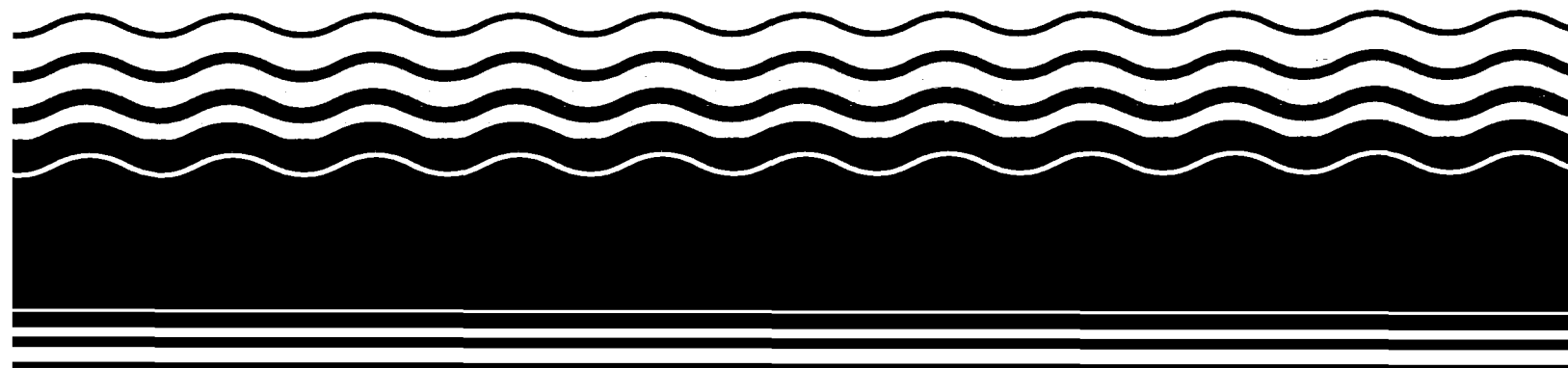




Superfund Record of Decision:

**American Creosote Works
(Winnfield Plant), LA**



REPORT DOCUMENTATION PAGE		1. REPORT NO. EPA/ROD/R06-93/086	2	3. Recipient's Accession No.	
4. Title and Subtitle SUPERFUND RECORD OF DECISION American Creosote Works (Winnfield Plant), LA First Remedial Action - Final				5. Report Date 04/28/93	
				6	
7. Author(s)				8. Performing Organization Rept. No.	
9. Performing Organization Name and Address 				10. Project Task/Work Unit No.	
				11. Contract(C) or Grant(G) No. (C) (G)	
				12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460	
13. Type of Report & Period Covered 800/800				14.	
15. Supplementary Notes PB94-964208					
16. Abstract (Limit: 200 words) <p>The 34-acre American Creosote Works site is an inactive timber treatment facility located in the southern portion of Winnfield, Winn Parish, Louisiana. Land use in the area is mixed agricultural, residential, and recreational, with forests and wetland areas located in the vicinity of the site. The site borders the Creosote Branch, a perennial creek which flows into the Pont de Luce Creek and later empties into the Dugdemona River, on two sides. An estimated 7,000 residents of the City of Winnfield use the Sparta Aquifer that underlies Winn Parish for their drinking water supply. From 1901 to 1910, the Bodcaw Lumber Company used the site for wood treatment and utilized creosote and pentachlorophenol (PCP) in the process. From 1910 until 1938, Louisiana Creosoting Company operated the wood treatment facility. In 1938, American Creosote Works of Louisiana, Inc. purchased the facility and operated it until 1977, when Dickson Lumber Company purchased the land. All onsite operations ceased in 1979. As a result of the threatened release of hazardous substances from two weakened storage tanks, a number of EPA investigations conducted in 1987 and 1988 resulted in the implementation of an emergency removal action. This removal action consisted of draining the tanks and constructing a berm around the process area in order to contain and stabilize the heavily-contaminated soil. When heavy rain threatened to overflow</p> <p>(See Attached Page)</p>					
17. Document Analysis a. Descriptors Record of Decision - American Creosote Works (Winnfield Plant), LA First Remedial Action - Final Contaminated Media: soil, sludge, debris Key Contaminants: organics (PAHs, phenols) b. Identifiers/Open-Ended Terms c. COSATI Field/Group					
18. Availability Statement		19. Security Class (This Report) None		21. No. of Pages 174	
		20. Security Class (This Page) None		22. Price	

Abstract (Continued)

and erode the berm, its height was increased and an overflow filtration system was installed. In 1989, a second EPA removal action was conducted and included consolidating fluids from all storage tanks into a single tank; constructing a drainage ditch to redirect surface water away from heavily-contaminated areas; backfilling a drainage ditch which ran through a contaminated area; filtering and discharging contaminated water from holding ponds, lagoons, storage tanks, and containment basins to the Creosote Branch; transferring and solidifying waste wood treating fluids and sludge from onsite storage tanks and containment areas; and dismantling, decontaminating, and piling building and process equipment. This ROD addresses contaminated soil, debris, surface sludge, and NAPLs as the source of onsite hazardous substances. The primary contaminants of concern affecting the soil, sludge, debris, and NAPLs are organics, including PAHs and phenols.

The selected remedial action for this site includes treating 250,000 yd³ of contaminated soil onsite using in-situ biological treatment; backfilling, capping, and revegetating all soil treated for organics; capping contaminated surface soil; excavating and incinerating onsite 25,000 yd³ of contaminated tars and sludge from the tar mat area, which contain greater than 3,000 ug/kg benzo(a)pyrene equivalents and/or greater than 50,000 ug/kg PCP; landfilling incinerator ash from the sludge remediation process onsite; decontaminating and landfilling all process equipment and debris onsite; pumping ground water to remove light and dense NAPLs; separating the NAPLs using an oil/water separator, followed by onsite or offsite treatment using thermal destruction; and utilizing the ground water extraction system for NAPL recovery to hydraulically control any offsite migration of ground water contamination. The estimated present worth cost for this remedial action is \$46,000,000, which includes an estimated annual O&M cost of \$750,000 for 30 years.

PERFORMANCE STANDARDS OR GOALS:

Chemical-specific cleanup goals are based on health-risk criteria and SDWA MCLs, and include benzo(a)pyrene 3,000 ug/kg for soil and sludge; PCP 7,400 ug/kg for sludge; and benzene 5 ug/l and benzo(a)pyrene 0.2 ug/l for NAPLs. Chemical-specific debris cleanup goals were not provided.

RECORD OF DECISION

**AMERICAN CREOSOTE WORKS, INC. SITE
WINNFIELD, LOUISIANA**

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

APRIL 1993

**DECLARATION FOR THE RECORD OF DECISION
AMERICAN CREOSOTE WORKS INC. SITE**

*Statutory Preference for Treatment
as a Principal Element
is Met and Five-Year Reviews are Required*

SITE NAME AND LOCATION

American Creosote Works, Inc. Site
Winnfield, Louisiana

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the American Creosote Works, Inc., in Winnfield, Louisiana, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record for this site.

The United States Environmental Protection Agency (EPA), Region 6, has consulted the Louisiana Department of Environmental Quality (LDEQ) on the proposed remedy, and LDEQ has written confirming agreement with the proposed remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

This Record of Decision (ROD) addresses the source of hazardous substances, as defined at Section 101(14) of CERCLA, 42 U.S.C. § 9601(14) and further defined at 40 CFR § 302.4, which includes surface sludges, subsurface pooled creosote and pentachlorophenol liquids defined as nonaqueous phased liquids (NAPLs), and contaminated soil and debris. This is the final remedy and addresses remediation of the source of shallow ground water contamination and contaminated soils at the American Creosote Works, Inc. site. The principal threats posed by the site will be eliminated through treatment.

RECORD OF DECISION

**AMERICAN CREOSOTE WORKS, INC. SITE
WINNFIELD, LOUISIANA**

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

APRIL 1993

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy will result in hazardous substances remaining on site for potentially several decades, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of public health, welfare, and the environment.

for W.B. Hartman
Joe D. Winkle
Acting Regional Administrator
U.S. EPA - Region 6

4/28/93
Date

This ROD addresses the principal threat at the site by thermal destruction (incineration) of the contaminated sludges and in-situ bioremediation of contaminated soils, thereby eliminating the potential for contaminant migration to surface waters and ground waters. The principal threat at the American Creosote Works, Inc., site is posed by NAPLs and contaminated soils which are contaminating the shallow ground water. Additional threats are from direct contact with creosote and pentachlorophenol sludges and soils at the surface of the American Creosote Works, Inc., site. The remedial objectives are to minimize potential exposure by direct contact and to reduce the potential for migration of contaminants into the surface waters and ground waters.

The major components of the selected remedy include:

- (1) Pump, separate and treat liquid contaminants. Light nonaqueous phased liquids (LNAPLs) and dense nonaqueous phased liquids (DNAPLs) would be pumped from the zones of pooled product beneath the site, separated from the water, and destroyed by on- or off- site incineration.
- (2) On-site incineration of 25,000 cubic yards of highly contaminated tars and sludges. 25,000 cubic yards of tars and sludges located in the "sludge overflow area" of the site, which is the most highly contaminated material, would be excavated and thermally treated on-site. The incinerator ash would be landfilled on-site.
- (3) In-situ biological treatment of 250,000 cubic yards of contaminated soils. The remainder of the site's contaminated soils/sludges from process areas and buried pits would be addressed in-situ by injecting, via wells, nutrients, microbes and oxygen as is necessary to attain stated treatment goals. The ground water extraction system used for NAPL recovery would also be used to hydraulically control any off-site migration of ground water contamination and allow for potential recirculation of the bacteria for efficient treatment.

Because of the expected pace of remediation, the EPA would categorize this site remediation as a Long Term Remedial Action. What this means is that the implementation of this alternative is expected to take several years. The EPA will be responsible for 90% funding beyond the customary 1 year time associated with the operational and functional period of the completed remedy. 90% funding will continue until such time as the established remediation goals are met. The State of Louisiana will be responsible for 10% of the costs. This component is innovative and is expected to provide permanent treatment.

- (4) Capping of surface contaminated soils, decontamination and on-site landfilling of process equipment and scrap. Grading and capping would be done to complement the above remedial actions.

**AMERICAN CREOSOTE WORKS, INC.
SUPERFUND SITE
DECISION SUMMARY**

1.0 SITE LOCATION AND DESCRIPTION

The American Creosote Works Inc., site, hereinafter referred to as American Creosote, is located in the southern portion of the City of Winnfield, in Winn Parish, Louisiana (See Figure 1). The property consists of approximately 34 acres east of Front Street and north of Watts and Grove Streets as depicted in Figure 2. The facility is bounded on two sides by Creosote Branch, a perennial creek which flows in a 10-12 foot deep valley. Surface drainage is predominantly via three man-made ditches and a single natural drainage pathway which flow into Creosote Branch. East of the former facility is a denuded area containing a mat of tar-like material, and further east is a densely vegetated area surrounding the City's sewage treatment plant.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 SITE OPERATIONS HISTORY


The facility was used for treating timber with creosote and pentachlorophenol (PCP) for over 80 years. Both creosote and PCP have been identified as hazardous substances as defined at Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9601(14) and further defined at 40 Code of Federal Regulations (CFR) § 302.4. The American Creosote site began operations in 1901 under the direction of the Bodcaw Lumber Company. This firm owned 61 acres of land in the area of the site. In 1910, Bodcaw Lumber sold 22 acres of the property to the Louisiana Creosoting Company. Records of site operations for the period of ownership by either of these two companies are unavailable. In 1938, American Creosote Works of Louisiana, Inc., purchased the property from Louisiana Creosoting. American Creosote Works ran the facility from 1938 until 1977, during which time it acquired an additional 12 acres of adjoining

RECORD OF DECISION
CONCURRENCE DOCUMENTATION

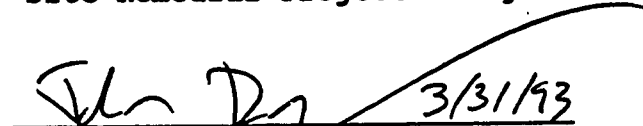
FOR THE

AMERICAN CREOSOTE WORKS, INC. SUPERFUND SITE

WINNFIELD, LOUISIANA

 3/31/93

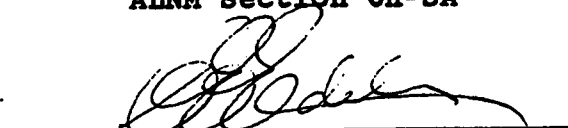
Robert M. Griswold, P.E.
Site Remedial Project Manager

 3/31/93

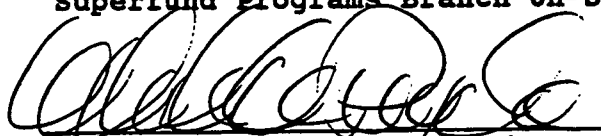
John Dugdale
Office of Regional Counsel
Site Attorney

 4-19-93

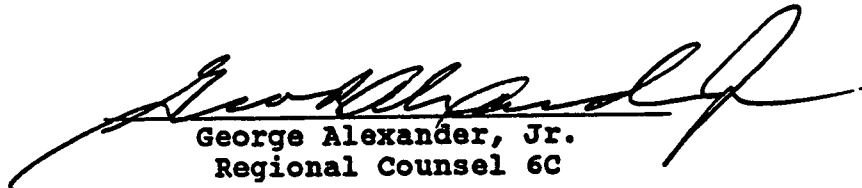
Stephen Gilrein, Chief
ALNM Section 6H-SA



Carl Edlund, Chief
Superfund Programs Branch 6H-8



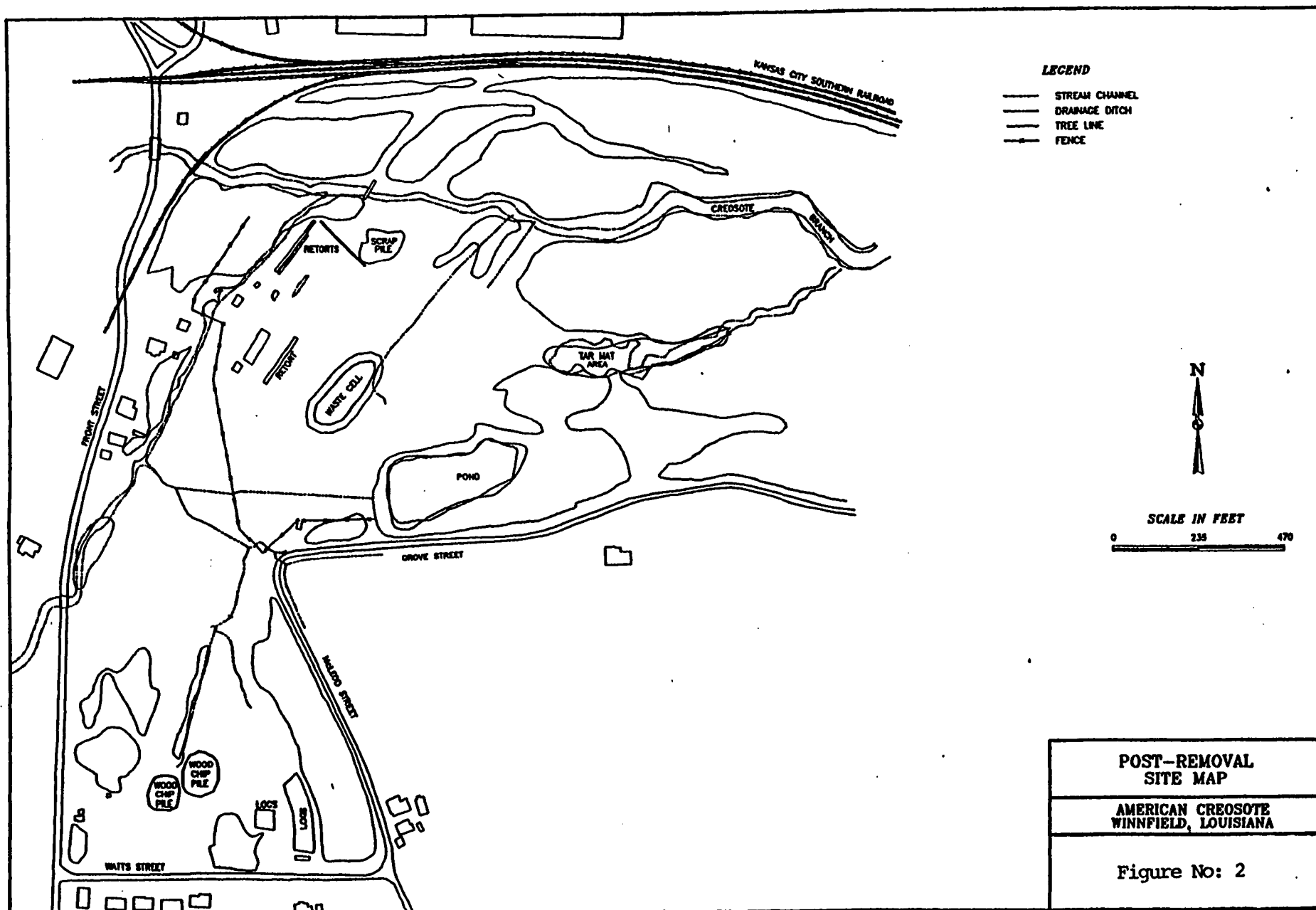
Mark Peycke, Acting Chief
Office of Regional Counsel
Hazardous Waste Branch 6C-W

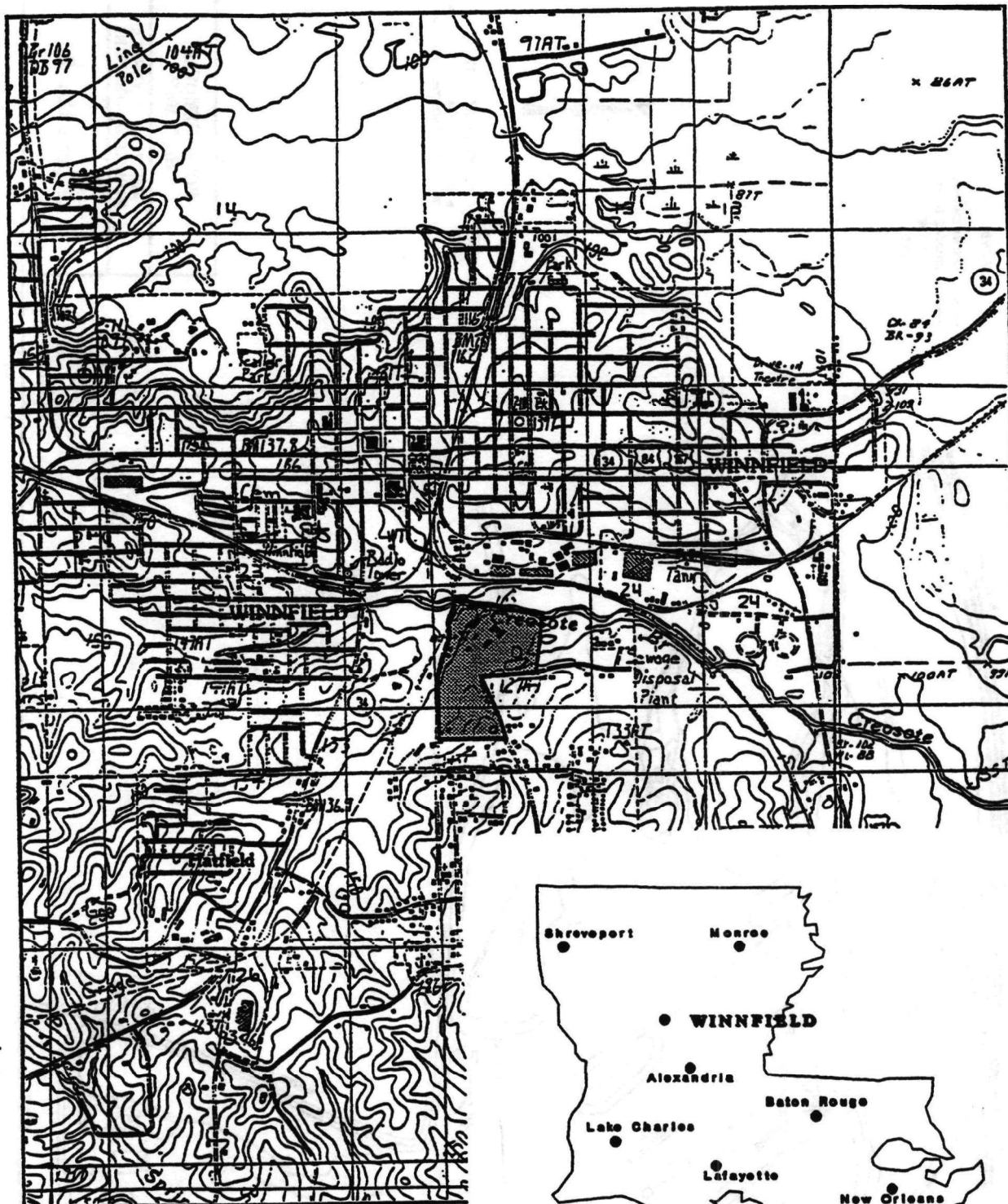


George Alexander, Jr.
Regional Counsel 6C



Allyn M. Davis
Hazardous Waste Management
Division 6H





Scale in Feet
0 2000 4000

Source: USGS 7.5 min. Winnfield East & West, La. Quadrangles

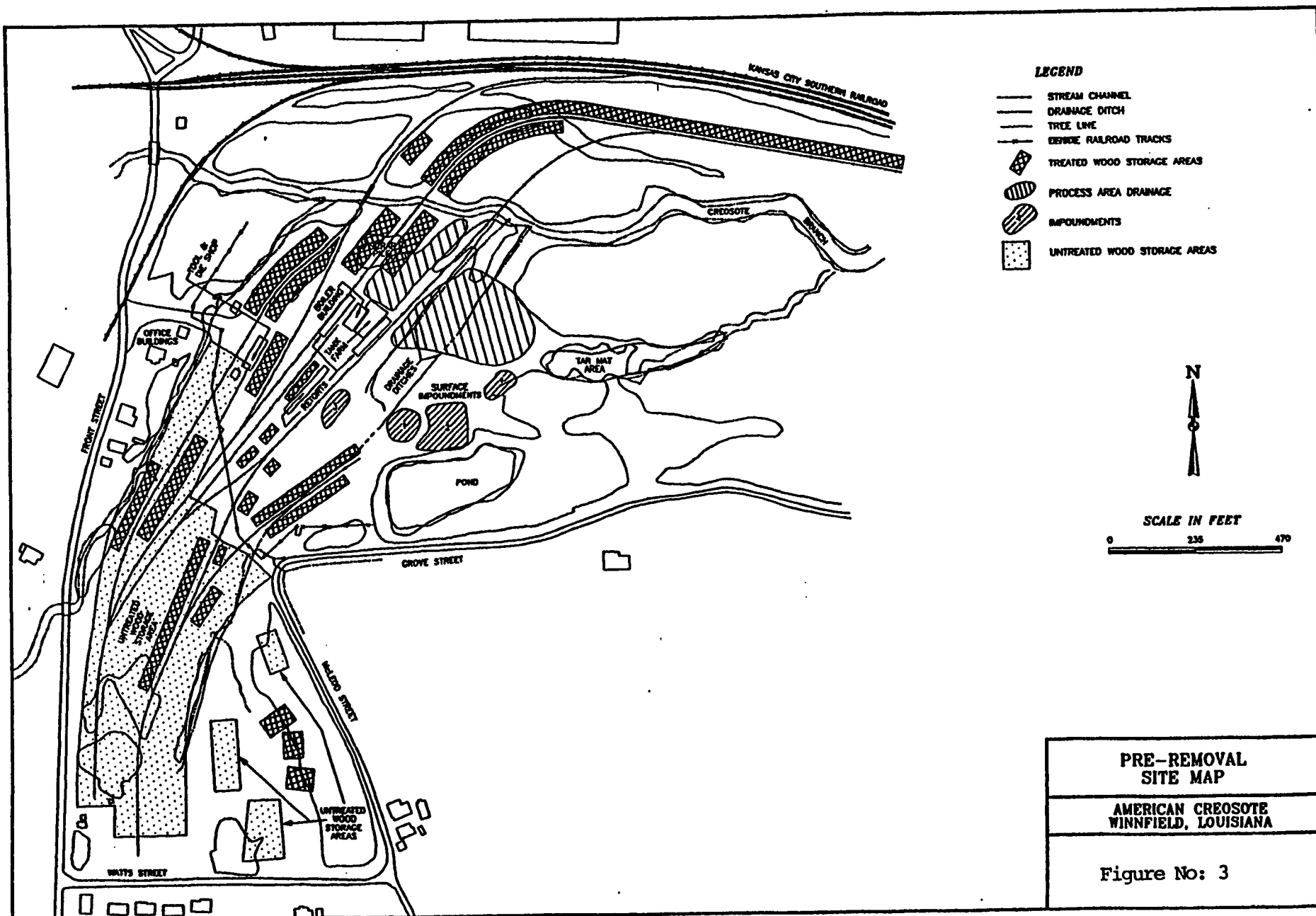


American Creosote
Winnfield, Louisiana

Site Location Map

Figure No.:

1



property. In 1977, the facility was purchased by the Dickson Lumber Company which was later declared bankrupt and seized by the City of Winnfield for taxes. The property was then purchased by Stallworth Timber Company in 1980.

Aerial photographs were utilized to interpret site conditions over the operational history, as reported below and shown on Figure 3. Aerial photographs provide evidence that the facility was well established by 1940. An office building was present west of Creosote Branch along Front Street and just south of the main entrance. Wood-treating operations were concentrated in the north-central portion of the site (the process area). The process area consisted of a boiler building flanked by pressure chambers, or retorts. A tank farm consisting of several vertical tanks lacking secondary containment was present immediately east of the boiler building. The southern half of the property was used primarily for debarking, cutting, and staging timbers prior to treatment.

Several sets of railroad tracks, used to transport treated and untreated lumber around the facility, ran from the southwest corner of the site north and northeast through the process area to the northeast portion of the site. The railroad tracks crossed Creosote Branch on three trestles north of the process area. Stacks of untreated lumber were present during plant operations in the southwest and western portions of the site. Stacks of treated lumber were evident in the central and north-central (north of Creosote Branch) portions of the site. In the 1940 photographs an unnamed drainage pathway in the northeast portion of the site follows a meandering path from the process area north and east (through an area later referred to as the "tar mat") to a confluence with Creosote Branch.

Between late 1950 and mid 1952, two impoundments were constructed east of the process area (Impoundments 1 and 2 on Figure 3). These impoundments probably received liquid wastes from the wood treating process including water, tree sap, creosote, petroleum distillates, and PCP. A third impoundment was constructed east of a new retort in the early to mid 1960's (Impoundment 3 on Figure 3). Based on

Judging from the quantity of treated and untreated wood stockpiled onsite, operations were taking place on a much smaller scale after 1980, than during the period of ownership by American Creosote Works, Inc. By 1983, Impoundments 2 and 4 had been backfilled, presumably with wood chips and soil, and the impoundment retaining walls had been demolished. Impoundment 3 was apparently still active. Evidence of continuing wood treating operations is present in photographs taken in 1983 and 1984.

In summary, the facility was used for over 80 years as a wood treating operation that utilized creosote and PCP in the treatment process. The facility also incorporated petroleum products as a carrier fluid for the creosote and/or PCP. Based on a review of available records and site sampling activities there is no reason to believe this facility used inorganic compounds (i.e., chromated copper arsenate, ammoniacal copper arsenate, etc.) in the treatment process.

2.2 ENFORCEMENT ACTIVITIES

The Louisiana Department of Environmental Quality (LDEQ) issued a letter of warning to Stallworth Timber Company in January 1983, in response to releases of contaminants to the environment. In December 1984, LDEQ found no environmental improvements and issued a Compliance Order the next month. In June 1985, LDEQ inspectors found the site abandoned. In March 1987, LDEQ referred the matter to the Environmental Protection Agency (EPA) Region 6, requesting it to take action. Under EPA's direction, several investigations of the site were conducted in 1987 and 1988. In 1989, the EPA Emergency Response Branch conducted a removal action pursuant to Section 106 CERCLA, 42 U.S.C. § 9606, having determined that actual or threatened releases of hazardous substances from the site posed an imminent and substantial endangerment to the human health or the environment. This response action at the American Creosote site included source control and contaminant migration control actions. At the time the site was found abandoned, it consisted of 15 tanks, four pressure vessels or retorts, a boiler building, a tool and die shop, offices and other administrative buildings, and several unlined waste impoundments.

the aerial photographs, the mid- to late- 1960's appear to be the period of maximum activity or production at the American Creosote site. Records discovered in a shed on site provide information regarding the magnitude of the American Creosote operation during that time. According to these records, for a seven-month period ending July 31, 1966, more than 750,000 gallons of petroleum distillate, 40,000 gallons of creosote, and 54,000 pounds of PCP were used to treat approximately 7.5 million board-feet of wood.

Impoundment 1 was apparently backfilled with soil and wood chips between 1967 and 1970. Apparent in the 1973 photographs is the development of the tar mat area, perhaps resulting from a single spill event. Located approximately 500 feet east of the process area, the tar mat is a large, flat, asphalt-like layer which extends over a marshy portion of the site. A number of mature pine trees located within the tar mat appear to have died shortly before the 1973 photographs were taken. Between 1973 and 1976, extensive earth moving operations north and east of the process area covered up most of the darkly stained soils and obliterated the remains of Impoundment 1. Impoundment 4 (Figure 3) was built immediately north of Impoundment 2 and may have been used to contain drainage from Impoundment 2. A pond was constructed just south of Impoundment 2 to collect and store water for emergency fire fighting purposes. Based on the volume of treated and untreated wood present onsite, wood treating operations may have been declining during this period.

