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Revised Addendum to Site Investigation Work Plan

Former Gulf States Creosoting Site Hattiesburg, Mississippi

April 8, 1998

Project No. 21-04

MICHAEL PISANI & ASSOCIATES, INC.

Environmental Management and Engineering Services

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Summary

Project Background

Kerr-McGee Chemical Corporation (KMCC) submitted a *Site Investigation Work Plan* for the Gulf States Creosoting Site (the site) to the Mississippi Department of Environmental Quality (MDEQ) for review on January 8, 1997. In a letter dated February 21, 1997, MDEQ approved the work plan for implementation. Remedial Investigation (RI) field activities were conducted between February 24 and April 30, 1997. The findings of the investigation were presented in the *Remedial Investigation Report* dated June 30, 1997.

MDEQ comments on the *Remedial Investigation Report* were transmitted to KMCC's legal counsel in a letter dated January 13, 1998. In its comment #7, MDEQ requested the submittal of a remedial investigation work plan sufficient to establish the vertical and horizontal extent of affected soil and ground water at the site. An initial work plan addendum presenting activities proposed by KMCC to accomplish this goal was submitted to MDEQ on February 25, 1998.

Representatives of KMCC met with MDEQ in Jackson, Mississippi on March 16, 1998. The purpose of the meeting was to discuss investigative activities proposed by KMCC in the initial work plan addendum. This revised work plan addendum includes additional proposed investigative activities and provides clarification requested by MDEQ at the March 16, 1998 meeting.

Summary of Previous Studies

Beginning in January 1990, the site has been studied extensively to determine the presence and extent of affected media (i.e., soil and ground water). Over 150 soil samples have been collected and submitted to fixed-base laboratories for analysis of chemical constituents. Ground water samples have been collected from eight on-site ground water monitoring wells for chemical analysis. The results of previous studies indicate that the majority of 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).

An extensive analytical database has been generated through previous studies. In many portions of the site, sufficient data to establish the vertical and horizontal extent of affected media are currently available. In other areas, additional data must be collected to achieve this goal. This revised work plan addendum addresses those areas in which additional investigative activities are warranted.

Proposed Additional Activities

Proposed additional activities can be divided into the following tasks:

- Soils Investigations
- Stratigraphic Characterization
- Ground Water Investigations
- Surface Water and Sediment Sampling
- Data Evaluation and Reporting

A brief description of the activities proposed to complete each task is provided below. Detailed information and supporting rationale for proposed additional activities are provided in Sections 2.0 through 5.0.

Soils Investigations

Additional soils investigations are proposed in the following areas:

- **Off-Site Process Area** - The extent of affected soil to the southwest and northwest of the Process Area has been established through previous investigations. The extent of affected soil to the southeast (i.e., toward the N.O. & N.E. Railroad right-of-way) and northeast (i.e., toward Scooba Street) from the former Process Area has not yet been established. Five soil borings will be advanced in these areas to further delineate the extent of creosote-impacted soil.
- **Former Treated Wood Storage Areas** - Historical aerial photographs indicate that the area southwest of the former Process Area and southeast of the current location of West Pine Street was used during operations for the storage of treated wood. Numerous soil samples have been collected in this area, most associated with the assessment of the former Gibson's Shopping Center. The results of previous studies indicate that wood treating residuals in these areas are confined to the upper two feet of soil. Nine additional soil borings will be advanced in the former treated wood storage area to further delineate the extent of creosote-impacted soil and to verify results from previous studies.
- **Other Areas** - Historical aerial photographs indicate that the portion of the site northwest of the current location of West Pine Street was never used as part of wood treating operations or for the storage of treated wood. However, low concentrations of wood treating constituents have been reported in shallow soils at some locations within these areas. Seven soil borings will be advanced in these areas to further delineate the extent of creosote-impacted soil and to verify results from previous studies.

Stratigraphic Characterization

Additional stratigraphic characterization is proposed in the following areas:

- **North and East of Process Area** - The geometry of the sand channel beneath and immediately adjacent to the Process Area was defined during 1997 RI activities. The geometry of the sand channel to the north and east of the Process Area is unknown. Six stratigraphic CPT pushes will be advanced outside the Process Area to determine the configuration of the sand channel and to select appropriate ground water sampling locations and depths.
- **Gordon's Creek Fill Area** - The stratigraphy within the Fill Area was defined using CPT and Geoprobe methods during 1997 RI activities. No stratigraphic information was obtained, however, from the opposite (northwest) bank of Gordon's Creek. Two stratigraphic CPT pushes will be advanced to evaluate the stratigraphy and to select appropriate ground water sampling locations and depths on the northwest bank of Gordon's Creek.

Ground Water Investigations

Additional ground water investigations are proposed in the following areas:

- **North and East of Process Area** - Analytical data from on-site monitoring wells show that affected ground water does not extend westward or significantly southward from the Process Area. The extent of affected ground water to the north and east of the Process Area has not been defined. Ground water samples will be collected from push-in well screens at one upgradient location and five downgradient locations to further define the extent of affected ground water and to determine appropriate locations and screen depths for three new wells downgradient of the Process Area. An interim report with proposed monitoring well locations will be submitted to MDEQ for review and approval prior to undertaking additional well installations.
- **Fill Area** - Ground water quality within the Fill Area has not been characterized during previous investigations. Ground water samples will be collected from push-in well screens at five locations within or adjacent to the Fill Area to define the extent of affected ground water and to determine appropriate locations and screen depths for three new wells in the Fill Area. Again, an interim report with proposed monitoring well locations will be submitted to MDEQ for review and approval prior to undertaking additional well installations.

Surface Water and Sediment Sampling

As stated in the 1997 RI Report, the site is located within two distinct drainage areas: one drained by a ditch and culvert system to the east-northeast of the Process Area; the other drained by Gordon's Creek and its tributary ditches to the west. The following surface water and sediment sampling activities are proposed for the two drainage pathways:

- **Northeast Drainage Pathway** - No surface water or sediment data from the northeast drainage pathway are available. Surface water and sediment samples will be collected near the inception of the drainage pathway and at 500-foot intervals to a

distance 1,500 feet downstream of the site. Background surface water and sediment samples will be collected for comparison to northeast drainage pathway samples.

- **Gordon's Creek** - Limited sediment data and no surface water data from Gordon's Creek are available. Surface water and sediment samples will be collected immediately adjacent to the Fill Area and at 500-foot intervals to a distance 1,500 feet downstream of the site. Background surface water and sediment samples will be collected for comparison to Gordon's Creek samples.

Data Evaluation and Reporting

Once stratigraphic characterization and ground water screening activities have been completed, the data will be evaluated and summarized in an interim report. The report will include a table summarizing ground water screening analytical data, a potentiometric surface map generated using ground water elevation data from existing wells, and a map depicting proposed locations of monitoring wells. The installation of wells will not commence until MDEQ approval of proposed locations has been received.

Upon completion of the activities detailed in Sections 2.0 through 5.0 of this revised work plan addendum, and once laboratory analytical reports are received and validated, the data obtained will be evaluated and presented in an addendum to the RI Report. The report will include descriptions of field activities, summary data tables, maps depicting sample locations, and conclusions drawn from the new RI data.

1.0 Introduction

1.1 Site Background

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 (Figure 1-1). Creosoting operations are believed to have been conducted at the site between the early 1900s and approximately 1960 (Roy F. Weston, 1990). 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 (Figure 1-2).

Beginning in January 1990, the site has been studied extensively to determine the presence and extent of affected media. Figure 1-3 is a map depicting sampling locations from previous investigations. A summary of data from previous investigations was provided as Appendix A of the RI Report.

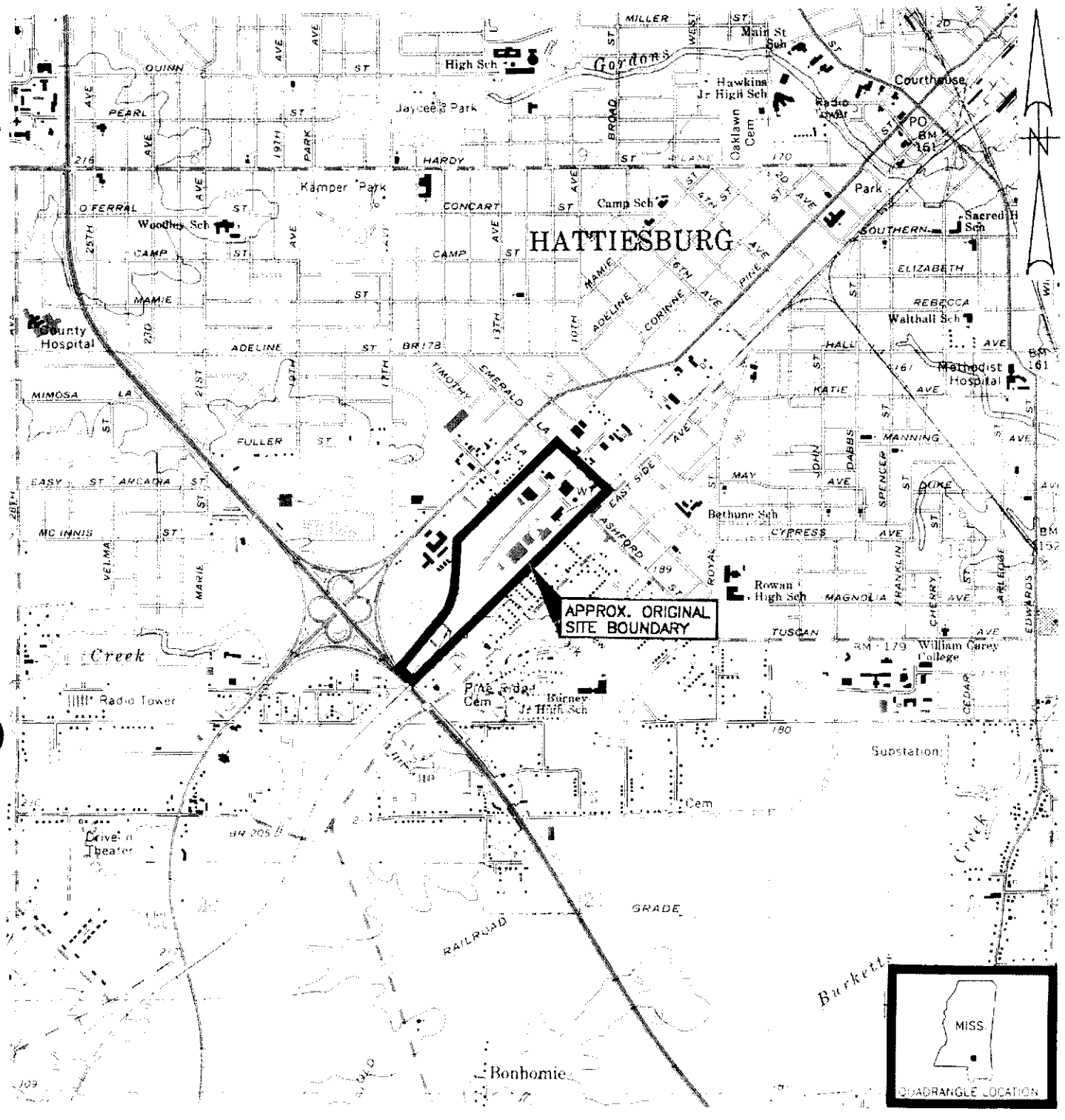
1.2 Objectives of Investigation

The objectives of additional site investigation activities include the following:

