

Remedial Investigation Report

Volume 1 of 3

**Former Gulf States Creosoting Site
Hattiesburg, Mississippi**

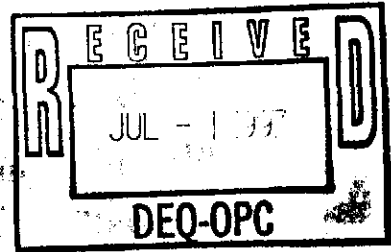
June 30, 1997

Project No. 21-02

MICHAEL PISANI & ASSOCIATES, INC.

Environmental Management and Engineering Services

1100 Poydras Street
1430 Energy Centre
New Orleans, Louisiana 70163
(504) 582-2468



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Remedial Investigation Report

Former Gulf States Creosoting Site Investigation Hattiesburg, Mississippi

Executive Summary

Overview

This report presents the findings of a Remedial Investigation (RI) of the former Gulf States Creosoting site (the site) in Hattiesburg, Mississippi. RI field activities were conducted between February 24 and April 30, 1997. The investigation was performed in accordance with a work plan approved by the Mississippi Department of Environmental Quality (MDEQ).

The RI resulted in the following findings regarding the site:

- Wood treating residuals exist at two distinct and separate locations. The first location is an approximate 2.5-acre former process area located in the northeastern corner of the site (the Process Area). The second location is an obvious fill area located between Gordon's Creek and West Pine Street, within and adjacent to the former Gordon's Creek channel (the Fill Area). The Gordon's Creek channel was moved west to its current location in the early 1960s to allow for the extension of West Pine Street and the redevelopment of this area.
- The Process Area is separated from the Fill Area by both surface topographic and underground geologic barriers.
- Historical aerial photographs reveal that the Fill Area was created after the closure of the wood treating facility and in conjunction with redevelopment of the site. This correlates well with physical examination of these materials, which appear to be placed, not native.
- Creosote-impacted soils in the Process Area are currently covered with asphalt paving or concrete slabs; there is no surface exposure to these creosote-impacted soils.
- Creosote-impacted soils and ground water at the site are effectively isolated from regional drinking water supplies by a massive (120 to 200 feet thick) clay of the Hattiesburg formation.
- The Rapid Optical Screening Tool Laser-Induced Fluorescence (ROST LIF) system was demonstrated to be an accurate, quick, and cost-effective method for identifying creosote contamination in subsurface soils. ROST LIF results were used to define the lateral and vertical extent of creosote-impacted soils within the site boundaries.
- The lateral extent of affected shallow ground water at the site has not been fully defined.

Project Background

Kerr-McGee Chemical Corporation (KMCC) entered into an agreement with the Mississippi Department of Environmental Quality (MDEQ) and the Mississippi Commission on Environmental Quality (Commission) pursuant to the Uncontrolled Site Voluntary Evaluation Program for the investigation of the site. The agreement calls for the investigation of the site under the direction and review of the MDEQ Office of Pollution Control, Uncontrolled Sites Section. MDEQ guidance for the program states that investigations will include all activities necessary to characterize the environmental setting

and to define the degree and extent of affected site media. The MDEQ guidance refers to this investigative process as a Remedial Investigation (RI).

After meeting with MDEQ to discuss investigation requirements and proposed activities, KMCC prepared a Site Investigation Work Plan for the former Gulf States Creosoting site. The plan was submitted to MDEQ for review on January 8, 1997. In a letter dated February 21, 1997, MDEQ approved the Site Investigation Work Plan for implementation. This report presents the findings of the site investigation (hereafter referred to as the Remedial Investigation).

