).
c: Lindsay (1979).
d: Freshwater chronic.
e: Region 4 ETAG recommends using 52 ppb for surface water screening.
f: Region 4 ETAG recommends using 62 ppb for surface water screening.
NA: Screening guidelines not available.
ND: Not detected; detection limit not available.
NT: Not tested.
NR: Not reported
\+ Hardness-dependent criteria; 100 mg/l $CaCO_3$ used.
* Insufficient Data to Develop Criteria. Value Presented is the L.O.E.L. (Lowest Observed Effect Level; USEPA 1993).
** Proposed Criterion.

factors greater than 10. Lead and zinc (collected from the tank area), and mercury and silver (collected from the drainage outlet of the on-site drainage ditch, next to Bernard Bayou) were the only trace elements detected in sediments at concentrations exceeding their respective ERL (Long and MacDonald 1992) screening guidelines (NUS 1991).

Phenanthrene, pyrene, chrysene, naphthalene, and 2-methylnaphthalene were the dominant PAHs detected in on-site soil samples. Sediment samples collected from on-site drainage ditches also contained elevated concentrations of numerous PAHs that exceeded their respective ERL screening guidelines. PAHs were detected less frequently at elevated concentrations in groundwater samples. Only chrysene, detected at a maximum concentration of 410 µg/l in groundwater, exceeded AWQC by more than a factor of 10. Neither pesticides nor PCBs were detected in groundwater samples at concentrations exceeding screening guidelines (NUS 1991).

Lead (6 µg/l) was detected in one of the three surface water samples collected from the Chemfax drainage ditch next to Bernard Bayou at a concentration slightly exceeding its ambient water quality criterion of 3.2 µg/l (NUS 1991).

Summary

Numerous hazardous wastes were disposed at the Chemfax site. The drainage ditches on the site discharge to Bernard Bayou, an important habitat to NOAA trust resources in the area. One sediment sample was collected where the combined drainage ditches discharge into Bernard Bayou. Elevated concentrations of various organic compounds and some trace elements were detected in on-site soil, groundwater, and in sediment collected from ditches leading to NOAA resources. Levels of silver, mercury, naphthalene, and 2-methylnaphthalene in sediment were above levels of concern where the ditch discharges to the Bayou. Given the duration of contaminant release, and the presence of transport pathways, site-related contaminants may be migrating downstream into NOAA habitats. To date, there has been no sampling to confirm or refute this.

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