1. Delineate the vertical and horizontal extent of creosote-impacted soils to the north and east of the Process Area;
2. Delineate the vertical extent of on-site creosote-impacted surface soils;
3. Determine the geometry of the sand channel to the north and east of the Process Area;
4. Determine the lateral extent of creosote-impacted ground water within the sand channel to the north and east of the Process Area;
5. Determine ground water quality within the Fill Area sands;
6. Determine appropriate locations and depths for additional ground water monitoring wells; and
7. Determine if surface water and sediment have been impacted with creosote constituents.

1.3 Work Plan Addendum Organization

The original *Site Investigation Work Plan* and its appendices presented extensive site background information (Sections 2.0 through 4.0) and detailed procedures for data collection, quality assurance and quality control (QA/QC), health and safety, and planning and reporting activities (Sections 5.0 through 9.0). In order to avoid duplication and reduce the volume of paperwork generated, this addendum incorporates the background information and procedures from the original work plan by reference. This addendum, therefore, consists of the proposed scope of work and rationale for additional activities and presents only those procedures not detailed in the original plan.



SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET

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

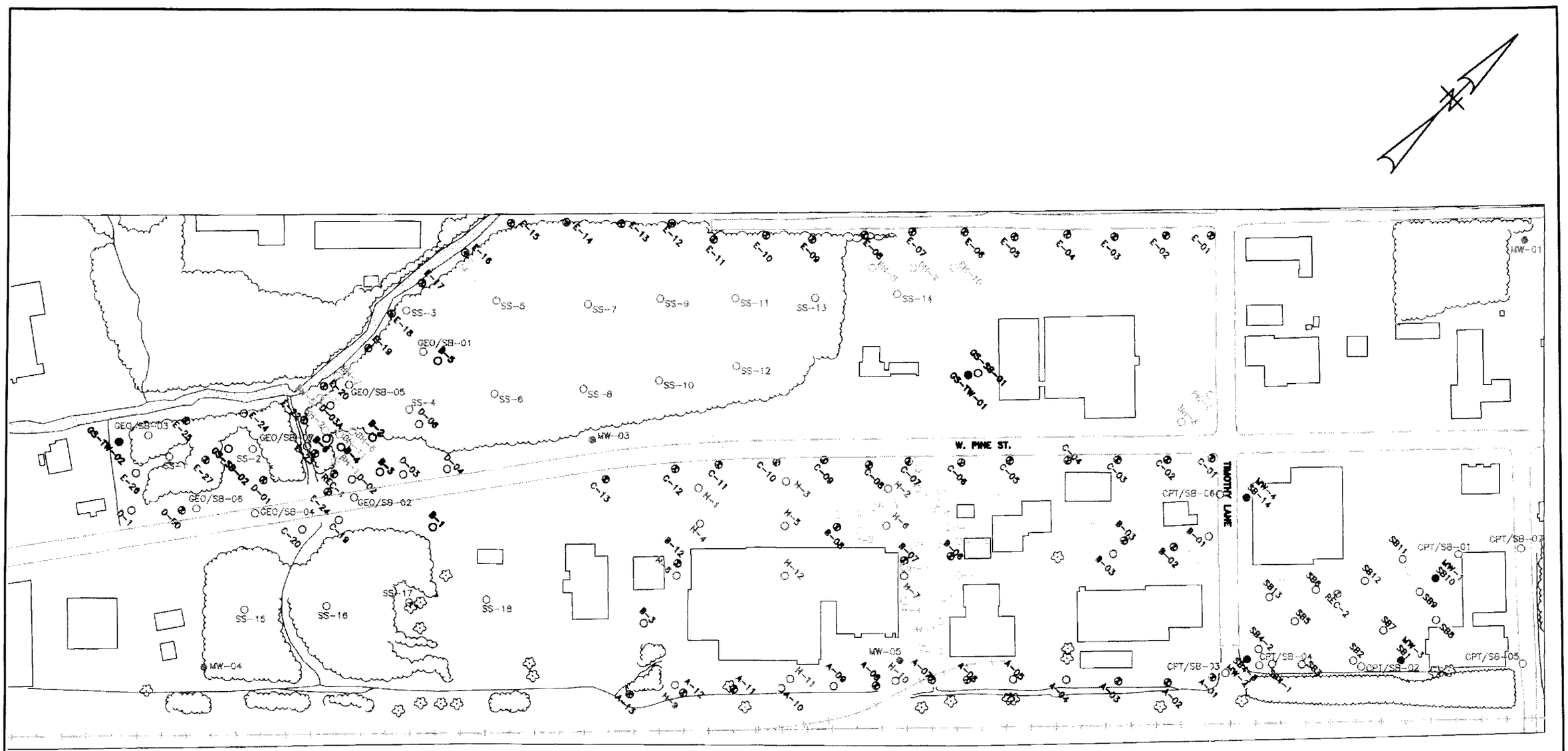
HATTIESBURG, MISSISSIPPI

N

0' 500' 1000'

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

TITLE:	FIGURE 1-2 CURRENT SITE FEATURES
PROJECT:	FORMER GULF STATES CREOSOTING SITE
LOCATION:	HATTIESBURG, MISSISSIPPI
SCALE:	DWG. NO.:



SITE INSPECTION, 1/92 BY MDEQ FOR EPA

SOIL GAS AND SOIL SAMPLING, 5/90 BY ROY F. WESTON FOR EPA

PHASE II INVESTIGATION OF PROCESS AREA, 1994 BY EPS FOR VAN SLYKE

PHASE II INVESTIGATION OF GIBSON'S SHOPPING CENTER, 8/94 BY BONNER FOR MS. THOMAS

PRELIMINARY SUBSURFACE INVESTIGATION OF RYAN MOTORS/RSCO REALTY, 10/94 BY BONNER ANALYTICAL TESTING

ADDITIONAL INVESTIGATION OF GIBSON'S SHOPPING CENTER, 11/95 BY BONNER FOR MS. THOMAS

SOIL BORING ASSESSMENT, 6/96 BY TDS

REMEDIAL INVESTIGATION, 1997 BY MP&A FOR KMCC

LEGEND

- B-2 ○ SOIL BORING/SAMPLE
- REC-1 ⊕ RECEIVER WELL
- ● MONITOR WELL
- ◐ SOIL GAS SAMPLE
- ◐ SOIL GAS/SOIL BORING

⊕ REC-1 THREE-DIMENTIONAL RESISTIVITY STUDY-WEST PINE STREET AREA 12/95 BY ART FOR VAN SLYKE

⊕ REC-2 THREE-DIMENTIONAL RESISTIVITY STUDY-COUNTESY FORD FACILITY 12/95 BY ART FOR VAN SLYKE

BASE MAP FROM ATLANTIC TECHNOLOGIES, LTD., HUNTSVILLE, ALABAMA, APRIL 1, 1996

0 100 200 300 400
SCALE FEET

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

TITLE: FIGURE 1-3
SAMPLE LOCATIONS FROM PREVIOUS STUDIES

PROJECT: FORMER GULF STATES CREOSOTING SITE

LOCATION: HATTIESBURG, MISSISSIPPI

SCALE: DWG. NO.: 21-04/01B

The work plan addendum includes the following sections:

1.0 Introduction
2.0 Soils Investigations
3.0 Stratigraphic Characterization
4.0 Ground Water Investigations
5.0 Surface Water and Sediment Sampling
6.0 Data Evaluation and Reporting

1.4 Access to Sampling Locations

KMCC does not own or control any of the properties where samples are proposed to be collected. KMCC will use its best efforts to obtain access to the properties where samples are to be collected from those persons or entities who own or control the properties. If KMCC is unsuccessful, it may seek assistance from MDEQ and/or the courts to gain access to the properties.

2.0 Soils Investigations

2.1 Soil Sampling Rationale

In many portions of the site, sufficient data to establish the vertical and horizontal extent of affected soil are currently available. The primary objective of soils investigations described in this section is to determine the vertical and horizontal extent of affected soil in areas where such information is not currently available. For example, Figure 2-1 depicts portions of the site described in the RI Report as areas containing affected soil. Because these areas have been fully characterized as to the vertical and horizontal extent of affected soil, no additional soil sampling activities are proposed for these areas.