By 1979, wood treating operations at the American Creosote site appear to have ceased. No untreated wood and very little treated wood are present in aerial photographs taken at that time. All railroad tracks had been removed from the site. This roughly coincides with the time at which the site owner, Dickson Lumber Company, was declared bankrupt and seized by the City of Winnfield. Aerial photographs taken in 1981, shortly after the site was purchased by Stallworth Timber Company, provide evidence of the resumption of wood treating activities at the site. A large drainage ditch was excavated from the south-central portion of the site north and east between the process area and Impoundment 2.

conducted an emergency removal action at the site pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606. The following steps were taken to stabilize the site.

- Fluids from all storage tanks were consolidated into a single tank (approximately 10,000 gallons of creosote and PCP treating fluids, 51,000 gallons of contaminated water, and 56,000 gallons of sludge).
- An east-west drainage ditch was constructed to redirect surface water originating from the southern portion of the site away from the heavily contaminated northern portion.
- The largest north-south drainage ditch running through the most contaminated area was backfilled.
- Contaminated water from holding ponds, lagoons, storage tanks, and containment basins was filtered and discharged to Creosote Branch.
- Waste wood treating fluids and sludges from storage tanks and contaminant areas were transferred to a former impoundment (Impoundment 3), solidified with fly ash and rice hulls, and capped.
- Building and process equipment were dismantled and an attempt was made to decontaminate the debris. This debris was placed in a scrap pile immediately northwest of the process area.

3.0 COMMUNITY PARTICIPATION

EPA's community relations activities started during the removal action with door-to-door interviews with residents surrounding the site. During the 1989 removal action residents of the community were also sent an information bulletin and regular meetings were held with the Mayor and Police Chief of Winnfield. The site was proposed for inclusion on the National Priorities List (NPL) in February 1992 and placed on the NPL in October 1992. Compilation

In December 1991, representatives of EPA, the United States Department of Justice, and the Stallworth Timber Company met. The purpose of the meeting was to discuss reimbursement to the United States Government for past response costs incurred and future costs to be incurred at the site by the United States. During the course of this meeting the United States learned that the Stallworth Timber Company had sold the property in 1990 to Reinhardt Investments located in the Netherlands Antilles. In addition, during this meeting the Stallworth Timber Company was provided the opportunity to conduct the Remedial Investigation (RI) and future activities (i.e., Feasibility Study (FS), Remedial Design (RD), Remedial Action (RA)) associated with the site. The Stallworth Timber Company indicated in the meeting and subsequently by letter dated December 12, 1992, its reluctance to conduct this work due to financial inability. Further inquiries to Reinhardt Investments have provided no response.

2.3 RESPONSE ACTION

The results from EPA's investigative efforts provided evidence that the site posed a significant human health and environmental threat. In May 1988, the EPA issued an Administrative Order to Stallworth Timber Company to fence and post warning signs around the most contaminated portions of the site. In July 1988, the fencing of the site was completed by Stallworth Timber Company. During oversight monitoring of this action, an EPA's Emergency Response Cleanup Services (ERCS) contractor noticed that two storage tanks were in imminent danger of rupturing. Stallworth Timber Company was verbally notified by EPA of this threat and declined the opportunity to respond. This prompted immediate mobilization of an ERCS team to drain the tanks and construct a berm around the process area in order to contain and stabilize the heavily contaminated soils. Following this work, heavy rain threatened to overflow and erode the berm. Consequently, ERCS was remobilized to extend the berm height and install an overflow filtration system.

In February 1989, the EPA issued a Unilateral Administrative Order to the Stallworth Timber Company for a removal action to address the immediate threats posed by the site that were found during the previous investigations. Stallworth Timber Company declined to take action, and between March 17 and August 31, 1989, EPA

EPA and LDEQ evaluated written and verbal comments recorded during the aforementioned comment period and considered the cost for full-scale incineration at approximately \$185 million. In March 1993, LDEQ and EPA released a new proposed remedy for the American Creosote site which combined elements of remedies previously proposed and added in-situ biological treatment for the bulk of the buried contaminated soils. The suggested remedy consisted of the following components:

- (1) Pump, separate and treat liquid contaminants. LNAPLs and DNAPLs would be pumped from the zones of pooled product beneath the site, separated from the water, and destroyed by on- or off- site incineration. (Proposed in July, 1992.)
- (2) On site incineration of 25,000 cubic yards of highly contaminated tars and sludges. 25,000 cubic yards of tars and sludges located in the "sludge overflow area" of the site, which is the most highly contaminated material, would be excavated and thermally treated on-site. Ash would be landfilled on-site. (Proposed in August, 1992.)
- (3) In-situ biological treatment of 250,000 cubic yards of contaminated soils. The remainder of the site's contaminated soils/sludges from process areas and buried pits would be addressed in-situ by injecting, via wells, nutrients, microbes and oxygen as is necessary to attain stated treatment goals. The ground water extraction system used for NAPL recovery would also be used to hydraulically control any off site migration of ground water contamination and allow for recirculation of the bacteria for efficient treatment.

Because of the expected pace of remediation, the EPA would categorize this site remediation as a Long Term Remedial Action. What this means is the EPA will be responsible for 90% funding beyond the customary 1 year time period; 90% funding will continue until such time as the established remediation goals are met. The State of Louisiana will be responsible for 10% of the costs. This component is innovative and is expected to provide permanent treatment. (Based on comments/ information received during the public comment period.)

of the administrative record for the remedial action also began in February 1992 along with a public open house to notify the public of planned activities. A subsequent open house was held in July 1992, to discuss the RI, FS, and the administrative record for the project. During and subsequent to the RI numerous contacts were made by EPA representatives with the Mayor of Winnfield.

A Proposed Plan for the American Creosote site was released to the public on July 29, 1992, after discussions with LDEQ. The Proposed Plan was sent to individuals on the mailing list for the project and to the administrative record repository locations at the Winnfield Public Library and at the offices of LDEQ in Baton Rouge, Louisiana and EPA Region 6 in Dallas, Texas. The notice for availability of the RI/FS, Proposed Plan, and Administrative Record, and the announcement for the public meeting was advertised on July 29, 1992 in the Winnfield Enterprise-News-American. On August 3, 1992, EPA held a public meeting with transcripts taken and subsequently added to the Administrative Record. The public meeting was attended by representatives from LDEQ and Louisiana's Office of Public Health. On August 26, 1992, EPA received a written request from the Mayor of Winnfield requesting an extension to the comment period and the need for an additional meeting. The public comment period was subsequently extended for an additional 30 days and a second public meeting was held on September 15, 1992.

Based on preliminary discussions between EPA and the State of Louisiana, EPA had issued a recommendation in the July 29 proposed plan for capping surface wastes and pumping and treatment of contaminated ground water and subsurface oils. Subsequent evaluations within EPA, and discussions with the State and the community (based on the August 3, 1992, public meeting) had shown that incineration of the wastes was more acceptable to the public in meeting goals to remediate the site. In response to this, EPA issued a notice and the local news media published articles about the possible use of onsite incineration in early September 1992. During the public meeting of September 15, 1992, the city council and mayor, and over 50 individuals from the local area, responded to EPA's proposed alternatives to remediate the site. The number of people at this meeting was significantly greater than the previous one that was attended only by 4 individuals.

A moderate risk is present primarily from direct contact of the surface materials in the tar mat area and to a lesser degree the surface soils from the process areas of the site. The objectives for remediation of this site are to prevent direct contact and/or ingestion of hazardous substances, pollutants, or contaminants that pose a significant human health or environmental risk. The sediments within Creosote Branch are below criteria that represent a threat to human health, but do represent some environmental threats when disturbed. However, the environmental threats posed by removal of these sediments both to wetlands and possible releases during excavation provides a greater threat than leaving the materials undisturbed. The remedy outlined in this ROD represents the final remedial action at the site.

5.0 SITE CHARACTERISTICS

5.1 DEMOGRAPHY AND LAND USE IN THE AREA OF THE SITE

Land in the Winnfield area supports agricultural, residential, and recreational uses. Agricultural uses are localized in a few small areas between forested lands and residential housing. The crop land is cultivated for several different types of crops including soybeans, wheat, cotton, and corn. The forests within the area are used for lumber production and several lumber mills exist in the surrounding area of Winnfield. A large lumbermill which produces fence posts and other forestry products is located immediately north of Creosote Branch adjacent to the Kansas-Missouri Railroad. Production of lumber has been a primary industry in the area for several decades. Lumber produced includes wood from trees such as the white pine, cypress, hickory, and oak.

Residential neighborhoods are present in all directions from the site. The City of Winnfield has a population of approximately 7,000 residents. Numerous businesses and private residences are located within the city, which covers approximately two square miles. A housing development lies to the south of the American Creosote site along McLeod and Watts Streets. Based on the location of this site with respect to these surrounding properties, a residential rather than industrial scenario appears to be appropriate for considering potential future land usage.

- (4) Capping of surface contaminated soils, decontamination and on-site landfilling of process equipment and scrap. Grading and capping would be done to complement the above remedial actions. (Proposed in July, 1992.)

The net cost of this set of remedies was estimated between \$40-\$50 million which is significantly less than the total cost of the incineration remedial option (approximately \$185 million) and more environmentally protective than the original pumping/capping proposal. Biological treatment of creosote-contaminated soils is being attempted at numerous wood treater sites nationwide. Although biological treatment for the site was initially screened from consideration early in the Feasibility Study, in light of the comments received and considering the extreme cost of complete on-site incineration, the EPA and LDEQ reconsidered bioremediation.

A response to the comments received during the comment period is included in the Responsiveness Summary which is part of this Record of Decision (ROD). This decision document presents the selected remedial action which was chosen in accordance with the CERCLA, the administrative record, and to the extent practicable, the National Contingency Plan (NCP), 40 CFR Part 300.

4.0 SCOPE AND ROLE OF RESPONSE ACTION

The primary focus of the American Creosote RI/FS and this ROD was to evaluate findings of previous investigations, to collect additional information that would assist in characterizing current and future risks, and to develop and evaluate long term and permanent remedial action alternatives. This is the only planned operable unit for this site.

Based on the evaluation of the wood treating process, findings of previous investigations and the results of the RI field investigation, the sources and the areas of environmental contamination at the American Creosote site have been delineated.

The principal risks to the residents is from creosote and PCP that is found in subsurface soils and in pooled layers within the subsurface, together these sources are contaminating ground water.

5.3 GEOLOGY

The Cockfield Formation is the only bedrock unit outcropping at the American Creosote site. It is nonmarine in origin, derived from predominantly continental sediments, and consists of interbedded silty sands and lignitic shales. The presence of lignite within the formation is an identifying characteristic. The individual beds are very thin, ranging from less than an inch to a few feet thick. The Cockfield Formation is approximately 150 feet thick in the Winnfield area.

The process area at the American Creosote site is underlain by Prairie Terrace deposits. These unconsolidated and poorly bedded deposits are up to 100 feet thick and are composed of gravels, sands, and silts. The grading within the terrace deposits show a fining upward sequence with gravels common at the base. The Pleistocene deposits lie unconformable on the Cockfield Formation in the northern portion of the site, and form a wedge which thins to the south. This relationship is illustrated in plan view and in cross-section presented on Figures 4 and 5.

5.4 HYDROGEOLOGY

Potable water is found primarily in the confined aquifers within the Sparta Sand and Cockfield Formation. Fresh water is present in the upper portion of the Sparta Aquifer underlying north-central Louisiana. A saline layer is present at depth. The Cockfield Aquifer consists of interbedded silty sands and produces lower yields of potable water than that of the Sparta Sand.

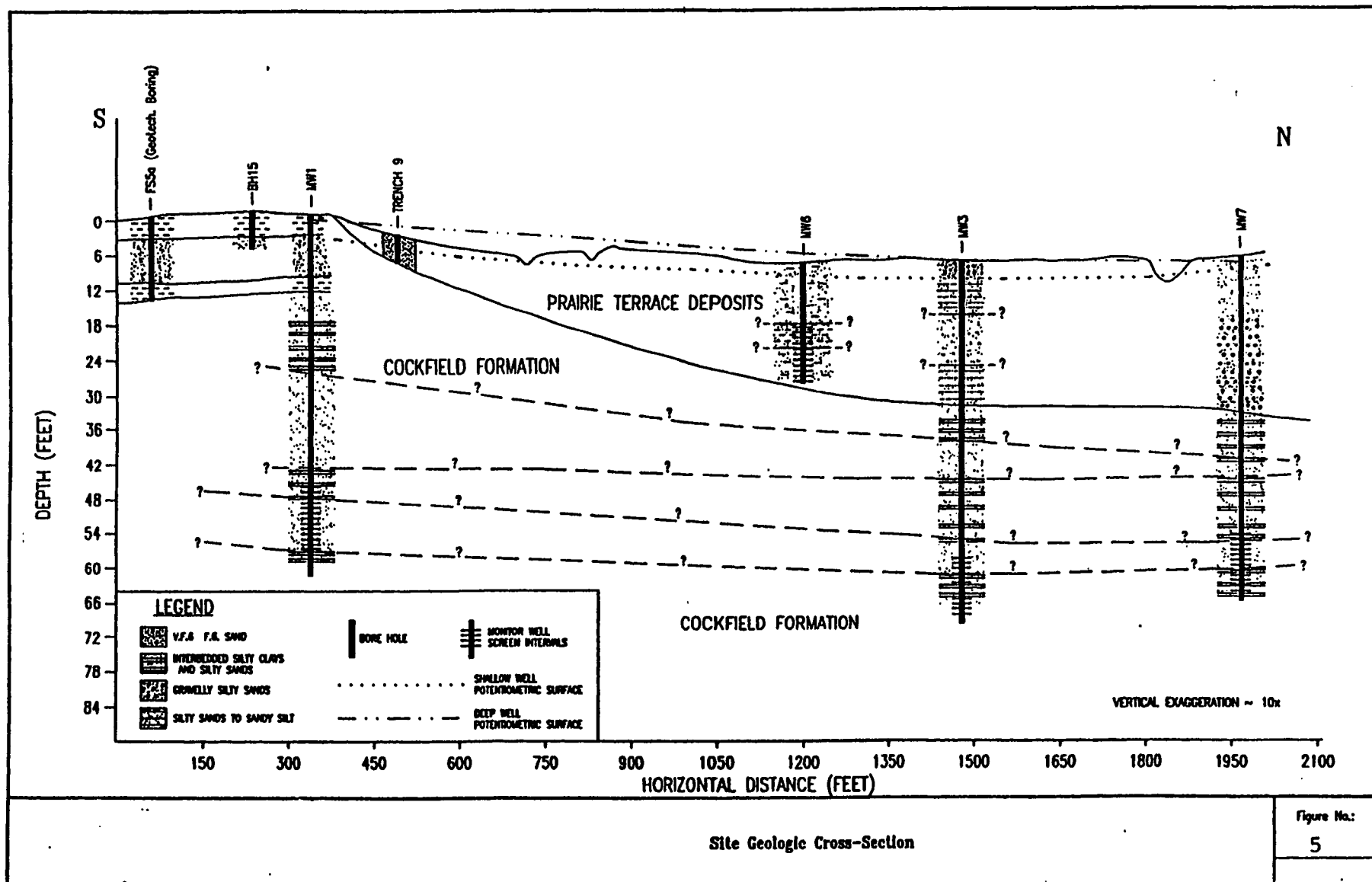
Underlying Winn Parish, the more permeable Sparta Aquifer is found at depths of 180 to 300 feet and yields large quantities of fresh water. The Cockfield Aquifer, which lies on top of the Sparta Sand, has pockets of interbedded silty sands that have lower yields in this area and is not economical for municipal well withdrawal. Heavy withdrawal from municipal and industrial wells in Ouachita Parish, northeast of Winn Parish, has changed the Winn Parish regional ground water flow direction from east-southeast to north-northeast. The fresh/saline water interface is found at depths of approximately 600 feet. The increase in the amount of

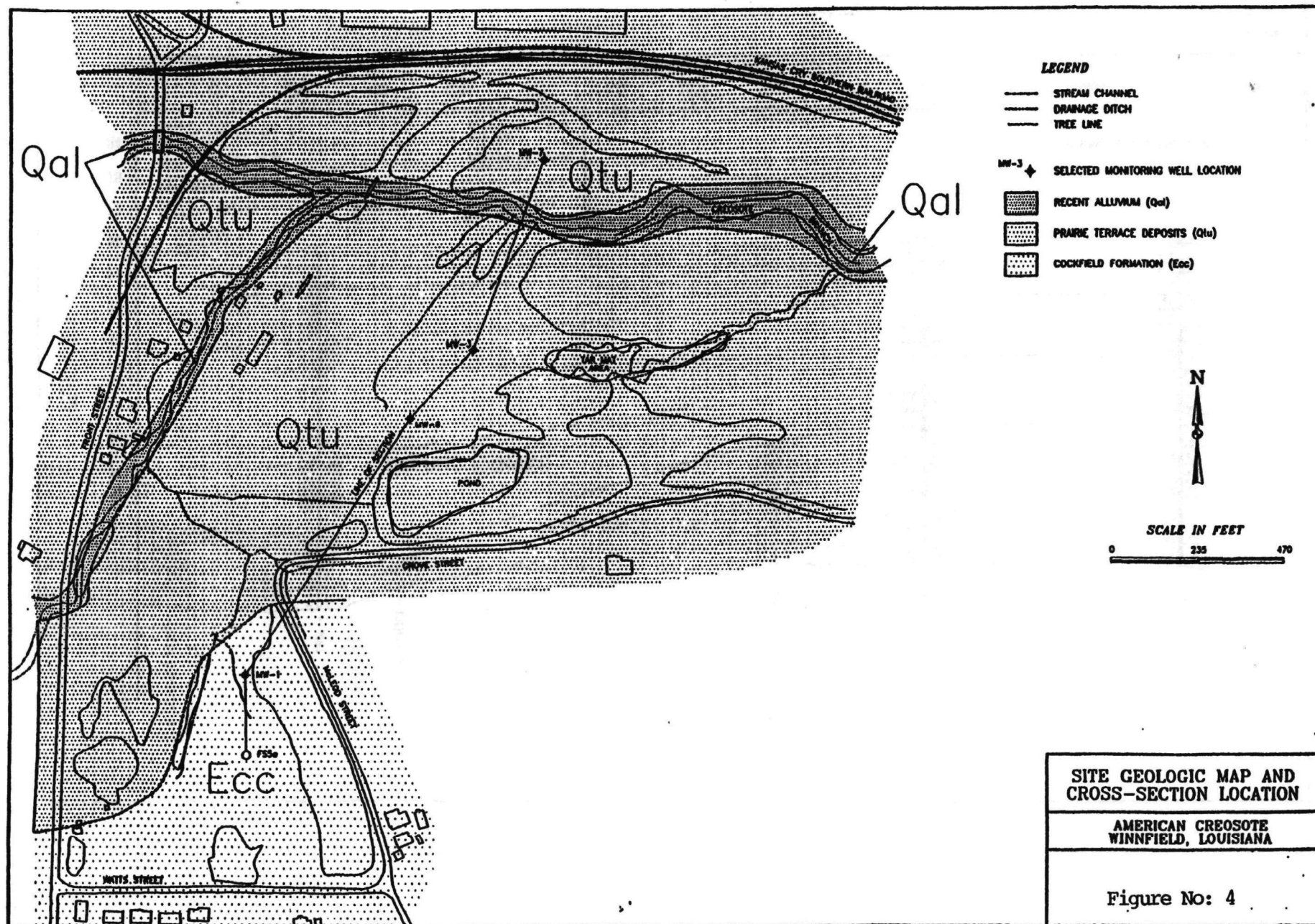
5.2 SURFACE WATER HYDROLOGY

Surface water from the American Creosote site drains into Creosote Branch, which crosses the western and northern portions of the site. Creosote Branch is a small creek with banks 10 to 12 feet high. Approximately two miles east to southeast of the site, the Creosote Branch joins with the Port de Luce Creek, which flows for another three miles to the southeast and then joins Cedar Creek before emptying into the Dugdemona River.

The southern part of the site is topographically higher than the northern part of the site due to outcrops of bedrock in this area. A manmade drainage ditch runs north-south through the middle of the southern portion of the site. In the southeast portion of the site the land is dissected to about one to three feet deep in many places exposing the bedrock. Rapid runoff in this area was observed several times during the RI. The southwestern portion of the site is characterized by more recent alluvial sediments of low relief draining by overland flow to the north. This portion of the site drains very slowly and is commonly the location of large standing pools of water. Drainage from the southern part of the site is intercepted by the east-west drainage ditch excavated by the EPA in 1989. These drainage ditches are approximately five feet deep and drain west towards Creosote Branch.

Surface water flow in the process and impoundment areas of the site is best described by dividing this portion into three areas. The northwestern third is drained primarily by overland flow. This water enters Creosote Branch west and northwest of the process area. The topography in this portion of the site has very little relief and water tends to pool or stand following heavy rains. One large area where water tends to pond is located at the south end of the existing waste cell. During the RI, water in this area was approximately two to three feet deep. The north-central portion of the site is drained by several manmade ditches. These drainage ditches run northward into Creosote Branch. Surface waters in the north-east portion of the site flow into an unnamed natural drainage pathway running eastward and northward then enter Creosote Branch just upstream of the sewage treatment plant. This creek is the site of a large tar mat which formed as a result of site runoff and/or discharges from the process area.





ground water usage from municipal and industrial wells has lowered the water table up to 120 feet in Winn Parish which has caused a rise in the underlying saline water as reported in the RI.

Ground water within the Prairie Terrace deposits appears to be under confined conditions. During drilling, saturated materials were first encountered at a depth of eight to ten feet. Over a period of several hours, water would rise in the borehole to within a few feet of the surface. Saturated conditions continued downward throughout the alluvial deposits. In some instances, interbedded silt of the Cockfield Formation encountered between the shallow and deep aquifer zones was found to be unsaturated. Potentiometric contours indicate the shallow aquifer zone discharges to Creosote Branch along the northern and southern boundaries. Flow direction within most of the site is to the north, towards Creosote Branch.

The presence of an upward vertical gradient suggests ground water flow may exist from the deep to the shallow aquifer zone. This flow would be impeded by the interbedded silts and sandy silts present between these aquifer zones.

5.5 FIELD INVESTIGATIONS

A field investigation was conducted from February 10, 1992, to March 15, 1992. The investigation was conducted according to plans and procedures described in the Field Sampling Plan that is part of the administrative record. The field investigation included the following tasks:

- Site survey and mapping
- Surface soil investigation
- Surface water and sediment investigation
- Subsurface soil investigation
- Ground water investigation
- Waste characterization sampling

Extensive perimeter air sampling was not considered to be necessary during the RI since previous investigations found no air emissions at the site perimeter caused by the investigative efforts. During these investigations it was noted that approximately 2,500 cubic yards of debris are present on the surface and buried at the

American Creosote site. Limited alternative approaches are available for addressing debris at the site. Based on findings made during the removal action, it is assumed that the debris on the surface (i.e., retort vessels, tanks, concrete, etc.) has been decontaminated to the maximum extent practicable. This debris along with any additional debris discovered during excavations will be buried in an acceptable location within the site boundaries that does not affect any selected remedy as described elsewhere within this ROD.

Table 1 provides a listing of previous investigations at the American Creosote site. The data from these previous investigations, as presented in Appendix A, were utilized to supplement the RI data where appropriate. The sampling locations from these investigations are presented in Figure 6, and are referenced in the following discussions. Soil data from previous investigations are most useful for those areas not disturbed during the 1989 removal action at the site. Soil sampling in the current investigation focused on providing information in those areas modified during the removal action or not covered by previous sampling.

The following discussion on sampling results relate primarily to creosote, PCP, and the contaminated petroleum carrier fluids that were utilized at the site and that constitute hazardous substances as defined at CERCLA Section 101(14), 42 U.S.C. § 9601(14), and further defined at 40 CFR § 302.4. The risk assessment evaluated all compounds that were detected and the results of these analyses are presented elsewhere in this ROD. Creosote, which is made up of polynuclear aromatic hydrocarbons (PAHs), consists of over 300 compounds. Some of these compounds have been identified as potential carcinogens, the most potent of which is benzo(a)pyrene (B(a)P). The carcinogenic PAH compounds have been equated to B(a)P by multiplying the concentration of the compound by a correlation factor (e.g., chrysene concentrations are multiplied by 0.01 to give B(a)P equivalent). This calculation is conducted because creosote compounds other than B(a)P present significantly less risk and it would be overly conservative to assume they were as potent as B(a)P.

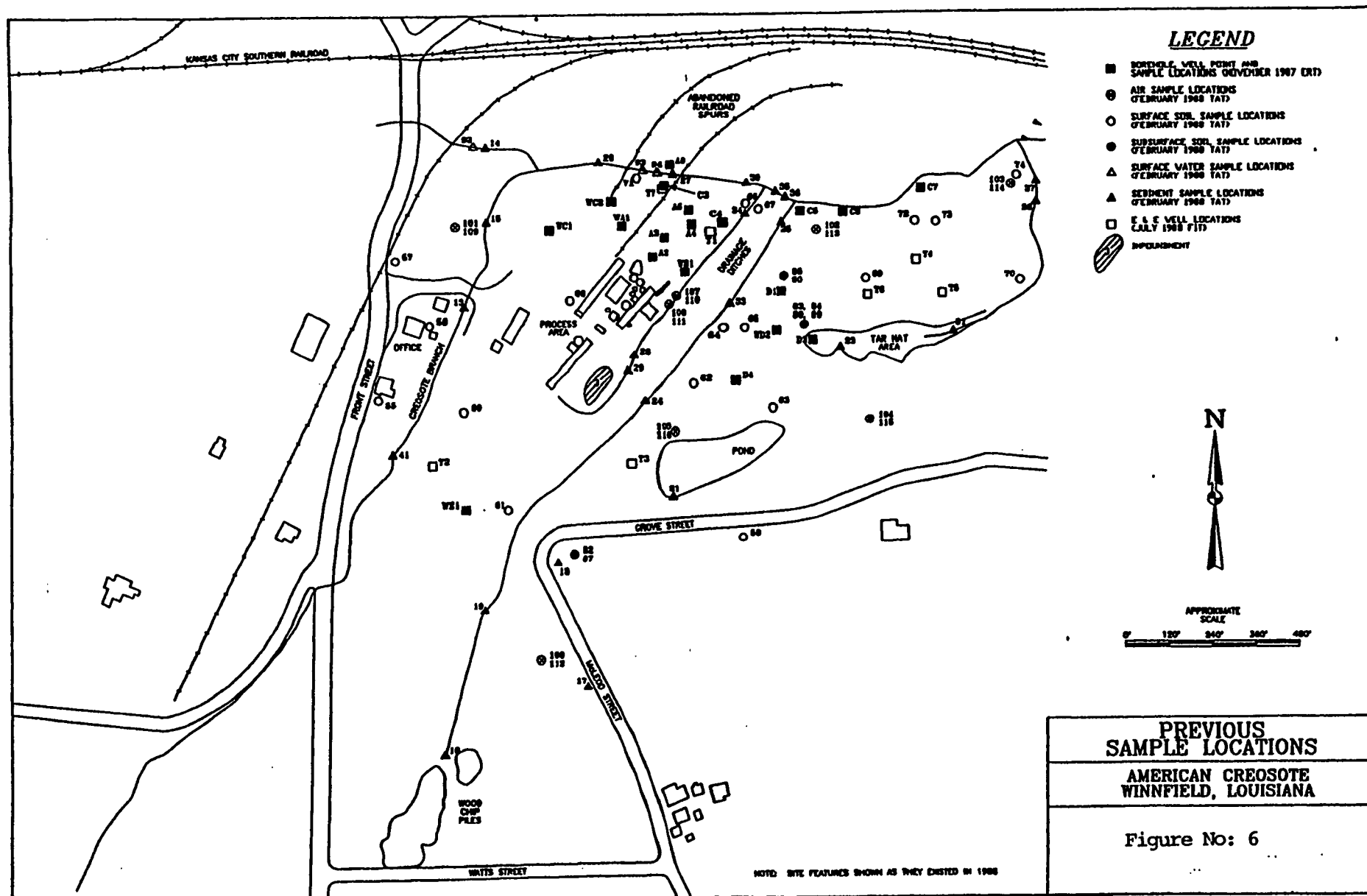
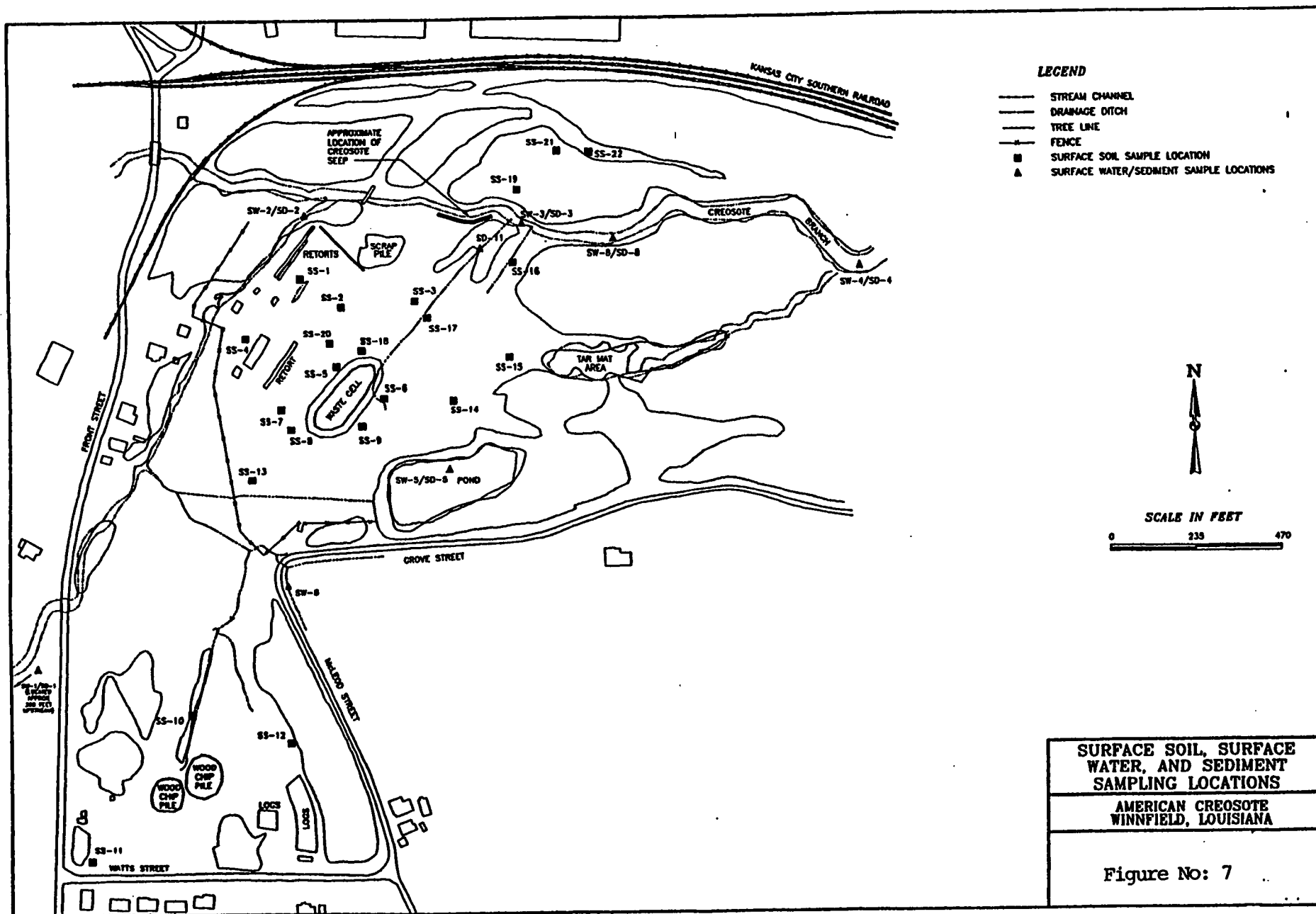


TABLE 1
SUMMARY OF PREVIOUS INVESTIGATIONS
AT THE AMERICAN CREOSOTE SITE

Investigative Team	Date	Activities
Technical Assistance Team (TAT)	March 1987	<ul style="list-style-type: none"> • Visual inspection to determine nature and extent of contamination
Emergency Response Team (ERT)	August 1987	<ul style="list-style-type: none"> • Multi-media environmental sampling program to assess contamination
Emergency Response Team (ERT)	September 1987	<ul style="list-style-type: none"> • Asbestos analysis of fibers on retorts
Emergency Response Team (ERT)	November 1987	<ul style="list-style-type: none"> • Subsurface soil samples collected and analyzed from 23 borings drilled along 4 transect lines - soil samples collected and analyzed for priority pollutants • Waste volume estimates calculated
Field Investigative Team (FIT)	February 1988	<ul style="list-style-type: none"> • Further sample collection undertaken - emphasis on surface soil, sediments and air samples • Demographic and geophysical survey undertaken
Technical Assistance Team (TAT)	June - July 1988	<ul style="list-style-type: none"> • Seismic refraction survey and slug test undertaken to determine subsurface features and hydraulic conductivity, respectively • Determination of soil textures from sieve and hydrometer tests • Collection of additional subsurface soil samples from new boreholes drilled.