Remedial Investigation Field Activities

Remedial Investigation field activities were conducted between February 24 and April 30, 1997. These activities included the following:

- Advanced 64 cone penetrometer testing (CPT) pushes to depths up to 75 feet to define site stratigraphy
- Advanced six hollow-stem auger soil borings for the installation of monitoring wells and to correlate CPT findings
- Collected seven subsurface soil samples for geotechnical laboratory testing
- Utilized the ROST LIF system at 56 CPT pushes to determine the presence/absence and relative concentrations of aromatic hydrocarbons in soils
- Collected 18 subsurface soil samples for laboratory chemical analysis to correlate ROST findings and to generate constituent-specific data
- Conducted ground water investigations to determine ground water quality, ground water flow direction and gradient, and aquifer characteristics
- Collected 18 surface soil samples to determine the presence and concentration of creosote constituents in near surface soils
- Mapped site surface water runoff
- Performed surveying to establish vertical and lateral control
- Performed a database search for water wells within one mile of the site

Site Description and Operations

The former Gulf States Creosoting site is a former wood treating facility located near the intersections of U.S. Highways 49 and 11 in Hattiesburg, Mississippi. The former site property is currently bounded by Scooba Street on the northeast, Gordon's Creek and Corinne Street on the west and northwest, U.S. Highway 49 on the southwest, and the Southern Railroad on the southeast. The wood treating facility operated between the early 1900s and approximately 1960. The site was redeveloped for commercial and light industrial use beginning in approximately 1962; there are no residential or institutional (e.g., schools) uses of the site.

Operations at the Gulf States Creosoting facility were of a relatively small scale consisting of the use of creosote in a single pressure cylinder. Creosoting and the associated storage and handling of chemicals were confined to an approximately 2.5-acre process area at the northeastern corner of the site. This area of the site is referred to as the Process Area and is now occupied by Courtesy Ford Motors; specifically the parking areas and body shop east of the main Courtesy Ford building. Subsequent to closure of the facility and concurrent with the redevelopment of the site, placement of demolition debris such as broken concrete and asphalt and other waste materials occurred at the southwestern site boundary near

Gordon's Creek. This area of the site is referred to as the Gordon's Creek Fill Area or the Fill Area and remains undeveloped.

Remedial Investigation Findings

A review of current (1996) and historical (1957-1960) topographic surveys indicates that the site is located within two distinct drainage areas separated by a topographic and drainage divide. The area northeast of this divide, including the former Process Area, is drained to the east by a ditch and culvert system. The area southwest of the divide, including the Fill Area, is drained to the west by Gordon's Creek and its tributary ditches.

Results of subsurface investigations show the geology of the Process Area and Fill Area to be significantly different, with the exception of an underlying clay aquitard common to both areas. The Process Area geology is characterized by the presence of an upper clay unit, a sand channel, and the underlying clay aquitard. The sand channel, which is the uppermost water-bearing zone beneath the Process Area, does not extend westward to Gordon's Creek or beneath the Fill Area. The Fill Area geology is characterized by shallow interbedded sands and clays underlain by the clay aquitard. The interbedded sand deposits beneath the Fill Area do not extend northeastward to the Process Area. The clay aquitard underlying the entire site at elevations of 150 to 170 feet above mean sea level (msl) is believed to be the massive clay of the Hattiesburg formation. Published reports and area well logs indicate that this clay layer ranges in thickness from 120 to 200 feet.

During RI activities, four new ground water monitoring wells were installed to verify site ground water flow direction and to determine site-wide ground water quality. Ground water elevation data obtained during the RI indicate that ground water flow within the Process Area sand channel is to the east, or in the opposite direction asserted in reports of previous investigations by others (this due to errors in a previous elevation survey). The ground water gradient in the sand channel is approximately 0.01 feet per foot to the east. The estimated ground water flow velocity is on the order of 0.2 to 0.04 feet per day.

A search of a U.S. Geological Survey (U.S.G.S.) water well database reported the presence of six wells within a one-mile radius of the Process Area and Fill Area; four additional wells were identified by MDEQ as possibly within one mile of the site. Three of the ten wells identified are screened at depths of less than 300 feet (i.e., above the massive Hattiesburg clay). The current status and use of these wells are unknown.