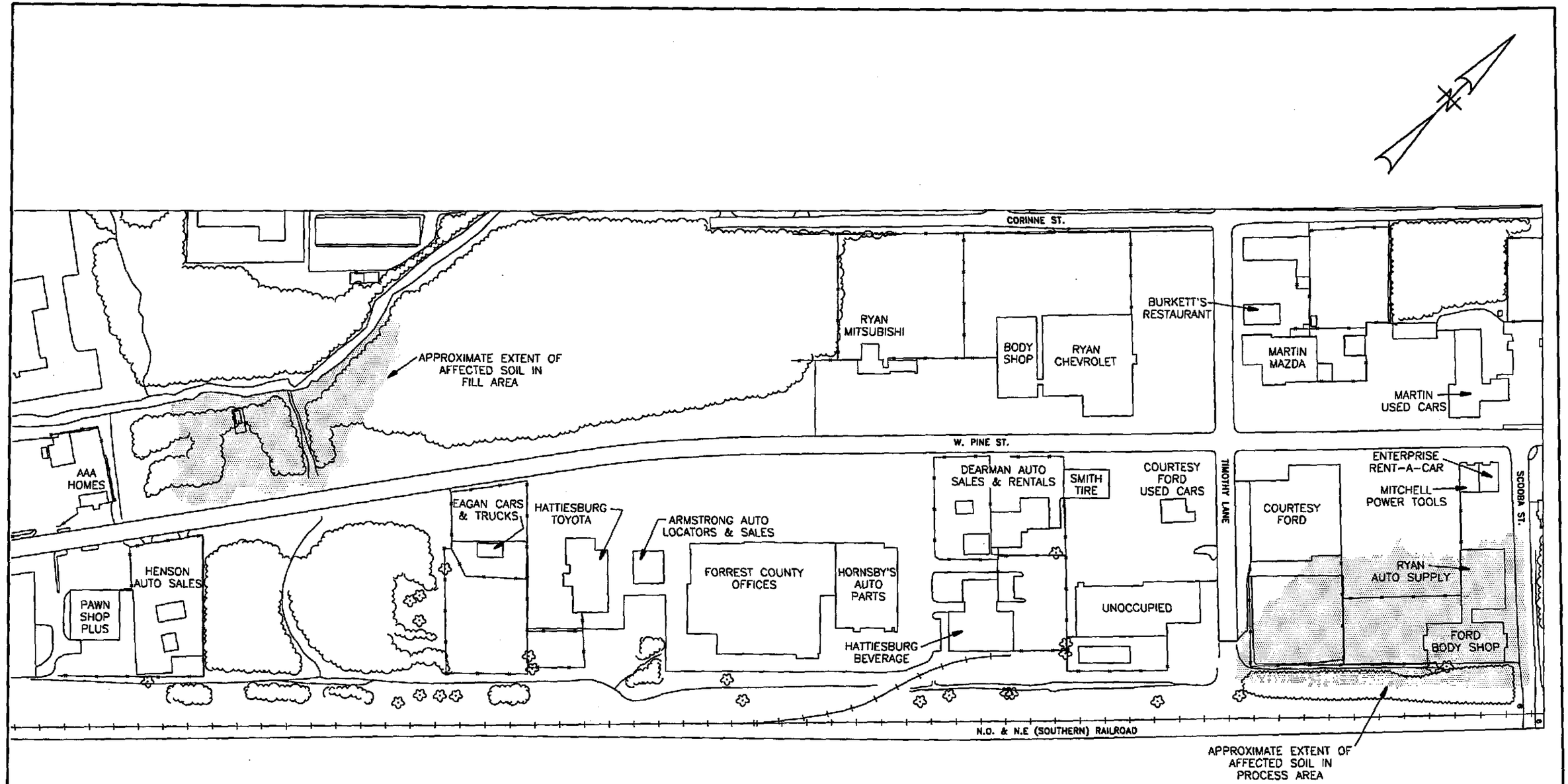
Another objective of the soils investigations proposed herein is the verification of results from previous studies. Both sampling and laboratory analyses of samples have been conducted by numerous parties since January 1990. In many cases, there is insufficient backup data available to evaluate the quality of the data. Therefore, verification sampling will be performed in some areas where the vertical and horizontal extent of affected soil has been determined through previous studies (e.g., the former Gibson's Shopping Center and Ryan Chevrolet).

2.2 Extent of Affected Soil

Existing data were used to evaluate the vertical and horizontal extent of soil containing creosote constituents at the site. Initially, soil samples were grouped into the following depth intervals: 0 to 2 feet, 2 to 5 feet, 5 to 10 feet, 10 to 15 feet, and 15 to 20 feet. Any affected soil beneath a depth of 20 feet is considered a ground water issue. Next, a single number was calculated using the toxicity equivalence factor (TEF) approach for assessment of potentially carcinogenic polycyclic aromatic hydrocarbons (PAHs). This approach assigns each of the seven potentially carcinogenic PAHs (CPAHs) an "estimated order of potential potency" based on its toxicity relative to benzo(a)pyrene in laboratory studies. U.S. EPA provides this methodology as a tool for assessing risk associated with CPAHs in the document *Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons*, EPA/600/R-93/089, July 1993.

The seven CPAHs and their estimated orders of potential potency, as provided in the EPA guidance, are:

Constituent	Relative Potency
Benzo(a)pyrene	1.0
Benz(a)anthracene	0.1
Benzo(b)fluoranthene	0.1
Benzo(k)fluoranthene	0.01
Chrysene	0.001
Dibenz(a,h)anthracene	1.0
Indeno(1,2,3-cd)pyrene	0.1



BASE MAP FROM ATLANTIC TECHNOLOGIES, LTD., HUNTSVILLE, ALABAMA, APRIL 1, 1996

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

TITLE: FIGURE 2-1
APPROXIMATE EXTENT OF AFFECTED SOIL IN PROCESS AREA AND FILL AREA

PROJECT: FORMER GULF STATES CREOSOTING SITE

LOCATION: HATTIESBURG, MISSISSIPPI

SCALE: 1"=200' DWG. NO.: 21-04/088

An example calculation of a benzo(a)pyrene equivalence follows.

Constituent	Concentration (mg/kg)	Relative Potency	Benzo(a)pyrene Equivalence (mg/kg)
Benzo(a)pyrene	2.5	1.0	2.5
Benz(a)anthracene	1.6	0.1	0.16
Benzo(b)fluoranthene	3.8	0.1	0.38
Benzo(k)fluoranthene	ND	0.01	0
Chrysene	2.9	0.001	0.0029
Dibenz(a,h)anthracene	0.5	1.0	0.5
Indeno(1,2,3-cd)pyrene	1.8	0.1	0.18
Total Benzo(a)pyrene Equivalence (mg/kg)			**3.72**

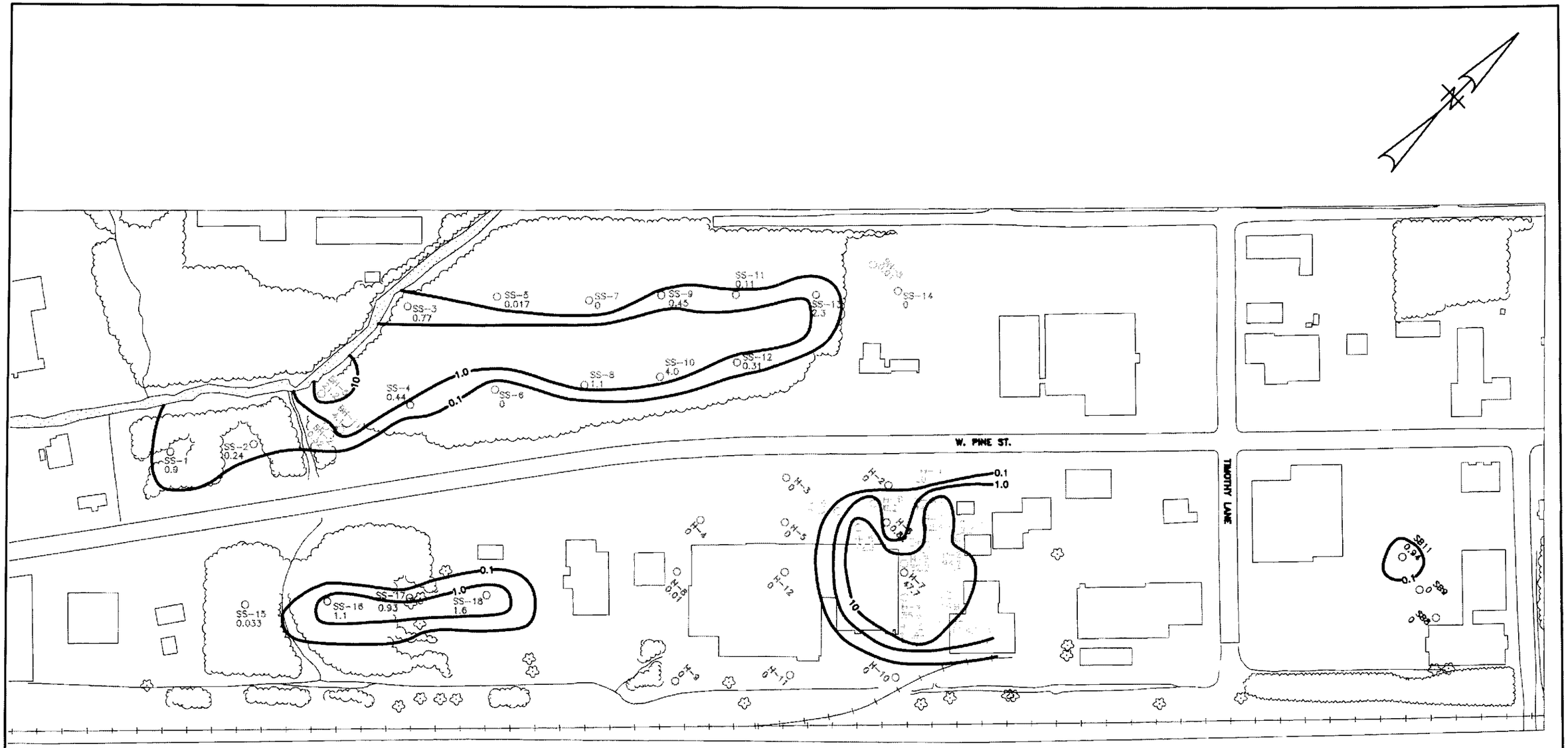
Figures 2-2 through 2-6 depict the distribution of benzo(a)pyrene equivalence in samples from the Gulf States Creosoting site at the five designated depth intervals. These maps provide the basis for the soil sampling program described in Sections 2.3 through 2.5.

2.3 Process Area

During 1997 RI activities, the Rapid Optical Screening Tool (ROST) system was utilized to delineate the extent of creosote-impacted soils within the Process Area and Gordon's Creek Fill Area. Correlation soil samples were collected and analyzed at a fixed-base laboratory to corroborate the results of ROST testing. The ROST system was demonstrated to be an effective screening tool for the delineation of the vertical and lateral extent of creosote-impacted soils. ROST results were correlated with laboratory analytical data to allow for the determination of the presence/absence and relative concentrations of creosote.

