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SITE INSPECTION, PHASE II REPORT
GULF STATE CREOSOTE SITE
HATTIESBURG, MISSISSIPPI
MSD985967199

PREPARED FOR:

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1.0 INTRODUCTION

The Mississippi Department of Environmental Quality, Office of Pollution Control (MS OPC), has conducted a Site Inspection (SI), Phase II of the Gulf State Creosote site in Hattiesburg, Mississippi. The SI Phase II was performed under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). Sampling was conducted on October 15-17, 1991. A Preliminary Assessment (PA) was performed by the MS OPC in March of 1990.

County Code:	035
Congressional District:	05
Coordinates:	Latitude 31° 18′ 33″ Longitude 89° 18′ 39″
Location:	NW 1/4 SW 1/4 S16 T4N R13W
Directions to Site:	The Gulf State Creosote site may be reached by traveling south on Highway 49 through the City of Hattiesburg. Take the Highway 11 exit and travel east to northeast for approximately 0.6 to one mile. Turn right onto Timothy Lane and continue for two blocks. Turn right onto Pine Street. The Gulf State Creosote site is adjacent to the road on the right and left sides.

1.1 Objectives

The objectives of the investigation were to determine the nature of contaminants present at the site and to determine if a release of hazardous substances has occurred or may occur. Further, the investigation sought to determine the possible pathways by which contaminants could migrate from the site and the populations and environments potentially affected. Through these objectives, a recommendation has been made regarding further investigation under the CERCLA program.

1.2 Scope of Work

The objectives were achieved through the completion of a number of specific tasks as described below:

- Obtain and review relevant background materials;
- Evaluate the groundwater and surface water use in the area;
- Evaluate target populations associated with the groundwater, surface water, and soil exposure pathways;
- Inspect, sketch, and photograph the site;
- Investigate the location and distances to the nearest potable wells;
- Collect environmental samples;
- Complete an SI Phase II report.

2.0 SITE CHARACTERIZATION

2.1 Background

(Reference 1)

In August of 1989, Richard Ball of the MS OPC investigated the site due to reports from the Corps of Engineers, Mobile District, indicating creosote in borings along Gordons Creek. A title search of county records revealed a creosote plant was in operation along Gordons Creek from around 1900 to 1960. The Gulf States Creosoting Company operated on the site from the mid 1930's to the late 1950's. The last operator of record was the American Creosoting Corporation.

Additional information on previous operators, owners, etc., may by obtained from the EPA Region IV Emergency Response section.

2.2 Site Description

(Reference 1)

The Gulf State Creosote site is approximately 84 acres in size, about 1/2 of a mile long and 1/4 of a mile wide. The site is located along Gordons Creek which flows through the site in a north northeasterly direction. A railroad borders the site to the southeast.

The site at one time, during the creosote operating years, consisted of buildings, structures, tanks, boilers, machinery, and equipment. Today the site consists of vacant lots, automobile dealers, and other small businesses.

The site is located on the south side of the City of Hattiesburg and is surrounded by residential areas, schools, and small businesses. The site is located on 16th section land with the Hattiesburg School District as trustee.

2.3 Waste Characteristics

(References 1, 2, 5, and Appendix A)

According to site visits in 1989 by the OPC and EPA emergency response personnel, creosote was discovered leeching into Gordons Creek. This was verified during the SI-Phase II investigation. The waste was observed to be unconsolidated with no diversion or containment system present.

The hazardous substance of concern is creosote which consists of a number of constituents (see Section 5.0). The areal extent of contamination is estimated to be 75,000 ft^2 with an estimated average depth of 10 feet. These estimates are based on the site's sampling history.

Based on the SI-Phase II investigation along with the previous investigations conducted at the site, the waste was in all probability disposed of in a low relief area. The physical state of the waste at the time of disposal was a solid and/or sludge.

3.0 GEOLOGY/HYDROLOGY

3.1 Stratigraphic Units

(Reference 1)

The stratigraphic units below the site in descending order are as follows: Hattiesburg Formation and the Catahoula Sandstone, Vicksburg Group (Undifferentiated) and the Yazoo Clay.

Fresh-water aquifers in the study area are mostly beds of sand or zones of sandy beds. The beds dip gently to the southwest and contain fresh water as much as 40 miles from the outcrops.

