Davis Timber Company

Hattiesburg, Mississippi

EPA Facility ID: MSD046497012

Basin: Upper Leaf

HUC: 03170004

Executive Summary

The Davis Timber Company site is in Hattiesburg, Lamar County, Mississippi. From 1972 to 1987, Davis Timber used the site for timber processing and wood preserving, including production of treated pine poles, pilings, and timber. A preserving solution containing PCP was used to treat timber. This preserving solution was occasionally spilled on the ground in the timber-treating area. Wastewater from the treatment process was stored in an on-site holding pond. Intentional and accidental releases of contaminants from the holding and cooling ponds into West and East Mineral Creeks have been documented. The primary contaminants of concern to NOAA at the site are PCP, dioxins, furans, and metals. Mineral Creek is the habitat of immediate concern to NOAA, which provides freshwater nursery and adult habitat for numerous NOAA trust resources. Surface water runoff and groundwater are the primary pathways for the migration of contaminants from the site to NOAA trust resources.

Site Background

The Davis Timber Company (Davis Timber) site is in Hattiesburg, Lamar County, Mississippi, approximately 9 km (6 mi) northwest of Hattiesburg (Figure 1). The site is approximately 12 ha (30 acres) in area and is bordered to the north by a power line, to the west by West Mineral Creek, to the south by a former railroad track that has been converted to a walking trail, and to the east by Jackson Road (USEPA 1999). The headwaters of West and East Mineral Creeks are adjacent to the site.

From 1972 to 1987, Davis Timber used the site for timber processing and wood preserving, including production of treated pine poles, pilings, and timber. As a result of state regulatory actions by the Mississippi Department of Environmental Quality (MDEQ), treatment operations were stopped in 1987. A skag mill, pole peeler, bark remover, capped holding pond, treating cylinder, cooling pond, oil separator, two above-ground-storage tanks (ASTs) for oil, two ASTs for a pentachlorophenol (PCP) preserving solution, an office, and a storage yard are still present at the site (Figure 2) (USEPA 2002a).

Operations at the site included bark removal, wood treatment, and storage of finished wood product. When unprocessed logs arrived at the site, the bark was removed using a bark remover and pole peeler. After the bark was removed, the logs were cut in half and pressure processed in a treating cylinder to force preservatives into the wood. During this process, the timber was first treated with steam to remove sap fluids and residual oils. The timber was then treated with a preservation solution containing 5 percent PCP and oil (USEPA 2002a). After treatment, excess preservation solution was removed from the treating cylinder by a vacuum, and the timber was again treated with steam. When the pressure process was complete, treated timber was moved to the open yard for drying and storage. A skag mill was also operated at the facility to salvage timber unsuitable for poles or pilings.