The results of the 1997 RI and previous studies at the Gulf States Creosoting site indicate that creosote-impacted soils within the Process Area are confined to areas beneath or immediately adjacent to former wood treating operational features. The extent of creosote-impacted soils to the southwest and northwest of the Process Area is well defined. Creosote-impacted soils were, however, detected at the southeastern edge (i.e., the fenceline between Courtesy Ford and the N.O. & N.E. Railroad right-of-way) and northeastern edge (i.e., along the southwestern side of Scooba Street) of the Process Area. KMCC will conduct additional soils investigations to determine the extent of impacted soils within these areas.

Figure 2-7 depicts proposed additional soil sampling locations. As surface soil samples collected during the 1997 RI were designated SS-01 through SS-18, new sample locations were numbered beginning with 19. At locations 19 through 23, KMCC will advance Geoprobe borings to depths of 6 feet below grade. Soil samples will be collected from the zero to 1-, 2- to 3-, and 5- to 6-foot intervals, and will be analyzed for Target Compound List semivolatile organic compounds (TCL SVOCs). Should field evidence of contamination (e.g., staining or odors) be present, samples may be collected at additional locations and/or depths to further delineate the extent of creosote-impacted soils.



SITE INSPECTION, 1/82 BY MDEQ FOR EPA

SOIL GAS AND SOIL SAMPLING, 5/90 BY ROY F. WESTON FOR EPA

PHASE II INVESTIGATION OF PROCESS AREA, 1994 BY EPS FOR VAN SLYKE

PHASE II INVESTIGATION OF GIBSON'S SHOPPING CENTER, 6/94 BY BONNER FOR MS. THOMAS

PRELIMINARY SUBSURFACE INVESTIGATION OF RYAN MOTORS/RSCC REALTY, 10/94 BY BONNER ANALYTICAL TESTING

ADDITIONAL INVESTIGATION OF GIBSON'S SHOPPING CENTER, 7/95 BY BONNER FOR MS. THOMAS

SOIL BORING ASSESSMENT, 6/96 BY TDS

REMEDIAL INVESTIGATION, 1997 BY MP&A FOR KMCC

LEGEND

- B-2 ○ SOIL BORING/SAMPLE
- REC-1 ⓡ RECEIVER WELL
- ● MONITOR WELL
- ⓖ SOIL GAS SAMPLE
- ⓑ SOIL GAS/SOIL BORING
- —0.1— BENZO(a)PYRENE ISOCONCENTRATION LINE (mg/kg)

ⓡ REC-1 THREE-DIMENTIONAL RESISTIVITY STUDY-WEST PINE STREET AREA 12/95 BY ART FOR VAN SLYKE

ⓡ REC-2 THREE-DIMENTIONAL RESISTIVITY STUDY-COUNTESY FORD FACILTY 12/95 BY ART FOR VAN SLYKE

NOTE:
CONTOUR LINES BETWEEN KNOWN POINTS ARE INTERPOLATIONS AND MAY NOT ACCURATELY REPRESENT CONSTITUENT CONCENTRATIONS.

BASE MAP FROM ATLANTIC TECHNOLOGIES, LTD., HUNTSVILLE, ALABAMA, APRIL 1, 1996

0 100 200 300 400
SCALE FEET

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

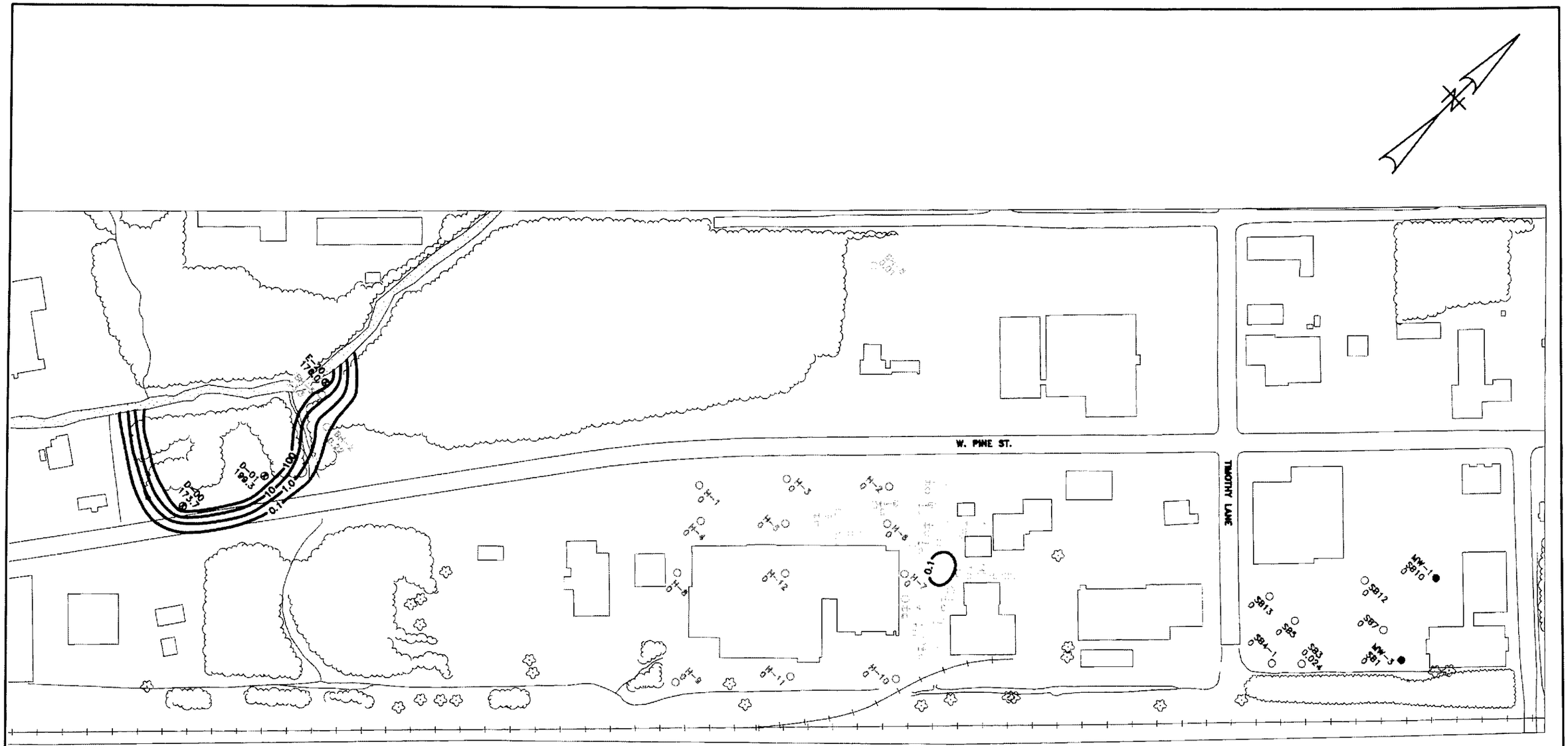
TITLE: FIGURE 2-2
BENZO(A)PYRENE EQUIVALENCE (mg/kg) IN 0-2' SOIL SAMPLES

PROJECT: FORMER GULF STATES CREOSOTING SITE

LOCATION: HATTIESBURG, MISSISSIPPI

SCALE:

DWG. NO.: 21-04/038



SITE INSPECTION,
1/92 BY MDEQ FOR EPA

SOIL GAS AND SOIL SAMPLING,
5/90 BY ROY F. WESTON FOR EPA

PHASE II INVESTIGATION OF PROCESS AREA, 1994 BY EPS FOR VAN SLYKE

PHASE II INVESTIGATION OF GIBSON'S SHOPPING CENTER, 6/94 BY BONNER FOR MS. THOMAS

PRELIMINARY SUBSURFACE INVESTIGATION OF RYAN MOTORS/RSCO REALTY, 10/94 BY BONNER ANALYTICAL TESTING

ADDITIONAL INVESTIGATION OF GIBSON'S SHOPPING CENTER, 96 BY BONNER FOR MS. THOMAS

SOIL BORING ASSESSMENT,
6/96 BY TDS

REMEDIAL INVESTIGATION, 1997 BY MP&A FOR KMCC

LEGEND

- B-2 ○ SOIL BORING/SAMPLE
- REC-1 ⊕ RECEIVER WELL
- ● MONITOR WELL
- ◉ SOIL GAS SAMPLE
- ◉ SOIL GAS/SOIL BORING
- —0.1— BENZO(a)PYRENE ISOCONCENTRATION LINE (mg/kg)

- ⊕ REC-1 THREE-DIMENTIONAL RESISTIVITY STUDY-WEST PINE STREET AREA 12/95 BY ART FOR VAN SLYKE
- ⊕ REC-2 THREE-DIMENTIONAL RESISTIVITY STUDY-COURTESY FORD FACILTY 12/95 BY ART FOR VAN SLYKE

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BASE MAP FROM ATLANTIC TECHNOLOGIES, LTD., HUNTSVILLE, ALABAMA, APRIL 1, 1996