Prediction of aquifer thickness and lithology is difficult because of the lenticular bedding of most units. Lithologic changes occur in short distances and individual sands, which are regular and thicken or thin in short distances, are difficult to trace, especially along the dip of the beds.

At Hattiesburg, the Hattiesburg Formation consists of thick beds of massive clays - 150 or 200 feet thick - which contain some lime but very little sand. Geophysical logs of nearby wells to the east of the site indicate a clay layer that occurs approximately 30 feet above sea level. The clay layer ranges from 110 to 180 feet in thickness and is overlain by and grades upward into alternating fine-grained silty sands and clays. The clay layer is underlain by interbedded sands and clays. The sands increase in prominence and become gravelly toward the base. A geohydrologic section to the west of the site (within the two-mile radius) indicates numerous silty sands and clay lenses underlying the land surface with sands increasing in prominence approximately 100 feet below sea level. These sources indicate that there is no uniform clay present, i.e., the clay layer mentioned above is not continuous over the two-mile radius. Four Forrest County aquifer tests of the Hattiesburg Formation show hydraulic conductivities ranging from 96 to 180 ft/day.

Separating the Hattiesburg from the underlying Catahoula is extremely difficult. To avoid confusion both these units are referred as the Miocene Aquifer System. The aquifer system is composed of numerous interbedded layers of sand and clay (sand beds in the Miocene are characteristically lens-shaped or wedge-shaped). Because of the interbedded nature, formations cannot be reliably separated and correlated either on the surface or in the subsurface.

Recharge to the Miocene Aquifer is from rainfall directly on the outcrop and leakage between aquifer units of the Miocene Aquifer System. Ten Forrest County aquifer tests of the Catahoula Sandstone, which is the lower unit of the Miocene Aquifer System, show hydraulic conductivities ranging from 18 to 170 ft/day. Hydraulic conductivities average 95 ft/day for the Miocene Aquifer System. Lithologic data indicates that the Miocene Aquifer System extends to a depth in excess of 1000 feet below sea level with the base of fresh water occurring approximately 800 feet below sea level.

Underlying the Miocene Aquifer is the Vicksburg Group (Undifferentiated) which is generally composed of limestone beds alternating with thin beds of limy sand and clay. The clay formations effectively isolate the overlying Miocene Aquifer System.

3.2 The Aquifer of Concern

(References 1 and 2)

The Hattiesburg Formation and the Catahoula Sandstone are considered as a single hydraulic unit, referred to as the Miocene Aquifer System. These aquifers constitute the aquifer of concern (AOC).

The first water-bearing unit of the AOC occurs in the surficial aquifer (Hattiesburg Formation) at a depth ranging from approximately 25 to 30 feet below the land surface. The depth to the aquifer, from the lowest known point of hazardous substances at the site to the top of the aquifer, is approximately 14 to 19 feet.

The unsaturated zone (i.e., the zone between the lowest known point of hazardous substances and the top of the aquifer) consists primarily of sandy silts, silts, and silty clays. The lowest hydraulic conductivity layer (i.e., silty clays) is approximately 1×10^{-6} cm/s, and has an approximate thickness of 3 to 5 feet.

U.S.G.S. identifies the following public water supply wells in the AOC within the four-mile radius:

Eleven (11) wells for the City of Hattiesburg which serve a population of approximately 38,570 persons (14,500 connections x 2.66 people per household - 1980 census). The water from the City of Hattiesburg wells is mixed/blended into one distribution system.

Two (2) Central Water Association wells which serve a population of approximately 865 persons (325 connections x 2.66 people per household). The water from the wells is mixed/blended into one distribution system.

Two (2) Palmers Water Association wells which serve a population of approximately 1,250 persons (470 connections x 2.66 people per household). The water from the wells is mixed/blended into one distribution system.

Three (3) Lamar Park Water Association wells which serve a population of approximately 2,926 persons (1,100 connections x 2.66 people per household). The water from the wells is mixed/blended into one distribution system.

The City of Hattiesburg wells, the Central Water Association wells, the Palmers Water Association wells, and the Lamar Park Association wells supply a total population of approximately 43,611 persons. These wells are screened from approximately 330 feet below the land surface to a maximum depth of approximately 665 feet.