5.5.1 SURFACE SOIL INVESTIGATION

The aim of the surface soil sampling program was to define the extent and magnitude of surface soil contamination at the site. Twenty-one surface soil samples were collected during February and March 1992, for the RI/FS at the American Creosote site. Figures 6 and 7 illustrate surface soil sampling locations from the previous removal action and RI investigations, respectively. Data for surface soil samples collected during the previous and RI investigations are presented in Appendices A and B, respectively.

Surface soils with the highest concentrations of organic compound contamination are located in the former process area. The former process area consists of approximately five acres in the northwest portion of the site, south of Creosote Branch. Organic compounds detected in surface soils of this area consist primarily of PAHs with lesser concentrations of phenols. No volatile compounds were detected in any surface soil samples collected during the current investigation. Sampling locations in the former process area included SS-1, SS-2, SS-4 through SS-9, SS-13, and SS-18. Soil samples from most of these locations showed visible signs of contamination, including black stains, pieces of hardened creosote, and a creosote odor. All of these compounds are hazardous substances as defined by CERCLA Section 101(14), 42 U.S.C. § 9601(14), and further defined at 40 CFR § 302.4.

Concentrations of individual PAH compounds in the former process area are typically in the thousands or tens of thousands of micrograms per kilogram ($\mu\text{g}/\text{kg}$). B(a)P equivalent concentrations are present in concentrations ranging from 2,400 $\mu\text{g}/\text{kg}$ (SS-6) to 30,000 $\mu\text{g}/\text{kg}$ (SS-3). Pentachlorophenol (PCP) concentrations similarly vary from less than 1 $\mu\text{g}/\text{kg}$ (SS-2) to 2,100 $\mu\text{g}/\text{kg}$ (SS-5). At SS-5, which was among the most contaminated surface soil samples, the soil was also analyzed for dioxin concentrations. A calculated 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) equivalent concentration for this sample is 5.32 $\mu\text{g}/\text{kg}$.

the site had 27,600 µg/kg of B(a)P and less than 1.0 µg/kg of PCP. This last sample was collected in a location used briefly for treated wood storage based on historical aerial photographs. Subsequent resampling of the same area in July 1992 showed a maximum concentration 2,900 µg/kg for B(a)P out of six samples. The previous data from this sampling location is considered invalid and, therefore, is being replaced with this new maximum value. Lack of significant concentrations in this area is supported by the sampling efforts prior to the 1989 removal action.

Surface soil data for three samples collected north of Creosote Branch demonstrate slight levels of contaminants in stained soils at the railroad bridge crossing (SS-19) and lower levels further to the north (SS-21, SS-22). The B(a)P equivalent concentration for SS-19 is 1,399 µg/kg and PCP was detected at 1,400 µg/kg. Samples SS-21 and SS-22 contained 2,312 µg/kg and 5 µg/kg B(a)P equivalents respectively, and no PCP was detected in either sample. Also of note, subsurface soil data for this portion of the site suggest that PAH concentrations decrease rapidly with depth. Samples BH-12 and BH-13 were collected at a depth of 5 feet at the same locations as SS-22 and SS-21, respectively. Analytical results for these samples indicate no detectable PAHs at these depths, implying minimal potential for downward migration of PAHs from surface soils in this area.

Three surface soil samples were collected from the office area during previous investigations. These data provide information about contaminant levels west of Creosote Branch. The three samples, 55, 56, and 57, contained low contaminant concentrations that were less than 300 µg/kg B(a)P equivalents.

In summary, the most heavily contaminated surface soils are located in the former process and impoundment areas, and the tar mat and its related drainage area to the northeast portion of the site. Surface soils in the southern and northern (north of Creosote Branch) do not appear to have any significant concentrations of contamination as discussed in the risk portion of this document.

The impoundment and drainage areas (including the tar mat) are located north and east of the former process area. Two samples were collected in the former impoundment area during the current investigation (SS-14 and 15). Degree of contamination noted in these samples is somewhat lower than that found in most process area soils. Values for B(a)P equivalent concentration and PCP ranged from 4,500 to 2,900 $\mu\text{g/kg}$ and 1,400 to 320 $\mu\text{g/kg}$ for SS-14 and SS-15, respectively. Contamination detected at SS-16 included a PCP concentration of 2,300 $\mu\text{g/kg}$, and a B(a)P equivalent concentration of 3,688 $\mu\text{g/kg}$. Data from previous investigations (69, 72, and 73, TAT 1988) provide information for the area which lies between Creosote Branch and the stream which drains the tar mat (Figure 6). Levels of contamination which exist in this area are evidenced by B(a)P concentrations ranging from 3,593 to 7,522 $\mu\text{g/kg}$ and undetected PCP. This area has been determined to be a wetlands area as discussed elsewhere in this document.

A single sample was collected during a previous investigation of the tar mat materials (31, TAT 1988) with a B(a)P equivalent concentration of 506,000 $\mu\text{g/kg}$ and 6,000,000 $\mu\text{g/kg}$ PCP. These values are greater than any other sample collected on site during the current investigation. In addition, the drainage from the tar mat areas was also previously sampled (samples 70 and 74) and showed concentrations of B(a)P equivalents of 51,520 $\mu\text{g/kg}$ and 6,199 $\mu\text{g/kg}$ and PCP at a maximum of 31,000 $\mu\text{g/kg}$.

Concentrations of PAHs and phenols decrease slightly in samples collected west and south of the process area. B(a)P equivalent concentrations at SS-8 and SS-9 are 5,601 and 10,320 $\mu\text{g/kg}$, respectively, while B(a)P equivalent concentrations range from 864 $\mu\text{g/kg}$ in SS-4 to 677 $\mu\text{g/kg}$ in SS-13. Concentrations of PCP range from less than 1 to 890 $\mu\text{g/kg}$ in SS-8 and SS-7, respectively.

Three surface soil samples were collected from the southern portion of the site during the current investigation (SS-10, SS-11, and SS-12), none of these were visibly contaminated. Samples SS-10 and SS-11 showed less than 200 $\mu\text{g/kg}$ B(a)P equivalents and less than 1.0 $\mu\text{g/kg}$ for PCP. Sample SS-12 from the southeastern portion of

A sample of surface water and sediment was collected immediately downstream of the confluence of the stream which drains the tar mat area into Creosote Branch. The surface water sample (SW-4) contained no volatiles, PCP, or PAHs. Results for the sediment sample (SD-4) showed a B(a)P equivalent of 1,549 $\mu\text{g/kg}$ and PCP concentration of 69 $\mu\text{g/kg}$.

Several sediment samples were collected downstream from the site to evaluate off-site migration of contaminants (Figure 8). Location SD-7 was approximately 5,000 feet downstream of the site boundary (at the junction of Route 167 and Creosote Branch). B(a)P equivalent concentration is 6,818 $\mu\text{g/kg}$ for SD-7, and no other contaminants were detected in this sample. Sediment samples SD-9 and SD-10, collected from Creosote Branch approximately 6,300 feet and 10,000 feet downstream of the site, respectively, contained lower concentrations B(a)P than SD-7 but did have detectable levels of phenols. The B(a)P equivalent concentration for SD-9 was 785 and SD-10 was 1,053 $\mu\text{g/kg}$. For SD-9, a concentration of 1,100 $\mu\text{g/kg}$ PCP was reported, although PCP was not detected in SD-10.

The pond located in the east-central portion of the site was the sampling location for SW-5 and SD-5. This pond was reportedly constructed as a reservoir for the storage of fire protection water. Both the surface water and sediment samples from the pond contained no detectable levels of PAHs or PCP. A single sediment sample was collected from the pond during a previous investigation of the site. This sample was analyzed for PAHs only and no contaminants were detected.

Observation of a film or sheen on water in the McLeod Street ditch upstream of the site prompted the collection of surface water sample SW-6. No organic contaminants were detected in this sample.

5.5.2 SURFACE WATER AND SEDIMENT INVESTIGATION

The purpose of the surface water and sediment sampling program was to delineate the extent and magnitude of surface water and sediment contamination resulting from downstream migration of site-related contaminants. Seven surface water and ten sediment samples were collected during February and March, 1992, for the RI at the American Creosote site. The sampling locations near the site are shown in Figure 7, and results are presented in Appendix C.

Surface water and sediment samples SW-1 and SD-1 were collected from Creosote Branch as background samples approximately 500 feet upstream of the site. No volatile compounds, PCP, or PAHs were detected in either sample.

Surface water and sediment samples SW-2 and SD-2 were collected from Creosote Branch in the northwest portion of the site. Upstream of this point, the stream receives the discharge of the drainage ditch which carries nearly all runoff from the southern portion of the site and a limited amount from the central portion of the site. No contaminants were detected in the surface water sample (SW-2) and no PCP was detected in the sediments. However, some contaminants were detected in the sediment sample, including a B(a)P equivalent concentration of 217 $\mu\text{g/kg}$. These data suggest some minimal impact on Creosote Branch from a source or sources along the western portion of the site.

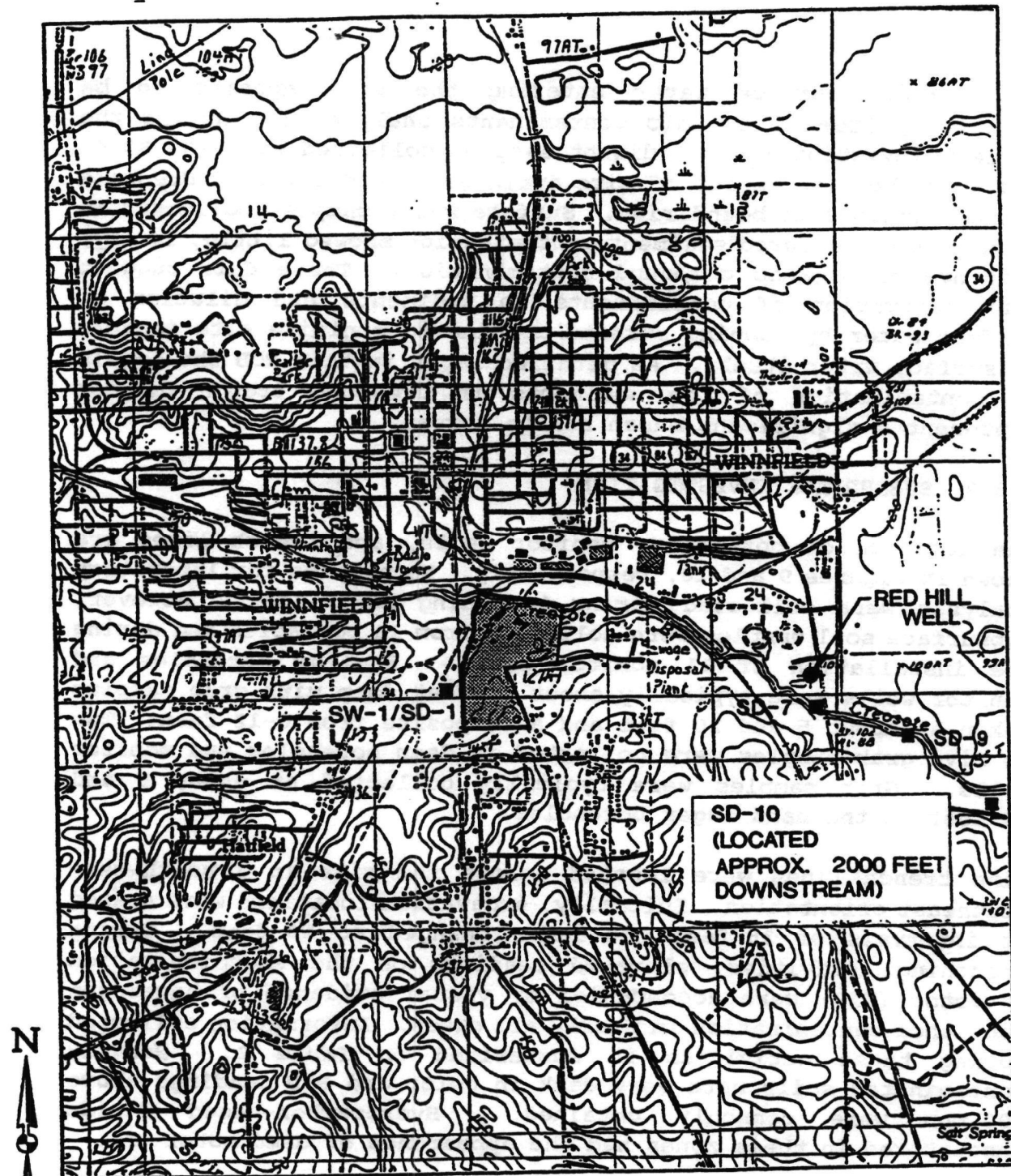
Samples of surface water and sediment were collected along Creosote Branch downstream of two ditches which drain the former process and impoundment areas (SW-3/SD-3 and SW-8/SD-8). These samples were also downstream of the onsite creosote seep (Figure 7). Surface water sample SW-3 contained 68 micrograms per liter ($\mu\text{g/l}$) of PCP, no other contaminants were detected in either SW-3 or SW-8. SD-3 and SD-8 had B(a)P equivalent concentrations of 580 and 1,061 $\mu\text{g/kg}$ with PCP concentrations of 17 and 160 $\mu\text{g/kg}$, respectively. SD-3 was analyzed for dioxin with a 2,3,7,8-TCDD equivalent concentration of 0.01 $\mu\text{g/kg}$ for this sample. All of these compounds are hazardous substances as defined at CERCLA Section 101(14), 42 U.S.C. § 9601(14) and further defined at 40 CFR § 302.4.

In summary, surface water entering the site appears to be relatively free of organic contaminants analyzed for during the current investigation. Sediment samples collected at SD-3, SD-4, and SD-8 show the impact of site drainage on sediments in Creosote Branch within site boundaries. Surface water samples collected in locations of measured sediment contamination showed little, if any, evidence of organic compound contamination. These data suggest that adsorption of contaminants to sediments and dilution of surface water by running streams combine to minimize site impacts on surface water itself. As detailed later in this ROD the levels of contamination of the sediments in Creosote Branch do not represent a significant human health threat.

5.5.3 SUBSURFACE INVESTIGATION

The location of boreholes, monitor wells, and trench lines are shown in Figures 9 and 10, respectively. No samples for laboratory analysis were collected during trenching activities. However, subsurface soil samples were collected from 18 boreholes and during the installation of 11 monitor wells. Shallow boreholes and monitor wells were typically about 20 feet deep with grab samples taken at about 5 and 20 feet and a composite from 0-12 feet. Two to five grab samples were collected in deep boreholes and monitor wells. Grab samples were typically collected at about 5 and 10 feet in the hand auger boreholes.

Nine trench lines were located across the site in a northwest-southeast orientation. Initially, excavation locations were spaced at intervals of 35 feet and later changed to 50 feet. During trenching activities, elevated readings on the Photoionization Detector (PID) were accompanied by visual evidence of hazardous substance contamination in nearly all cases. Information collected during these activities is summarized on Table 2. Heavily contaminated soils were very dark in color and PID readings above 100 ppm were commonly obtained. Hydrocarbon-based fluids encountered in these zones had the appearance of used motor oil.



Scale in Feet

0 2000 4000

Source: USGS 7.5 min. Winnfield East & West, La. Quadrangles

American Creosote
Winnfield, Louisiana

Offsite Surface Water,
Sediment Sampling and
Groundwater Locations

Figure No.:

8

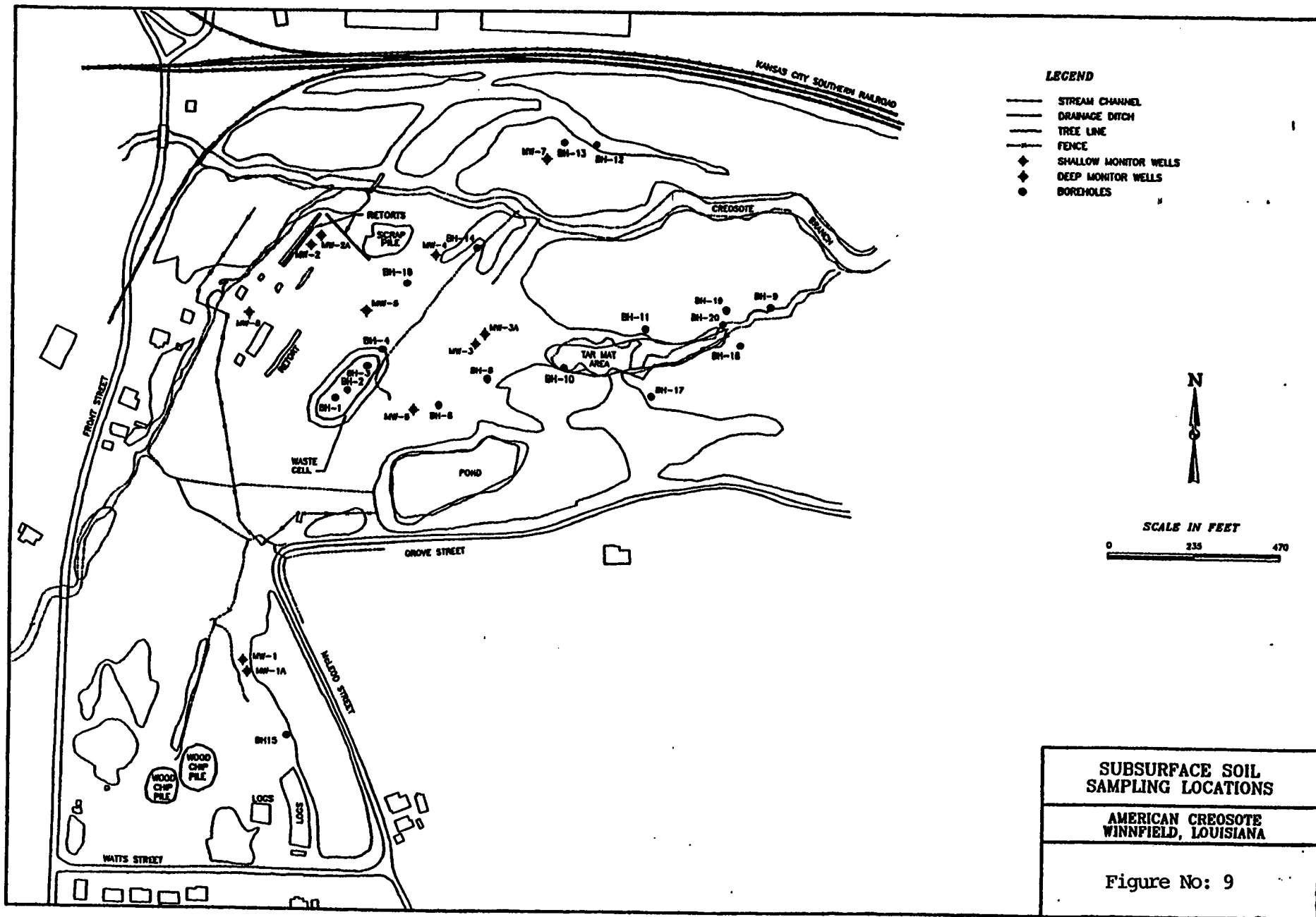


TABLE 2 (continued)
SUMMARY OF TRENCHING OBSERVATIONS

Transect	Location	Total Depth	PID Peak				0'-8' or 0'-10' avg. PID ^b	Debris Depth	Visual Extent of Contamination	Remarks ^a
			0'-5' Peak	Depth	5'-10' Peak	Depth				
T3	0N	8'	101	2'	0	-	20.7	0-3'	Heavy @ 0-4', none below	Debris: woodchips. ∇ = 2-4' w/sheen
	40N, 10E	11'	0	-	45	8'	15.6	-	Mod. @ 8-11', none above	∇ = 11' w/product
	100N	10'	0	-	0	-	0	-	None observed	∇ = 6 & 10'
	150N	10'	0	-	32	10'	14.8	-	Mod. @ 6-10', none above	∇ = 6-8'
	250N	10'	30	4'	45	6'	26.8	0-6'	Mod. - Heavy 0-10'	Debris: concrete, pipe, metal rack. ∇ = 7' w/product
	400N	2'	0	-	-	-	-	0-2'	Heavy @ 0-2'	Debris: rice hulls, mud, wood, concrete pad
	450N	10'	84	4'	55	6'	42.8	0-4'	Heavy @ 0-4', none below	Debris: wood, pipe. ∇ = 4' & 6-8' w/product
	500N	10'	15	4'	40	7'	25.0	-	Heavy @ 0-7', mod. @ 8-10'	∇ = 3' w/product
	550N	10'	75	3'	140	5'	64.0	-	Mod. - Heavy @ 0-10'	
	590N	10'	55	3'	120	5'	59.0	-	Slight @ 3-7'	Positive PID all depths
	0N, 150W	10'	0	-	0	-	0	-	None observed	
	10S, 100W	10'	0	-	0	-	0	-	None observed	
T4	0N	8'	5	1'	23	8'	13.3	0-2'	Mod. @ 0-2'	Debris: wood, roots 3-5'. ∇ = 4'
	60N	4'	0.4	2'	-	-	-	0-4'	Heavy @ 0-4'	Debris: treated wood, pipeline
	100N	10'	1.0	2'	75	8'	28.2	4-8'	Slight @ 0-6', mod. @ 6-10'	Debris: sticks, hose, wood
	150N	4'	35	4'	-	-	-	0-4'	Heavy @ 3-4'	Debris: rocks, cable. ∇ = 3' w/product
	200N	8'	93	3'	120	7'	95.3	2-8'	Heavy @ 0-8'	Debris: bricks, rice hulls, cables, etc.
	250N	4'	35	1'	-	-	-	2-4'	Heavy @ 0-4'	Excavation stopped due to debris
	300N	2'	35	1'	-	-	-	0-2'	Heavy @ 0-2'	Excavation stopped due to debris
	350N	10'	320	3'	270	7'	272.2	0-1'	Heavy @ 0-4', mod. @ 4-10'	∇ = product 2'
	400N	10'	428	3'	454	5'	362.4	-	Heavy @ 0-4', mod. @ 4-10'	∇ = product 2'
	450N	10'	40	3'	110	5'	59.6	-	Mod. @ 0-10'	

TABLE 2

SUMMARY OF TRENCHING OBSERVATIONS

Transect	Location	Total Depth	PID Peak				0'-8' or 0'-10' avg. PID ^a	Debris Depth	Visual Extent of Contamination	Remarks ^a
			0'-5' Peak	Depth	5'-10' Peak	Depth				
T1	0N	10'	0	-	0	-	0	-	None observed	▽=6-8'
	100N	10'	0	-	0	-	0	0-2'	None observed	Debris: wood, mud, bricks, gravel. ▽=6'
	150N, 10W	10'	73	2'	76	6'	55	0-2'	Heavy PID @ 0-2', mod. @ 2-10'	Debris: logs, metal, pipe, cable. ▽=8' w/sheen
	200N	10'	51	4'	0	-	10.2	0-5'	Mod. PID @ 3-4'	Debris: metal, wood, bricks. ▽=3' & 8'
	250N	10'	0	-	0	-	0	0-3'	Heavy @ 0-3'	Debris: mostly small pieces of wood. ▽=3'
T2	0N	2'	20	2'	-	-	-	0-2'	Heavy @ 0-2'	Debris: wood chips, mud, concrete pad
	50N	3'	22	2'	-	-	-	0-3'	Heavy @ 0-3'	Debris: ties, pipe, logs, metal
	100N	10'	30	4'	19	6'	15.1	0-4'	Heavy @ 0-4', mod. @ 4-8'	Debris: metal, woodchips. ▽= 4' w/product
	150N	10'	0.5	2'	0	-	0.1	2'-4'	Upper 2'	Debris: woodchips, clay. ▽= 4-6' w/slight sheen
	200N	10'	0	-	0	-	0	-	Slight upper 2' of fill	▽= 10' w/slight sheen
	250N	10'	28	4'	37	10'	23.8	0-1'	Mod. @ 1-10'	Debris: cable. ▽= 7' w/product
	300N	10'	0	-	30	8'	10.0	-	Mod. @ 6-10'	▽=4 & 10' w/product @ 6'
	330N,10W	10'	40	4'	19	6'	15.8	0-2'	Heavy @ 0-2', mod. @ 2-10'	Debris: pipe, wood. ▽= 2' w/oily water

TABLE 2 (continued)
SUMMARY OF TRENCHING OBSERVATIONS

Transect	Location	Total Depth	PID Peak				0'-8' or 0'-10' avg. PID ^a	Debris Depth	Visual Extent of Contamination	Remarks ^c
			0'-5' Peak	Depth	5'-10' Peak	Depth				
T7	0N	5'	33	4'	-	-	-	5'	Heavy @ 2-5'	Debris: logs, tire; ∇=3' w/product.
	50N	11'	90	4'	55	11'	43.0	2'-3'	Mod. @ 0-4'	Debris: railroad ties. ∇=3'. peat @ 3'
	100N	11'	7	4'	3	6'	2.2	-	Slight @ 4-6'	∇=4-6', peat @ 4'
	150N	10'	30	4'	4	6'	6.8	-	Mod. @ 3-4'	Peat @ 4'
	200N	10'	50	4'	229	6'	136.8	-	Slight-Mod. @ 3-7'	∇=3-6', Oily sheen on soil @ 6'
	250N	7'	0	-	-	-	-	-	None observed	Excavation stopped due to caving
	50S	2'	0	-	-	-	-	-	None observed	Hand auger stopped by rocks
	65S	7.5'	15.5	5'	70	6'	19.8	-	Mod. @ 4-5', slight @ 5-7.5'	Oily sheen on soil @ 5-7.5'
	130S	10'	0	-	1.6	8'	0.3	-	Slight @ 8'	Slight oily sheen @ 8'
T8	200N	10'	0	-	0	-	0	1-3'	None observed	Debris: railroad ties. ∇=9'
	300N	10'	0	-	0	-	0	-	None observed	
T9	100N	10'	0	-	0	-	0	1'	None observed	Debris: wood, ∇=9'
	200N	10'	0	-	0	-	0	-	None observed	∇=9'
	300N	10'	0	-	0	-	0	1'	None observed	Debris: treated wood. ∇=9'
	400N	10'	0	-	0	-	0	-	None observed	∇=9'
	500N	10'	0	-	0	-	0	1'	None observed	∇=29'
TE-1	180°N 21°E of T6, 410N	10'	0	-	0	-	0	1'	None observed	Materials saturated at 8'
TE-2	73°SW of MW7	8'	0	-	0	-	0	-	None observed	Water depth 7'
TE-3	E of tar mat	7'	1	3	18	7'	-	-	Slight @ 0-6', heavy @ 6-7'	Contamination increased with depth
TE-4	30°SE of machine shop	8'	-	-	-	-	-	-	None observed	Hand augering stopped @ 8' due to hard siltstone

^a Photoionization detector (PID) readings were obtained in the field by placing the instrument's probe within a few millimeters of a freshly exposed portion of soil.