0 100 200 300 400
SCALE FEET

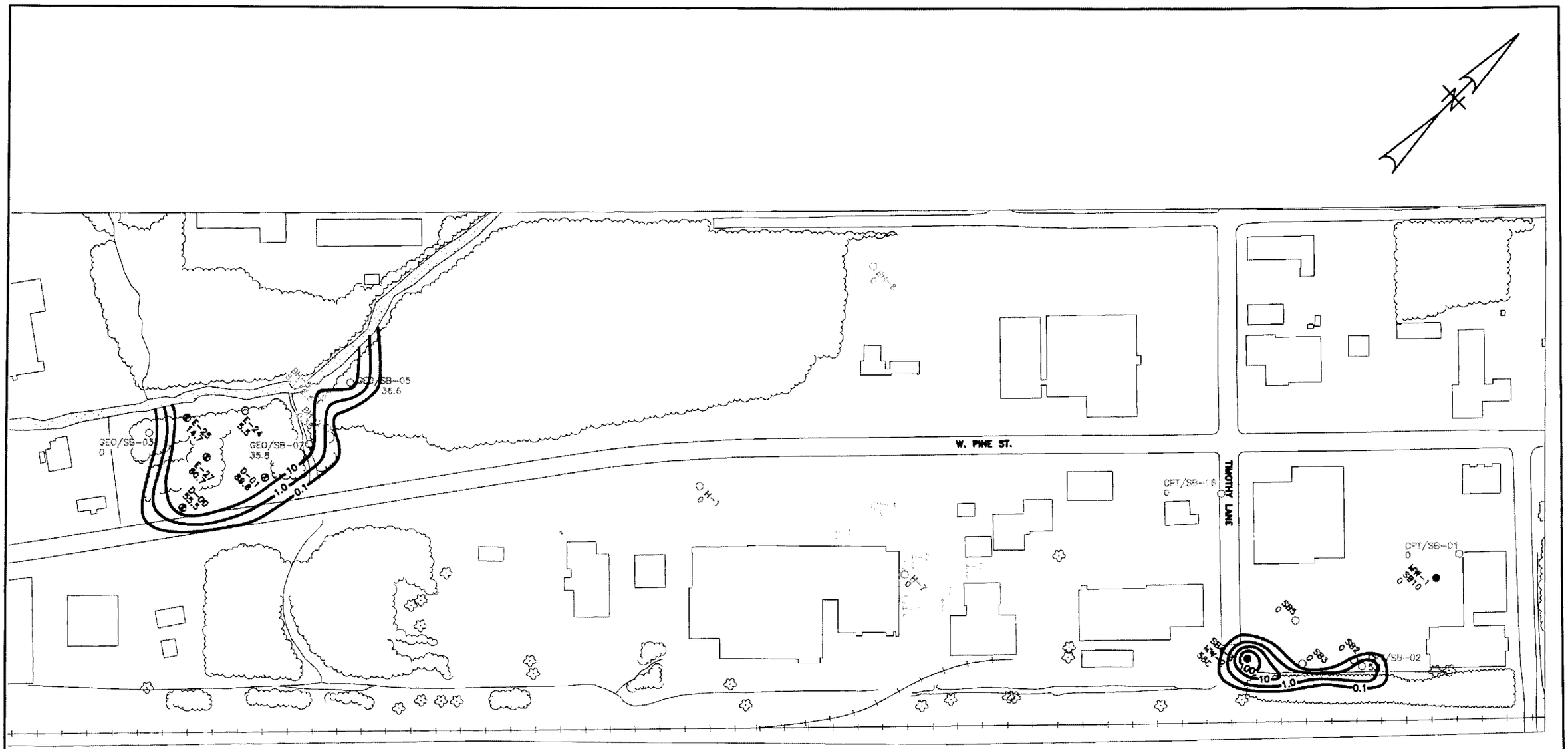
MICHAEL PISANI & ASSOCIATES
Environmental Management and Engineering Services
New Orleans, Louisiana Houston, Texas

TITLE: FIGURE 2-3
BENZO(A)PYRENE EQUIVALENCE (mg/kg)
IN 2-5' SOIL SAMPLES

PROJECT: FORMER GULF STATES CREOSOTING SITE

LOCATION: HATTIESBURG, MISSISSIPPI

SCALE: DWG. NO.: 21-04/04B



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1/92 BY MDEQ FOR EPA

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PHASE II INVESTIGATION OF [illegible]

**SOIL BORING ASSESSMENT,
6/96 BY TDS**

REMEDIAL INVESTIGATION, 1997 BY MP&A FOR KMCC

LEGEND

- B-2 ○ SOIL BORING/SAMPLE
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BASE MAP FROM ATLANTIC TECHNOLOGIES, LTD., HUNTSVILLE, ALABAMA, APRIL 1, 1996

0 100 200 300 400
SCALE FEET

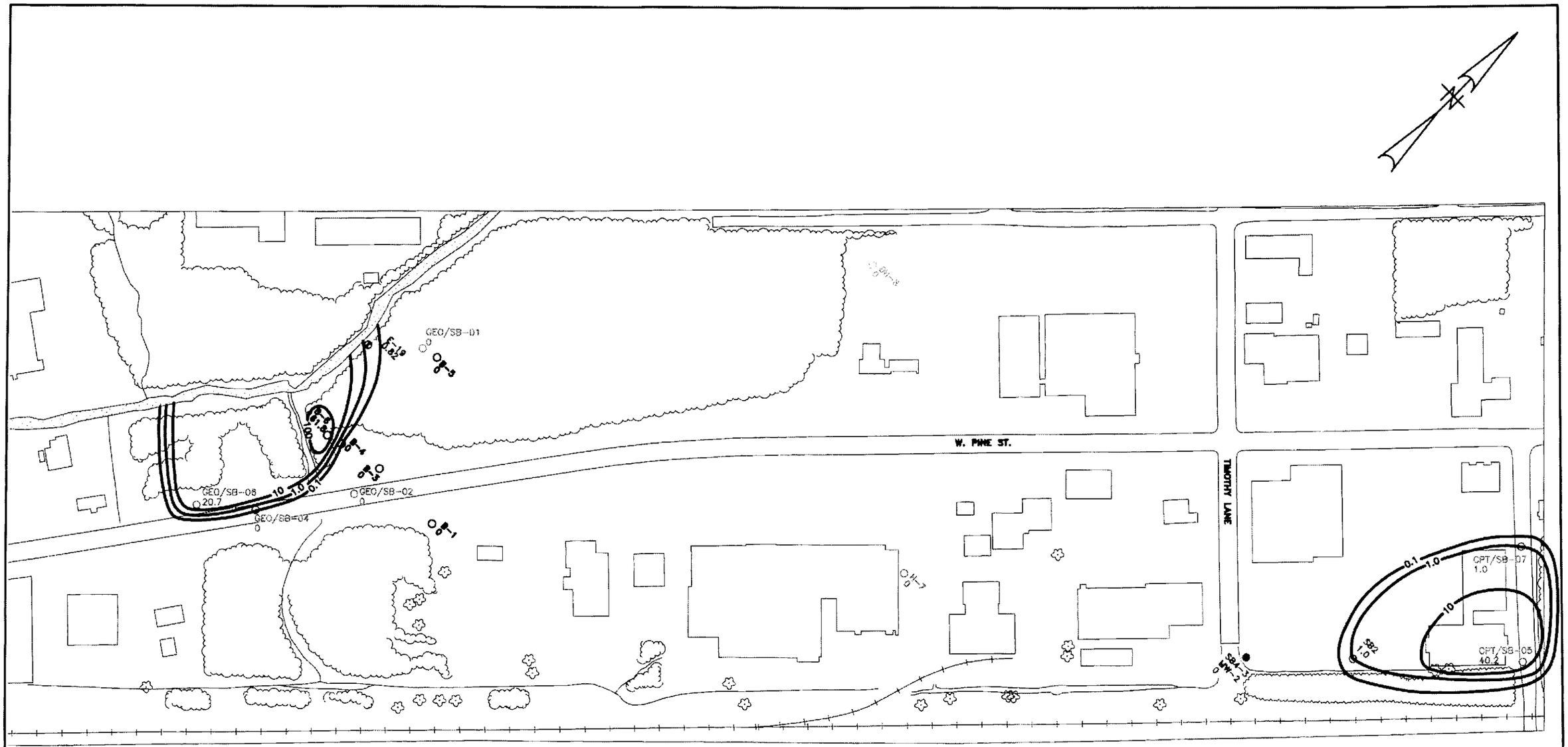
MICHAEL PISANI & ASSOCIATES
Environmental Management and Engineering Services
New Orleans, Louisiana Houston, Texas

TITLE: FIGURE 2-4
BENZO(A)PYRENE EQUIVALENCE (mg/kg) IN 5-10' SOIL SAMPLES

PROJECT: FORMER GULF STATES CREOSOTING SITE

LOCATION: HATTIESBURG, MISSISSIPPI

SCALE: DWG. NO.: 21-04/05B



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1/92 BY MDEQ FOR EPA

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ADDITIONAL INVESTIGATION AT GIBSON'S SHOPPING CENTER, 5/95 BY BONNER FOR MS. THOMAS

SOIL BORING ASSESSMENT,
6/96 BY TDS

REMEDIAL INVESTIGATION, 1997 BY MP&A FOR KMCC

LEGEND

- B-2 ○ SOIL BORING/SAMPLE
- REC-1 ⊕ RECEIVER WELL
- ● MONITOR WELL
- ◐ SOIL GAS SAMPLE
- ◍ SOIL GAS/SOIL BORING
- —0.1— BENZO(a)PYRENE ISOCONCENTRATION LINE (mg/kg)

- ⊕ REC-1 THREE-DIMENTIONAL RESISTIVITY STUDY-WEST PINE STREET AREA 12/95 BY ART FOR VAN SLYKE
- ⊕ REC-2 THREE-DIMENTIONAL RESISTIVITY STUDY-COUNTESY FORD FACILITY 12/95 BY ART FOR VAN SLYKE

NOTE:
CONTOUR LINES BETWEEN KNOWN POINTS ARE INTERPOLATIONS AND MAY NOT ACCURATELY REPRESENT CONSTITUENT CONCENTRATIONS.