The ROST system was used in conjunction with laboratory analytical data to delineate the extent of creosote-impacted soil within the Process Area and Fill Area. The ROST system was demonstrated to be an effective tool for determining the presence or absence of creosote constituents and, where present, their relative concentrations. Samples collected from intervals exhibiting no ROST response contained virtually no creosote constituents; samples from intervals showing moderate ROST responses contained up to 600 milligrams per kilogram (mg/kg) total polycyclic aromatic hydrocarbons (PAHs); and samples from intervals showing relatively high ROST responses contained up to 3,700 mg/kg total PAHs.

Creosote-impacted soils within the Process Area are confined to areas beneath and/or immediately adjacent to former wood treating operational features. Mapping of the lateral extent of creosote-impacted soils above the water table indicates approximately 3.4 acres of soil in and around the Process Area have been impacted by former wood treating operations. The vertical extent of creosote-impacted soils above the water table throughout the Process Area ranges from a few feet below land surface (bls) to the top of the water table (20 to 25 feet bls). The saturated upper sand channel in portions of the Process Area

is also impacted. All areas of identified impacted soils within the Process Area are covered with asphalt paving or concrete slabs; there are no current surface exposures to the creosote-impacted materials.

Creosote-impacted soils within the Fill Area are presently within and adjacent to areas where filling occurred in conjunction with redevelopment of the property beginning in approximately 1962. Mapping of the lateral extent of creosote-impacted soils indicates approximately 2.1 acres of soil in and around the Fill Area have been impacted. The upper 3 to 4 feet of soil in the Fill Area is generally not affected. Evidence of creosote impact extends into the upper saturated sand beneath the Fill Area. The thickness of creosote-impacted soil varies by location and ranges from several feet to as much as 15 feet.

Results of the RI indicate a lack of a historical or present transport mechanism for creosote or other constituents to migrate from the Process Area to the Fill Area: the surface drainage is not connected and flows to separate basins; the ground water flow beneath the Process Area is away from the Fill Area and is confined to a sand which does not extend to the Fill Area; and the dip of the underlying clay in the Process Area slopes away from the Fill Area. These findings, coupled with evaluation of historical aerial photographs and topographic surveys, indicate that creosote-impacted media in the Fill Area are not a result of creosote wood treating operations but resulted from the placement of creosote-impacted soils and debris (combined with other waste material) in the Fill Area during redevelopment of the site in the early 1960s.

Samples were collected from existing ground water monitoring wells in the Process Area and from new wells near site boundaries during the RI. The results of ground water monitoring indicate that affected ground water is present within the uppermost water-bearing zone (i.e., the sand channel) beneath the Process Area. Affected ground water does not extend to the west of the Process Area; the extent of affected ground water to the north and east of the Process Area has not been defined. Analytical results from other on-site monitoring wells, including one well located between the Process Area and Fill Area, indicate no ground water contamination. Ground water flow direction and quality beneath the Fill Area have not been characterized; the direction of flow in the shallow interbedded sands is anticipated to be toward or downstream along Gordon's Creek.

The results of surface soil sampling performed in exposed (i.e., unpaved or uncovered) areas throughout the site indicate the presence of very low concentrations of wood treating constituents in the upper 12 inches of soil below land surface. The highest sum total of all PAHs in any surface soil sample was less than 30 mg/kg.

The results of investigations performed at the site indicate that affected subsurface media are confined to two separate and distinct areas: the Process Area and the Fill Area. These areas comprise approximately 5.5 acres of the original site property. No additional on-site work is warranted outside of these two areas. Additional investigation activities will be necessary to fully determine the extent of affected ground water in the Process Area and Fill Area.