^b Averages were taken only in those excavations which achieved depths greater than 8 feet and 4 or more PID readings were recorded.

^c The use of the symbol "∇" is used in this column to indicate the depth at which water was entering the excavation.

TABLE 2 (continued)
SUMMARY OF TRENCHING OBSERVATIONS

Transect	Location	Total Depth	PID Peak				0'-8' or 0'-10' avg. PID ^a	Debris Depth	Visual Extent of Contamination	Remarks ^a
			0'-5' Peak	Depth	5'-10' Peak	Depth				
T5	0N	10'	200	4'	235	8'	145.2	0-6'	Heavy @ 0-6', none below	Debris: woodchips. $\nabla=6'$ & 8' w/sheen
	50N	8'	269	4'	250	8'	-	0-6'	Heavy @ 0-6'	Debris: woodchips, logs. $\nabla=6'$ w/sheen
	100N	10'	15	2'	215	8'	100.0	0-5'	Heavy @ 0-5'	Debris: woodchips. Oily sheen on chips
	150N	10'	4	4'	29	6'	7.9	0-2'	Slight @ 4-8'	Debris: logs, ties. $\nabla=5'$
	200N	8'	75	5'	145	7'	60.5	-	Slight grading to heavy from 0-8'	
	250N	10'	30	4'	175	10'	83.4	-	Mod. @ 4-10'	∇ =product 6' & 9'
	300N	10'	8	4'	225	8'	110.4	-	Mod. @ 4-10'	Upper 2' fill mat'l. ∇ =product 6'
	350N	10'	14	4'	23	8' & 10'	14.6	0-4'	Heavy @ 0-4', mod. 4-7'	Debris: metal, woodchunks. $\nabla=2'$
	400N	10'	158	3'	160	7'	141.6	-	Mod. @ 3-8'	
	450N	10'	215	3'	230	7'	191.0	-	Heavy @ 0-10'	
	500N	2'	82	1'	-	-	-	0-2'	Heavy 0-2'	Excavation stopped due to debris
	0N, 5W	2'	0	2'	-	-	-	2'	None observed	Debris: boulders (bedrock?)
	35N	4'	0.2	4'	-	-	-	4'	None observed	Debris: boulders (bedrock?)
	70N	8'	-	-	-	-	-	-	None observed	
	105N	4'	-	-	-	-	-	-	Heavy @ 4'	
T6	140N	8'	-	-	-	-	-	-	None observed	
	175N	11'	-	-	96	9'	-	0-1'	Heavy @ 0-11'	Debris: wood
	210N	11'	-	-	200	10'	-	-	Slight grading to heavy @ 0-11'	3 high PID @ 6-11'. Oily sheen on soils.
	245N	11'	220	4'	245	10'	177.8	0-3'	Heavy @ 0-11'	Debris: woodchips. Free product 8'.
	280N	11'	-	-	-	-	-	-	Heavy @ 0-11'	No log recorded due to rain
	315N	11'	168	4'	100	10'	-	0-2'	Heavy @ 0-3', mod. @ 3-11'	Debris: railroad ties, etc.
	360N	11'	20	4'	79	10'	45.8	2'	Heavy @ 4-11'	Debris: rocks. $\nabla=4'$ w/product. Soils had oily sheen
	410N	8'	18	4'	32	6'	16.1	0-3'	Heavy @ 0-3', mod. @ 3-8'	Debris: railroad ties. $\nabla=2'$ w/product
	50S	8'	0	-	0	-	0	-	Slight @ 6-8'	$\nabla=2.5'$
	100S	10'	19	3'	0	-	17.0	0-2'	Heavy @ 0-10'	Debris: woodchips
	145S, 10E	10'	0.5	1'	19	6'	0.1	-	Slight @ 1'	$\nabla\approx 1'$, minor odor all depths

selected as representative of this area. B(a)P equivalent values vary from 8,800 to 52,000 $\mu\text{g/kg}$ in BH-8 (10 feet) and MW-6 (1-10 feet), respectively. Reported PCP concentrations for these samples are 83,000 and 450,000 $\mu\text{g/kg}$. Volatile compounds were also detected in samples from this area with benzene concentrations of 100 and 120 $\mu\text{g/kg}$ in the two samples discussed above.

Contamination in subsurface soils of the tar mat area can be characterized by samples BH-9 (9.5 feet) and BH-10 (5 feet). Visually, the BH-9 sample appeared only slightly contaminated (*i.e.*, sheen observed on soil surface) whereas the sample collected at BH-10 could be described as moderately contaminated (*i.e.*, gray color with dark streaks). B(a)P equivalent concentrations of 3,200 and 4,500 $\mu\text{g/kg}$ were recorded for BH-9 and BH-10, respectively and the PCP concentrations for these two samples were 820 and 1,700 $\mu\text{g/kg}$. Benzene was not detected in the BH-9 sample although total BTEX present was 200 $\mu\text{g/kg}$. Total BTEX in the BH-10 sample was 2,600 $\mu\text{g/kg}$ but benzene was reported to be only 24 $\mu\text{g/kg}$. The only dioxin analyses conducted on samples from this area were for BH-9 (5 feet). The calculated 2,3,7,8-TCDD equivalent for this sample was 0.69 $\mu\text{g/kg}$. Concentrations of PAHs and phenols in this sample were several orders of magnitude less than those detected in obviously contaminated samples collected in the area. As reported previously, the materials of the tar mat have provided the highest concentrations of PAHs and PCP.

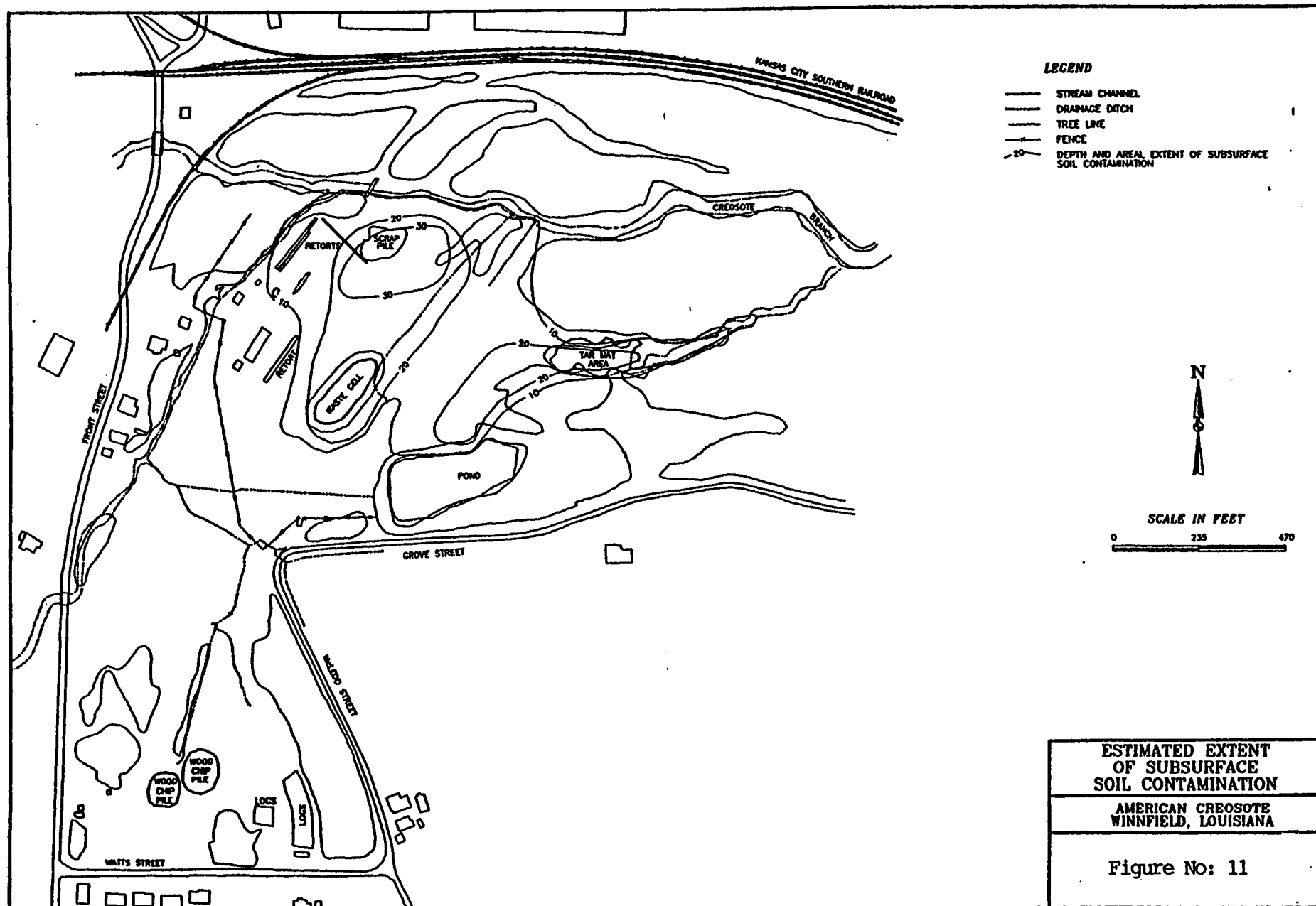
Three subsurface soil samples were collected to determine contaminant concentrations for material in the waste cell constructed during the 1989 removal action. The first sample collected in borehole BH-1 (1-12 feet) was a composite representing the stabilized waste present in the cell. The second sample from this boring (20 feet) was collected below the waste and liner to provide information regarding contaminant concentrations below the cell. A second sample of the waste material was collected from BH-3 at a depth of 0.5 to 6 feet. Maximum B(a)P equivalent and PCP concentrations reported for the waste cell were 36,600 and 170,000 $\mu\text{g/kg}$, respectively. Volatile compounds were present in all three samples with a maximum reported benzene value of 240 $\mu\text{g/kg}$ from stabilized waste materials. The single sample from BH-3 was analyzed for dioxin. The calculated 2,3,7,8-TCDD equivalent value for this sample is 3.23 $\mu\text{g/kg}$.

Soils with moderate visual contamination were usually gray in color with occasional black streaking, had an oily sheen, and PID readings were generally less than 100 ppm. Some elevated PID readings were also found in soils with no outward evidence of contamination other than a slight sheen. In all cases, positive visual evidence was accompanied by a characteristic creosote odor.

Appendix D presents the subsurface sampling data results. Some of the highest concentrations of contaminants found at the site are located within the former process area. Samples which provide examples of these high levels of contamination include MW-4 (5 feet), MW-5 (0-10 feet), BH-14 (0-10 feet). The sample collected at BH-14 (0-10 feet) had the highest B(a)P equivalent and PCP concentration of the three samples at 53,400 $\mu\text{g/kg}$ and 200,000 $\mu\text{g/kg}$, respectively. The levels of PCP were 13,000 and 110,000 $\mu\text{g/kg}$ in MW-4 and MW-5 and B(a)P equivalent concentrations were 52,960 and 48,840 $\mu\text{g/kg}$, respectively. Volatile organic compounds, consisting of benzene, toluene, ethylbenzene, and xylene (BTEX), were detected in most subsurface soil samples from the former process area. Benzene concentrations for MW-4 (5 feet), MW-5 (0-10 feet), and BH-14 (0-10 feet) are 21 $\mu\text{g/kg}$, 29 $\mu\text{g/kg}$, and 150 $\mu\text{g/kg}$, respectively. All of these compounds are hazardous substances as defined at CERCLA Section 101(14), 42 U.S.C. § 9601(14) and further defined at 40 CFR § 302.4.

Four samples were collected for dioxin analysis from various depths during the drilling of MW-2A and MW-2. Calculated 2,3,7,8-TCDD equivalent concentrations were relatively low and decreased with increasing depth of the sampling interval. TCDD equivalent concentrations were 0.49 $\mu\text{g/kg}$ at 0-10 feet, 0.01 $\mu\text{g/kg}$ at the 13-16 feet and 31-35 feet depths, and undetected at 51 feet.

Concentrations of contaminants in subsurface soils of the former impoundment and drainage areas are similar to those found in the process area. However, the areal extent and depth of contamination in this area are not as great as that of the process area. As with subsurface soils in the process area, analytical data correlate well with evidence from visual observations and field screening methods employed during trenching and borehole drilling. Samples collected from BH-8 (10 feet) and MW-6 (1-10 feet), have been



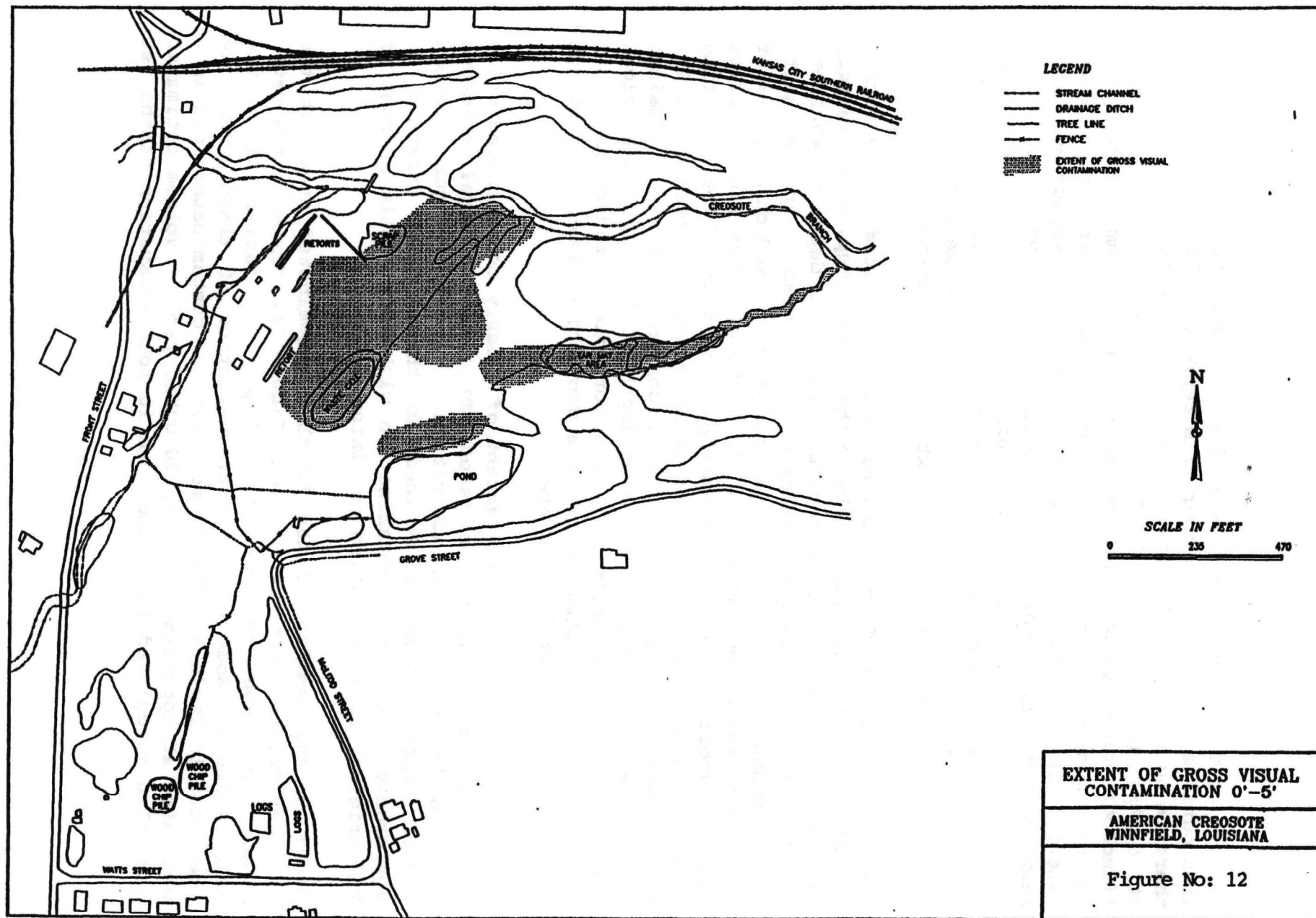
Results for subsurface soil samples collected in the southern portion of the site indicate significantly less contamination exists in this area relative to other portions of the site such as the process area. Sample MW-1A (0-10 feet) contained 82 $\mu\text{g/kg}$ of PCP but no PAHs or volatile compounds were detected. Conversely, MW-1 (51 feet) reported no PCP, but had 2,300 $\mu\text{g/kg}$ total phenols, 1,050 $\mu\text{g/kg}$ total PAHs, and 320 $\mu\text{g/kg}$ ethylbenzene. B(a)P and B(a)P equivalents concentrations were undetected in these samples. Sample MW-1A (0-10 feet) was also analyzed for dioxin and a 2,3,7,8-TCDD equivalent value of 0.002 $\mu\text{g/kg}$ was calculated.

North of Creosote Branch, contaminant levels were detected at similar concentrations as were found in the southern portion of the site. A sample collected at MW-7 (0-10 feet) had a B(a)P equivalent concentration of 145 $\mu\text{g/kg}$. No volatile compounds were detected, but 92 $\mu\text{g/kg}$ PCP were reported.

In summary, grossly contaminated subsurface soils are present throughout the former process area, the impoundment area, and the tar mat area. Significantly lesser concentrations of some contaminants are present at depth in the southern and northern portions of the site. Concentrations of contaminants in these locations decline rapidly with depth. All of these compounds are hazardous substances as defined in CERCLA Section 101(14), 42 U.S.C. § 9601(14) and further defined at 40 CFR § 302.4.

5.5.4 AREAL AND VERTICAL EXTENT OF CONTAMINATION

The estimated areal and vertical extent of subsurface soil contamination at American Creosote is shown in Figure 11. This figure was prepared using data and information from a variety of sources. Visual evidence and PID readings recorded during trenching excavations and hand auger borings provided data critical to the determination of the extent of contamination in the upper

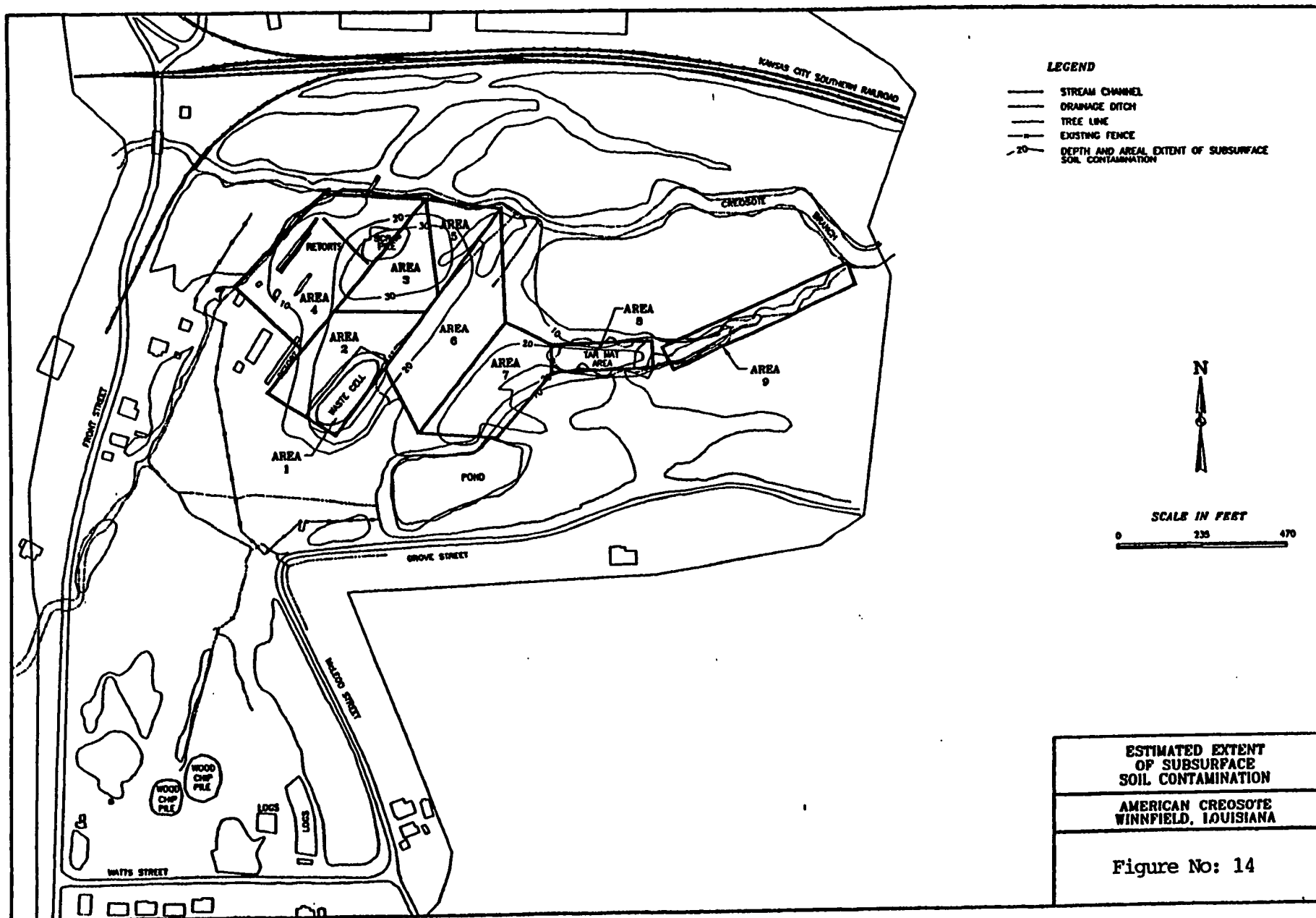


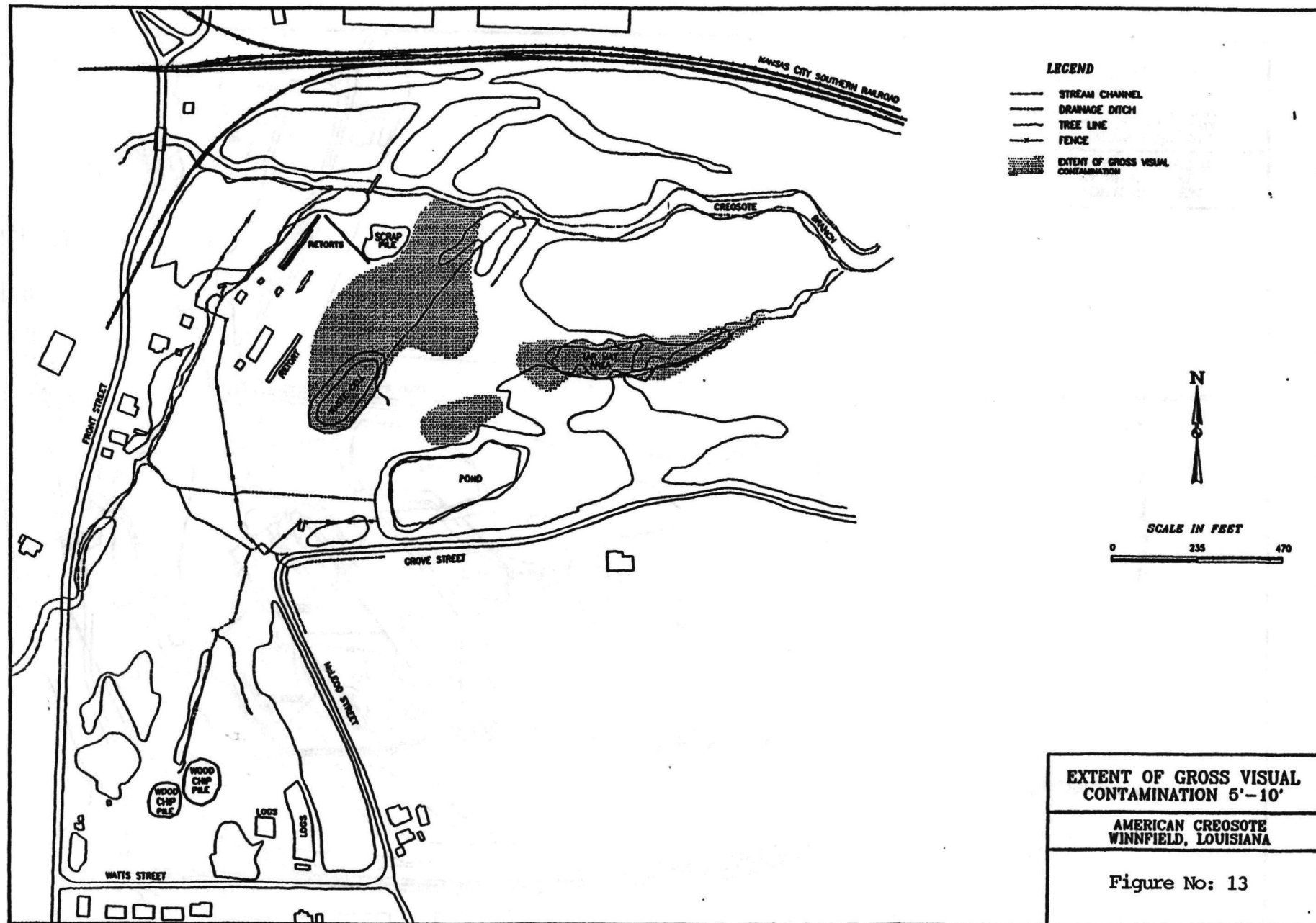
10 feet of the subsurface. Generally, as shown in Figure 11, the area outside the 10 foot contour line represents those areas where there is no visual or PID evidence of contamination. Information at depths greater than 10 feet was obtained from borehole lithologic descriptions, laboratory results of samples collected during monitor well installation and boreholes, and to a lesser extent, PID readings. In preparing Figure 11, subsurface soil samples containing more than approximately 10,000 $\mu\text{g}/\text{kg}$ total organic compounds were included within the extent of contamination shown. In areas where data were lacking (e.g., depths greater than 10 feet in the tar mat area), professional judgment was used to estimate the areal and vertical extent of contamination.

The largest volume of contaminated soils is located in the former process area. Contaminated soils in this area occupy approximately five acres and extend to a maximum identified depth of 40 feet. The deepest contamination appears to be centered in an area north of the former tank farm and boiler building. Based on a review of historical aerial photographs, this portion of the site received spills, runoff and possibly discharges over much of the operating life of the plant (80 years). An exploratory soil boring, BH-16, was advanced near the center of this contaminated area. Stained subsurface soil was observed to a depth of 40 feet. Analytical data from samples collected in this borehole corroborated visual evidence of gross contamination to a depth of at least 38 feet but no more than 47 feet in this area.

Figures 12 and 13 depict the extent of grossly contaminated soils at two different intervals based strictly on visual evidence obtained during trenching activities. For these figures, gross visual contamination is defined as those soils darkened in appearance by creosote contamination with very little or none of the original soil coloration remaining.

Based on the results of the RI the contaminated areas at the American Creosote site are shown in Figure 14. These contaminated areas are shown as geometric shapes to facilitate volume calculations. Some of the characteristics of these areas are presented in Table 3. The total volume of contaminated soil is estimated at approximately 273,000 cubic yards. Volume estimates were also calculated for 5-foot and 10-foot excavation depths, so





that these partial source control actions could be evaluated. The 5-foot and 10-foot excavations would occur in the most heavily contaminated portions of the site as shown in Figures 12 and 13 respectively. Assuming the 5-foot excavation is conducted, the total volume of soil removed is 59,000 cubic yards. Assuming the 10-foot excavation is conducted, the total volume is 106,000 cubic yards.

5.5.5 GROUND WATER INVESTIGATION

Ground water investigations began with the installation of piezometers throughout the site. Piezometers were installed to confirm ground water flow directions so monitor wells could be optimally located. A total of 12 piezometers, as shown in Figure 15, were installed onsite to characterize the hydraulic gradient of the shallow aquifer in the contaminated area. Eleven of the twelve piezometers were positioned within the portion of the site area bounded by Creosote Branch. One piezometer was installed on the west side of the Creosote Branch, in the former American Creosote office yard, to evaluate the hydraulic effects of the stream on the shallow aquifer.

The piezometric water levels were used to strategically place four deep and seven shallow monitor wells up- and down-gradient of the contaminated portions of the site. The shallow monitor well boreholes were screened within fine to medium sand and gravel in the top ten feet of aquifer and ranged from 20 to 25 feet in total depth. Deep monitor wells were screened in a fine sand and silty zone approximately sixty feet below grade.