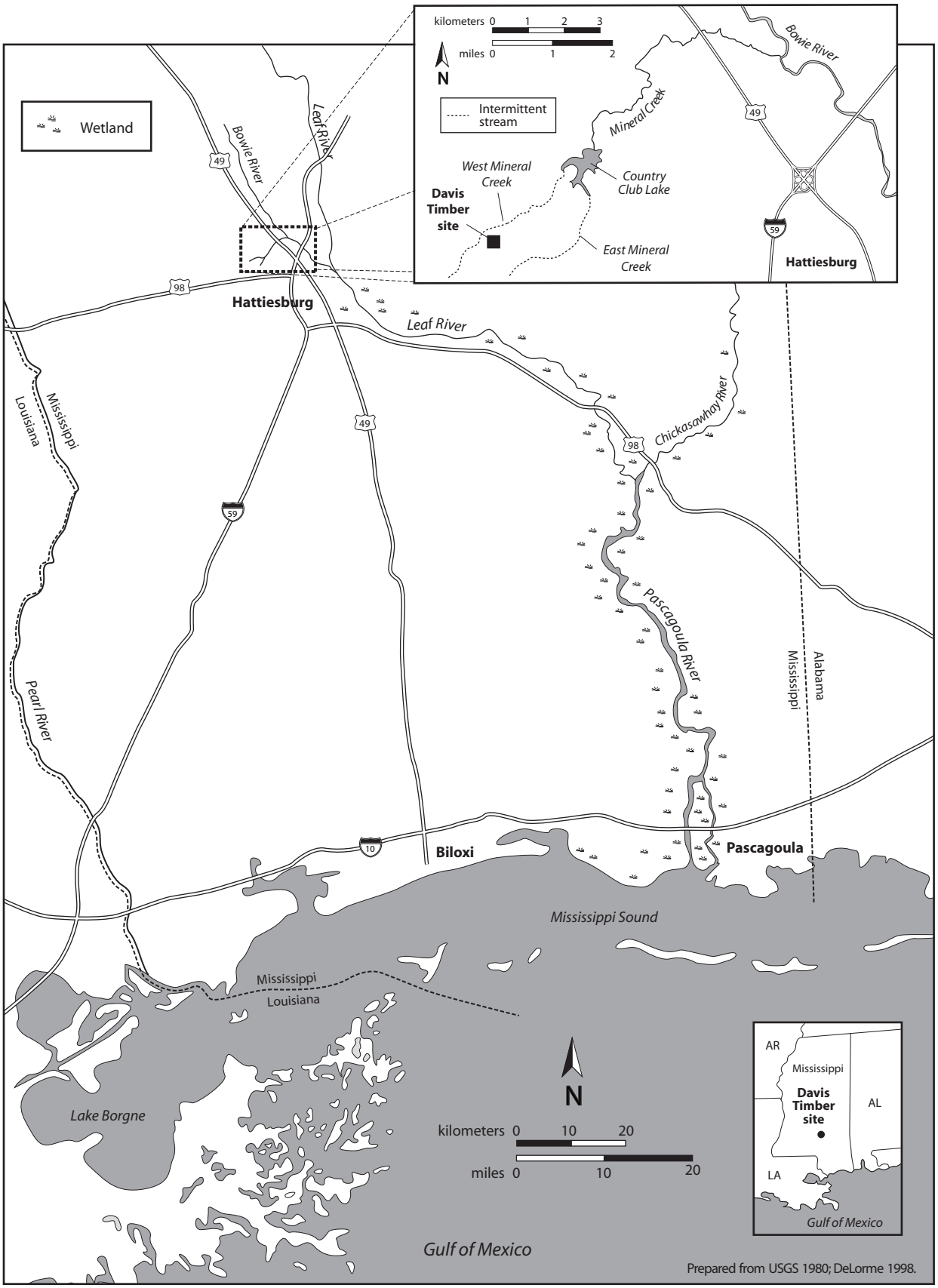

Figure 1. Location of the Davis Timber Company site, Hattiesburg, Mississippi.