U.S.G.S. identifies approximately 62 domestic/private wells occurring in the AOC within the four-mile radius that serve a total population of approximately 165 persons (62 wells x 2.66 people per household).

The nearest drinking water wells occurring in the AOC are located within the 1 to 2 mile radius. One of the wells is a City of Hattiesburg well located approximately 1.5 miles east of the site. This well was sampled during the SI-Phase II investigation. The well extends to approximately 485 feet below the land surface, with the top of the screened interval occurring approximately 435 feet below the land surface.

U.S.G.S. identifies three (3) domestic/private wells occurring in the AOC within the 1/2 to 1 mile radius. However, information collected during the SI-Phase II investigation indicated that the wells were no longer in use.

U.S.G.S. also identifies a number of irrigation wells occurring in the AOC within the 4-mile radius that supply water to commercial food crops and/or commercial forage crops.

3.3 Precipitation

(Reference 1)

The climate of southeastern Mississippi is humid and semitropical. Average annual rainfall is approximately 61 inches. Average annual runoff from the numerous streams in the area is approximately 20 inches. The remainder of the precipitation seeps into the ground or is dissipated by evapotransporation. The net annual precipitation of the study area is about 15 inches.

3.4 Surface Water

(Reference 1)

The Gulf State Creosote site is located adjacent to Gordons Creek which is the nearest perennial downslope surface water. Gordons Creek flows in a north northeasterly direction before entering the Leaf River approximately 4.5 stream miles from the site. The 15-mile surface water migration pathway ends in the Leaf River.

According to the Mississippi Office of Land and Water Resources, there are no drinking water intakes located along the 15-mile surface water migration pathway. The Leaf River is used for recreational purposes such as fishing and swimming.

The site and surrounding area is relatively flat with a slight gradient to the west southwest. The surface elevation of the sight is approximately 180 feet above mean sea level.

4.0 ENVIRONMENTAL THREATS

(References 1 and 4)

There are no national wildlife refuges or critical habitats for federally designated endangered or threatened species along the 15-mile migration pathway. Additionally, no other sensitive environments listed in the HRS Table 4-23 of EPA's Hazard Ranking System; Final Rule, 40 CFR Part 300 were identified according to information sources from the U.S. Fish and Wildlife Service. Also, topographic maps of the site and the surrounding area indicate no wetlands along the surface water migration pathway.

5.0 FIELD INVESTIGATION

5.1 Sampling History

In 1989 and 1990, EPA Emergency Response personnel and the MS OPC conducted a sampling investigation of the site. The analytical results and other information from the investigation are located in Appendix A.

5.2 Sample Collection Methodology

All sample collection, preservation, and chain-of-custody procedures used during the SI-Phase II investigation were in accordance with the standard operating procedures specified in Sections 3 and 4 of the Engineering Support Branch Standard Operating procedures and Quality Assurance Manual; United States Environmental Protection Agency, Region IV, Environmental Services Division, April 1, 1986.

5.3 Description of Samples and Sample Locations

The purpose of the sampling investigation was to characterize the chemical composition of sediment, soil, and groundwater samples collected from potentially contaminated areas. The selection of sample locations was based on visual observations, previous sampling investigations and other historical site information. Background as well as site-related samples were collected.

Two temporary wells (i.e., one upgradient and one downgradient) were installed on-site. Groundwater samples were collected from each of the temporary wells. A groundwater sample was also collected to determine if site-related contaminants have impacted one of the nearest potable wells, which is a City of Hattiesburg public water supply well screened in the Miocene Aquifer System.

A total of seven (7) samples were collected: Two (2) sediment samples, two (2) subsurface soil samples, and three (3) groundwater samples. Sample codes, locations, and rationale are shown in Table B-1 of Appendix B. Sample locations are also shown in Figure B-1 of Appendix B.

The temporary wells were installed using a Failing 1500 drill rig with solid stem augers.

MS OPC representatives--Jim Hardage, Michael Slack, Ken Whitten, and Mark Walters--collected, bottled, and labeled the samples.