Twelve ground water samples were collected between March 10-13, 1992, for the American Creosote site RI/FS. Eleven of these samples were collected from monitoring wells, which are shown in Figure 15. One sample was also collected from the Red Hill drinking water supply well. The location of this well is shown in

TABLE 3**CHARACTERISTICS OF CONTAMINATED AREAS**

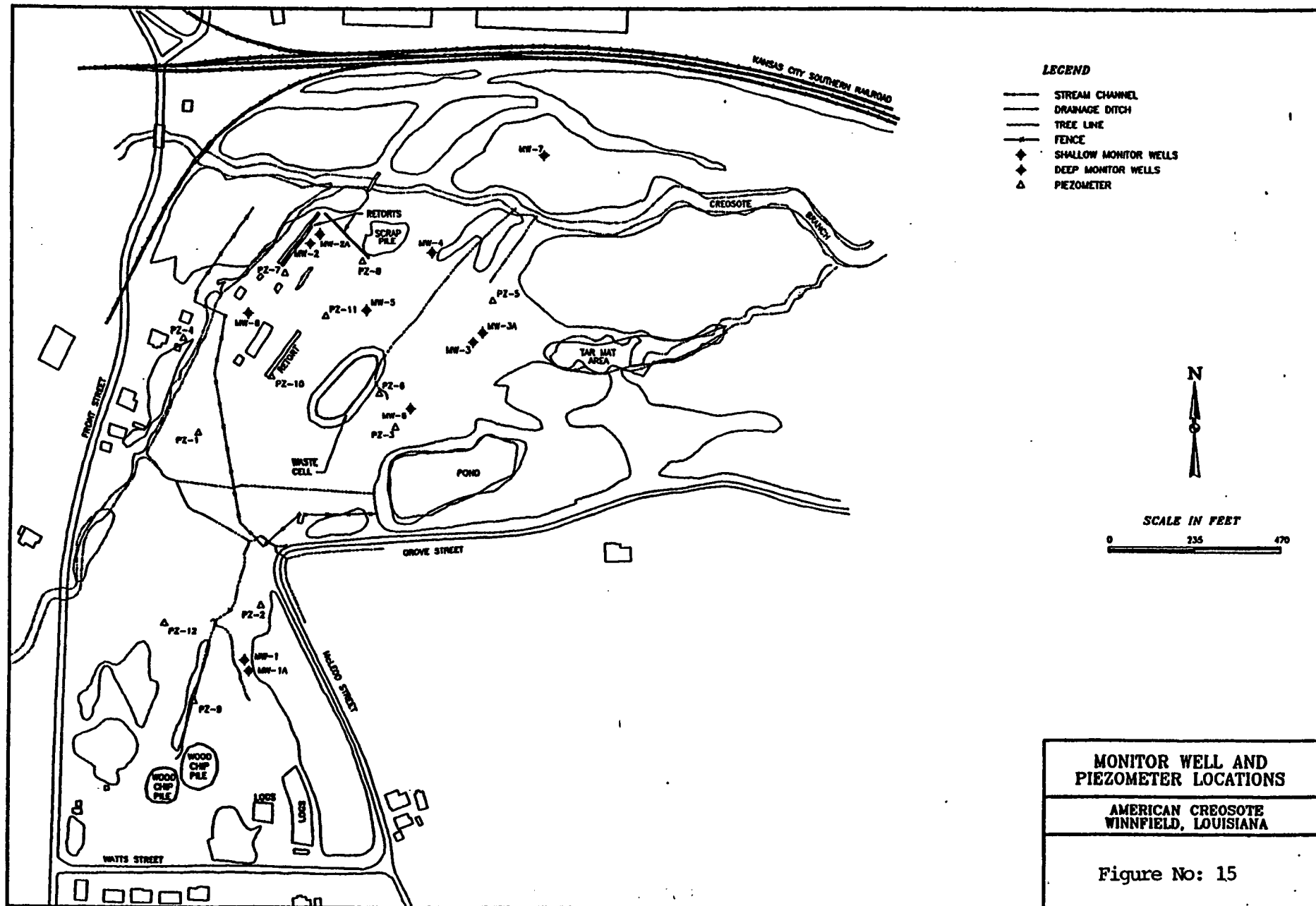
EXCAVATION VOLUMES FOR ONSITE TREATMENT			
Area #	Estimated Contaminated Soil Thickness	Estimated Soil Volume (cy)	Description
1	24 ft.	6,800	Post-Removal Mound
2	20 ft.	50,400	Southwest Process Area
3	30 ft.	45,000	Process Area
4	15 ft.	54,700	Treated Wood Storage Area
5	20 ft.	16,600	Northeast Process Area
6	10 ft.	31,900	Process/Impoundment Area
7	20 ft.	42,200	Impoundment Area
8	20 ft.	15,300	Tar Mat Area
9	10 ft.	10,100	Tar Mat Drainage Area
Total Volume		273,000	

Figure 8. On June 1 and 2, 1992, monitor wells MW 1, 3, 6 and 7 were re-sampled for PAHs and phenols. Laboratory data reports for all these samples are included in Appendix E.

Analytical data for ground water are available from current and previous investigations. Ground water data from previous investigations are most useful for those areas not sampled during the current investigation. Monitor well installation and ground water sampling in the current investigation focused on providing information up-gradient and down-gradient of known or potential source areas.

Shallow monitor well MW-1A and deep monitor well MW-1 were installed on the southern portion of the site to provide data on ground water quality upgradient of contaminant sources present on site. The only organic compound detected in ground water from MW-1A was fluorene at a concentration of less than 1 $\mu\text{g/l}$. Several PAH compounds were reportedly detected in the sample from MW-1 but each was present at less than 1 $\mu\text{g/l}$. Data from the April 1992 resampling of MW-1 indicated no PAH compounds or phenols above detection limits. These data document that ground water entering the site is essentially free of the organic compounds associated with site contamination.

Based on available data and professional judgment, the areas of greatest ground water contamination by site-related organic compounds are the former process area, impoundment area, and portions of the site which lie hydraulically down-gradient of these locations. Phase-separated liquids have been identified in at least two shallow wells representing these portions of the site, MW-4 and MW-6. Phase-separated liquids are identified as Non-Aqueous Phase Liquids (NAPL) and further defined as "floating" low density phased LNAPL or "sinking" dense phased DNAPL. In the course of this text reference will be made to "product" which is considered to be the same as NAPLs. All of these contaminants are hazardous substances as defined at CERCLA Section 101(14), 42 U.S.C. § 9601(14), and further defined at 40 CFR § 302.4.



from the shallow monitor well MW-8 west of the zone of subsurface soil contamination. No volatile organic compounds or phenols were detected in the ground water at this location.

Deep monitor wells were installed to the east (MW-3), west (MW-2), and north (MW-7) of the former process area. Analytical data for ground water from these wells reported no detectable organic compounds with the exception of extremely low levels of PAHs (less than 1 $\mu\text{g/l}$). However, subsurface soil samples collected from the intervals screened by MW-2 and MW-3 document the presence of adsorbed contaminants, particularly phenols, at that depth. The resampling of MW-3 and MW-7 indicated that no PAHs or phenols were present in deep ground water at these locations above detection limits.

Based on lithologic information, it appears unlikely that there is significant interaction between the zones in which the shallow and deep monitor wells are screened. Relatively dry, interbedded silty sands and silty clays were encountered between 30 and 50 feet during the drilling of all deep monitor wells and deep boreholes. These interbedded layers in combination with the upward vertical hydraulic gradient appear to prevent or least retard the migration of dissolved contaminants from the upper zone to the lower zone data. Data collected from deep borehole BH-16 suggest a maximum depth of migration for NAPLs of 40 feet.

A ground water sample was also collected from a nearby public water supply well belonging to the Red Hill Water Cooperative (Figure 8) during both sampling events. This well is screened from approximately 550 to 600 feet in the Sparta Sand. The only organic compounds detected in the sample from this well are acenaphthene (3.29 $\mu\text{g/l}$) and fluorene (0.11 $\mu\text{g/l}$). A resample of this well, however, indicated no PAHs or phenols present above detection limits.

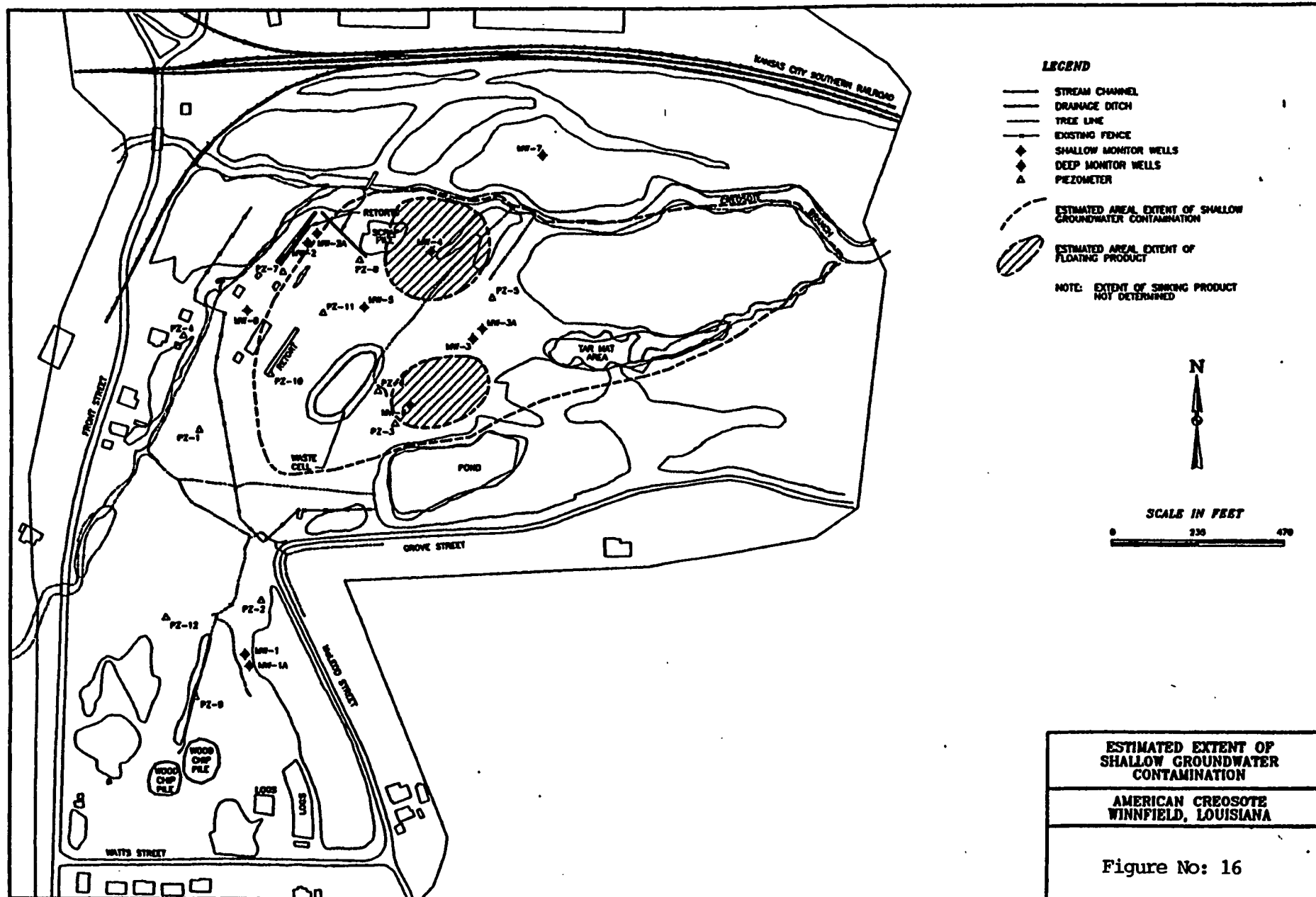
Based on data currently available, samples collected from deep monitor wells (approximate depth 55-65 feet) contained no detectable contamination. The presence of low concentrations of organic contaminants in subsurface soil samples collected from the intervals screened by these wells suggest that any contaminants

Observations of monitor well MW-4, located north of the former process area and screened from 11 to 21 feet, have found both LNAPL and DNAPL product phases. The sinking product phase has been determined to be approximately 1 foot thick at the bottom of this well. Floating product is also present in MW-4 and its thickness has been estimated at approximately 2 inches. A thin layer of floating product as well as traces of sinking product has been observed in MW-6, which is screened from 5 to 20 feet. Additionally, during the field investigation, product was observed seeping directly from the bank of Creosote Branch to the stream surface, particularly in the location depicted on Figure 7.

Ground water samples collected from monitor wells MW-4 and MW-6 contain the highest concentrations of dissolved contaminants detected in site ground water samples. B(a)P equivalent concentrations in ground water from MW-4 and MW-6 are 868 and 369 $\mu\text{g/l}$, respectively. Concentrations of many of the individual compounds are just above or just below maximum solubility for these compounds. Benzene is also present in ground water samples from these wells with reported concentrations of 162 and 146 $\mu\text{g/l}$, respectively. No phenols were detected in MW-4 and MW-6 in these earlier results. However, the resampling of MW-6 indicates total phenols of 154,400 $\mu\text{g/l}$ and no PCP. All of these contaminants are hazardous substances as defined at CERCLA Section 101(14), 42 U.S.C. § 9601(14), and further defined at 40 CFR § 302.4.

Shallow monitor wells MW-3A and MW-5, screened from 5 to 20 and 17 to 27 feet, respectively, are also located within the area of contaminated soils surrounding the process and impoundment areas. Analytical data for ground water samples from these wells demonstrate ground water contamination exists in these areas but at lower concentrations than those in MW-4 and MW-6. No LNAPLs or DNAPLs were observed. B(a)P equivalents reported for MW-3A and MW-5 were both 0 $\mu\text{g/l}$. Benzene was present in these samples at concentrations of 12 and 18 $\mu\text{g/l}$. Phenols were not detected.

Ground water from shallow monitor well MW-2A, located near the western limit of the contaminated subsurface soils, exhibits significantly lower concentrations of contaminants than MW-3A and MW-5. No evidence of LNAPLs or DNAPLs was observed at this location. No phenols were reported. Similar results were obtained



present are strongly adsorbed to the matrix material and are not available for ground water transport.

In summary, sampling data from shallow monitor wells (approximate depth 15-25 feet) indicates that the extent of ground water contamination closely follows the pattern of contaminated subsurface soils illustrated in Figure 11. Estimated extent of shallow ground water contamination and NAPLs are depicted in Figure 16. Creosote Branch appears to be effectively intercepting the northward migrating contamination from the former process and impoundments areas. Based on an estimated average contaminated thickness of 25 feet, and assuming a porosity (amount of void space in the subsurface soils) of 0.3, the contaminated ground water volume has been calculated to be approximately 24 million gallons. Evidence exists that DNAPLs are present at several intervals within areas of greatest contamination (areas surrounding BH-16 and MW-4). Presence of these DNAPLs roughly coincides with the 30-foot contour of subsurface soil contamination shown in Figure 11. DNAPLs may also be present in the former impoundment area (MW-6 and BH-8).

6.0 SUMMARY OF SITE RISKS

6.1 RISK OVERVIEW AND EXPOSURE ASSESSMENT

A risk assessment is a procedure that uses a combination of facts and assumptions to estimate the potential for adverse effects on human health or the environment from exposure to hazardous substances, pollutants, or contaminants found at a site. Risks are determined by comparing actual chemical concentrations at a site versus chemical exposure limits known to have an adverse impact on human health or the environment. Carcinogenic risks are expressed in terms of the chance of developing cancer over a given period of exposure. Toxicity assessments of non-carcinogenic risks are based on comparing site contaminant concentrations to reference concentrations known to have an adverse non-cancerous impact. Conservative assumptions are used in calculating risks that weigh in favor of protecting human health.

industrial and trespassing is available in the administrative record.

6.2 TOXICITY ASSESSMENT

The objective of the toxicity assessment is to weigh available evidence regarding the potential for particular contaminants to cause adverse effects in exposed individuals. Also, the toxicity assessment provides, where possible, an estimate of the relationship between the extent of exposure to a contaminant and the increased likelihood and/or severity of adverse effects. The types of toxicity information considered in this assessment include the reference dose (RfD) used to evaluate non-carcinogenic effects and the slope factor which is used to evaluate carcinogenic potential.

RfDs have been developed by EPA for indicating the potential for adverse health effects from exposure to contaminants of concern exhibiting non-carcinogenic effects. RfDs, which are expressed in units of milligrams per kilogram per day (mg/kg-day), are estimates of acceptable lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of contaminants of concern from environmental media (e.g., the amount of a contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans and to protect sensitive subpopulations) to ensure that it is unlikely to underestimate the potential for adverse non-carcinogenic effects to occur. The purpose of the RfD is to provide a benchmark against which the sum of the other doses (i.e., those projected from human exposure to various environmental conditions) might be compared. Doses that are significantly higher than the RfD may indicate that an inadequate margin of safety could exist for exposure to that substance and that an adverse health effect might occur.

No RfD or slope factors are available for the dermal route of exposure. In some cases, however, non-carcinogenic or carcinogenic risks associated with dermal exposure can be evaluated using an oral RfD or an oral slope factor. Exposures via the dermal route generally are calculated and expressed as absorbed doses. These

The national incidence of risk, or probability, that an individual may develop some form of cancer from everyday sources, over a 70-year life span, is estimated at a probability of three-in-ten. Activities such as too much exposure to the sun, occupational exposures, or dietary or smoking habits contribute to this high risk. This three-in-ten probability is considered the "natural incidence" of cancer in the United States. To protect human health, the EPA has set the range from one in ten-thousand to one in one-million excess cancer incidents as the remedial goal for Superfund sites. A risk of one in one-million means that one person out of one-million people could develop cancer as a result of a lifetime exposure to the site. This risk is above and beyond the "natural incidence" of three in ten. This range may also be expressed as 1×10^{-4} to 1×10^{-6} . The NCP considers 1×10^{-6} as the point of departure when no chemical specific requirements have been established.

The level of concern for non-carcinogenic contaminants is determined by calculating a hazard index. The hazard index reflects the level that chemical contaminants might cause poisoning, organ damage, and/or other health problems. If the hazard index exceeds one (1), there may be concern for potential non-cancer health effects from a extended exposure to the site contaminants.

The risk assessment process evaluated the current site risk, also called the baseline risk, posed to human health or the environment by the site if left alone. The calculation of risk was based on using the values as established in EPA's Supplemental Guidance on Standard Default Exposure Factors of the Human Health Evaluation Manual. The environmental risks were calculated based on EPA's Environmental Evaluation Manual of March 1989. The risks to human health for the sediments, soils and ground water were calculated based on three separate scenarios: a lifetime exposure for a future residential population living on the site for 30 years, on individuals visiting the site on a casual basis (trespassing) or wading in Creosote Branch, and on an industrial basis. Because the site is surrounded by residential areas, this ROD is based on the residential scenario which is the most conservative risk assumption. The discussions that follow will only present the data from a lifetime exposure. The other exposure information for

Slope factors (SFs) have been developed for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic contaminants of concern. SFs, which are expressed in units of $(\text{mg/kg-day})^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Slope factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

There are varying degrees of confidence in the weight-of-evidence for carcinogenicity of a given chemical. The EPA system involves characterizing the overall weight of evidence for a chemical's carcinogenicity based on the availability of animal, human, and other supportive data. The weight-of-evidence classification is an attempt to determine the likelihood that the agent is a human carcinogen, and thus qualitatively affects the estimation of potential health risks. Three major factors are considered in characterizing the overall weight of evidence for carcinogenicity: (1) the quality of evidence from human studies; (2) the quality of evidence from animal studies, which are combined into a characterization of the overall weight-of-evidence for human carcinogenicity; and (3), other supporting information that is assessed to determine whether the overall weight-of-evidence should be modified. EPA uses the weight-of-evidence classification system to categorize carcinogenicity of contamination as one of the following five groups:

Group A - Human Carcinogen: This category indicates that there is sufficient evidence from epidemiological studies to support an association between the compound and cancer.

absorbed doses are compared to an oral toxicity value that is also expressed as an absorbed dose. Toxicity information used in the toxicity assessment for the Site was obtained from EPA's Integrated Risk Information System (IRIS). If values were not available from IRIS, then EPA's Health Effects Assessment Summary Tables (HEAST) were consulted. The toxicity factors used in this evaluation for non-carcinogenic effects and carcinogenic effects are summarized in the tables outlined in the following pages.

For chemicals that exhibit non-carcinogenic health effects, it is assumed that organisms have repair and detoxification capabilities that must be exceeded by some critical concentration (threshold) before the health is adversely affected. For example, an organ can have a large number of cells performing the same or similar functions. To lose organ function, a significant number of those cells must be depleted or impacted. This threshold view holds that exposure to some amount of a contaminant is tolerated without an appreciable risk of adverse effects.

For chemicals that exhibit carcinogenic effects, most authorities recognize that one or more molecular events can evoke changes in a single cell or a small number of cells that can lead to tumor formation. This is the non-threshold theory of carcinogenesis which purports that any level of exposure to a carcinogen can result in some finite possibility of generating the disease.

EPA's Carcinogenic Risk Assessment Verification Endeavor (CRAVE) has developed slope factors (i.e., dose-response values) for estimating excess lifetime cancer risks associated with various levels of lifetime exposure to potential human carcinogens. The carcinogenic slope factors can be used to estimate the lifetime excess cancer risk associated with exposure to a potential carcinogen. Risks estimated using slope factors are considered unlikely to underestimate actual risks, but they may overestimate actual risks. Excess lifetime cancer risks are generally expressed in scientific notation and are probabilities. An excess lifetime cancer risk of 1×10^{-6} (one-in-one-million), for example, represents the probability that one additional individual in a population of one million will develop cancer as a result of exposure to a carcinogenic chemical over a 70-year lifetime under specific exposure conditions.

TABLE 4

SUMMARY OF CHEMICALS OF POTENTIAL CONCERN FOR THE AMERICAN CREOSOTE SITE

	SURFACE SOILS	GROUND WATER	SURFACE WATER	SEDIMENTS
• VOA ANALYTES	(µg/kg)	(µg/L)	(µg/L)	(µg/kg)
• VINYL CHLORIDE	-		-	-
• 1,1-DICHLOROETHENE	-		-	-
• TRANS-1,2-DICHLOROETHENE	-		-	-
• 1,1-DICHLOROETHANE	-		-	-
• CIS-1,2-DICHLOROETHENE	-		-	-
• CHLOROFORM	-		-	-
• 1,1,1-TRICHLOROETHANE	-		-	-
• CARBON TETRACHLORIDE	-		-	-
• BENZENE	-	0 - 162	-	-
• 1,2-DICHLOROETHANE	-		-	-
• TRICHLOROETHENE	-		-	-
• BROMODICHLOROMETHANE	-		-	-
• TOLUENE	-	0 - 598	-	-
• TETRACHLOROETHENE	-		-	-
• CHLOROBENZENE	-	-	-	-
• 1,1,2,2-TETRACHLOROETHANE	-		-	-
• ETHYLBENZENE	-	0 - 51	-	-
• BROMOFORM	-		-	-
• M,P-XYLENE	-		-	-
• O-XYLENE	-		-	-
• XYLENES	-	0 - 371	-	-
• 1,2-DICHLOROBENZENE	-	-	-	-
• 1,3-DICHLOROBENZENE	-	-	-	-
• 1,4-DICHLOROBENZENE	-	-	-	4
• PAH ANALYTES	(µg/kg)	(µg/L)	(µg/L)	(µg/kg)
• NAPHTHALENE	0 - 960	0 - 20900	-	0 - 300
• ACENAPHTHYLENE	0 - 2000	-	-	0 - 419
• ACENAPHTHENE	0 - 1700	0 - 2730	-	0 - 1100
• FLUORENE	0 - 6700	0 - 8980	-	0 - 1200
• PHENANTHRENE	0 - 13000	0 - 922	-	0 - 3300
• ANTHRACENE	0 - 29000	0 - 922	-	0 - 770
• FLUORANTHENE	0 - 38046	0 - 2710	-	0 - 4300
• PYRENE	0 - 55000	0 - 2060	-	0 - 4000
• BENZ(A)ANTHRACENE	0 - 28973	0 - 1060	-	0 - 1800
• CHRYSENE	0 - 37000	0 - 4340	-	0 - 1800
• BENZO(B)(K)FLUORANTHENE	0 - 47469	0 - 487	-	0 - 3000
• BENZO(A)PYRENE	0 - 24000	0 - 658	-	0 - 1600
• INDENO(1,2,3-CD)PYRENE	0 - 11858	-	-	0 - 1200
• DIBENZ(A,H)ANTHRACENE	0 - 16000	-	-	0 - 4600
• BENZO(G,H,I)PERYLENE	0 - 15000	0 - 45	-	0 - 1000
• PHENOL ANALYTES	(µg/kg)	(µg/L)	(µg/L)	(µg/kg)
• PHENOL	0 - 530	0.001	-	0 - 460
• 2-CHLOROPHENOL	0 - 0.3	-	-	0 - 60
• O-CRESOL	0 - 0.1	-	-	0 - 7.1
• M/P-CRESOL	0 - 0.1	-	-	0 - 290
• 2-NITROPHENOL	-	-	-	0 - 65
• 2,4-DIMETHYLPHENOL	0 - 6.3	-	-	0 - 40
• 2,4-DICHLOROPHENOL	0 - 110	-	-	0 - 430
• 4-CHLORO-3-METHYLPHENOL	-	-	-	0 - 12
• 2,4,5/6-TRICHLOROPHENOL	0 - 0.1	-	-	0 - 3
• 2,4-DINITROPHENOL	0 - 0.8	-	-	0 - 32
• 4-NITROPHENOL	0 - 0.8	-	-	-
• 2,3,4,6-TETRACHLOROPHENOL	0 - 230	-	0 - 140	0 - 320
• 4,6-DINITRO-2-METHYLPHENOL	0 - 1.0	-	-	-
• PENTACHLOROPHENOL	0.2 - 340	-	0 - 68	0 - 330

Group B - Probable Human Carcinogen: This category generally indicates that there is at least limited evidence from epidemiological studies of carcinogenicity to humans (Group B1) or that, in the absence of adequate data on humans, there is sufficient evidence of carcinogenicity in animals (Group B2)

Group C - Possible Human Carcinogen : This category indicates that there is limited evidence of carcinogenicity in animals in the absence of data on humans.

Group D - Not Classified: This category indicates that the evidence for carcinogenicity in animals is inadequate.

Group E - No Evidence of Carcinogenicity to Humans; This category indicates that there is no evidence for carcinogenicity in at least two adequate animal tests in different species, or in both epidemiological and animal studies.

6.3 SITE RISKS AND CONTAMINANTS OF CONCERN

Table 4 presents a summary of all compounds analyzed and a range of the constituents found in each medium. This data was used in the baseline risk assessment which was divided into two parts: The human health evaluation and the ecological evaluation. The baseline risk assessment was based on reasonable maximum exposure values for hazardous substances found on site as presented in Table 5. The human health evaluation considered potentially contaminated media such as surface soils, ground water, surface water, and sediments. Contaminant migration via an air pathway was evaluated in the risk assessment. Air monitoring from previous actions and throughout the remedial investigation activities showed no significant breathing hazards to the nearby populations or terrestrial wildlife.