BASE MAP FROM ATLANTIC TECHNOLOGIES, LTD., HUNTSVILLE, ALABAMA, APRIL 1, 1996

0 100 200 300 400
SCALE FEET

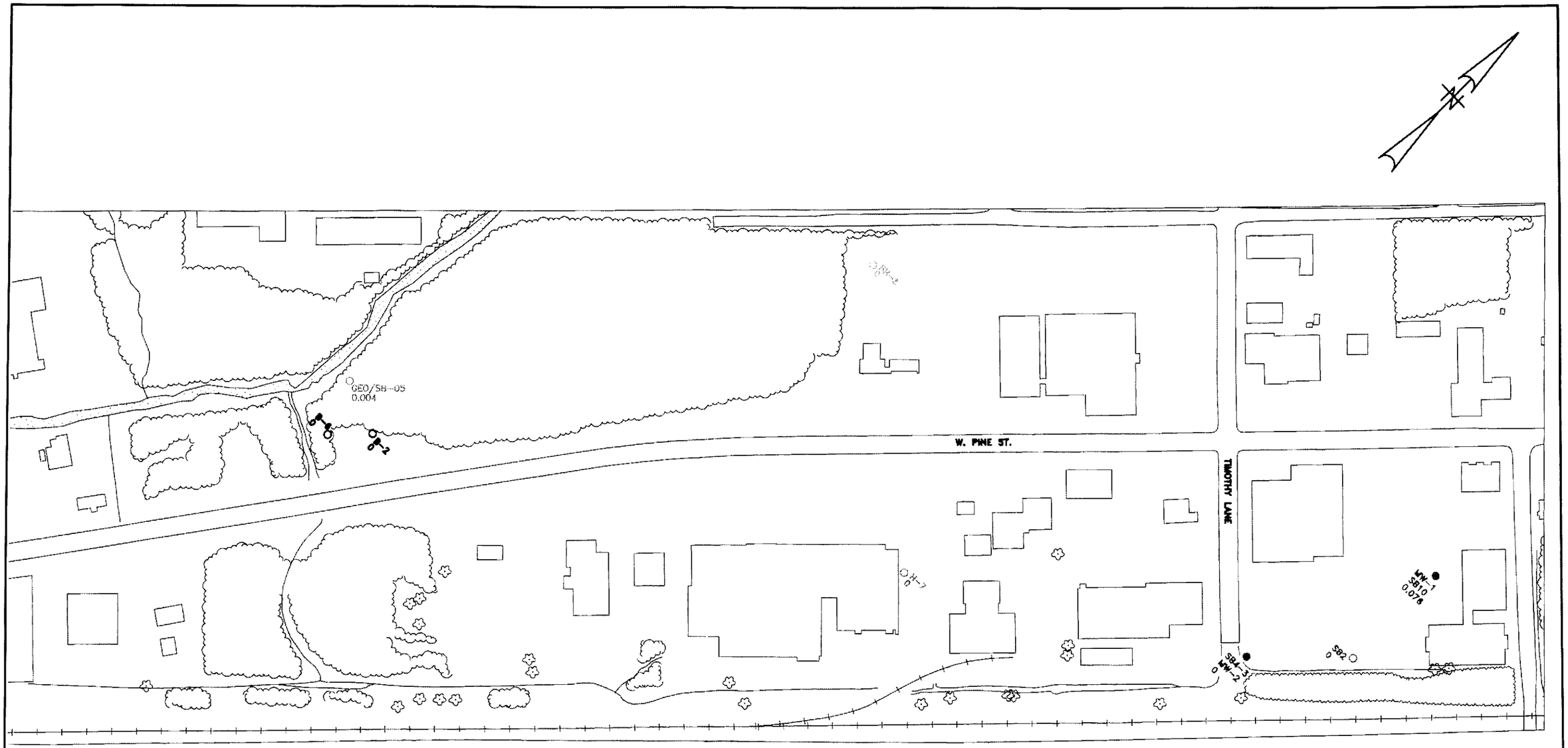
MICHAEL PISANI & ASSOCIATES
Environmental Management and Engineering Services
New Orleans, Louisiana Houston, Texas

TITLE: FIGURE 2-5
BENZO(A)PYRENE EQUIVALENCE (mg/kg)
IN 10-15' SOIL SAMPLES

PROJECT: FORMER GULF STATES CREOSOTING SITE

LOCATION: HATTIESBURG, MISSISSIPPI

SCALE: DWG. NO.: 21-04/06B



SITE INSPECTION,
1/92 BY MDEQ FOR EPA

SOIL GAS AND SOIL SAMPLING,
5/90 BY ROY F. WESTON FOR EPA

PHASE II INVESTIGATION OF PROCESS AREA, 1994 BY EPS FOR VAN SLYKE

PHASE II INVESTIGATION OF GIBSON'S SHOPPING CENTER, 6/94 BY BONNER FOR MS. THOMAS

PRELIMINARY SUBSURFACE INVESTIGATION OF RYAN MOTORS/RSCO REALTY, 10/94 BY BONNER ANALYTICAL TESTING

[illegible] INVESTIGATION OF GIBSON SHOPPING CENTER [illegible] BY BONNER FOR MS. THOMAS

SOIL BORING ASSESSMENT,
6/96 BY TDS

REMEDIAL INVESTIGATION, 1997 BY MP&A FOR KMCC

LEGEND

- B-2 ○ SOIL BORING/SAMPLE
- REC-1 ⓡ RECEIVER WELL
- ● MONITOR WELL
- ⓖ SOIL GAS SAMPLE
- ⓑ SOIL GAS/SOIL BORING

ⓡ REC-1 THREE-DIMENTIONAL RESISTIVITY STUDY-WEST PINE STREET AREA 12/95 BY ART FOR VAN SLYKE

ⓡ REC-2 THREE-DIMENTIONAL RESISTIVITY STUDY-COURTESY FORD FACILTY 12/95 BY ART FOR VAN SLYKE

BASE MAP FROM ATLANTIC TECHNOLOGIES, LTD., HUNTSVILLE, ALABAMA, APRIL 1, 1996

0 100 200 300 400
SCALE FEET

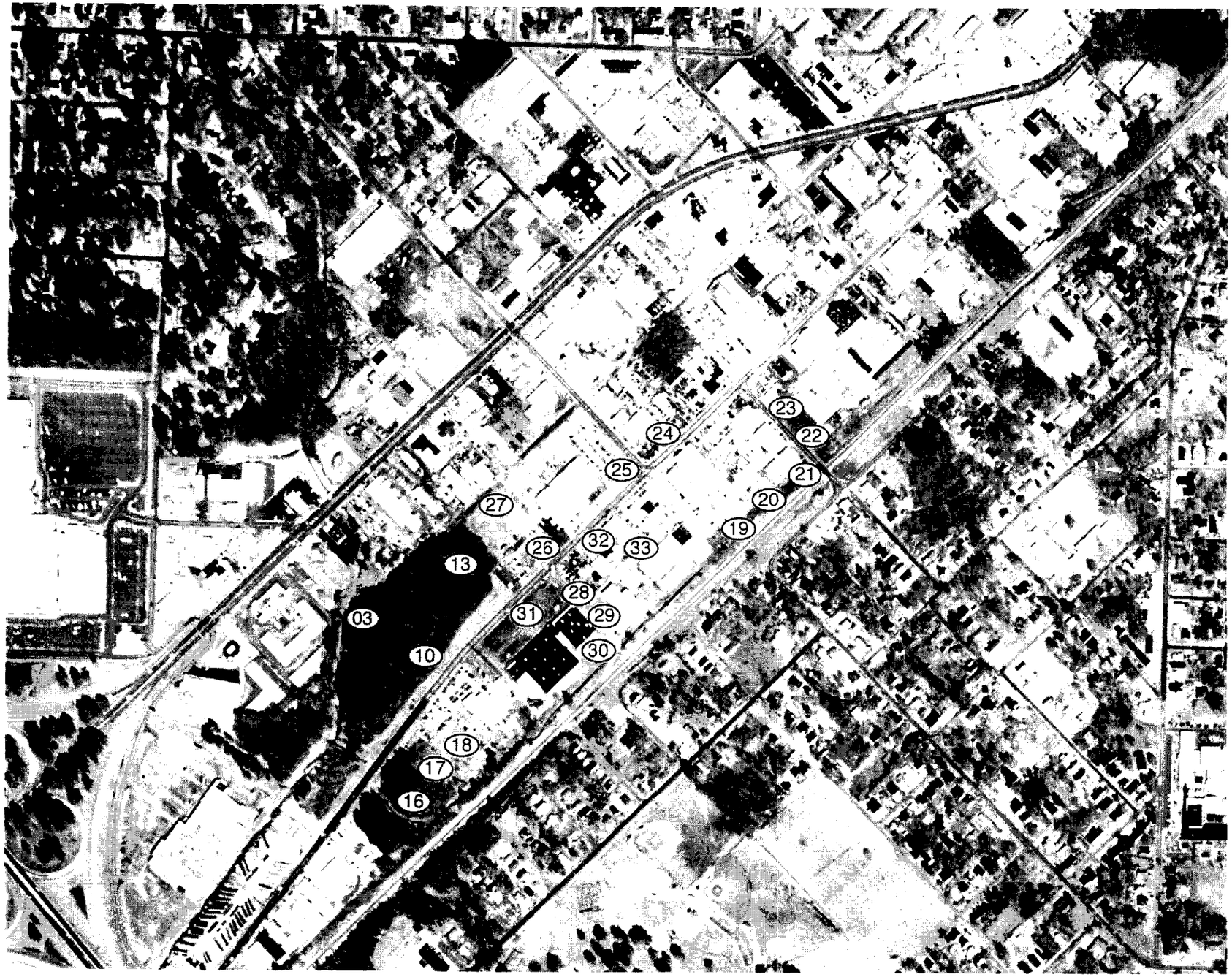
MICHAEL PISANI & ASSOCIATES
Environmental Management and Engineering Services
New Orleans, Louisiana Houston, Texas

TITLE: FIGURE 2-6
BENZO(A)PYRENE EQUIVALENCE (mg/kg)
IN 15-20' SOIL SAMPLES

PROJECT: FORMER GULF STATES CREOSOTING SITE

LOCATION: HATTIESBURG, MISSISSIPPI

SCALE: DWG. NO.: 21-04/078



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LEGEND

(03) Soil Sampling Location

0' 500' 1000'

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

TITLE:	FIGURE 2-7 SOIL SAMPLING LOCATIONS
PROJECT:	FORMER GULF STATES CREOSOTING SITE
LOCATION:	HATTIESBURG, MISSISSIPPI
SCALE:	DWG. NO.:

2.4 Former Treated Wood Storage Areas

During 1997 RI activities, surface soil samples (i.e., samples from the zero to 12-inch interval) were collected from unpaved areas and analyzed to determine the presence/absence of creosote constituents in near surface soils. A total of 18 surface soil samples were collected on a grid pattern at a frequency of approximately one per each 40,000 square feet of exposed area. Samples were analyzed for TCL SVOCs.

Low concentrations of polynuclear aromatic hydrocarbons (PAHs) were reported in three of four surface soil samples (SS-16, SS-17, and SS-18) collected in former treated wood storage areas during the RI. In addition, numerous surface and subsurface soil samples have been collected and analyzed from former treated wood storage areas as part of two investigations of the former Gibson's Shopping Center. Generally, constituents in these areas are confined to the uppermost two feet of soil.