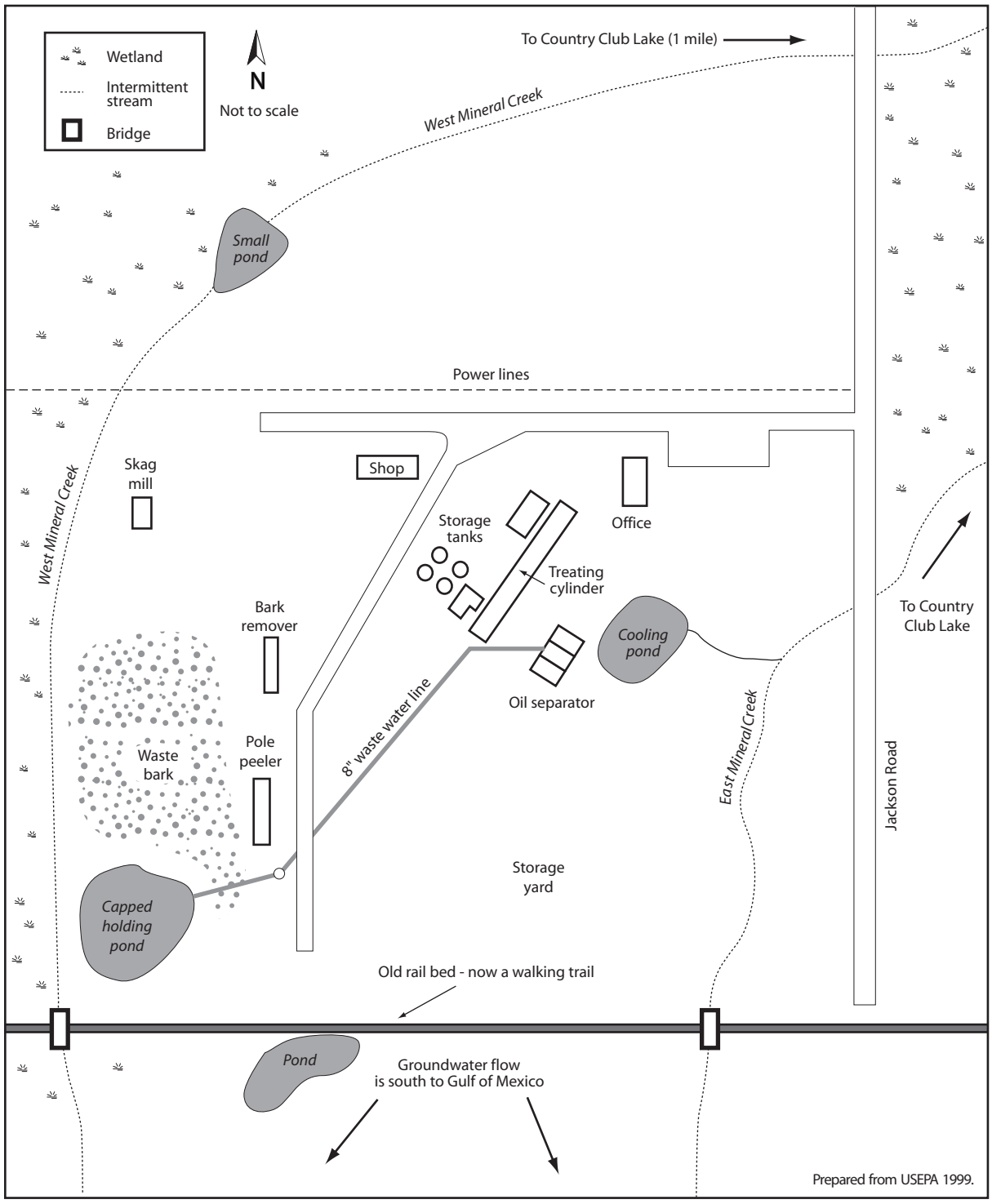

Figure 2. Detail of the Davis Timber Company property, Hattiesburg, Mississippi.

Wastewater was stored in a holding pond and a cooling pond. The holding pond was periodically drained into West Mineral Creek and has overflowed during heavy rain. Wastewater in the cooling pond overflowed into East Mineral Creek during heavy rain as well (ATSDR 2003). It is not known how often the holding pond was intentionally drained into West Mineral Creek or how often both ponds overflowed into West and East Mineral Creeks. In addition, the preservation solution was occasionally spilled on the ground in the vicinity of the ASTs and the treating cylinder. In 1980, the holding pond was closed, backfilled, and capped with approximately 15 to 20 cm (6 to 8 in) of clay (MDEQ 2000; USEPA 2002a).