5.4 Analytical Support and Methodology

All samples were analyzed for semivolatile organic compounds listed in the EPA Target Compounds List (TCL). Analyses were limited to these compounds because the site was a wood-treating facility that used creosote, creosote compounds are typically picked up in a semivolatile organics analysis, and also because previous sampling by Emergency Response personnel had identified the compounds of concern as creosote constituents. Analyses of soil, sediment and groundwater samples were performed by Mississippi State Chemical Laboratory (MSCL), Starkville, Mississippi.

The analyses were performed in accordance with the standard procedures and protocols specified in the USEPA manual SW-846, "Test Methods for Evaluating Solid Waste," second edition, or equivalent procedures.

5.5 Mississippi State Chemical Laboratory QA/QC Procedures

Internal QC for analytes consists of the analysis of surrogate spikes, matrix spikes, matrix blanks, and internal standards with each set of environmental samples of a specific matrix type. Samples are submitted for analysis in small groups typically containing less than 12 samples of any one type, so only one of each of the above QC samples is normally analyzed with each set of samples of a specific matrix. All analytical data are subjected to a QA review to determine their acceptability. Percent recoveries are calculated from matrix spikes for each class of analytes and matrix types. Those data are accepted as valid for which recoveries of 70-130% are obtained. Reported analytical results are flagged for which applicable surrogate recoveries are outside acceptable limits, as suggested in SW-846. Data for sample sets where matrix spike recoveries are not acceptable are deemed invalid, in which case the sample set, including surrogates, blanks, and spikes, are reanalyzed. Standard deviations and coefficients of variation are calculated from recovery data for sets of matrix spikes for specific analytes accumulated over a period of months or even years, illustrating the continuous performance of a particular analytical method for a matrix-analyte pair.

5.6 Soil Samples

Two (2) subsurface soil samples (one background and one on-site), were collected. Sample GS-SB-01, the background sample, was collected from an area thought to be free of contaminants associated with the past creosote operation. This area was located on the north northeastern side of the site near the Ryan Motors automobile dealership. Sample GS-SB-02 was collected from a known contaminated source area located between two drainage ditches on the west to southwest side of the site that drain into Gordons Creek.

No semi-volatile organic compounds were detected at or above the minimum quantifiable level (MQL) in background sample GS-SB-01. Sample GS-SB-02, however, contained the following compounds: naphthalene (1,900 mg/kg or ppm), 2-methylnaphthalene (1,400 mg/kg), acenaphthene (970 mg/kg), dibenzofuran (1,000 mg/kg), fluorene (1,500 mg/kg), phenanthrene (3,500 mg/kg), anthracene (4,200 mg/kg), fluoranthene (1,600 mg/kg), pyrene (770 mg/kg), benzo(a)anthracene (270 mg/kg), chrysene (280 mg/kg), benzo(b)fluoranthene (113 mg/kg), benzo(k)fluoranthene (100 mg/kg), and benzo(a)pyrene (85 mg/kg). This sample also contained nineteen (19) additional polynuclear aromatic hydrocarbons (PAHs) not on EPA's TCL or RCRA Appendix IX list.

Naphthalene, acenaphthene, fluoranthene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, and benzo(a)pyrene are common constituents from wood preserving processes that use creosote.

5.7 Sediment Samples

Two (2) sediment samples, one upstream and one adjacent to the site, were collected from Gordons Creek. Sample GS-SD-01, the upstream sample, was collected adjacent to a trailer park located to the southwest of the site. Sample GS-SD-02, the downstream sample, was collected adjacent to the site, where visual evidence of creosote material along the creek bank was observed.

Upstream sample, GS-SD-01, contained three (3) of the following compounds: phenanthrene (0.470 mg/kg), fluoranthene (0.700 mg/kg), and pyrene (0.470 mg/kg).

Sample GS-SD-02 contained the following compounds: naphthalene (240 mg/kg), 2-methylnaphthalene (240 mg/kg), acenaphthene (370 mg/kg), dibenzofuran (400 mg/kg), fluorene (550 mg/kg), phenanthrene (18,000 mg/kg)--thousands of times greater than the upstream sample; anthracene (220 mg/kg), fluoranthene (770 mg/kg)--1,100 times greater than the upstream sample; pyrene (490 mg/kg)--approximately 1,040 times greater than the upstream sample; benzo(a)anthracene (170 mg/kg), chrysene (160 mg/kg), benzo(b)fluoranthene (58 mg/kg), benzo(k)fluoranthene (72 mg/kg), and benzo(a)pyrene (60 mg/kg). This sample also contained nineteen (19) additional PAHs not on EPA's TCL or RCRA Appendix IX list.