1.0 Introduction

1.1 Purpose of Report

In January 1997, KMCC submitted to the Mississippi Department of Environmental Quality (MDEQ) a work plan for a Remedial Investigation (RI) at the former Gulf States Creosoting site in Hattiesburg, Mississippi (the site). The objective of the investigation was to define site stratigraphy, ground water conditions, and other physical site characteristics and to determine the nature and extent of chemical constituents in site media. The work plan was approved for implementation by the MDEQ Office of Pollution Control (OPC), Uncontrolled Sites Section, in a letter dated February 21, 1997.

RI field activities were conducted between February 24, 1997 and April 30, 1997. Work was performed according to procedures specified in the MDEQ-approved work plan. This RI Report documents data collection activities and presents the results of the remedial investigation. The report was prepared in general conformance with the following documents:

- *Guidance for Remediation of Uncontrolled Hazardous Substance Sites in Mississippi*, Superfund Branch, Hazardous Waste Division, Office of Pollution Control, Department of Environmental Quality, State of Mississippi, September 1990; and
- *Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, U.S. EPA, October 1988.

1.2 Report Organization

The RI report is organized as follows:

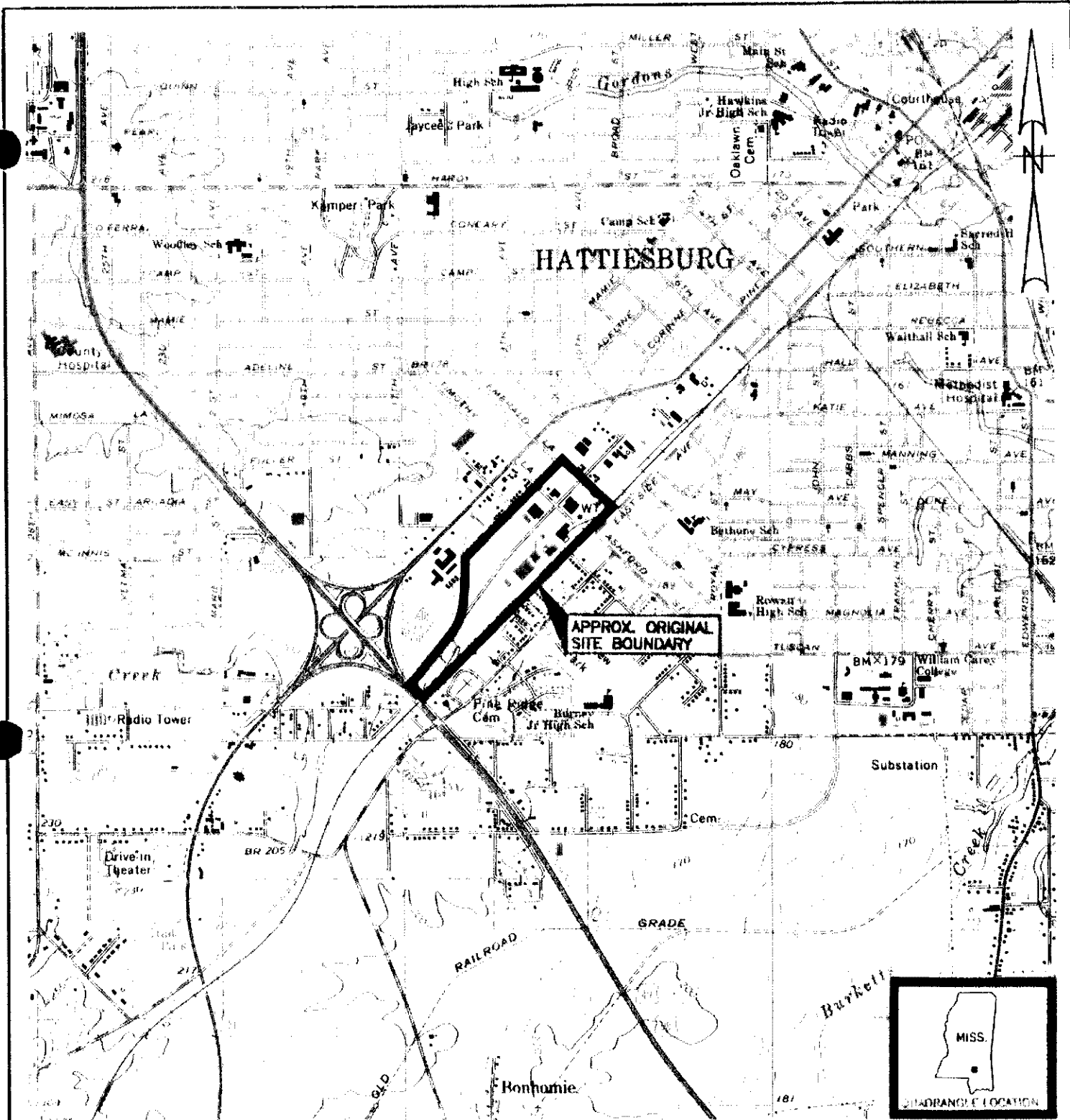
- Section 1 presents site background information.
- Section 2 presents details of study area investigation activities undertaken during the RI, including sampling procedures and the number and types of samples.
- Section 3 presents information on the environmental setting (physical characteristics) of the study area.
- Section 4 presents information on the nature and extent of chemical constituents in site media.
- Section 5 presents conclusions of RI activities.