Figure 2-7 depicts proposed additional soil sampling locations. Soil samples designated 16, 17, and 18 on Figure 2-7 will be collected at 1997 RI surface soil sample locations designated by the same numbers to determine the vertical extent of affected soil. At each of these locations, borings will be advanced using a Geoprobe or hand auger (depending on accessibility) to depths of 6 feet. Soil samples will be collected from the 2- to 3-foot and 5- to 6-foot intervals, and will be analyzed for TCL SVOCs.

Soil samples will be collected from locations 28, 29, 30, and 31 to verify the results of previous studies. Samples will be collected from locations 32 and 33 to determine the presence and extent of affected soil between the Process Area and former Gibson's Shopping Center, an area also used historically for the storage of treated wood. Sampling methodology and laboratory analyses will be as described above; samples will be collected from the zero to 1-, 2- to 3-, and 5- to 6-foot intervals.

2.5 Other Areas

Historical aerial photographs do not indicate that any portion of the area northwest of West Pine Street was ever used for treated wood storage. However, low concentrations of PAHs were reported in surface soil samples collected east-northeast of the Gordon's Creek Fill Area during the RI. Soil samples designated 03, 10, and 13 on Figure 2-7 will be collected at 1997 RI surface soil sample locations designated by the same numbers to determine the vertical extent of affected soil. Soil samples will be collected from the 2- to 3-foot and 5- to 6-foot intervals, and will be analyzed for TCL SVOCs.

Soil samples will be collected from locations 25 and 27 to verify the results of previous studies. Samples will be collected from locations 32 and 33 to provide additional site coverage. Sampling methodology and laboratory analyses will be as described in Section 2.4; samples will be collected from the zero to 1-, 2- to 3-, and 5- to 6-foot intervals.

3.0 Stratigraphic Characterization

3.1 Process Area

The geometry of the sand channel beneath and immediately adjacent to the Process Area was defined during 1997 RI activities. These activities established that the sand channel does not extend westward to the Fill Area, and that the channel trends and dips from the southwest to the northeast. The geometry of the sand channel to the north and east of the Process Area is unknown.

KMCC will utilize cone penetrometer testing (CPT) to achieve the following objectives:

- Determine the geometry (i.e., configuration, alignment, and thickness) of the sand channel to the north and east of the Process Area;
- Determine the elevation and slope of the underlying confining clay; and
- Determine appropriate depths for ground water sampling.

As site-wide CPT pushes advanced during the 1997 RI were designated CPT-01 through CPT-07, new CPT locations were numbered beginning with 08. Six CPT pushes (pushes 08 through 13 on Figure 3-1) will be advanced through the sand channel to the top of the underlying confining clay. If the sand channel is absent, pushes will be terminated at a depth of 60 feet below grade. Locations may be modified based on field observations; MDEQ will be notified of the rationale for any deviations from this work plan addendum. CPT logs will be evaluated to determine locations and appropriate depths for additional ground water sampling (see Section 4.1).

3.2 Gordon's Creek Fill Area

The stratigraphy within the Fill Area was defined using CPT and Geoprobe methods during 1997 RI activities. No stratigraphic information was obtained, however, from the opposite (northwest) bank of Gordon's Creek. KMCC will utilize CPT to characterize the stratigraphy on the opposite bank of the Creek and determine appropriate depths for ground water sampling.

Two CPT pushes (pushes 14 and 15) will be advanced to depths of 50 feet below grade. Based on the geology of the Fill Area, this should be sufficiently deep to fully penetrate the shallow sands near the creek and encounter the upper portion of the underlying confining clay. CPT logs will be evaluated to determine appropriate depths for additional ground water sampling (see Section 4.2).

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LEGEND

13 CPT Stratigraphic Push/ Push-In Well Screen

16 Push-In Well Screen

0' 500' 1000'

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

TITLE: FIGURE 3-1
CPT & PUSH-IN WELL SCREEN LOCATIONS

PROJECT: FORMER GULF STATES CREOSOTING SITE

LOCATION: HATTIESBURG, MISSISSIPPI

SCALE: DWG. NO.:

4.0 Ground Water Investigations

4.1 Methodology

In the document *Presumptive Remedies for Soil, Sediments, and Sludges at Wood Treater Sites* (EPA/540/R-95/128, December 1995), EPA recommends that ground water characterization be implemented using a phased approach. In a phased approach, "activities are conducted in a sequence of steps, such that information obtained from earlier steps is used to refine subsequent investigations, objectives, or actions." KMCC plans to utilize a phased approach to determine ground water quality within the Fill Area and to evaluate the potential for off-site migration of affected ground water from the Process Area.

The first step of the ground water characterization is actually the stratigraphic CPT work described in Section 3.0. Once sufficient stratigraphic data has been obtained to determine appropriate locations and depths for ground water sampling, KMCC plans to utilize a CPT push-in well screen sampler to delineate the extent of affected ground water and determine appropriate locations for plume defining wells. The push-in well screen is a stainless steel sampler which is designed to remain closed and water-tight until the target sampling depth is attained. Once the tool has been pushed to the target sampling interval, the sampling rods are retracted approximately one foot, exposing the stainless steel well screen and allowing water to enter the sampling chamber. Ground water samples are then collected by lowering a small-diameter bailer through the sampling rods into the sampling chamber. When sampling is completed, the resulting borehole is pressure grouted from the bottom to the surface to ensure complete filling. The CPT push-in well screen has proven to be an effective tool for delineating ground water plumes, allowing the user to make informed and logical decisions regarding the placement of ground water monitoring wells.

The ground water screening phase will be conducted using a CPT unit, a rig not capable of installing ground water monitoring wells. Because a hollow-stem auger drilling rig must be mobilized to the site to install wells, a natural break in field activities is created, allowing for the interim interpretation of physical and chemical data. At the completion of the screening phase field activities, ground water investigations will be suspended pending the receipt of ground water screening analytical data and the evaluation of stratigraphic data. Once all ground water screening data are received and evaluated, KMCC will prepare and submit to MDEQ an interim report depicting proposed monitoring well locations and rationale. The well installation phase will not commence until MDEQ approval of well locations is received.

A hollow-stem drilling rig will be mobilized to the site for the installation of monitoring well. Wells will be constructed in accordance with the same procedures utilized during the RI. Well construction materials will be two-inch, Schedule 40 PVC, with 0.01-inch machine-slotted screen spanning the entire thickness of the first saturated permeable zone. Wells will be completed at grade with water-tight, flush-mount manhole covers. Keys to well locks will be maintained by KMCC and/or its designated representative.

4.2 Process Area

Results of previous investigations indicate that ground water in the uppermost water-bearing zone beneath the Process Area has been impacted by former wood treating operations. However, analytical data from on-site monitoring wells show that affected ground water does not extend westward or significantly southward from the Process Area. The extent of affected ground water to the north and east of the Process Area has not been defined.

Ground water samples will be collected at pushes 08 through 13 (see Figure 3-1), unless the sand channel is absent. The sampler will be pushed to a depth at the approximate vertical midpoint of the sand channel at each location. Samples will be transferred directly from the small-diameter bailer into clean, laboratory-supplied sample containers. Ground water samples will be analyzed for TCL SVOCs.

4.3 Gordon's Creek Fill Area

Ground water quality within the Fill Area has not been characterized during previous investigations. However, the extent of creosote-impacted soils within the Fill Area was delineated during the 1997 RI activities using ROST and subsurface soil data. It is anticipated that the ground water plume will be similar in size and shape to the footprint of affected soil. KMCC will utilize the CPT push-in well screen to delineate the extent of affected ground water and determine appropriate locations for plume defining wells in the Fill Area.

Ground water samples will be collected at pushes 14 through 20 (see Figure 3-1) from the uppermost water-bearing sand (typically 8 to 12 feet below grade). Samples will be transferred directly from the small-diameter bailer into clean, laboratory-supplied sample containers. Ground water samples will be analyzed for TCL volatile organic compounds (VOCs) and SVOCs.

4.4 Ground Water Monitoring Wells

Currently, there is a network of eight ground water monitoring wells on site: four wells installed within the Process Area in 1994, and four wells installed during the 1997 RI activities to monitor site-wide ground water. The results of ground water screening activities outlined in Sections 4.2 and 4.3 will provide the basis for selecting locations for three new wells downgradient of the Process Area and three new wells within the Fill Area. Prior to installation of the new wells, KMCC will submit for MDEQ review and approval an interim report depicting proposed monitoring well locations and rationale.

Wells will be installed, developed, and surveyed using the same procedures utilized during the 1997 RI. Ground water samples will be collected from the six new wells and four site-wide monitoring wells using dedicated PVC bailers. Samples will be analyzed for TCL SVOCs.

5.0 Surface Water and Sediment Sampling

5.1 Surface Water and Sediment Sampling Rationale

The site is located within two distinct drainage areas: one drained by a ditch and culvert system to the east-northeast of the Process Area; the other drained by Gordon's Creek and its tributary ditches to the west. Two sediment samples were collected from Gordon's Creek as part of a 1991 MDEQ study; no other surface water or sediment data are known to exist. KMCC will collect surface water and sediment samples from both Gordon's Creek and the ditch and culvert system to determine the presence/absence, concentrations, and extent of creosote constituents in these media. The results will be used to evaluate the potential for off-site migration of constituents via the surface water pathway.

5.2 Sampling Methodology

Surface water and sediment samples will be collected in accordance with procedures presented in Section 10 and 11 of the document *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, U.S. EPA Region IV, May 1996. These procedures were designed to minimize the effects of sampling on the physical and chemical integrity of samples.

If the stream or drainage pathway is narrow enough to reach the center point, surface water and sediment sampling locations will be accessed from the bank. Otherwise, sampling locations will be accessed by wading. Samples from each drainage pathway will be collected beginning at the furthest downstream sampling location and moving upstream. At each location, the sampler will face upstream and will collect the surface water sample prior to the sediment sample, avoiding disturbance of the sediment during surface water sampling.

Surface water samples will be collected by gently immersing the sample container slightly beneath the water's surface. Care will be taken not to displace any preservative in pre-preserved sample containers. Sediment samples will be collected from the upper six inches of the sediment column using a stainless steel scoop or spoon. Samples will be homogenized in glass or stainless steel bowls and will then be transferred directly into sample containers. Sample handling and chain-of-custody procedures will be identical to those used during 1997 RI activities.