TABLE 5
SUMMARY OF EXPOSURE CONCENTRATIONS
AMERICAN CREOSOTE

Chemicals	Sample Mean (mg/kg or mg/l)	95% Upper Confidence limit of the mean (mg/kg or mg/l)	RME	Residential Lifetime CDI	
				carcinogen (mg/kg-day)	non-carcinogen (mg/kg-day)
Ingestion of Soils					
2-chlorophenol	0.13	0.16	0.16	NA	2.3 x 10 ⁶
Dichlorophenol	0.36	0.64	0.64	NA	9.0 x 10 ⁶
Dimethylphenol	0.06	0.09	0.09	NA	1.2 x 10 ⁶
Dinitrophenol	8.3 x 10 ⁻⁴	NA	8.3 x 10 ⁻⁴	NA	1.2 x 10 ⁶
m-/p-cresol	0.2	0.39	0.39	NA	5.5 x 10 ⁶
o-cresol	8.0 x 10 ⁻³	NA	8.0 x 10 ⁻³	NA	1.1 x 10 ⁹
Tetrachlorophenol	0.2	0.4	0.4	NA	5.7 x 10 ⁶
Phenol	0.49	0.69	0.69	NA	9.7 x 10 ⁶
Pentachlorophenol	0.6	0.92	0.92	1.4 x 10 ⁶	1.3 x 10 ³
Tetrachlorophenol	0.21	0.4	0.4	NA	5.7 x 10 ⁶
Trichlorophenol	0.11	0.19	0.19	3.0 x 10 ⁷	2.7 x 10 ⁶
B(a)P equivalents	11	15	15	2.4 x 10 ³	NA
Acenaphthene	0.44	NA	0.65	NA	9.3 x 10 ⁶

TABLE 4 (Continued)

	SURFACE SOILS	GROUND WATER	SURFACE WATER	SEDIMENTS
METALS		(µg/L)	(µg/L)	(µg/kg)
•ALUMINUM		0 - 27700	340	321 - 1150
•ANTIMONY		—	50	—
•ARSENIC		—	—	9.7 - 84
•BARIUM		79 - 485	82	90 - 268
•BERYLLIUM		3	2	0.61 - 2
•CADMIUM		0 - 21	—	—
•CALCIUM		4340 - 113000	49200	2760 - 70800
•CHROMIUM		0 - 31	8	0 - 6
•COBALT		0 - 133	—	0 - 2
•COPPER		5 - 30	8	3 - 3.1
•IRON		2500 - 2600	743	1220 - 2450
•LEAD		0 - 79	—	0 - 29.4
•MAGNESIUM		1860 - 80900	2300	103 - 4360
•MANGANESE		59 - 3280	102	52.7 - 208
•NICKEL		0 - 15	—	0 - 5.3
•POTASSIUM		3150 - 6000	1760	69.2 - 2220
•SELENIUM		—	126	0 - 143
•SILVER		—	—	—
•SODIUM		24300 - 281000	7050	88.9 - 20100
•THALLIUM		0 - 107	152	98.8 - 181
•VANADIUM		0 - 91	—	4.5 - 7
•ZINC		16 - 300	42	26 - 49
•MOLYBDENUM		—	—	—
•PHOSPHORUS		15 - 323	83	83 - 141
•STRONTIUM		213 - 1670	276	13.2 - 485
DIOXINS				(µg/kg)
•2378-TCDD				—
•2378-TCDF				—
•12378-PeCDF				—
•12378-PeCDD				—
•23478-PeCDF				—
•123478-HxCDF				—
•123678-HxCDF				—
•123478-HxCDD				—
•123678-HxCDD				—
•123789-HxCDD				—
•234678-HxCDF				—
•123789-HxCDF				—
•1234678-HpCDF				0.1072
•1234678-HpCDD				0.4359
•1234789-HpCDF				—
•OCDD				5.3465
•OCDF				0.4081

TABLE 5 (continued)

SUMMARY OF EXPOSURE CONCENTRATIONS
AMERICAN CREOSOTE

Chemicals	Sample Mean (mg/kg or mg/l)	95% Upper Confidence limit of the mean (mg/kg or mg/l)	RME	Residential Lifetime CDI	
				carcinogen (mg/kg-day)	non-carcinogen (mg/kg-day)
Dermal Contact with Soils (continued)					
Pentachlorophenol	0.6	0.92	0.92	3.4×10^{-6}	2.1×10^{-5}
Phenol	0.49	0.69	0.69	NA	1.6×10^{-5}
Tetrachlorophenol	0.2	0.4	0.4	NA	9.2×10^{-6}
Trichlorophenol	0.11	0.19	0.19	7.1×10^{-7}	4.4×10^{-6}
2,3,7,8-TCDD equivalent	5.4×10^{-3}	NA	5.5×10^{-3}	1.0×10^{-7}	NA
Inhalation of Fugitive Dusts					
Trichlorophenol	0.11	0.19	0.19	5.0×10^{-12}	NA
B(a)P equivalents	11	15	15	3.9×10^{-10}	NA
2,3,7,8-TCDD equivalent	5.4×10^{-3}	NA	5.5×10^{-3}	1.4×10^{-13}	NA
Ingestion of Sediments - Reasonable Maximum Exposure					
2-chlorophenol	1.2	NA	1.2	NA	NA
m-/p-cresol	0.29	NA	0.29	NA	NA

TABLE 5 (continued)

SUMMARY OF EXPOSURE CONCENTRATIONS
AMERICAN CREOSOTE

Chemicals	Sample Mean (mg/kg or mg/l)	95% Upper Confidence limit of the mean (mg/kg or mg/l)	RME	Residential Lifetime CDI	
				carcinogen (mg/kg-day)	non-carcinogen (mg/kg-day)
Ingestion of Soils (continued)					
Fluoranthene	12	16	16	NA	2.3 X 10 ⁴
Fluorene	1.2	1.9	1.9	NA	2.6 x 10 ³
Naphthalene	0.2	0.3	0.3	NA	4.3 x 10 ⁶
Pyrene	15	23	23	NA	3.3 x 10 ⁴
2,3,7,8-TCDD equivalent	5.4 x 10 ³	NA	5.5 x 10 ³	8.6 x 10 ⁹	NA
Dermal Contact with Soils					
2-chlorophenol	0.13	0.16	0.16	NA	3.7 x 10 ⁶
Dichlorophenol	0.36	0.64	0.64	NA	1.5 x 10 ³
Dimethylphenol	0.06	0.09	0.09	NA	2.0 x 10 ⁶
Dinitrophenol	8.3 x 10 ⁻⁴	NA	8.3 x 10 ⁻⁴	NA	1.9 x 10 ⁸
m-/p-cresol	0.2	0.39	0.39	NA	8.8 x 10 ⁶
o-cresol	8.0 x 10 ⁵	NA	8.0 x 10 ⁵	NA	1.8 x 10 ⁹

TABLE 5 (continued)
SUMMARY OF EXPOSURE CONCENTRATIONS
AMERICAN CREOSOTE

Chemicals	Sample Mean (mg/kg or mg/l)	95% Upper Confidence limit of the mean (mg/kg or mg/l)	RME	Residential Lifetime CDI	
				carcinogen (mg/kg-day)	non-carcinogen (mg/kg-day)
Dermal Contact with Sediments - most likely scenario					
2-chlorophenol	1.2	NA	1.2	NA	1.3 x 10 ⁷
m-/p-cresol	0.29	NA	0.29	NA	3.2 x 10 ⁸
Pentachlorophenol	0.069	NA	0.069	9.8 x 10 ⁻¹⁰	7.6 x 10 ⁹
Tetrachlorophenol	0.21	NA	0.38	NA	4.2 x 10 ⁸
Ingestion of Groundwater					
B(a)P equivalents	0.3	NA	0.85	1.3 x 10 ²	NA
Acenaphthene	0.56	0.12	0.12	NA	1.1 x 10 ¹
Anthracene	0.21	0.48	0.48	NA	4.4 x 10 ²
Fluoranthene	0.59	0.48	0.48	NA	1.4 x 10 ¹
Fluorene	2.0	4.3	4.3	NA	4.1 x 10 ¹
Pyrene	0.3	0.73	0.73	NA	6.7 x 10 ²
Napthalene	4.8	11	11	NA	9.6 x 10 ¹

TABLE 5 (continued)

**SUMMARY OF EXPOSURE CONCENTRATIONS
AMERICAN CREOSOTE**

Chemicals	Sample Mean (mg/kg or mg/l)	95% Upper Confidence limit of the mean (mg/kg or mg/l)	RME	Residential Lifetime CDI	
				carcinogen (mg/kg-day)	non-carcinogen (mg/kg-day)
Ingestion of Sediments - Reasonable Maximum Exposure (continued)					
Pentachlorophenol	0.069	NA	0.069	NA	NA
Tetrachlorophenol	0.21	NA	0.38	NA	NA
Ingestion of Sediments - most likely scenario					
2-chlorophenol	1.2	NA	1.2	NA	3.1 x 10 ⁴
m-/p-cresol	0.29	NA	0.29	NA	7.4 x 10 ⁹
Pentachlorophenol	0.069	NA	0.069	2.3 x 10 ⁻¹⁰	1.8 x 10 ⁹
Tetrachlorophenol	0.21	NA	0.38	NA	9.7 x 10 ⁹
Dermal Contact with Sediments - Reasonable Maximum Exposure					
2-chlorophenol	1.2	NA	1.2	NA	NA
m-/p-cresol	0.29	NA	0.29	NA	NA
Pentachlorophenol	0.069	NA	0.069	NA	NA
Tetrachlorophenol	0.21	NA	0.38	NA	NA

Based on the results of previous field sampling and historical site activities, polynuclear aromatic hydrocarbons (PAHs), expressed as benzo(a)pyrene equivalents, and pentachlorophenol (PCP), were tentatively selected as the major hazardous substance contaminants of concern prior to the RI field sampling. In addition to these contaminants, the volatile compounds associated with the use of petroleum as a carrier fluid were identified as potential contaminants of concern. These volatile compounds are benzene, toluene, ethylbenzene and xylenes (BTEX), and are also hazardous substances as defined at CERCLA Section 101(14), 42 U.S.C. § 9601(14), and further defined at 40 CFR § 302.4. As shown in the following analyses, these assumptions were verified by the RI.

6.3.1 HUMAN HEALTH RISKS

A summary of site risks from contaminants at the American Creosote site is presented in Tables 6 and 7. The risks shown in these tables were calculated based on standard default assumptions that often overestimate potential risks. The human health risk from potential exposure to ground water is based on the conservative assumption that exposure would occur at the site. Such exposure is unlikely to occur since no domestic wells currently exist on the site, however, it is assumed that future generations may tap into the ground water at the site. The information gathered at the site indicates that the salt-water interface is rising in this Parish due to excessive withdrawal from aquifers below 600 feet. The potential remains that in the future shallower aquifers may be used even though they do not yield as much water as the deeper aquifers. In addition, the standard default assumptions as previously noted are included in Table 9 at the end of this section of the ROD.

TABLE 5 (continued)

**SUMMARY OF EXPOSURE CONCENTRATIONS
AMERICAN CREOSOTE**

Chemicals	Sample Mean (mg/kg or mg/l)	95% Upper Confidence limit of the mean (mg/kg or mg/l)	RME	Residential Lifetime CDI	
				carcinogen (mg/kg-day)	non-carcinogen (mg/kg-day)
Ingestion of Groundwater (continued)					
Benzene	3.8 x 10 ⁻²	7.9 x 10 ⁻²	7.9 x 10 ⁻²	1.2 x 10 ⁻³	NA
Ethylbenzene	9.9 x 10 ⁻³	2.1 x 10 ⁻²	2.1 x 10 ⁻²	NA	1.9 x 10 ⁻³
Toluene	0.075	0.2	0.2	NA	1.8 x 10 ⁻²
Xylenes	0.055	0.13	0.13	NA	1.2 x 10 ⁻²
Inhalation of Groundwater during Showering					
Benzene	3.8 x 10 ⁻²	7.9 x 10 ⁻²	7.9 x 10 ⁻²	1.8 x 10 ⁻⁴	NA
Ethylbenzene	9.9 x 10 ⁻³	2.1 x 10 ⁻²	2.1 x 10 ⁻²	NA	1.1 x 10 ⁻⁴
Toluene	0.075	0.2	0.2	NA	1.1 x 10 ⁻³
Xylenes	0.055	0.13	0.13	NA	7.2 x 10 ⁻⁴

NA - Not applicable

TABLE 6 (Continued)

**CANCER RISK ESTIMATES FOR FUTURE LAND USE
RESIDENTIAL LIFETIME EXPOSURE
AMERICAN CREOSOTE**

Chemical	CDI (mg/kg-day)	CDI adj. for Adsorption	SP (mg/kg-day) ¹	Weight of Evidence	Type of Cancer	SP Source	SP Basis Vehicle	Chemical Specific Risk	Total Pathway Risk	Total Exposure Risk
Exposure Pathway: Ingestion of Contaminated Groundwater										
B(a)P equivalents	1.3×10^{-2}	No	5.79	B2	NA	EPA (1992)	Food, Water	7.5×10^{-2}		
Benzene	1.2×10^{-3}	No	0.029	A	Leukemia	EPA (1992)	Water	3.5×10^{-3}		
Total Pathway Risk									7.5×10^{-2}	
Exposure Pathway: Inhalation of Vapors from Groundwater during Showering										
Benzene	1.8×10^{-4}	No	0.029	A	Leukemia	EPA (1992)	Water	5.2×10^{-4}		
Exposure Pathway: Dermal Contact with Surface Water while wading - most likely scenario										
Pentachlorophenol	1.3×10^{-4}	Yes	0.12	B2	NA	EPA (1992)	Food	1.6×10^{-9}		
Exposure Pathway: Ingestion of Sediment While Wading - most likely scenario										
Pentachlorophenol	2.3×10^{-10}	No	0.12	B2	NA	EPA (1992)	Food	2.8×10^{-11}		
B(a)P equivalents	1.5×10^{-4}	No	5.79	B2	NA	EPA (1992)	Food, Water	8.7×10^{-4}		
2,3,7,8-TCDD equivalents	3.3×10^{-14}	No	1.5×10^3	B2	NA	EPA (1991)	Food	5.0×10^{-9}		
Total Pathway Risk									9.2×10^{-4}	
Exposure Pathway: Dermal Contact with Sediments - most likely scenario										
Pentachlorophenol	9.8×10^{-10}	Yes	0.12	B2	NA	EPA (1992)	Food	1.2×10^{-10}		
2,3,7,8-TCDD equivalents	5.7×10^{-13}	Yes	1.5×10^3	B2	NA	EPA (1991)	Food	8.6×10^{-4}		
Total Pathway Risk									8.6×10^{-4}	
Total Exposure Risk										9.1×10^{-2}

TABLE 6

**CANCER RISK ESTIMATES FOR FUTURE LAND USE
RESIDENTIAL LIFETIME EXPOSURE
AMERICAN CREOSOTE**

Chemical	CDI (mg/kg-day)	CDI adj. for Adsorption	SF (mg/kg-day) ⁻¹	Weight of Evidence	Type of Cancer	SF Source	SF Basis Vehicle	Chemical Specific Risk	Total Pathway Risk	Total Exposure Risk
Exposure Pathway: Ingestion of Contaminated Soils										
Pentachlorophenol	1.4×10^{-6}	No	0.12	B2	NA	EPA (1992)	Food	1.7×10^{-7}		
2,4,5/6 Trichlorophenol	3.0×10^{-7}	No	0.011	B2	NA	EPA (1992)	Food	3.3×10^{-9}		
B(a)P equivalents	2.4×10^{-5}	No	5.79	B2	NA	EPA (1992)	Food, Water	1.4×10^{-4}		
2,3,7,8-TCDD equivalents	8.6×10^{-9}	No	1.5×10^3	B2	NA	EPA (1991)	Food	1.3×10^{-3}		
Total Pathway Risk									1.4×10^{-3}	
Exposure Pathway: Dermal Contact with Contaminated Soils										
Pentachlorophenol	3.4×10^{-6}	Yes	0.12	B2	NA	EPA (1992)	Food	4.1×10^{-7}		
2,4,5/6 Trichlorophenol	7.1×10^{-7}	Yes	0.011	B2	NA	EPA (1992)	Food	7.8×10^{-9}		
2,3,7,8-TCDD equivalents	1.0×10^{-7}	Yes	1.5×10^3	B2	NA	EPA (1991)	Food	1.5×10^{-2}		
Total Pathway Risk									1.5×10^{-2}	
Exposure Pathway: Inhalation of Contaminated Soils										
Pentachlorophenol	2.4×10^{-11}	No	0.12	B2	NA	EPA (1992)	Food	2.9×10^{-12}		
2,4,5/6 Trichlorophenol	5.0×10^{-12}	No	0.011	B2	NA	EPA (1992)	Food	5.5×10^{-14}		
B(a)P equivalents	3.9×10^{-10}	No	5.79	B2	NA	EPA (1992)	Food	2.3×10^{-9}		
2,3,7,8-TCDD equivalents	1.4×10^{-13}	No	1.5×10^3	B2	NA	EPA (1992)	Food	2.1×10^{-8}		
Total Pathway Risk									2.3×10^{-8}	

TABLE 7 (Continued)

**FUTURE LAND USE
RESIDENTIAL (LIFETIME)
CHRONIC HAZARD INDEX ESTIMATES
AMERICAN CREOSOTE**

Chemical	CDI (mg/kg-day)	CDI adj. for Adsorption	RfD (mg/kg-day)	Confidence Level	Critical Effect	RfD Source	RfD Basis Vehicle	RfD Uncertainty Adjustments & Modifying Factors	Hazard Quotient	Pathway Hazard Index	Total Exposure Hazard Index
Exposure Pathway: Ingestion of Contaminated Soils (continued)											
Fluorene	2.6×10^3	No	0.04	low	decreased red blood cells	EPA, 1992	gavage	3,000	6.5×10^4		
Naphthalene	4.3×10^4	No	0.04	--	reduced body weight	EPA, 1991	gavage	10,000	1.1×10^4		
Pyrene	3.3×10^4	No	0.03	low	kidney	EPA, 1992	gavage	3,000	1.1×10^2		
Pathway Hazard Index										2.3×10^2	
Exposure Pathway: Dermal Contact with Contaminated Soils											
2-chlorophenol	3.7×10^4	Yes	0.005	low	reproduction	EPA, 1992	water	1,000	7.4×10^4		
m/p-cresol	8.8×10^4	Yes	0.05	medium	weight loss, neurotoxicity	EPA, 1992	food	1,000	1.8×10^4		
o-cresol	1.8×10^3	Yes	0.05	medium	neurotoxicity	EPA, 1992	gavage	1,000	3.6×10^4		
2,4-Dichlorophenol	1.5×10^3	Yes	0.003	--	immune system	EPA, 1991	--	100	5.0×10^3		
2,4-Dimethylphenol	2.0×10^4	Yes	0.02	--	CNS	EPA, 1991	--	1,000	1.0×10^4		
2,4-Dinitrophenol	1.9×10^4	Yes	0.002	--	cataracts	EPA, 1991	--	1,000	9.5×10^4		
Pentachlorophenol	2.1×10^3	Yes	0.03	medium	liver, kidney	EPA, 1992	food	100	7.0×10^4		
Phenol	1.6×10^3	Yes	0.6	low	reduced fetal body weight	EPA, 1992	gavage	100	2.7×10^3		

TABLE 7
FUTURE LAND USE
RESIDENTIAL (LIFETIME)
CHRONIC HAZARD INDEX ESTIMATES
AMERICAN CREOSOTE

Chemical	CDI (mg/kg-day)	CDI adj. for Adsorption	RfD (mg/kg-day)	Confidence Level	Critical Effect	RfD Source	RfD Basis Vehicle	RfD Uncertainty Adjustments & Modifying Factors	Hazard Quotient	Pathway Hazard Index	Total Exposure Hazard Index
Exposure Pathway: Ingestion of Contaminated Soils											
2-chlorophenol	2.3×10^{-4}	No	0.005	low	reproduction	EPA, 1992	water	1,000	4.6×10^{-4}		
m/p-cresol	5.5×10^{-4}	No	0.05	medium	weight loss, neurotoxicity	EPA, 1992	food	1,000	1.1×10^{-4}		
o-cresol	1.1×10^{-3}	No	0.05	medium	neurotoxicity	EPA, 1992	gavage	1,000	2.2×10^{-4}		
2,4-Dichlorophenol	9.0×10^{-4}	No	0.003	--	immune system	EPA, 1991	--	100	3.0×10^{-3}		
2,4-Dimethylphenol	1.2×10^{-4}	No	0.02	--	CNS	EPA, 1991	--	1,000	6.0×10^{-3}		
2,4-Dinitrophenol	1.2×10^{-4}	No	0.002	--	cataracts	EPA, 1991	--	1,000	6.0×10^{-4}		
Pentachlorophenol	1.3×10^{-3}	No	0.03	medium	liver, kidney	EPA, 1992	food	100	4.3×10^{-4}		
Phenol	9.7×10^{-4}	No	0.6	low	reduced fetal body weight	EPA, 1992	gavage	100	1.6×10^{-3}		
2,3,4,6- Tetrachlorophenol	5.7×10^{-4}	No	0.03	medium	liver	EPA, 1992	gavage	1,000	1.9×10^{-4}		
2,4,5 Trichlorophenol	2.7×10^{-4}	No	0.1	low	liver, kidney	EPA, 1992	food	1,000	2.7×10^{-3}		
Acenaphthene	9.3×10^{-6}	No	0.06	low	liver	EPA, 1992	gavage	3,000	1.6×10^{-4}		
Anthracene	1.9×10^{-4}	No	0.3	low	--	EPA, 1992	gavage	3,000	6.3×10^{-4}		
Fluoranthene	2.3×10^{-4}	No	0.04	low	neuropathy, liver	EPA, 1992	gavage	3,000	5.8×10^{-3}		

**FUTURE LAND USE
RESIDENTIAL (LIFETIME)
CHRONIC HAZARD INDEX ESTIMATES
AMERICAN CREOSOTE**

[illegible]

**FUTURE LAND USE
RESIDENTIAL (LIFETIME)
CHRONIC HAZARD INDEX ESTIMATES
AMERICAN CREOSOTE**

[illegible]

As shown, the potential risks to human health are from surface soils and contaminated ground water, while sediments within Creosote Branch are below established health-based goals for remediation. Currently, carcinogenic threats to human health via exposure to ground water and surface soils are above EPA's target risk range for taking actions at CERCLA sites. For the aquifer, the upper-bound estimate of carcinogenic health risks associated with potential lifetime exposure was reported as 8×10^{-2} . The majority of risk associated with this exposure is from drinking the carcinogenic PAHs (expressed as B(a)P) from contaminated ground water. For surface soils the ingestion and direct contact (dermal contact) exposures from carcinogenic PAHs and dioxins are represented as 2×10^{-2} . Both contaminated surface soils and ground water greatly exceed the lower bound of EPA's target risk range of 1×10^{-4} and represents a significant carcinogenic health risk.

The non-cancer health risks reported as the hazard quotient was as high as 43 for potential exposure to ground water. This value is substantially greater than the established NCP goal of less than 1. The risk from this aquifer is driven primarily by the individual PAH compounds such as naphthalene and fluorene. The contaminated ground water presents an unacceptable noncarcinogenic health risk.

6.3.2 IMPACTS TO THE ENVIRONMENT

A detailed ecological assessment was conducted using worm studies of surface soils, and bioassays of the surface waters and sediments of Creosote Branch. Knowledge of site ecology is based on site reconnaissances and a compilation of existing ecological information. Surveys were conducted of terrestrial vegetation and wildlife, aquatic and wetland habitats, and aquatic life. The ecological risk assessment was conducted in accordance with the Risk Assessment Guidance for Superfund: Volume II, Environmental Evaluation Manual (EPA, 1989b), and Ecological Assessment of Hazardous Waste Sites: A Field and Laboratory Reference (EPA, 1989c).

Risks to the following media were evaluated as part of that risk assessment:

- terrestrial vegetation;
- terrestrial wildlife;
- aquatic life; and
- wetlands.

6.3.2.1 Field Ecological Investigations

A field investigation of the site and adjacent properties was conducted on March 18, 1992. Wetlands were identified using the three parameter approach of the 1989 Federal Manual for Identifying and Delineating Jurisdictional Wetlands (Fed. Interagency Comm. for Wetland Delineation 1989). This approach identifies wetlands based on the presence of the following criteria: (1) a periodic predominance of hydrophytic vegetation, (2) a substrate of predominantly undrained hydric soil and (3) a substrate saturated or inundated during at least part of the growing season.

During the investigation, data were collected on vegetation, soils and hydrological characteristics of the site. A qualitative assessment was made of vegetative communities on-site by noting the distribution and extent of different plant species in each of three general vegetative strata: the canopy, the understory, and the herbaceous layer. The extent of each species was estimated by direct observation. The U.S. Fish and Wildlife Service (FWS) has assigned a wetland indicator classification to plant species, based on the growth requirements of each species. This classification was used concurrently with field observations to determine the approximate extent of wetland plant communities on site.

Soil was evaluated to determine the upper limit of the wetland boundary. However, in this study, soil sampling was relied upon to a lesser extent, given the highly disturbed and contaminated nature of the soil. Soil profiles were investigated visually for color, organic content, general texture, mottling or streaking and evidence of past disturbance. Hydrologic indicators were used in conjunction with soils and vegetation to establish the upper wetlands boundary. These indicators included topographic and

surface water features, soil saturation and evidence of past inundation or surface flow, such as tree buttressing, watermarks, darkened leaves, sediment deposition and/or driftlines.

Most of the site previously has been utilized for various wood treating activities and consequently is denuded of most vegetation. This is particularly true of the former process area where various buildings, wood treating apparatus and storage tanks were located. This activity has resulted in highly disturbed vegetation and bare soil mosaic composed of a variety of disturbance species, with little discernible pattern. Wetland tree species such as black willow were observed growing alongside upland species such as black locust, with escaped cultivars including scattered crabapple trees. Patches of grasses, such as quackgrass and cheatgrass were common throughout this area. Most of this area is covered by weedy herbaceous species, such as ragweed, goldenrod, panic-grass, India lovegrass, and numerous other invaders. This former process area thus offers little habitat value for wildlife.

The west-central and southern portion of the site was used for wood storage and debarking. This area has been subject to less frequent and vigorous disturbance and is presently in an early successional stage dominated by knee-high saplings of red maple and willow and shrubs such as alder and elderberry. Rushes, sedges, rough-stemmed goldenrod, tick-seed sunflower, pokeberry, and a variety of other weedy herbaceous species are present.

A relatively undisturbed wetland-upland complex is located along the east and west peripheries of the site and the northern third of the property. Three relatively intact wetland types exist within this undisturbed area including a palustrine forested wetland, a palustrine emergent wetland, and an open water wetland.

A palustrine forested wetland covers much of the northern portion of the site. This palustrine forested wetlands consists of a canopy dominated by several oaks including willow oak, overcup oak, and water oak, American elm and sweet gum. Sweetbay magnolia, red maple and black gum represented a minor proportion of the canopy trees. Understory vegetation consists of green ash, water locust, stiff dogwood, hybrid oak species and hornbean. Due to seasonal factors, herbaceous vegetation was uncommon at the time of the

study but greenbrier, poison ivy, and supplejack were present. White oak, swamp chestnut oak, American beech, loblolly pine and black gum were noted in areas of slightly higher ground.

Small pockets of emergent wetlands were noted in disturbed portions of the palustrine forested wetland. These areas exist along the western and northern site boundary and have formed in canopy openings and historic road beds. These wetlands are dominated by swamp leucothoe, sweet pepperbush, elderberry, arrowleaf tearthumb, rush, sedge, and in some areas by cattails and other emergents.

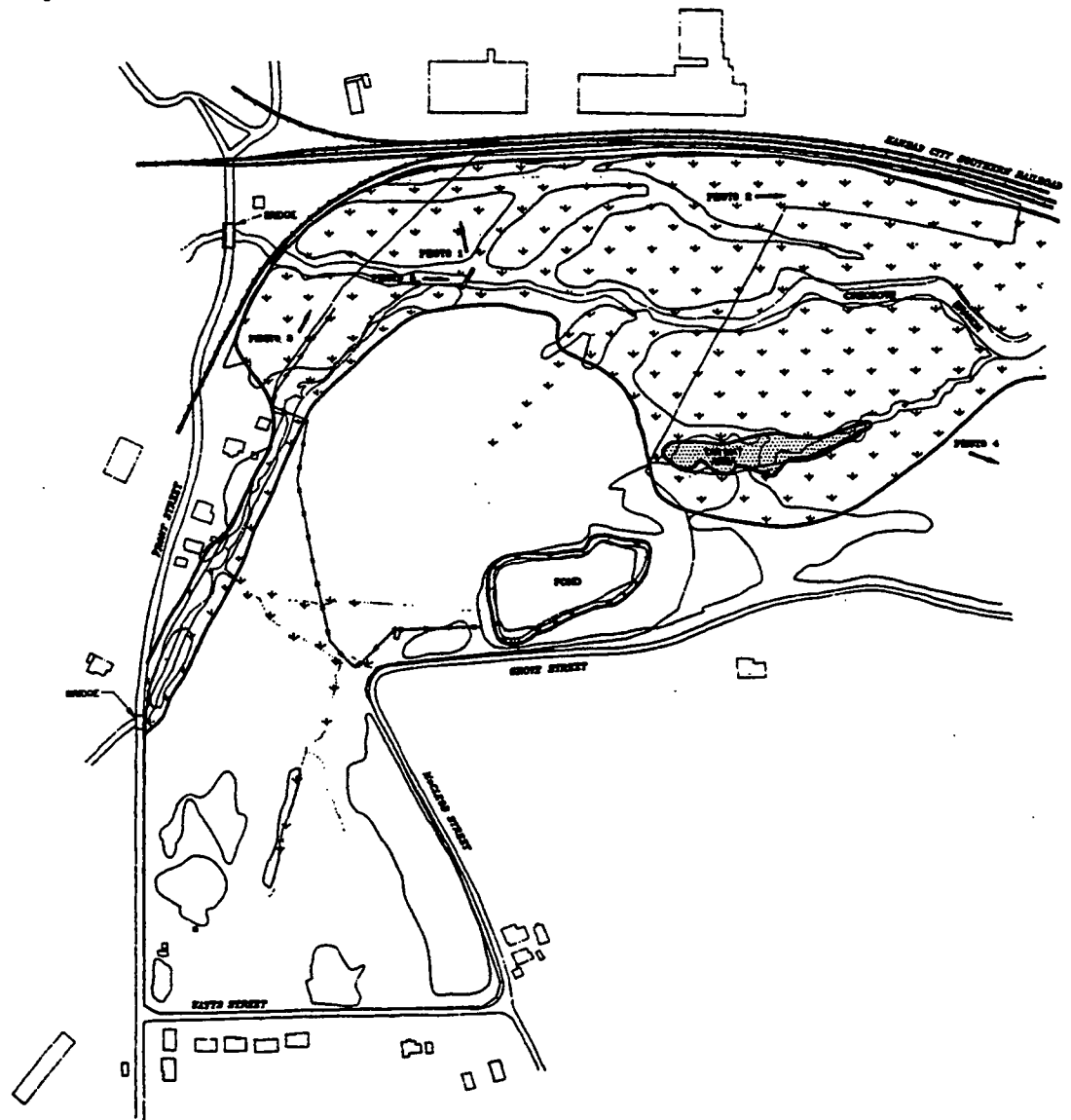
A open water wetland is present along the east central corner of the site. It is situated in an upland area dominated by shortleaf pine, sweet gum, white ash, mockernut hickory, southern red oak, and others. As suggested by the shape and size of the basin, it is likely that this pond is man-induced and may have been the site of a former borrow pit or lagoon.

Numerous small upland inclusions were identified within the northern forested wetland and are associated with railroad track beds and dredge spoils along the northern edge of the property. These areas are higher in elevation than the surrounding forest, and are dominated by white oak, sassafras, white ash, loblolly pine, and red maple saplings. Mayapple and trumpet honeysuckle were present in the herbaceous layer.

Most of the eastern fringes of the property as well as the parcels adjacent to the sewage treatment plant consist of a upland community dominated by loblolly pine, shortleaf pine, American beech and white oak. The understory is comprised of a variety of sapling and shrub species, including scrub oak, black locust, black cherry, sassafras, prickly dewberry, winged sumac and dangleberry. Typical herbaceous species include bracken fern and goldenrod.

6.3.2.2 Wetlands Determination

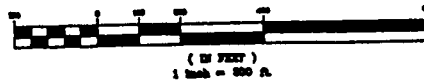
Portions of the American Creosote site possess the three criteria necessary to meet the regulatory definition of a wetland. These areas are presented on Figure 17. Approximately 28.3 acres of wetland, and 1.6 acres of open water were identified on the site and adjacent parcels. These wetlands cover most of the northern



LEGEND

- ↓ WETLAND VEGETATION
- APPROXIMATE EXTENT OF WETLAND COMPLEX
- STREAM BANK / SHORELINE
- DRAINAGE DITCH
- TREE LINE
- FENCE
- SITE BOUNDARY

GRAPHIC SCALE



**WETLAND MAP
AMERICAN CREOSOTE SITE
WINNFIELD, LA
MARCH 17, 1992**

US EPA ENVIRONMENTAL RESPONSE TEAM
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
ES-00-0482
V.03 2047-00-00-4413

Figure No: 17

portion of the site, as well as the eastern and western peripheries. Wetlands present on and adjacent to the site have become degraded to some extent as a consequence of human activities. Nevertheless, the wetlands identified in this study, while degraded from erosion and exposure to site contaminants, still offer some habitat value, as evidenced by sightings of wildlife species including birds, reptiles, and amphibians. Amphibians are typically sensitive to changes in habitat characteristics, supporting the premise that these wetlands are not severely degraded. Further, these wetlands are of high quality from the perspective of flood control, aquifer recharge and, in particular, sediment, nutrient, and contaminant trapping. In contrast, wetlands in the western portion of the site are generally highly disturbed and degraded.

6.3.2.3 Toxicity Testing

Earthworm and aquatic toxicity testing were conducted to evaluate the potential environmental risks associated with site contaminants. These studies as outlined below and presented on Table 8 were performed on samples collected in 1987 and February 1992, from the American Creosote site.