All of the compounds detected in sediment sample GS-SD-02 were also present in soil sample GS-SB-02. The data and visual evidence suggests migration of creosote material from the source area to the nearby sediments of Gordons Creek.

5.8 Groundwater Samples

Two (2) groundwater samples were collected from the two temporary wells (one upgradient and one downgradient). Sample GS-TW-01, which was collected from the upgradient temporary well, was located approximately in the same area as subsurface soil sample GS-SB-01 (i.e., near Ryan Motors). Sample GS-TW-02, was collected from the downgradient temporary well located south of the source area and sample GS-SB-02. Also, a groundwater sample, GS-PW-01, was collected from a City of Hattiesburg public well located approximately 1.5 miles to the east of the site.

No semi-volatile organic compounds on the TCL were detected at or above the MQL in any of the groundwater samples. However, nineteen (19) peaks not on the TCL or the RCRA Appendix IX list were detected in downgradient sample GS-TW-02. Seventeen (17) of the peaks were not identified. Two of the peaks appear to be fatty acids at a total estimated concentration of 125 ug/l. Four (4) peaks not on the TCl or the RCRA Appendix IX were also detected in upgradient sample GS-TW-02. Three of the peaks appear to be fatty acids at a total estimated concentration of 50 ug/l. The other peak was not identified.

Four (4) peaks not on the TCL or the RCRA Appendix IX list were detected in the public well sample. Two of the peaks appear to be substituted chlorinated benzenes at an estimated total concentration of 10 ug/l. The other two peaks were not identified. The substituted chlorinated benzenes detected in the public well sample are not thought to be site-related.