Between 1974 and 1987, the Mississippi Department of Environmental Quality reported numerous violations and intentional and accidental releases of contaminants from the storage and cooling ponds into West and East Mineral Creeks (ATSDR 2003). Several orders related to improper operations were issued to Davis Timber during this time frame and Davis Timber was found in violation of discharging wastewater without a permit. As a result, the Department of Environmental Quality ordered Davis Timber to cease all wastewater discharge from the facility until the company obtained a valid permit. To obtain a wastewater discharge permit, Davis Timber was required to hire an engineering firm to provide guidance in the design of a wastewater treatment system. Davis Timber complied and in April of 1977, the department issued a five-year permit. In 1979, the Department of Environmental Quality ordered Davis Timber to modify the facilities wastewater treatment process, and in May of 1982 they reissued the five-year wastewater discharge permit. During the same period, the department reported six fish kills in Country Club Lake and a nearby privately owned lake. The fish kills were attributed to releases of PCP into West and East Mineral Creeks (ATSDR 2003). In 1989, the Department of Environmental Quality petitioned the Agency for Toxic Substances and Disease Registry (ATSDR) to conduct a public health assessment at Country Club Lake Estates. The ATSDR classified Country Club Lake as a public health hazard because of elevated levels of PCP, dioxins, and furans.

The Mississippi Department of Environmental Quality conducted a phase II site investigation in 1991 and an expanded site investigation in 1995. Elevated levels of PCP, dioxins, and furans were detected in soil and sediment samples taken on and off-site. In 1997 and 2000, the department detected elevated levels of dioxins and furans in freshwater fish tissue samples collected from Country Club Lake. The U.S. Environmental Protection Agency (USEPA) conducted a remedial investigation from 2000 to 2001 (USEPA 2002a). During a 2001 site visit by the ATSDR and Department of Environmental Quality, a black, shiny substance was observed on the surface water of West Mineral Creek near the small pond and a black, oily substance was observed in the ditch surrounding the capped holding pond (ATSDR 2003). The Davis Timber Company site was proposed to the National Priorities List (NPL) on May 11, 2000, and placed on the NPL on July 27, 2000.

Surface water runoff and groundwater are the primary pathways for the migration of contaminants from the site to NOAA trust resources. Groundwater beneath the site is encountered approximately 4.5 m (15 ft) below ground surface and flows south toward the Gulf of Mexico (ATSDR 2003). Surface water runoff from the property flows west and east into West and East Mineral Creeks. West and East Mineral Creeks flow into Mineral Creek.

NOAA Trust Resources

The habitats of primary concern to NOAA are the surface water and sediments of Mineral Creek. The Bowie River is also of concern to NOAA but due to its distance from the site, it is of secondary concern. Mineral Creek is a small stream bordered by pine forests and farmlands. Two tributaries of Mineral Creek, West and East Mineral Creeks, flow through the site. West and East Mineral

Creeks are intermittent streams that join Country Club Lake, 1.6 km (1 mi) downstream of the site. Mineral Creek was damned near its headwaters in the early 1970s to create Country Club Lake for recreational use (Figure 1). Country Club Lake flows into Mineral Creek, which intersects the Bowie River 5 km (3 mi) downstream. A privately owned lake is between Country Club Lake and the Bowie River. The Bowie River flows southeasterly for 7 km (4.5 mi) and intersects the Leaf River. The Leaf River flows southwest approximately 40 km (25 mi) to its confluence with the Pascagoula River, which continues to flow approximately 64 km (40 mi) before discharging into the Mississippi Sound north of the Gulf of Mexico.

No dams or other impediments block fish from entering Mineral Creek near its confluence with the Bowie River (Slack 2004). NOAA trust resources that use the Bowie River and Mineral Creek for spawning, nursery or adult habitat are anadromous species such as Alabama shad, Gulf sturgeon, skipjack herring, and striped bass and the catadromous American eel (Table 1; Slack 2004). NOAA trust resources are not present in East and West Mineral Creeks or Country Club Lake because they are unable to migrate upstream of the dam that forms Country Club Lake (Folmar 2004). During high water events there is a possibility that NOAA trust resources would be able to migrate past the dam that forms the privately owned lake (Folmar 2004).