The EPA Environmental Research Laboratory-Corvallis tested 7 soil samples using earthworm bioassays. In addition to mortality data, qualitative observations were recorded to evaluate potential sublethal effects. Earthworms exposed to soil samples (test sample ID AE-14 and 15 on Table 8) which were visibly stained and oiled from the former process area exhibited complete mortality with observations of decomposed earthworms on the surface of the test containers. This observation suggests that the earthworms did not burrow or burrowed and returned to the surface, and thus may have been severely effected without soil ingestion and with reduced dermal exposure. These observations, coupled with visual observations of those particular soil samples (dark, slimy, oily) clearly indicate soil toxicity.

TABLE 8
SUMMARY OF TOXICITY TESTS FOR
AMERICAN CREOSOTE SITE

TEST SAMPLE ID	TEST ORGANISM RESULTS			
1987 SEDIMENT ELUATE	ALGAE	DAPHNIA	MINNOW	
100	TOX	NT	NT	
102	NT	TOX	NT	
103	NT	TOX	NT	
104	NT	NT	TOX	
109	NT	TOX	NT	
1992 SURFACE WATER	CERIO % MORT.	CERIO SUBLETHAL	MINNOW % MORT.	MINNOW SUBLETHAL
AW1	0	NO	0	NO
AW2	0	NO	0	NO
AW2a	0	NO	0	NO
AW3	0	NO	0	NO
1992 SEDIMENT ELUATE	CERIO % MORT.	CERIO SUBLETHAL	MINNOW % MORT.	MINNOW SUBLETHAL
AW1	0	NO	0	NO
AW2	0	NO	100	YES
AW2a	30	YES	100	YES
AW3	0	NO	100	YES
1992 SOIL (100%)	EARTHWORM % MORT.		EARTHWORM SUBLETHAL	
AE-01	0		YES	
AE-10	0		YES	
AE-11	0		NO	
AE-12	0		NO	
AE-14	100		(DECOMPOSED ON SURFACE)	
AE-15	100		(DECOMPOSED ON SURFACE)	
AE-19	3		YES	
TOX	= Toxicity Significantly Different From Controls			
NT	= Nontoxic-Not Significantly Different From Controls			
CERIO	= Ceriodaphnia Dubia			
MINNOW	= Fathead Minnow			
SUBLETHAL	= Sublethal Effects-Effects Vary With Species			

Samples from the debarking area in the southern portion of the site and an off-site area (adjacent to Creosote Branch approximately 300 feet upstream from the site) exhibited no earthworm mortality. These samples are presented as AE-01, AE-10, AE-11, and AE-12 on Table 8. Earthworms exposed to the off-site soil sample produced several earthworms with segmental constrictions and lesions. Earthworms exposed to soils from one of the three samples from the debarking area appeared clumped together as a potential avoidance mechanism, whereas earthworms exposed to soils from the other samples exhibited no sublethal effects. These results indicate minimal, if any, impacts of these surface soils to the environment.

Several earthworms exposed to soil from the former treated wood storage area to the north of Creosote Branch exhibited segmental constrictions and restricted movement. These sublethal effects may not be related to site contaminants, but could be related to the high moisture content of the soil. A soil sample from the former treated wood storage area wooded area north of Creosote Branch exhibited a single mortality out of 30 earthworms. These results also indicate that the area to the north of Creosote Branch do not represent a significant threat to the environment.

Chronic toxicity testing was conducted in February, 1992 on sediment eluate and water samples (site and reference samples) by EPA Region 6, Houston Laboratory using water fleas (Ceriodaphnia) and fathead minnows test organisms. All tests as presented on Table 8 were conducted for up to 7 days to evaluate the exposure of water fleas and fathead minnows to ambient water site samples and to sediment eluate. There was no significant effect, based on mortality or reproduction, from any of the surface water samples taken upstream at the site, or downstream from the site.

No significant adverse effects were observed in organisms exposed to the eluate from a sediment sample (AW1) taken approximately 300 feet upstream of the site. A sample of sediment eluate from a tributary of Creosote Branch (AW2a), not directly impacted by the American Creosote site, showed water fleas were significantly affected based on reduced reproductive capacity. However, fathead minnows showed no adverse effects. Sample AW2 of the sediments adjacent to the process area showed no effects to water fleas while

fathead minnows were significantly affected. Fathead minnows exposed to an eluate from a sediment sample (AW3) further downstream of the site were significantly affected, whereas no significant effect was observed in water fleas at the same location.

In summary, the surface waters in the Creosote Branch do not appear to represent a significant threat to the environment as indicated by chemical analyses and toxicity tests of these waters. However, the sediments near the site represent a threat to the environment as indicated the detection of contaminants of concern in chemical analyses and by significant toxicity in the aquatic toxicity tests. Further consideration of these threats shows removal of these sediments could greatly impact the wetlands by excavation operations on and within the area adjacent to Creosote Branch. Based on this consideration, disturbance of the sediments in the Creosote Branch may pose a greater threat to the environment than leaving the sediments in place. Remediation of the process area will eliminate the source of contamination to the sediments in Creosote Branch. Furthermore, earthworm toxicity tests indicate that surface soils in the process area represent a significant threat to the environment. Earthworm toxicity tests conducted on surface soils outside the process area indicate minimal, if any, impacts of these soils to the environment.

6.3.2.4 Quantitative Ecological Risk Assessment

As presented in the administrative record and briefly summarized below, quantitative ecological risk assessment also indicates that the site poses an environmental threat. As documented in the toxicity tests, the sediments pose a threat to fish as indicated by observed effects on fathead minnows. Risk calculations show a potential threat to aquatic life as indicated by observed effects on algae, fathead minnows and bluegills. Ecological risk calculations show that site-related contaminants have potential adverse effects on small mammals such as deer mice from PCP, PAHs and dioxins. For instance, reported ecological hazard quotients for small mammals are as high as 3,980 for PAH exposure, 800 for dioxin exposure, and 2.2 for PCP exposure. Ecological hazard quotients based on low observable adverse effect levels that exceed 1 indicate potentially significant ecological risks. For a more

detailed explanation of the quantitative ecological risk assessment assumptions and equations refer to the Ecological Risk Assessment in the Administrative Record.

6.4 UNCERTAINTIES ASSOCIATED WITH RISK CALCULATIONS

Risk assessment is a scientific activity subject to uncertainty. In addition to the uncertainty and the use of conservative assumptions to calculate slope factors and RfDs, the analysis of environmental conditions is difficult and inexact. The American Creosote risk assessment is subject to uncertainty from a variety of sources including:

- sampling and analysis;
- toxicological data;
- exposure estimation;
- fate and transport estimation; and
- risk characterization.

These uncertainties in the American Creosote baseline risk assessment are a function of risk assessments in general and a function of the uncertainties specific to the American Creosote in particular. Although all risk assessments contain a certain amount of uncertainty, an attempt to reduce the uncertainty in the American Creosote baseline risk assessment was made whenever possible.

Based on a February 26, 1992, memorandum from EPA Deputy Administrator F. Henry Habicht, EPA is required to evaluate both "reasonable maximum exposure" (RME) and "central tendency" in the risk assessment at Superfund sites. The exposure assumptions associated with the RME have been used to estimate the baseline risks and ultimately the remedial action goals at the sites. The "central tendency" scenario represents the risk from more of an "average" exposure, compared to a "reasonable maximum" exposure. A comparison of RME and "central tendencies" is presented in Table 9.

TABLE 9
COMPARISON OF CENTRAL TENDENCIES TO REASONABLE MAXIMUM EXPOSURE

A. General Equation for Estimating Exposure

$$\text{Intake (mg/kg-day)} = C \times \frac{\text{CR} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

B. Comparison of Central Tendency and RME

	<u>Average or Central Tendency</u>	<u>Reasonable Maximum Exposure</u>
<u>Concentration Term (C)</u>		
Site-specific value	95% UCL	95% UCL
<u>Contact Rates (CR)</u>		
Water Ingestion Rates		
Children (1 - 6 yrs)	0.7 L/day	1 L/day
Adults	1.4 L/day	2 L/day
Workers	0.7	1 L/day
Soil Ingestion Rates		
Children (1 - 6 yrs)	200 mg/day	200 mg/day
Adults	100 mg/day	100 mg/day
Workers	50 mg/day	50 mg/day
Fish Ingestion Rates		
Adults	6.5 g/day	54 g/day
Air Inhalation Rates		
Children (1 - 6 yrs)	5 cu. m/day	5 cu.m/day (50%)
Adults	20 cu.m/day	20 cu.m/day (50%)
<u>Dermal Exposure</u>		
Adherence factor (AF)	0.2 mg/cm ²	1 mg/cm ²
Absorption factor (ABS)	Chemical-specific	Chemical-specific
Total Surface Area (SA)		
Children	7,200 cm ² /event	7,200 cm ² /event
Adults	20,000 cm ² /event	20,000 cm ² /event

TABLE 9 (continued)

COMPARISON OF CENTRAL TENDENCIES TO REASONABLE MAXIMUM EXPOSURE

	<u>Average or Central Tendency</u>	<u>Reasonable Maximum Exposure</u>
<u>Body Weights (BW)</u>		
Children (1 - 6 yrs)	16 kg	16 kg (50%)
Adult	70 kg	70 kg (50%)
Workers	70 kg	70 kg (50%)
<u>Exposure Duration (ED)</u>		
Residential	9 years	30 years
Industrial	9 years	25 years
<u>Exposure Frequency (EF)</u>		
Residential	350 days/year	350 days/year
Industrial	250 days/year	250 days/year
<u>Averaging Time (AT)</u>		
Carcinogenic effects	70 years	70 years
Noncarcinogenic effects	ED	ED
<u>C. References For Central Tendency Exposure Parameters</u>		
	<u>Central Tendency</u>	<u>Basis/Reference</u>
<u>Concentration Term (C)</u>		
Site-specific value	95% UCL	US EPA, 1992a
<u>Contact Rates (CR)</u>		
<u>Water Ingestion Rates</u>		
Children (1 - 6 yrs)	0.7 L/day	US EPA, 1989a
Adults	1.4 L/day	US EPA, 1989b
Workers	0.7	50% Adults Ingestion Rate

TABLE 9 (continued)
COMPARISON OF CENTRAL TENDENCIES TO REASONABLE MAXIMUM EXPOSURE

	<u>Central Tendency</u>	<u>Basis/Reference</u>
Soil Ingestion Rates		
Children (1 - 6 yrs)	200 mg/day	US EPA, 1989c
Adults	100 mg/day	US EPA, 1989c
Workers	50 mg/day	US EPA, 1991
Fish Ingestion Rates		
Adults	6.5 g/day	US EPA, 1989b
Air Inhalation Rates		
Children (1 - 6 yrs)	5 cu. m/day	US EPA, 1989a
Adults	20 cu.m/day	US EPA, 1989a; US EPA, 1989b
<u>Dermal Exposure</u>		
Adherence factor (AF)	0.2 mg/cm ²	US EPA, 1992b
Absorption factor (ABS)	Chemical-specific	
Total Surface Area (SA)		
Children (1 - 6 yrs)	7,200 cm ² /event	US EPA, 1989a; US EPA, 1989b
Adults	20,000 cm ² /event	US EPA, 1992b
<u>Body Weights (BW)</u>		
Children (1 - 6 yrs)	16 kg	US EPA, 1989b
Adult	70 kg	US EPA, 1989b; US EPA, 1991
Workers	70 kg	US EPA, 1991
<u>Exposure Duration (ED)</u>		
Residential	9 years	US EPA, 1989b
Industrial	9 years	= to residential
<u>Exposure Frequency (EF)</u>		
Residential	350 days/year	US EPA, 1991
Industrial	250 days/year	US EPA, 1991

TABLE 9 (continued)
COMPARISON OF CENTRAL TENDENCIES TO REASONABLE MAXIMUM EXPOSURE

	<u>Central Tendency</u>	<u>Basis/Reference</u>
<u>Averaging Time (AT)</u>		
Carcinogenic effects	70 years	US EPA, 1989b
Noncarcinogenic effects	ED	US EPA, 1989b

D. References For Reasonable Maximum Exposure Parameters

	<u>Reasonable Maximum</u>	<u>Basis/Reference</u>
<u>Concentration Term (C)</u>		
Site-specific value	95% UCL	US EPA, 1992a
<u>Contact Rates (CR)</u>		
Water Ingestion Rates		
Children (1 - 6 yrs)	1 L/day	US EPA, 1989a
Adults	2 L/day	US EPA, 1989b; US EPA, 1991
Workers	1 L/day	US EPA, 1991
Soil Ingestion Rates		
Children (1 - 6 yrs)	200 mg/day	Average value, US EPA, 1989c
Adults	100 mg/day	Average value, US EPA, 1989c
Workers	50 mg/day	Average value, US EPA, 1991
Fish Ingestion Rates		
Adults	54 g/day	US EPA, 1991
Air Inhalation Rates		
Children (1 - 6 yrs)	5 cu. m/day	US EPA, 1989a
Adults	20 cu.m/day	Average value, US EPA, 1989a; US EPA, 1989b
Adults	30 cu.m/day	Upper bound #, US EPA, 1989a; US EPA, 1989b

TABLE 9 (continued)
COMPARISON OF CENTRAL TENDENCIES TO REASONABLE MAXIMUM EXPOSURE

	<u>Reasonable Maximum</u>	<u>Basis/Reference</u>
<u>Dermal Exposure</u>		
Adherence factor (AF)	1 mg/cm ²	US EPA, 1992b
Absorption factor (ABS)	Chemical-specific	
<u>Total Surface Area (SA)</u>		
Children (1 - 6 yrs)	7,200 cm ² /event	Average value, US EPA, 1989a; US EPA, 1989b
Adults	20,000 cm ² /event	Average value, US EPA, 1992b
<u>Body Weights (BW)</u>		
Children (1 - 6 yrs)	16 kg	Average value, US EPA, 1989b
Adult	70 kg	Average value, US EPA, 1989b; US EPA, 1991
Workers	70 kg	Average value, US EPA, 1991
<u>Exposure Duration (ED)</u>		
Residential	30 years	US EPA, 1989b; US EPA 1991
Industrial	25 years	US EPA 1991
<u>Exposure Frequency (EF)</u>		
Residential	350 days/year	Average value, US EPA, 1991
Industrial	250 days/year	Average value, US EPA, 1991
<u>Averaging Time (AT)</u>		
Carcinogenic effects	70 years	US EPA, 1989b
Noncarcinogenic effects	ED	US EPA, 1989b

TABLE 9 (continued)
COMPARISON OF CENTRAL TENDENCIES TO REASONABLE MAXIMUM EXPOSURE

E. References

- US EPA. 1989a. Exposure Factors Handbook. EPA/600/8-89/043.
- US EPA. 1989b. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A). EPA/540/1-89/002.
- US EPA. 1989c. Interim Final Guidance for Soil Ingestion Rates. OSWER Directive 9850.4.
- US EPA. 1991. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Supplemental Guidance, Standard Default Exposure Factors. OSWER Directive 9285.6-03.
- US EPA. 1992a. Supplemental Guidance to RAGS: Calculating the Concentration Term. Publication 9285.7-081.
- US EPA. 1992b. Dermal Exposure Assessment: Principles and Applications. EPA/600/8-91/011B.

6.5 REMEDIATION GOALS

The selection of appropriate remediation levels is based primarily on an evaluation of the potential health effects caused by human exposure to the contaminants, assuming that the future land use will be residential. The reasoning behind designating the future land use as residential is that the site is currently surrounded by residential areas.

The contaminated shallow ground water was determined to represent the most significant long term threat at the site. This arises out of the potential exposure of the public to the site contaminants and because of the potential usage of the aquifer for drinking purposes or seepage into the Creosote Branch. The deeper ground water zones are currently used for drinking water purposes. However, the potential rise of the saline/water interface as based on recent data in Winn Parish, may require use of shallower aquifers in the future. The remedial objective for shallow ground water is to prevent the exposure of potential receptors to on-site contamination in amounts above human health-based standards and to restore ground water quality.

The contaminated tar mat materials and subsurface soils and NAPLs were determined to be a potential threat at the site because of the potential for direct contact and potential impact on ground water. One of the most important effects of these subsurface materials is the presence of NAPLs which will provide a continual source of contaminants to the ground water if left untreated. Removal of the tar mat area would also allow restoration of wetlands.

PAHs (primarily expressed as B(a)P equivalents), phenols (primarily PCP), and dioxins were found to be the primary contaminants of concern at the American Creosote site based on risk assessments. The RI results have shown dioxin/furan analyses with up to 5 $\mu\text{g}/\text{kg}$ 2,3,7,8-TCDD equivalents in surface soils. It has been determined by EPA and the Agency for Toxic Substances and Disease Registry (ATSDR) as presented in the RI/FS that levels of 2,3,7,8 TCDD between 1 to 10 $\mu\text{g}/\text{kg}$ do not represent a significant residential risk provided they are covered with at least 12 inches of clean soil. Furthermore, ATSDR and EPA have established that levels of 1 $\mu\text{g}/\text{kg}$ or less of 2,3,7,8 TCDD is an acceptable level in surface

soils. Therefore, the remediation goal for surface soils that does not involve treatment of dioxins is to ensure that the material is covered with at least 12 inches of clean cover. For treatment alternatives of dioxins the established remedial goal will be 1 $\mu\text{g}/\text{kg}$ or less of 2,3,7,8 TCDD equivalents. It should also be recognized that no 2,3,7,8-TCDD has actually been found.

For this ROD EPA Region 6 has considered an acceptable concentration of 3,000 $\mu\text{g}/\text{kg}$ for carcinogenic PAHs expressed as B(a)P equivalents, and PCP concentrations less than 50,000 $\mu\text{g}/\text{kg}$ for soils within 2 feet of the surface (for a detailed discussion of the basis for these levels refer to Section 9). These values represent a level approaching a 1×10^{-5} risk range for carcinogenic PAHs and 1×10^{-5} for PCP, and the 2 feet is believed to represent the maximum distance below the immediate surface to which surface materials are typically disturbed. Below 2 feet the soils are determined to represent a ground water threat and will be addressed as follows. The goals for remediation of the ground water are to reduce the B(a)P value below a concentration of 0.2 $\mu\text{g}/\text{l}$, which is the maximum contaminant level (MCL) for PAHs, and benzene below a concentration of 5 $\mu\text{g}/\text{l}$ which is the MCL for this compound. The goals for the remediation of soils below 2 feet will be the same as the upper 2 feet which are 3,000 $\mu\text{g}/\text{kg}$ for carcinogenic PAHs expressed as B(a)P equivalents, and PCP concentrations less than 50,000 $\mu\text{g}/\text{kg}$. It is believed that by achieving these soil goals that the aforementioned goals for the ground water may be attained.

The soils in the area between the tar mat and Creosote Branch are not being removed as part of this remedy because of the potential effects on wetlands. The maximum concentration of B(a)P equivalents in this area is 7,500 $\mu\text{g}/\text{kg}$. This concentration is still below the 1×10^{-4} goal for remediation. These soils are not considered a significant threat to ground water or to human health because of direct contact. However, if the soils between the tar mat and Creosote Branch were removed the existing wetlands would be drastically damaged.

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

7.0 DESCRIPTION OF ALTERNATIVES

7.1 IDENTIFICATION OF APPROPRIATE TECHNOLOGIES

The analyses for remedial alternatives for the American Creosote site used data generated from previously selected Remedial Actions at other wood treating sites to identify a set of technologies appropriate for further screening, development, and detailed analysis. This analysis included evaluation of RODs prepared after the passage of the Superfund Amendments and Reauthorization Act (SARA) of 1986. The evaluation was restricted to post-SARA RODs to reflect SARA's statutory preference for reduction in toxicity, mobility, or volume through treatment. Additional consideration was given to Innovative Treatment Technologies to ensure an adequate evaluation of technologies.

Wood treating sites are known to be of three broad types, depending on the chemicals used: creosote, pentachlorophenol (PCP), or metal compounds such as chromated copper arsenate (CCA), ammoniacal copper arsenate (ACA), or ammoniacal copper-zinc-arsenate (ACZA). At the American Creosote site, both creosote and PCP were used, and, therefore, polycyclic aromatic hydrocarbons (PAHs) and phenols (mainly PCP) are the primary contaminants of concern in addition to the BTEX from petroleum used as a carrier fluid. The use of metal compounds have not been documented at the site. Even though the contaminants of concern have been limited to PCP, PAHs and BTEX, after attempting to review historical records and operations, it has been determined that the materials at the site do not constitute a RCRA listed hazardous waste specified at 40 CFR Part 261 for the reasons described below.

The EPA has not been able to identify specific sources or specific processes that allow adequate determination for listing of this material due to post-generation commingling of the wood treating process wastes with soils and debris. Therefore, the material is not a listed RCRA hazardous waste pursuant to 40 CFR Part 261. However, the Land Disposal Requirements (LDR) related to waste code U-051 for spills of creosote is considered to be a relevant and appropriate requirement for the organic wood treating wastes at the site because any remediation activity involving treatment will

include contaminated soils with creosote wastes. Such consideration includes the PAHs and PCP when establishing treatment standards. As specified in 40 CFR § 268.43, the treatment standards expressed as waste concentrations for U-051 nonwastewater (soils/sludges) are:

Naphthalene	- 1,500 µg/kg
Pentachlorophenol	- 7,400 µg/kg
Pyrene	- 1,500 µg/kg
Toluene	- 1,500 µg/kg
Xylenes	- 28,000 µg/kg
Lead	- 33,000 µg/kg

These levels are supplemental to the goals as established in the remediation goals section of the Summary of Site Risks portion of this ROD. However, the PCP level in the goals for remediation is stated as 50,000 µg/kg, as detailed in Section 6.5, and presented as 7,400 µg/kg above, the lower value will be established as a criterion for any treatment alternative. In addition, the remediation goal of 3,000 µg/kg for B(a)P equivalents will also be established as a goal for all treatment alternatives of the soils/sludges as explained in Section 6.5.

Tables 10 and 11 were presented in the FS to represent the technologies that were all or part of the selected remedies at NPL sites that documented wood treating contaminants in soil and ground water. Also included are the number of sites where the selected remedy faced technological problems. These comparisons were based on 38 post-SARA RODs and 2 removal actions. Subsequent evaluations of these analyses by EPA after the issuance of the FS have shown that out of these 40 sites, 23 had site contaminants related to metal process treatment of the timber. It is believed that in those RODs, the presence of metals had a significant impact on the selected remedy and, therefore, the tables have been re-evaluated for those sites in which metals were a controlling factor. The results of this re-evaluation are presented in Tables 12 and 13 for sludge/soil. Based on this comparison it is believed that Table 13 is most representative of current technologies used to address PCP and creosote contaminated sludge/soil similar to the American Creosote site.

TABLE 10

**SUMMARY OF SOIL TREATMENT TECHNOLOGIES SELECTED
AT POST-SARA WOOD-TREATING SITES**

Technology/Remedy	Number of Sites Selected ^a	Number of Sites Where Selected Remedy Resulted in Technological Difficulties ^b
Bioremediation	19	4
Dechlorination	1	0
* Low Temperature Thermal Desorption	1	0
RCRA Cap/Landfill	10	0
* Soil Flushing	4	3
* Soil Washing	8	0
Stabilization/Solidification/Fixation	8	1
* Solvent/Critical Fluid Extraction	1	0
Thermal Destruction	7	0

^a Based on RODs

^b Based on discussions with RPM

* These technologies are typically implemented in conjunction with another treatment technology.

TABLE 11

**SUMMARY OF GROUNDWATER TREATMENT TECHNOLOGIES SELECTED
AT POST-SARA WOOD-TREATING SITES**

Technology/Remedy	Number of Sites Selected^a	Number of Sites Where Selected Remedy Resulted in Technological Difficulties^b
Activated Alumina Adsorption	1	0
Activated Carbon Adsorption	13	0
* Air Flotation	1	0
* Air Stripping	1	0
Bioremediation - Ex situ	6	0
Bioremediation - In situ	3	0
Electrochemical Reduction	2	0
High Pressure Filtration	2	0
* Flocculation/Precipitation	6	0
Hot-Water Flushing	1	1
Ion Exchange	1	0
* Oil/Water Separation	9	0
Slurry Wall/Sheet Pile Barrier	3	0
* Ultraviolet/Oxidation	3	0

* These technologies are typically implemented in conjunction with another treatment technology.

^a Based on RODs

^b Based on discussions with RPMs

TABLE 12

**SUMMARY OF SOIL/SLUDGE TREATMENT TECHNOLOGIES
SELECTED AT POST-SARA WOOD TREATING SITES**

Type of Technology	Number of Sites Where Selected	Number of Sites Where Selected Remedy has been Applied	Number of Applied Sites Where Selected Remedy has Proven Successful to Date
PRINCIPLE TREATMENT			
Bioremediation	15	4	3*
Thermal Destruction	8	2	2
Stabilization/Solidification	8	0	0
Dechlorination	1	0	0
PRELIMINARY TREATMENT			
Low Temperature Desorption	1	0	0
Soil Flushing	4	2	0
Soil Washing	9	0	0
Solvent/Critical Fluid Extraction	1	0	0
RESIDUAL TREATMENT			
Capping	9	2	2
Offsite Recycling	1	0	0

NOTES

- 1) This table is based on an evaluation of 38 RODS and 2 Removal Actions.
 - 2) This table is based on sites that were classified as wood treaters which includes contaminants of concern that included both inorganic and organic compounds.
 - 3) Sites that have inorganics compounds tend to select stabilization/solidification because of the inorganics.
- * One of these sites had to obtain a treatability waiver because bioremediation could not achieve the cleanup goals. The other sites had cleanup goals that were an order of magnitude or higher than that proposed for American Creosote.

TABLE 13

**SUMMARY OF SOIL/SLUDGE TREATMENT TECHNOLOGIES
SELECTED AT POST-SARA WOOD TREATING SITES THAT HAVE
PREDOMINANTLY ORGANIC COMPOUNDS (PCP and/or Creosote)**

Type of Technology	Number of Sites Where Selected	Number of Sites Where Selected Remedy has been Applied	Number of Applied Sites Where Selected Remedy has Proven Successful to Date
PRINCIPLE TREATMENT			
Bioremediation	15	4	3*
Thermal Destruction	8	2	2
Stabilization/Solidification	0	0	0
Dechlorination	1	0	0
PRELIMINARY TREATMENT			
Low Temperature Desorption	1	0	0
Soil Flushing	3	1	0
Soil Washing	9	0	0
Solvent/Critical Fluid Extraction	1	0	0
RESIDUAL TREATMENT			
Capping	4	0	0
Offsite Recycling	1	0	0

NOTES

* One of these sites had to obtain a treatability waiver because bioremediation could not achieve the cleanup goals. The other sites had cleanup goals that were an order of magnitude or higher than that proposed for American Creosote.

Table 13 shows that approximately two-thirds of the wood treating sites that used PCP or creosote processes have selected bioremediation for principle treatment of soil/sludges, 8 selected incineration of soil/sludges, and 1 involved dechlorination. Of the RODs that selected bioremediation or incineration, 9 of the processes called for soil washing prior to treatment and 1 called for critical fluid extraction prior to treatment. Based on this analysis, consideration was given to processes involving phase separation (*i.e.*, soil washing, critical fluid extraction, low temperature desorption, etc.) prior to any contaminant destruction.

7.1.1 INITIAL SCREENING OF SOIL AND SLUDGE ALTERNATIVES

Tables 10 and 13 show an initial screening of potential technologies for remediating contaminated sludges and soils at the American Creosote site. For the reasons discussed below, low temperature thermal desorption, soil flushing, soil washing, or solvent/critical fluid extraction have been rejected as effective means of separating the organic phased contaminants from the soil matrix.

Low temperature thermal desorption was eliminated because of concerns that it may only be partially successful (demonstrated removal efficiencies of only 65%) at separating the contaminants. It is possible that due to the range of size in subsurface materials (clay to gravel) that low temperature desorption would not separate a significant portion of PCP and creosote from the soils.

Soil flushing without additional treatment such as in-situ bioremediation would not be effective because its success relies on flushing (removal) of contaminants from soil surfaces. Soil flushing would potentially result in flushing of only the NAPLs from the more porous sand and gravel lenses where encountered. However, the other layers (silts and clays) would likely not be effectively flushed due to the lesser porosity of those layers. In addition, it is possible that since there is a large potential for the PCP/creosote to adhere (absorb) to the soil particles that this process would not treat the adhered contamination thus resulting in the potential for a source of ground water contamination. However,

it is important to note this technology is an element of in-situ bioremediation which is addressed in the following pages.

Both soil washing and solvent/critical fluid extraction require excavation of the soils/sludges and involve contact of the contaminants on the soil particles with a solvent fluid. The subsurface areas at American Creosote contain a large range of particle sizes, and soil washing is more effective on large grained soils than on silts and clays. Because the contaminated soil at American Creosote consists largely of silts and clays, soil washing is not considered to be viable due to the likelihood that a large volume of contaminants would remain adhered to the clays and silts.

Solvent/critical fluid extraction was eliminated from consideration due to concerns about the pH of the soil and the heterogeneity of the subsurface materials. Effective fluid extraction requires a narrow range of pH in a soil matrix. The range of pHs in the contaminated soils at American Creosote is relatively broad, requiring pH adjustment prior to solvent treatment. Because of that fact, in addition to the heterogeneity of the soil matrix, solvent/critical fluid extraction is considered to be impracticable.

Dechlorination is considered inappropriate for this site due to the presence of PAHs, which are not chlorinated compounds. As such, PAHs are not susceptible to this treatment technology. Although the process of dechlorination is appropriate for PCP, which is a chlorinated compound, the majority of the contaminants driving the risk at the American Creosote Site are carcinogenic PAHs. Therefore, dechlorination would not address the principal threats to human health or the environment at the site.

In summary, based on initial screening, the only alternatives considered appropriate for the contaminated sludges and soils at this site were the treatment of the material through bioremediation, stabilization, thermal destruction, or capping of the wastes. These results were further supported by the October 1992, EPA document from the Office of Research and Development which is entitled "Contaminants and Remedial Options at Wood Preserving Sites" (EPA/600/R-92/182). These four alternatives were considered potential treatment alternatives for further evaluation.