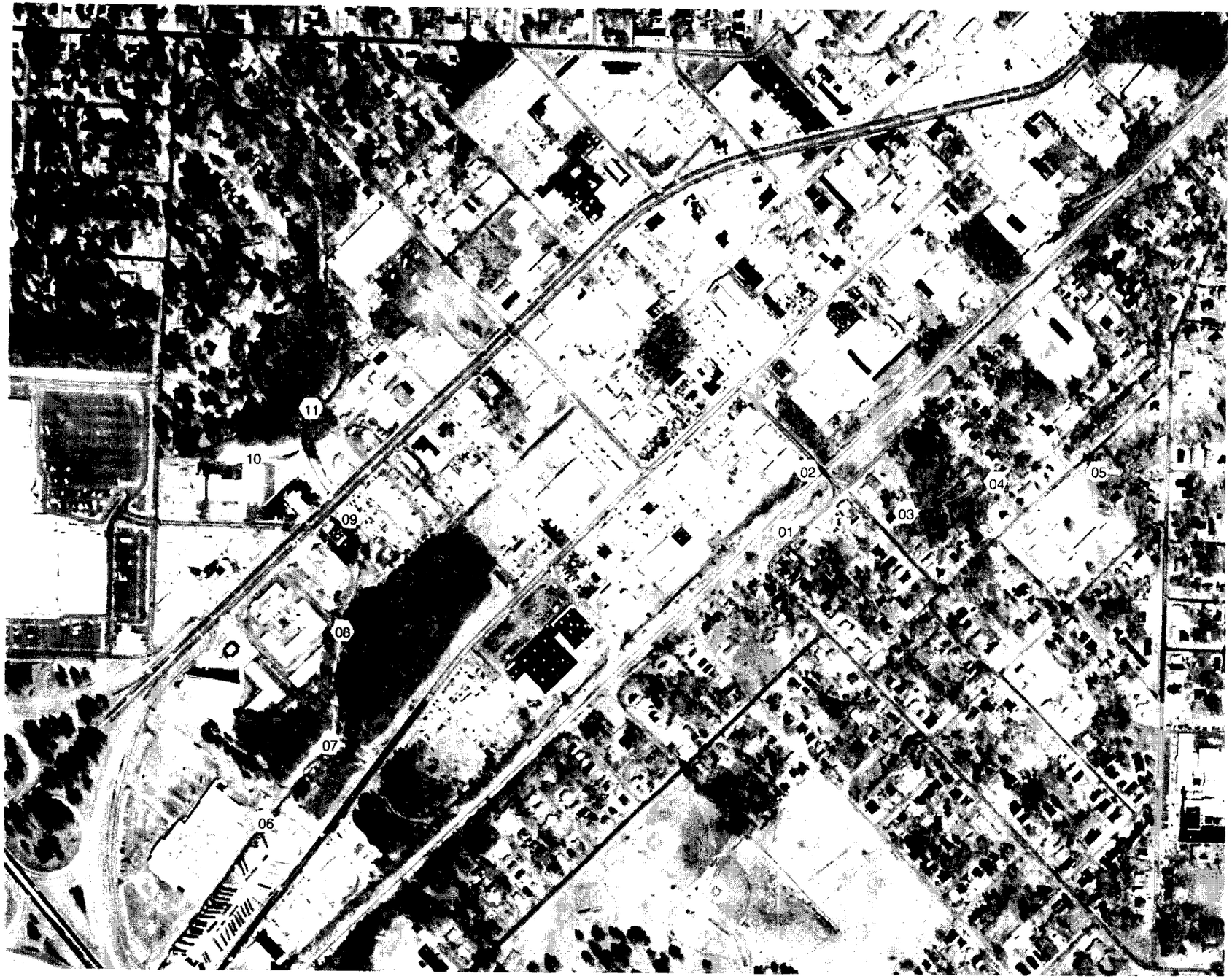
5.3 Northeast Drainage Pathway

For the purpose of sampling, the northeast drainage pathway begins at the confluence of the drainage ditch between the N.O. & N.E. Railroad and Courtesy Ford and a buried culvert running along the southwest side of Scooba Street. Surface water and sediment samples will be collected near this point of inception and at 500-foot intervals to a distance approximately 1,500 feet downstream of the site. Background surface water and sediment samples will be collected for comparison to northeast drainage pathway samples. Any obvious discharges which could potentially impact surface water or sediment quality may

also be sampled. Proposed surface water and sediment sample locations are depicted on Figure 5-1. All surface water and sediment samples will be analyzed for TCL SVOCs.

5.4 Gordon's Creek

Surface water and sediment samples will be collected immediately adjacent to the confluence of Gordon's Creek and the drainage ditch which runs through the Fill Area to the creek. Surface water and sediment samples will also be collected downstream from the confluence at 500-foot intervals to a distance approximately 1,500 feet from the site. Background surface water and sediment samples will be collected for comparison to Gordon's Creek samples. Any obvious discharges which could potentially impact surface water or sediment quality may also be sampled. All surface water and sediment samples will be analyzed for TCL SVOCs.



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LEGEND

12 Sediment & Surface Water Sample Location

GRAPHIC SCALE

0' 500' 1000'

MICHAEL PISANI & ASSOCIATES	
Environmental Management & Engineering Services	
New Orleans, Louisiana	Houston, Texas
TITLE:	FIGURE 5-1 SEDIMENT & SURFACE WATER SAMPLES
PROJECT:	FORMER GULF STATES CREOSOTING SITE
LOCATION:	HATTIESBURG, MISSISSIPPI
SCALE:	DWG. NO.:

6.0 Data Evaluation and Reporting

Once stratigraphic characterization and ground water screening activities have been completed, the data will be evaluated and summarized in an interim report. The report will include a table summarizing ground water screening analytical data, a potentiometric surface map generated using ground water elevation data from existing wells, and a map depicting proposed locations of monitoring wells. The installation of wells will not commence until MDEQ approval of proposed locations has been received.

Upon completion of the activities detailed in Sections 2.0 through 5.0, and once laboratory analytical reports are received and validated, the data obtained will be evaluated and summarized in an addendum to the RI Report. The report will include descriptions of field activities, summary data tables, maps depicting sample locations, and conclusions drawn from the new RI data. Laboratory reports, boring logs, well construction diagrams, and CPT logs will be provided as appendices to the report.

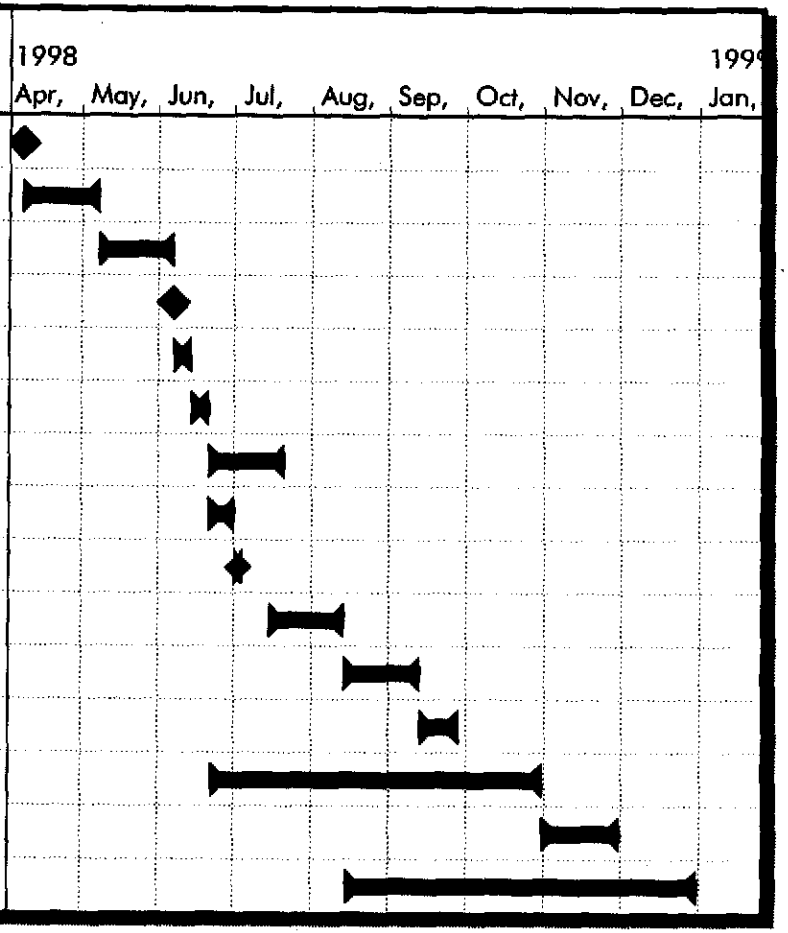
7.0 Schedule

The schedule for activities proposed in this revised work plan addendum is shown on Figure 7-1. It is important to note that field activities cannot begin until MDEQ approval of this work plan addendum is received, and that the installation of monitoring wells is contingent upon MDEQ approval of well locations proposed in the interim report. Once this work addendum is approved and subcontractors are procured, KMCC or its representatives will advise MDEQ of the schedule for field activities. Should the schedule change significantly, a revised schedule will be prepared and submitted to MDEQ.

Figure 7-1
Schedule for Additional
Site Investigation Activities

Gulf States Creosoting Site
Hattiesburg, Mississippi

Task Name	Planned Start	Duration in Days	Planned Finish
Submit Revised Work Plan Addendum	4/8/98	0	4/8/98
MDEQ Review and Approval	4/8/98	30	5/8/98
Procure Subcontractors/Mobilize to Field	5/8/98	30	6/7/98
Site Access Agreements in Place*	6/7/98	0	6/7/98
Stratigraphic Characterization	6/7/98	7	6/14/98
Ground Water Screening	6/14/98	7	6/21/98
GW Screening Laboratory Analysis	6/21/98	30	7/21/98
Soils Investigations	6/21/98	10	7/1/98
Surface Water/Sediment Sampling	7/1/98	3	7/4/98
Prepare and Submit Interim Report	7/15/98	30	8/14/98
MDEQ Review and Approval	8/14/98	30	9/13/98
Install and Sample Monitoring Wells	9/13/98	15	9/28/98
Laboratory Analysis	6/22/98	131	10/31/98
Data Validation	10/31/98	30	11/30/98
Prepare Addendum to RI Report	8/15/98	138	12/31/98



* All subsequent dates are subject to access agreements being in place by this date.