Table 1. NOAA trust resources present in Mineral Creek and the Bowie River in the vicinity of the Davis Timber site (Slack 2004).

Species		**Habitat Use**			**Fisheries**	
Common Name	Scientific Name	Spawning Area	Nursery Area	Adult Habitat	Comm.	Rec.
ANADROMOUS FISH						
Alabama shad	*Alosa alabamae*	◆	◆	◆		◆
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	◆	◆	◆		
Skipjack herring	*Alosa chrysochloris*	◆	◆	◆		◆
Striped bass	*Morone saxatilis*	◆	◆	◆		◆
CATADROMOUS FISH						
American eel	*Anguilla rostrata*			◆		

In 2002, the U.S. Fish and Wildlife Service proposed the Bowie River as critical habitat for Gulf sturgeon (a subspecies of Atlantic sturgeon) (USFWS 2002). The Bowie River provides crucial cool-water habitat during the warm summer months for aestivating fish (aestivation is the dormant or sluggish state that some animals enter to cope with periods of hot and dry conditions). The Bowie River is the only documented spawning area for Gulf sturgeon in Mississippi (Slack 2004).

Gulf sturgeon and Alabama shad spawn in freshwater reaches of coastal rivers and streams from January to April. Both species spend the majority of their lives in coastal rivers seeking cool water, especially during hot summer months. Gulf sturgeon enter freshwater reaches of coastal rivers and streams from February to April and return to saltwater habitats October through November. Gulf sturgeon require 9 to 12 years to reach sexual maturity (USFWS 2003a). Breeding habitat for Gulf sturgeon consists of riverine spawning sites with substrates suitable for egg deposition and development, such as limestone outcrops and cut limestone banks, bedrock, large gravel or cobble beds, marl, soapstone, or hard clay. Alabama shad enter fresh water to spawn from January to April when water temperatures reach 19°C to 22°C. Spawning occurs over sand, gravel, and rock substrates in a moderate current (NMFS 2004).

Striped bass migrate extensively throughout river systems, spending most of their life cycle in fresh water. Striped bass enter coastal rivers and streams to spawn in mid-February when saltwater temperatures begin to rise. Striped bass deposit eggs and sperm directly into the water column. Under normal conditions, eggs hatch after 36 to 42 hours. This is a critical time for striped bass, requiring strong water currents and adequate river distances to ensure eggs and newly hatched young will not settle to the river bottom. (USFWS 2003b).

There is no commercial fishery on the Bowie River or Mineral Creek. Alabama shad, skipjack herring, and striped bass are fished recreationally on the Bowie River (Slack 2004). Creel surveys have not been conducted on Mineral Creek so it is unknown to what extent the creek is fished recreationally (Gibson 2004).

There are no fish consumption advisories currently in effect for Mineral Creek or the Bowie River (MDEQ 2003). A fish-consumption advisory is in effect for the entire length of the Pascagoula River because of mercury contamination. The Mississippi State Health Department recommends that people limit their consumption of bass and large catfish from these areas. Children under seven and women of child-bearing age are advised to eat no more than one meal of these fish every two months. Other adults are advised to eat no more than one meal of these fish every two weeks (MDEQ 2003).

Site-Related Contamination

Soil, groundwater, surface water, and sediment samples were collected from the site and adjacent properties during multiple sampling events between 1995 and 2001. The samples were analyzed for metals, polycyclic aromatic hydrocarbons (PAHs), phenols, pesticides, dioxins, and furans. Soil samples were collected throughout the site. Groundwater samples were collected from on-site monitoring wells. Surface water samples were collected from a pond just south of the site, the wetlands adjacent to the site, Country Club Lake, and the privately owned lake downstream of the site. Sediment samples were collected from wetland areas on-site and adjacent to the site, as well as from Country Club Lake, the privately owned lake, and West and East Mineral Creeks.