FIGURE 1

GULF STATE CREOSOTE SITE

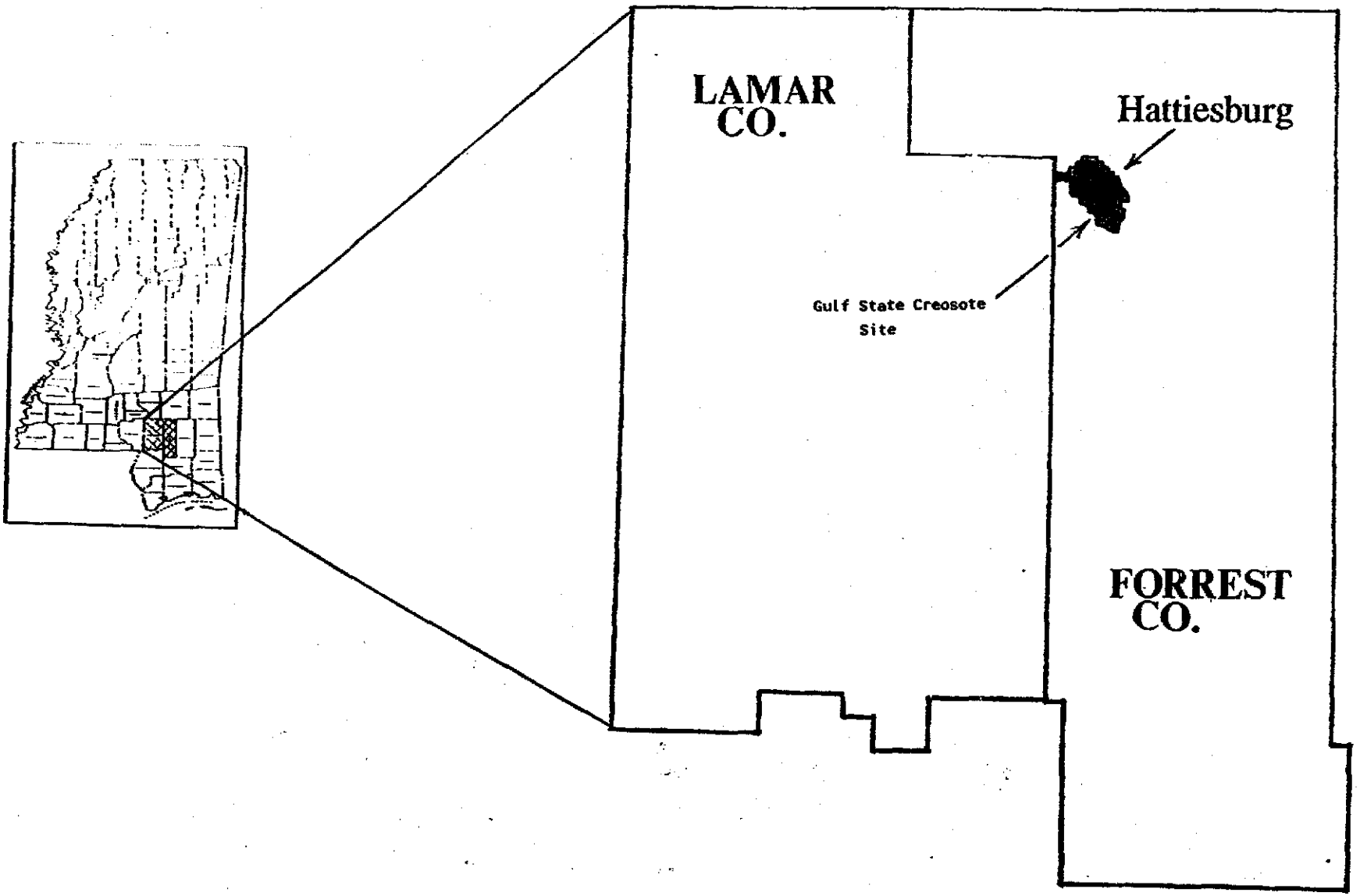

TABLE 1

SUMMARY OF ORGANIC (SEMI-VOC) ANALYTICAL RESULTS
GULF STATE CREOSOTE SITE - SI-PHASE II

Parameters milligrams/kg (ppm)	Upgradient Well GS-TW-01	Downgradient Well GS-TW-02	Upstream Sediment GS-SD-01	Downstream Sediment GS-SD-02	Background Soil GS-SB-01	Soil - Source Area GB-SB-02
Naphthalene	-	-	-	240	-	1,900
2-Methylnaphthalene	-	-	-	240	-	1,400
Acenaphthylene	-	-	-	Trace	-	Trace
Acenaphthene	-	-	-	370	-	970
Dibenzofuran	-	-	-	400	-	1,000
Fluorene	-	-	-	550	-	1,500
Phenanthrene	-	-	0.470	18,000	-	3,500
Anthracene	-	-	-	220	-	4,200
Fluoranthene	-	-	0.700	770	-	1,600
Pyrene	-	-	0.470	490	-	770
Benzo(a)anthracene	-	-	Trace	170	-	270
Chrysene	-	-	Trace	160	-	280
Benzo(b)fluoranthene	-	-	-	58	-	113
Benzo(k)fluoranthene	-	-	-	72	-	100
Benzo(a)pyrene	-	-	-	60	-	85
Indeno(1,2,3-cd)	-	-	-	Trace	-	-
pyrene						
Benzo(g,h,I)perylene	-	-	-	Trace	-	-

- Constituent analyzed for but not detected above the minimum quantifiable level (MQL)

REFERENCES

1. A Preliminary Assessment (PA) Report for the Gulf State Creosote Site, Hattiesburg, Mississippi, prepared by the Mississippi Office of Pollution Control (MS OPC), Hazardous Waste Division (HWD), March 6, 1991.

2. Field Notes of the SI-Phase II Investigation conducted at the Gulf State Creosote Site, Hattiesburg, MS, by the MS OPC, October 15-17, 1991.

3. Estimates of Households, for Counties: July 1, 1985, Average Population per Household.

4. Environmental Protection Agency, 40 CFR Part 300, Hazard Ranking System; Final Rule, Friday, December 14, 1990.

5. Photographs of the SI-Phase II Investigation conducted at the Gulf State Creosote Site, Hattiesburg, MS, by the MS OPC, October 16-17, 1991.