1.3 Site Background

1.3.1 Site Description

The former Gulf States Creosoting site is located in Hattiesburg, Mississippi near the intersection of U.S. Highways 49 and 11. The site is situated entirely within Section 16 of Township 4 North, Range 13 West, in Forrest County, Mississippi. The site is bounded by Scooba Street on the northeast, Gordon's Creek and Corinne Street on the northwest, U.S. Highway 49 on the southwest, and the N.O. & N.E. Railroad (also known as the Southern Railroad) on the southeast. The location and approximate boundary of the original plant area are shown on Figure 1-1.

Aerial photographs depicting the site area were identified, obtained, and interpreted by Aero-Data Corp. of Baton Rouge, Louisiana. A listing of identified aerial photographic



SOURCE: USGS MAP OF HATTIESBURG, MISSISSIPPI, 7.5' QUADRANGLE, 1964 PHOTOREVISED 1982

MICHAEL PISANI & ASSOCIATES
 Environmental Management and Engineering Services
 New Orleans, Louisiana Houston, Texas

SCALE: DWG. NO.: 21-01/07A

FIGURE 1-1
 SITE LOCATION

FORMER GULF STATES CREOSOTING SITE
 HATTIESBURG, MISSISSIPPI

coverage of the site is provided in Table 1-1. The aerial photographs were used to develop the description of site operations provided in the following paragraphs.

The property comprising the former Gulf States Creosoting site is an irregularly-shaped, elongated southwest/northeast property located within the City of Hattiesburg, Mississippi. Creosoting and the associated storage and handling of bulk chemicals used in the creosoting process were confined to a Process Area located at the northeastern corner of the site. This Process Area encompassed approximately 2.5 acres and was located in the area currently bounded by Timothy Lane, Scooba Street, West Pine Street, and the N.O. & N.E. Railroad. The portion of the site currently southwest of Timothy Lane between West Pine Street and the Southern Railroad was historically used for the storage of either treated or untreated wood. Subsequent to closure of the facility in approximately 1960, the Gordon's Creek channel was moved 200 to 300 feet to the northwest to allow for the development of land along the extension of West Pine Street and an area at the western edge of the property near Gordon's Creek was cleared of trees. The shallow subsurface in this area currently contains fill consisting of demolition rubble and waste materials, the exact source of which is unknown. This area is referred to as the Gordon's Creek Fill Area, or simply the Fill Area, in this report.