The primary contaminants of concern to NOAA are PCP, dioxins, furans, and metals. Table 2 summarizes maximum contaminant concentrations detected during the site investigations and compares them to appropriate screening guidelines. Only maximum concentrations that exceeded the screening guidelines are discussed below. The screening guidelines for soil are the ecological screening values for soil recommended by USEPA Region 4 (USEPA 2001), and the ambient water quality criteria (AWQC) for water (USEPA 2002b). For sediment, the screening guidelines are the threshold effects concentrations (TECs; MacDonald et al. 2000). Any exceptions to the screening guidelines are noted in Table 2.

Groundwater

Metals were detected in the groundwater samples taken from on-site monitoring wells. The only metal that exceeded the AWQC was lead (Table 2), which was detected in groundwater samples taken from the monitoring well in the southwest corner of the site.

Surface water

Metals were detected in surface water samples taken from the wetlands southwest of the site and from the pond south of the site. However, the only metal that exceeded the AWQC screening guidelines was copper. Copper was detected in surface water samples taken from wetlands adjacent to the southwest corner of the site (Figure 2) at concentrations that exceeded the AWQC by a factor of two (Table 2).

Table 2. Maximum concentrations of contaminants of concern to NOAA detected in samples collected at the Davis Timber site (USEPA 2002a). Contaminant values in bold exceeded screening guidelines.

	Soil (mg/kg)		Water (µg/L)			Sediment (mg/kg)	
Contaminant	Soil	USEPA Region 4[a]	Ground-water	Surface Water	AWQC[b]	Sediment	TEC[c]
METALS/INORGANICS							
Arsenic	6.7	10	2.2	ND	150	4	9.79
Chromium[d]	**21**	0.4	6.7	ND	11	9.6	43.4
Copper	12	40	3.1	**20**	9[e]	18	31.6
Lead	21	50	**4**	ND	2.5[e]	18	35.8
Nickel	19	30	8.1	ND	52[e]	5.2	22.7
Selenium	**2**	0.81	ND	ND	5.0[f]	0.91	NA
Zinc	46	50	ND	43	120[e]	41	121
PAHs							
Benz(a)anthracene	0.15	NA	ND	ND	NA	0.046	0.108
Benzo(a)pyrene	**0.13**	0.1	ND	ND	NA	0.072	0.15
Benzo(b)fluoranthene	0.34	NA	ND	ND	NA	**0.17**	NA
Benzo(k)flouranthene	0.16	NA	ND	ND	NA	0.13	13.4[g]
Chrysene	0.41	NA	ND	ND	NA	0.17	0.166
Indeno(1,2,3cd)pyrene	0.096	NA	ND	ND	NA	0.049	0.330[g]
Pyrene	ND	0.1	ND	ND	NA	**0.28**	0.195
PHENOLS							
Pentachlorophenol (PCP)	**68**	0.002	ND	ND	15[h]	8.2	NA
PESTICIDES							
4,4′-DDD	ND	0.0025	ND	ND	0.006[i,j]	0.0021	0.00488
4,4′-DDE	ND	0.0025	ND	ND	1.05[i,j]	**0.0058**	0.00316
4,4′-DDT	ND	0.0025	ND	ND	0.001[k]	**0.0091**	0.00416
Dieldrin	ND	0.00028[l]	ND	ND	0.056	0.0011	0.0019
Endrin	ND	0.001	ND	ND	0.036	0.0015	0.00222
Gamma-BHC (Lindane)	ND	0.00005	ND	ND	0.95[i]	0.00063	0.00237
Heptachlor Epoxide	ND	NA	ND	ND	0.0038	0.0011	0.00247
DIOXINS/FURANS							
TEQ (Toxic Equivalent Value)[m]	$6.6x10^{-4}$	NA	ND	**$1.3x10^{-5}$**	$1.0x10^{-8}$[j]	**0.0059**	$8.8x10^{-6}$[g]

a: USEPA Region 4 recommended ecological screening values (USEPA 2001).

b: Ambient water quality criteria for the protection of aquatic organisms (USEPA 2002b). Freshwater chronic criteria presented.

c: Threshold Effects Concentration (TEC). Concentration below which harmful effects are unlikely to be observed (MacDonald et al. 2000).

d: Screening guidelines represent concentrations for $Cr.^{+6}$

e: Criterion expressed as a function of total hardness; concentrations shown correspond to hardness of 100 mg/L $CaCO_3$.

f: Criterion expressed as total recoverable metal.

g: Freshwater upper effects threshold (UET) for bioassays. The UET represents the concentration above which adverse biological impacts would be expected.

h: Chronic criterion is pH dependent; concentration shown above corresponds to pH of 7.8.

i: Chronic criterion not available; acute criterion presented.

j: Lowest observable effects level (LOEL) (USEPA 1986).

k: Expressed as total DDT.

l: Ecological soil screening guidelines (USEPA 2004).

m: Maximum toxic equivalant value (TEQ) is provided. Each dioxin/furan is assigned a toxic equivalency factor (TEF) relative to 2,3,7,8-tetrachlorodibenzodioxin, which is the most toxic in this group of compounds. In order to determine the toxicity of a mixture of dioxin/furan compounds, the measured concentration of the individual dioxin/furans is multiplied by its assigned TEF. The results are summed to produce a TEQ.

NA: Screening guidelines not available.

ND: Not detected.

Dioxins and furans were detected in surface water samples taken from the wetlands at concentrations that exceeded the AWQC by three orders of magnitude.

Sediment

Metals, PAHs, PCP, pesticides, dioxins, and furans were detected in sediment samples. Maximum concentrations of metals were below the TECs. The PAHs chrysene and pyrene were detected in sediment samples taken from East Mineral Creek downstream of Jackson Road (Figure 2) at concentrations that slightly exceeded the TECs (Table 2).

The maximum concentrations of pesticides 4,4'-DDE and 4,4'-DDT, were also detected in sediment samples taken from East Mineral Creek downstream of Jackson Road. The maximum concentration of 4,4'-DDE slightly exceeded the TEC, and the maximum concentration of 4,4'-DDT exceeded the TEC by a factor of two.

Dioxins and furans were also detected in sediment samples taken from East Mineral Creek downstream of Jackson Road at maximum concentrations that exceeded the TEC by two orders of magnitude. There is no TEC available for comparison to the maximum concentration of PCP detected in sediment.

Soil

Metals, PAHs, PCP, dioxins, and furans were detected in soil samples taken from the site. Selenium was detected in a soil sample taken in the area of the treating cylinder (Figure 2) at a maximum concentration two times the USEPA Region 4 screening guidelines (Table 2). Chromium was detected in a soil sample from the southwest corner of the capped holding pond (Figure 2) at a maximum concentration that exceeded the screening guidelines by one order of magnitude (Table 2).

Maximum concentrations of PAHs were detected in soil samples taken from the area of the ASTs and treating cylinder (Figure 2). PAHs were also detected in soil samples taken from the south edge of the waste bark pile, the east side of the holding pond, and northeast of the cooling pond (Figure 2). Benzo(a)pyrene was detected in a soil sample taken in the area of the treating cylinder at a maximum concentration that just exceeded the screening guidelines (Table 2). There are no USEPA screening guidelines available for comparison to five of the PAHs that were detected in soil samples (Table 2). Maximum concentrations of PCP, dioxins, and furans were detected in soil samples taken northeast of the cooling pond. The maximum concentration of PCP exceeded the screening guidelines by four orders of magnitude. There are no USEPA screening guidelines available for comparison to dioxin and furan concentrations detected in soil.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2003. "Public health assessment Davis Timber Company". January 2003. Public Health Assessments. Available: http://www.atsdr.cdc.gov/HAC/PHA/davistimber/dtc_toc.html. (January 22, 2004).