The property was developed commercially beginning in approximately 1962. The original plant area is currently occupied by several automobile dealerships, auto parts stores, a beverage dealership, a convenience store, and other commercial operations. The Process Area and wood storage areas have been regraded, covered with asphalt, and are no longer evident (Weston, May 1990). Figure 1-2 is a map depicting the current site features.

1.3.2 Site History and Operations

Creosoting operations are believed to have been conducted at the site between the early 1900s and approximately 1960 (Roy F. Weston 1990). Interviews with former employees indicate that during the life of the facility, operations consisted of treating primarily cross-ties in a single pressure cylinder. In an August 1994 deposition, a former plant supervisor indicated that to his knowledge, the only preservative ever used at the site was creosote (Deposition of Paul Davis Mabry, August 30, 1994). The major components of creosote are listed in Table 1-2 (US EPA 1990).

Historical aerial photographs and Sanborn maps have been used to establish the former locations of the various wood treating components. The following are among the components identified within the Process Area: a settling basin (or U-basin), boiler house, treating room(s), a dry kiln, preservative storage and working tanks, wood storage areas, and an office. Locations of operational features are shown on a 1960 photograph provided as Figure 1-3. Figure 1-4 shows current site features relative to 1960 site operational features.

1.3.3 Previous Investigations

Previous investigations performed at the site, with corresponding reports cited, include the following:

- January and March 1990 investigations by Roy F Weston for U.S. EPA (*Soil Gas and Soil Sampling*, Roy F. Weston, Inc., May 1990);
- An October 1991 investigation by MDEQ (*Site Inspection, Phase II Report*, MDEQ, January 7, 1992);

**Table 1-1
Identified Aerial Photographic Coverage**

**Former Gulf States Creosoting Site
Hattiesburg, Mississippi**

<u>Date</u>	<u>Scale</u>	<u>Source (a)</u>
9/3/37	1: 18,000	TOBIN
3/6/42	1: 20,000	NARA
3/7/43	1: 20,000	NARA
4/27/52	1: 20,000	NARA
2/29/56	1: 11,670	NARA
3/2/58	1: 20,000	ASCS
3/21/60	1: 18,000	USGS
4/5/60	1: 18,000	USGS
8/8/62	1: 40,000	NOS
11/8/63	1: 24,000	USGS
10/17/64	1: 20,000	ASCS
10/3/66	1: 24,000	GCAM
1/26/82	1: 40,000	ASCS
2/22/96	1: 31,680	ADC

(a) Abbreviations stand for the following organizations and agencies:

- TOBIN: Tobin Research
- NARA: National Archives and Records Administration
- ASCS: Agricultural Stabilization Conservation Service
- USGS: United States Geologic Survey
- NOS: National Oceanic Service
- GCAM: Gulf Coast Aerial Mapping
- ADC: Aero-Data Corporation

Table 1-2
Major Chemical Components of Creosote

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

Component	Composition
Naphthalene	17.0
2-Methylnaphthalene	6.5
1-Methylnaphthalene	3.5
Biphenyl	1.9
Acenaphthylene	0.5
Acenaphthene	7.8
Dibenzofuran	5.2
Fluorene	6.0
Phenanthrene	19.4
Anthracene	2.5
Carbazole	5.1
Fluoranthene	11.8
Pyrene	8.4
1,2-Benzanthracene/Chrysene	4.2
Total	99.8

(1) - US EPA 1990





Hattiesburg
2/22/95

Interpretations From 8/21/60
Superimposed on 2/22/95

Cylinder
House

Orp
Track

Figure 1-4
FORMER GULF STATES CREOSOTING SITE
Aerial Photography Analysis
Hattiesburg, Mississippi

- Legend**
-  Tanks
 -  Water Channel
 -  Treated Wood
 -  Buildings
 -  Ditch
 -  Untreated Wood
 -  Rail Road
 -  Flow Vectors
 -  Unpaved Roads
 -  Lagoon

Scale
200' 0 200' 400'