DeLorme. 1998. Mississippi atlas and gazetteer. 1:182,000. Yarmouth, ME.

Folmar, H. Lab director for the Office of Pollution Control/Field Services division, Mississippi Department of Environmental Quality. Pearl, MS. Personal communication February 2, 2004.

Gibson, A. Fisheries biologist for the Office of Pollution Control/Field Services division, Mississippi Department of Environmental Quality. Pearl, MS. Personal communication July 12, 2004.

MacDonald, D., C. Ingersoll, and T. Berger. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. Archives of Environmental Contamination and Toxicology 39:20-31.

Mississippi Department of Environmental Quality (MDEQ). 2000. "Country Club Lake phase one total maximum daily load for dioxin and pentachlorophenol (PCP)." January 2000. Statewide List of Completed TMDLs. Available: http://www.deq.state.ms.us/MDEQ.nsf/pdf/TWB_CountryClubLkJn00/$File/PascagoulaRBCountryClubLakeJn00.pdf?OpenElement. (August 10, 2004).

Mississippi Department of Environmental Quality (MDEQ). 2001. "Mississippi's fish tissue advisories and commercial fishing bans." August 2001. Mississippi Fish Advisories. Available: http://www.deq.state.ms.us/MDEQ.nsf/pdf/FS_FishAdvisoriesAugust2001/$File/FishAdvisoriesAugust2001.pdf?OpenElement. (February 24, 2004).

National Marine Fisheries Service (NMFS). 2004. "Alabama shad." April 2004. Species of Concern and Candidate Species. Available: http://www.nmfs.noaa.gov/pr/species/concern/profiles/alabama_shad.pdf. (August 10, 2004).

Slack, T. Wildlife/fisheries biologist for the Mississippi Museum of Natural Science. Jackson, MS. Personal communication January 26, 2004.

U.S. Environmental Protection Agency (USEPA). 1986. Quality criteria for water 1986. EPA 440/5-86-001. Washington D.C.: U.S. Environmental Protection Agency, Office of Water.

U.S. Environmental Protection Agency (USEPA). 1999. Davis Timber site, final remedial investigation work plan. Athens, GA: U.S. Environmental Protection Agency (USEPA) Region 4.

U.S. Environmental Protection Agency (USEPA). 2001. Supplemental guidance to RAGS: Region 4 bulletins, ecological risk assessment. November 2001. Available: http://www.epa.gov/Region4/waste/ots/ecolbul.htm. (August 10, 2004).

U.S. Environmental Protection Agency (USEPA). 2002a. Davis Timber site, draft remedial investigation report. Athens, GA: U.S. Environmental Protection Agency (USEPA) Region 4.

U.S. Environmental Protection Agency (USEPA). 2002b. National recommended water quality criteria: 2002. Washington D.C.: U.S. Environmental Protection Agency, Office of Water.

U.S. Fish and Wildlife Service (USFWS). 2002. Draft economic analysis of critical habitat designation for the Gulf sturgeon. July 2002. Available: http://alabama.fws.gov/gs/ea_draft_7-02.html. (August 10, 2004).

U.S. Environmental Protection Agency (USEPA). 2004. Ecological soil screening guidelines. June 2004. Available: http://www.epa.gov/ecotox/ecossl/ (August 10, 2004).

U.S. Fish and Wildlife Service (USFWS). 2003a. "Endangered and threatened wildlife and plants; designation of critical habitat for the Gulf sturgeon." May 2002. Summary of the proposed rule. Available: http://alabama.fws.gov/gs/summary.htm. (August 10, 2004).

U.S. Fish and Wildlife Service (USFWS). 2003b. Gulf Coast striped bass. December 2003. Available: http://southeast.fws.gov/welaka/gulfcoaststripedbass.html. (August 10, 2004).

U.S. Geological Survey (USGS). 1980. Topographic map, Hattiesburg quadrangle, MS, 7.5 minute series. 1:24,000. Denver, CO.