Initial screening during preparation of the FS identified potential difficulties associated with biologically treating soils contaminated with wood treating chemicals (particularly carcinogenic PAHs, such as benzo[a]pyrene). One of the major concerns to EPA was the ability to achieve the remediation goals as previously established. Out of the sites where bioremediation was the selected remedy, problems associated with the presence of dioxins, which are not remediated by biological activities, were reported at two sites. For these sites, the selected remedies are currently being re-evaluated. At another wood treating site for which biological treatment through land farming was selected as a remedy, heavy rain resulted in continuously saturated soil conditions. This saturation reduced the biological growth rates of the bacteria and thus greatly increased the treatment time. Cleanup levels could not be achieved at one other site because bioremediation was not able to reduce the concentrations to established health-based action levels (bioremediation is generally effective but has difficulty achieving levels for PAHs below 10,000 $\mu\text{g/kg}$).

The use of bio-reactors, which are vessels in which contaminated media for accelerated and controlled biotreatment are placed, has also been considered for this project. However, most bio-reactor systems are capable of only handling several cubic yards per day. Given the large volume of wastes at the American Creosote site and the questionable availability of large volume reactors, this method of treatment could extend for several decades.

EPA also evaluated a Superfund Site in Libby, Montana, where bioremediation was selected as a remedy and is discussed in the May 1992 "Symposium on Bioremediation of Hazardous Wastes." That article describes an estimated period of 8 to 10 years for the bioremediation of 45,000 cubic yards of creosote- and PCP-contaminated soils in a 2 acre land treatment unit at the Montana site. The site's bioremediation system for PCP and PAHs had been in operation for only a year at the time of the evaluation and, therefore, the success of the operation is unknown at this time.

However, the information from the Libby site is still useful for evaluating alternative remedies for the American Creosote site. Based on the assumptions presented for the Montana site, and

assuming that 6 acres of land is available at the American Creosote site to use for biological land treatment, the same rate of treatment as at the Libby site would occur, and that excessive rainfall will not saturate the unit, it would take over 20 years to remediate the American Creosote site.

The May 1991 EPA document entitled "On-Site Treatment of Creosote and Pentachlorophenol Sludges and Contaminated Soil" (EPA/600/2-91/019) reveals that the PCP and carcinogenic PAH compounds such as B(a)P have half-lives that exceed 100 days and may be as high as 450 days. In some cases no transformation of the compounds at all occurred during the time frame of the experiments reported in that document. Based on this document and the aforementioned considerations, EPA Region 6 initially questioned the overall effectiveness of biodegradation of the carcinogenic compounds at the American Creosote site.

Subsequent discussions with EPA's technical staff in Cincinnati, Ohio at the Risk Reduction Laboratory and the Robert S. Kerr Environmental Research Laboratory in Ada, Oklahoma indicated that in-situ bioremediation may be effective in treating the site contaminants. These individuals concurred with the Region's concerns regarding extended timeframes as outlined above, but they also indicated that the information related to the effectiveness of bioremediation was increasing and it would be beneficial to consider in-situ bioremediation in more detail. Although bioremediation was first eliminated from detailed analysis, both LDEQ and EPA decided to conduct further evaluation of in-situ bioremediation especially in light of the large volume of contamination at the site.

The decision to consider bioremediation is further supported by the October 1992 EPA document entitled "Contaminants and Remedial Options at Wood Preserving Sites". This document states that in-situ bioremediation promotes and accelerates natural processes in undisturbed soil and under appropriate conditions, this technology can destroy organic contaminants in place without the high costs of excavation and materials handling. It can also minimize the release of volatile contaminants into the air.

7.1.2 INITIAL SCREENING OF NAPLS AND CONTAMINATED GROUND WATER ALTERNATIVES

Table 11 provides an outline of the processes that have been utilized to remediate contaminated ground water and associated NAPLs from other wood treating sites. Many of the processes listed in this table have been eliminated from consideration for the American Creosote site for the reasons that follow below based upon an evaluation of information specific to the American Creosote site.

Activated alumina adsorption, electrochemical reduction, flocculation, high-pressure filtration, and ion exchange can be eliminated because of the lack of metals in the contaminated ground water at American Creosote. These treatment processes are only effective on metal (inorganic) wastes, which are not present at the American Creosote site.

Air flotation and air stripping can be removed from consideration because of the lack of emulsified NAPLs and low concentrations of volatiles at the American Creosote site. Air stripping is not appropriate because the concentration of volatiles at the American Creosote site are not present in significant concentrations, and as such this process is not necessary. Air flotation is not appropriate because the NAPLs at American Creosote are found in separate layers (i.e., floating or sinking products) in the contaminated aquifer and are not homogeneously mixed within the ground water. For this reason, air flotation is not considered a viable alternative.

Hot water flushing would not be effective due to the heterogeneity of subsurface materials at the American Creosote site. The injection of hot water into the subsurface would not be uniformly spread throughout the aquifer. While hot water can penetrate more porous soil layers such as sands and gravels, it might not penetrate the less porous soil layers such as clays and silts. This could leave significant concentrations of contaminants in the subsurface soils where the hot water is not as effective. Additionally, this technology has not proven to be successful at other wood treating sites having heterogeneous soils.

Ultraviolet/oxidation was eliminated from the list on Table 11. Both ultraviolet/oxidation and activated carbon treatment are equally effective at removing organic compounds and act as a polishing step in the treatment process. However, lower operational and maintenance costs associated with the use of activated carbon make ultraviolet/oxidation treatment prohibitively expensive. Although ultraviolet/oxidation is an effective means of treatment for the wastes at the American Creosote site, the same level of achievement of contaminant filtration can be achieved with activated carbon at a reduced cost.

Therefore, for the reasons that follow, the remaining appropriate alternatives listed in Table 11 for the remediation of the American Creosote site ground water and NAPLs are activated carbon adsorption, oil/water separation, and slurry wall/sheet pile barrier. All of the treatment processes noted above involve an extraction procedure that is detailed in the following sections.

7.2 DESCRIPTION OF VIABLE ALTERNATIVES

The remedial-technologies appropriate for the American Creosote site have been combined into remedial alternatives as required by the NCP. The range of alternatives includes treatment that reduces the toxicity, mobility, or volume of the contaminants as a principal element and reduces the need for long term management. An evaluation was also done of options that vary in the degree of treatment employed and the amount of residual and untreated waste that must be managed. In accordance with the NCP, the range of alternatives also includes no action and alternatives which protect human health and the environment with little or no treatment of the wastes, such as institutional controls and containment.

The cost estimates presented in the following comparisons are based on present worth analyses and are accurate to plus 50 percent and minus 30 percent as established in EPA's Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. These costs will be refined substantially during the remaining stages of the remedial process, which are the remedial design and remedial action phases. The Operation and Maintenance (O&M) costs presented in the following pages are based on a 30 year period,

where actual durations may be more or less depending on future site conditions.

7.2.1 SOIL/SLUDGE REMEDIAL ALTERNATIVES

As presented in Section 5.5.4 "Areal and Vertical Extent of Contamination" and shown on Figure 11, the total volume of contaminated soil is estimated to be approximately 273,000 cubic yards. Figure 11 was prepared using subsurface soil samples containing more than approximately 10,000 $\mu\text{g/kg}$ total organic compounds as the indicator cutoff for contamination. The largest volume of contaminated soils is located in the former process area. Contaminated soils in this area occupy approximately five acres and extend to a maximum identified depth of 40 feet. The following analyses are based on the assumption that the total volume of contaminated material on-site potentially to be remediated is 273,000 cubic yards.

7.2.1.1 Alternative 1: No Action

Capital Cost: \$0
Annual Operation and Maintenance: \$25,000
Present Worth: \$350,000
Implementation Time: Not Applicable

Under the No Action alternative for the contaminated surface areas at the American Creosote site, no activities to address the risks identified at the site would be implemented. However, some sampling would occur to determine if contamination was spreading. This alternative is being included as a baseline for evaluating other alternatives. The long term risks would be above EPA's lower target range of 1×10^{-4} for carcinogens.

7.2.1.2 Alternative 2 - Institutional Controls

Capital Cost: \$150,000
Annual Operation and Maintenance: \$25,000
Present Worth: \$500,000
Implementation Time: 6 months

This alternative would involve minor construction activities and institutional controls to limit access to contaminated areas of the site. Included in the alternative is repairing and extending the existing fences and posting warning signs around the contaminated areas, placing deed notices on the property, and having the State of Louisiana perpetually maintain the property.

Contaminated material at the site would not be addressed by this alternative. The risks would be somewhat lower than those of a residential scenario as discussed in the Summary of Risks. However, there would remain a potential for trespassers breaking through the fence and coming into contact with contaminated surface materials. The chances of someone installing a ground water well at the site would be reduced through maintenance activities, such as site visits, performed by the State of Louisiana. However, the contaminated ground water plume would remain uncontrolled and could migrate both vertically and horizontally. The site would be re-evaluated as required by the Superfund law every five years to ensure that the action taken remains protective of the human health or welfare or the environment. Annual sampling would be conducted of the surface materials as deemed appropriate. The 6 month implementation period is based on improving and extending the existing fence.

7.2.1.3 Alternative 3 - Multi-layered Clay Cap

- . Capital Cost: \$8 million
- Annual Operation and Maintenance: \$300,000
- Present Worth: \$13 million
- Implementation Time: 2-3 years

This alternative would involve the excavation of approximately 25,000 cubic yards of sludges from the tar mat area and its consolidation with approximately 250,000 cubic yards of wastes from the impoundment and process areas. The consolidated material would likely require the addition of lime or cement as a solidifying agent to support the placement of a multi-layered clay cap over the existing impoundment and process areas. The cap would consist of an impermeable clay/membrane layer constructed in compliance with Subtitle C of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6901 et seq. The purpose of the cap would be to prevent

the chances of direct contact with contaminated materials and to reduce the volume of water which would contact contaminated soils. The contaminated materials are not treated in this alternative. Therefore, the only remaining risk would be that stemming for the ground water contamination.

Since contaminated soil would still remain in contact with ground water, this alternative is protective only in conjunction with ground water treatment/containment because the subsurface soils would remain a source of contamination for the ground water. Implementation of this alternative would result in possible air emissions associated with excavation and solidification of consolidated material. However, these possible emissions can be adequately controlled during construction to ensure protection of surrounding residents. The excavated areas would be backfilled with clean materials, upon which would be placed topsoil that would be seeded.

7.2.1.4 Alternative 4 - Excavation, Stabilization and On-Site Disposal

Capital Cost: \$37 million
Annual Operation and Maintenance: \$100,000
Present Worth: \$38 million
Implementation Time: 5 years

This alternative involves stabilization, which is a process involving the addition of chemical stabilizing agents to contaminated soil/sludge in order to reduce the mobility of the hazardous constituents contained in the soil matrix. Mobility is reduced through the chemical binding of hazardous materials into a stable form with low permeability and reduced leachate generation potential. The actual mechanism of binding, which depends on the stabilization process type, can be categorized by the primary fixation agent used. These can include cement-based, pozzolanic- or silicate-based, thermoplastic-based, or organic polymer-based agents and materials. Techniques may overlap because additives, such as silicates, are frequently used in conjunction with the fixation agent to control rate or to enhance properties of the solid product.

Stabilization can be accomplished in both in-situ and ex-situ methods depending on specific site characteristics. Due to the high ground water table at the American Creosote site, in-situ stabilization would not be readily implementable. Therefore, ex-situ stabilization was evaluated in detail. The equipment used for ex-situ soil stabilization is similar to that used for cement mixing and handling. It includes a feed system, mixing vessels and a curing area. Numerous companies offer on-site chemical stabilization services and provide expertise in selecting critical parameters, including selection of stabilizing agents and other additives, the waste-to-additive ratio, mixing, and curing conditions.

The removal of contaminated soil/sludge can be accomplished by excavation with conventional equipment such as backhoes, bulldozers or dredges. Excavation of saturated material (below the water table or near the creek bed), could require the use of dragline, backhoe, or clamshell equipment, the dewatering of the subsurface soils, or a combination of such equipment/methods. Dewatering activities would require discharge of treated ground water in compliance the Clean Water Act, 33 U.S.C. § 1251 et seq. Excavated areas will also require restoration activities such as backfilling, regrading, and planting a vegetative cover. Uncontaminated soils from an on-site borrow area or from an off-site location may be used as backfill. Containment and treatment of water produced during excavation may be required.

Stabilization is well-demonstrated on inorganic wastes. However, organic wastes have not been effectively treated in a consistent manner. A treatability study has been conducted to determine the effectiveness of stabilization on organic wastes from the American Creosote site. The results from this study have shown some effectiveness but fell short of regulatory goals (i.e., less than a 40% reduction in leachability was achieved versus a preliminary goal of 90%). Based on this study, the potential would remain for the soils to leach contaminants to the ground water. The leachate concentrations would be above the MCL of 0.2 µg/l as discussed previously at Section 6.4 (Remediation Goals), and therefore the ground water would remain a risk to human health. However, the direct contact threat of the stabilized mass would be mitigated with the placement of a vegetative cap.

7.2.1.5 Alternative 5: Excavation and On-site Incineration

Capital Cost: \$185 million
Annual Operation and Maintenance: \$100,000
Present Worth: \$187 million
Implementation Time: 6 years

This alternative would involve the excavation of contaminated soils, screening the large particles/rocks from the soil, and on-site thermal destruction in a transportable incinerator. Excavation could be conducted as noted for Alternative 4. A variety of incinerators are commercially available and are capable of achieving the temperatures necessary to destroy the organic compounds found in the soil. Incineration treatability studies as presented in the administrative record were conducted to further evaluate the feasibility of this alternative and the tests proved the option to be quite successful. The ash from the incineration treatability studies has proven to be below the previously established remediation levels and would not pose a human health threat. In addition, the remediation levels are at or below the LDR treatment standards discussed at Section 7.1 above. Finally, because this option calls for excavation and treatment of the source of ground water contamination, a majority of the ground water would also be remediated during the course of dewatering for excavation of subsurface materials. In those areas where the ground water plume is already outside the limits of contaminated soils, the plume would be remediated by natural attenuation.

RCRA technical requirements for incinerators found at 40 CFR § 264, Subpart O and at 40 CFR § 270, would apply for on-site incineration of contaminated soils. Those technical requirements include operating, monitoring, maintaining and inspecting procedures for the incinerator. The on-site facility would be operated to meet the substantive technical regulatory standards for incinerator performance set by the State and federal governments that relate to air emissions, scrubber liquid treatment and discharge, and the disposal of incinerator ash, all of which would be established during trial burn stages. The concentrations of metals at the site are insignificant and are not considered to represent an air emissions concern. Ash meeting remediation levels, as previously noted, from the incineration would be used to backfill the

excavated areas on-site and then will be covered with a vegetative cap to minimize erosion of the material. However, pursuant to CERCLA Section 121(e)(1), 42 U.S.C. §9621(e)(1), because the incineration activities would occur entirely on-site, no State, federal, or local permits are required, although all substantive requirements as described above would be met.

The feasibility of transporting contaminated materials from the site to an off-site incinerator was also evaluated as part of this remedial alternative. The decision to use this approach is usually based on the cost-effectiveness compared to the construction of an on-site incinerator. Discussions with vendors indicated the disposal costs at an off-site facility would be estimated on the order of \$0.65 per pound or approximately \$2,000 per cubic yard. Therefore, disposal at an off-site incinerator, not including excavation and transportation costs, would cost over \$550 million for approximately 275,000 cubic yards. This is approximately three times that associated with on-site incineration.

7.2.1.6 Alternative 6: Partial Excavation and On-site
 Incineration with In-situ Bioremediation

Capital Cost: \$29 million
Annual Operation and Maintenance: \$500,000
Present Worth: \$40 million
Implementation Time: 30 years

Under this option approximately 25,000 cubic yards of contaminated sludge from the tar mat area would be incinerated on-site as discussed in Alternative 5, Excavation and On-site Incineration. The remaining 250,000 cubic yards of subsurface soils in the process and impoundment areas would be treated through in-situ bioremediation. This process would be a long-term remedial action in which nutrients and oxygen would be injected into the subsurface to promote biological degradation of PAHs and PCP. This alternative would also involve the removal and treatment of NAPLs and contaminated ground water as discussed for Alternative C, Active Treatment, as explained in the following pages.

Bioremediation is a process in which soil microorganisms chemically degrade organic contaminants into carbon dioxide, water and harmless cell protein. The reason for adding nutrients and oxygen

is to promote the growth of microorganisms and increase the rate at which the degradation of contaminations takes place within the subsurface. The basis for the combined approach of incineration and bioremediation is that the tar mat area is a defined area of highly contaminated materials that can be readily excavated and treated and represents material that also may be too heavily concentrated with PAHs and PCP to be conducive to bioremediation. Whereas, while the NAPLs in the subsurface of the process and impoundment areas are also highly concentrated with PAHs and PCP, these materials can be removed as part of the pumping process allowing in-situ bioremediation to be effective. One of the primary concerns with this alternative is the equal dispersion of nutrients and oxygen and thus the overall rate at which bioremediation would occur. In the more porous zones (sands and gravel) the biodegradation is anticipated to occur prior to the zones of silts and clays. Therefore, it is expected that this process will take several decades. During this time the NAPLs and contaminated ground water would be extracted and treated as outlined in Alternative C, and this action would ensure hydraulic control to prevent enlargement of the contaminated plume.

Ash meeting remediation levels, as previously noted, from the incineration of NAPLs and contaminated soils/sludge would be used to backfill the excavated areas on-site and then would be covered with a vegetative cap to minimize erosion of the material. The process and impoundment areas in which in-situ bioremediation would be implemented would also be covered by a vegetative cap. The best time for placement of the cap in the impoundment and process areas would be determined in the design phase of the Superfund process and would be based on considerations that would optimize the effectiveness of in-situ bioremediation. The reason this would be determined during the design is that thorough analyses would be conducted to determine if rainfall would be more conducive to infiltration through existing soils or that a vegetative cover would be more effective for in-situ bioremediation.

7.2.1.7 Partial Excavation and Treatment Analysis

The treatment alternatives presented below provide three different levels of cleanup based on excavation of the top 5 feet of gross contamination, the top 10 feet of gross contamination, or all of the gross contamination (down to a maximum depth of 40 feet). These options provide sensitivity analyses for the volumes of contaminated subsurface materials. The 5 foot excavation represents 60,000 cubic yards of excavated material, the 10 foot excavation represents approximately 110,000 cubic yards of material, and the total gross contamination is estimated at 275,000 cubic yards of material. The rationale for these varying depths of excavations is to evaluate the comparative reduction in volume of contamination and the consequential reduction of probability of direct contact with the contaminated material.

The 5 feet of excavation would still leave approximately 80 percent of the subsurface waste material, while the 10 foot excavation would leave 60 percent of the waste volume. The alternatives for partial excavation and treatment also represent an attempt to remove the old impoundment and tar mat areas and sumps related to the process area. However, alternatives that involve less than full removal of subsurface contaminated soils would still leave a ground water threat while removing the direct contact threat.

Alternative 4: Excavation, Stabilization and On-site Disposal

- 4A - The top 5 feet of soils (60,000 cubic yards)
- 4B - The top 10 feet of soils (110,000 cubic yards)
- 4C - All contaminated soils (275,000 cubic yards)

	<u>4A</u>	<u>4B</u>	<u>4C</u>
Capital Cost (\$ millions):	12	19	37
Annual Operation and			
Maintenance (\$ millions):	0.3	0.3	0.1
Present Worth (\$ millions):	16	23	38
Implementation Time (years):	4	5	5

Alternative 5: Excavation and On-site Incineration

- 5A - The top 5 feet of soils (60,000 cubic yards)
- 5B - The top 10 feet of soils (110,000 cubic yards)
- 5C - All contaminated soils (275,000 cubic yards)

	<u>5A</u>	<u>5B</u>	<u>5C</u>
Capital Cost (\$ millions):	49	80	185
Annual Operation and Maintenance (\$ millions):	0.3	0.3	0.1
Present Worth (\$ millions):	53	84	187
Implementation Time (years):	4	5	6

7.2.2 NAPLs AND GROUND WATER REMEDIAL ALTERNATIVES

7.2.2.1 Alternative A - No Action

Capital Cost: \$0
Annual Operation and Maintenance: \$25,000
Present Worth: \$350,000
Implementation Time: Not applicable

The No Action alternative does not include remedial action but represents baseline conditions for comparison with other alternatives. The pool of creosote and oils would remain as a source of contaminant migration. Monitoring would be conducted periodically to assess the risks associated with contaminated ground water. The long term risks would be above EPA's lower target range of 1×10^{-4} for carcinogens and above a hazard quotient greater than 1 for non-carcinogens. There would also be a chance that the contaminated ground water plume would increase in size, creating a larger area of contamination in the future.

7.2.2.2 Alternative B - Institutional Controls

Capital Cost: \$3,000

Annual Operation and Maintenance: \$25,000

Present Worth: \$350,000

Implementation Time: 6 months

This alternative will include deed notices to inform future land owners of subsurface ground water contamination and to notify individuals on the property that no water wells should be placed in the contaminated plume. In addition, periodic inspections would be conducted to ensure that this is the case. As in Alternative A, the liquid creosote and oils would remain as a source material for future contamination and the risks from placing a water well would be above 1×10^{-4} for carcinogens and above a hazard quotient 1 for non-carcinogens. The chances of someone installing a ground water well at the site would possibly be reduced due to site visits by representatives of the State of Louisiana. However, the contaminated ground water plume would remain uncontrolled and could migrate both vertically and horizontally. The site would be re-evaluated as required by the Superfund law every five years to ensure that the action taken remains protective of the human health or welfare or the environment. Annual sampling would be conducted of the surface materials as deemed appropriate.

7.2.2.3 Alternative C - Active Treatment

Capital Cost: \$2 million

Annual Operation and Maintenance: \$250,000

Present Worth: \$6 million

Implementation Time: 30 years

This alternative involves extraction and treatment of pooled product (NAPLs) and contaminated ground water. The primary objective would be to capture as much pooled product and contamination as possible while creating a hydraulic containment barrier to prevent migration of contaminants into Creosote Branch and to impede enlargement of the ground water plume. This alternative would also be conducive to an in-situ bioremediation remedy to treat any contamination that is absorbed to subsurface

soils. A combination of ground water collection/extraction options could be used at the site, including extraction/pumping wells, interceptor trenches, and subsurface drains. Ground water could be treated to surface discharge levels established by the Clean Water Act, 33 U.S.C. § 1251 et seq., and discharged to Creosote Creek. Alternatively, ground water could be treated and reinjected into the ground water to enhance recovery of the pooled liquid contamination and/or to carry oxygen and nutrients for in-situ bioremediation.

Pumping wells/hydraulic barriers can be used at a site in several different manners to reduce the migration of contaminants from the site. The primary goal of this alternative would involve the removal of NAPLs and contaminated ground water for treatment, followed by reinjection into the aquifer to provide nutrients for in-situ bioremediation, or discharge to a surface water system. The goal would be to remove the contaminated pooled product and contaminated ground water in the upper aquifer down to approximately 35 feet. Interceptor trenches and subsurface drains can be used to intercept NAPLs and/or contaminated ground water and transport it to the treatment area. Since trenches and drains essentially function as a line of extraction wells, they can perform many of the same functions as wells. The decision to use trenches and drains or wells is generally based upon site hydrogeology, the depth of the water table, and cost-effectiveness, which is dependent on the site conditions. Current analysis of geologic and hydrogeologic conditions indicates that a combination of trenches and extraction wells will be the most effective ground water collection method.

The extraction of contaminated ground water and NAPLs would include a detailed analysis of the influence of the Creosote Branch on extraction processes. If the Creek is found to significantly affect the pumping of contaminated material by acting as a recharge source of water to the aquifer, then a slurry wall may be necessary. By acting as a barrier to prevent infiltration of surface water into the ground water, the addition of a slurry wall would reduce the costs associated with pumping and treatment of the additional water. The details for a slurry wall are addressed in Alternative D, Containment. However, it should be understood that the need for a slurry wall would be different than as shown in

Alternative D because in this alternative the slurry wall would only act as a barrier to prevent infiltration of surface water from Creosote Branch. For Alternative C, only a partial slurry wall along the creek would be utilized. The decision for the installation of a slurry wall would be made during the Remedial Design phase of the project if this alternative is selected.

Treatment of contaminated ground water and NAPLs can be accomplished by sedimentation and oil/water separation processes to remove soluble and insoluble matter from ground water and NAPL streams. Sedimentation is a purely physical process which uses gravity to settle suspended particles from solution. Sedimentation may be required to remove the small amount of silt-sized particles that sometimes are removed during pumping operations. Oil/water separation is a process which separates free and/or emulsified oils from water. Once separated, the oils from this process would be incinerated on-site or transported off-site in accordance with RCRA hazardous waste transportation requirements found at 40 CFR Part 263 and incinerated off-site at a RCRA hazardous waste facility deemed acceptable pursuant to the Superfund Off-Site Policy promulgated pursuant to CERCLA Section 121(d)(3), 42 U.S.C. § 9621(d)(3).

Following sedimentation and oil/water separation, the water can be filtered by a sand filter and run through an activated carbon treatment unit. Activated carbon adsorption is a technology proven effective for the treatment of waters containing adsorbable organics compounds. Once the activated carbon filters have been used to capacity, they would be transported off-site in accordance with RCRA hazardous waste transportation requirements found at 40 CFR Part 263 and disposed of at a RCRA hazardous waste facility deemed acceptable pursuant to the Superfund Off-Site Policy promulgated pursuant to CERCLA Section 121(d)(3), 42 U.S.C. § 9621(d)(3).

The equipment and technology required to implement this alternative are readily available. Following on-site treatment, ground water can be either directly discharged to a surface water area or reinjected on site. Surface water discharge of treated ground water would involve discharge to the Creosote Branch. Discharge limitations for this option would be established under applicable

federal and state regulations concerning the Clean Water Act, 33 U.S.C. § 1251 et seq.

The goal of this ground water alternative is to remove as much of the source of shallow ground water contaminants as possible. However, without treatment of the contaminants from the subsurface soils there will always be the potential for contamination remaining in the ground water, even if all NAPLs were removed by pumping. Therefore, to avoid continued ground remediation it would be necessary to treat the subsurface soils by in-situ bioremediation or by complete removal of the soils and incineration. The goal for remediation of the ground water is to reduce the B(a)P equivalents below a concentration of 0.2 µg/l, which is the maximum contaminant level (MCL) for PAHs, and benzene below a concentration of 5 µg/l which is the MCL for this compound. Based on information obtained during the remedial investigation, and the analysis of other ground water remedial alternatives employed at other wood treating Superfund sites, this remedial alternative may not achieve this low a goal. The ability to achieve cleanup levels cannot be determined until the extraction and monitoring system has been implemented.

7.2.2.4 Alternative D - Containment

Capital Cost: \$3 million
Annual Operation and Maintenance: \$200,000
Present Worth: \$5 million
Implementation Time: 2-3 years

This alternative provides a containment option for site ground water. Although contamination would still remain at the site, contaminant migration would be controlled by constructing a barrier (slurry wall or similar-type structure), both upgradient and downgradient of the site. Placement of a slurry wall set back from the edges of Creosote Creek would seek to encompass as much of the dense liquids and grossly contaminated subsurface soils of the process areas as possible. In addition, this alternative would include some ground water pumping and treatment in order to maintain an inward flow gradient. The NAPLs and contaminated ground water would be treated as presented in Alternative C. However, this gradient pumping and treatment would not treat liquid

contaminants to the extent proposed in Alternative C. Water from this alternative would be treated as specified for Alternative C, Active Treatment.

Isolation technologies that have potential for use at the site to control contaminant migration include grout curtains, sheet piling, and slurry trench/walls. An important consideration for any of the ground water isolation options is the depth to bedrock, or aquitard. Current evaluation of site conditions indicate that an acceptable aquitard is present within the upper 70 feet of the surface and this is within the limits of conventional equipment for implementation of this alternative. Of these alternatives, slurry walls are expected to be the optimal choice for this site. Grout curtains are generally more costly and have higher permeabilities than slurry walls, and are seldom used for containing ground water flow in unconsolidated materials. Sheetpiling was eliminated from consideration because of uncertainties with wall integrity over extended periods of time and potential damage to or deflection of the piles by rocks during installation.

Slurry trench/walls apply the concept of lateral encapsulation (or vertical barriers) to provide a relatively impermeable barrier around impacted soil or ground water to divert ground water flow around the impacted areas and/or prevent impacted ground water from migrating. Slurry trench/walls are constructed in a vertical trench that is excavated under a slurry. The slurry performs in a similar way to drilling fluid in that it hydraulically shores the trench to prevent collapse while forming a cake on the trench wall to reduce fluid losses to the subsurface soil. The most common types of slurry wall materials include soil-bentonite and cement-bentonite.

8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

EPA uses nine criteria to evaluate the merits of Superfund remedies. The first two assessments that are directly related to statutory determinations are:

- 1) Overall protection of human health and the environment, and
- 2) Compliance with Applicable or Relevant and Appropriate Requirements (ARARS) of other Federal and State environmental statutes.

If a remedial alternative does not meet the first two criteria it is not carried over for further analysis. If it meets the first two criteria, it is then reviewed against five additional measures which are identified as balancing criteria:

- 3) Long-term effectiveness and permanence,
- 4) Reduction of contaminant toxicity, mobility, or volume through treatment,
- 5) Short-term effectiveness,
- 6) Implementability, and
- 7) Cost, including capital and operation and maintenance cost.

The final two criteria are modifying criteria and are evaluated following the public comment period on the RI/FS Report and the Proposed Plan:

- 8) State Acceptance, and
- 9) Community Acceptance.

8.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, and/or institutional controls.

All of the alternatives, with the exception of the "No Action" and "Institutional Control" alternatives, would provide protection of human health and the environment by eliminating, reducing, or controlling risks through treatment or engineering controls.

A combination of Alternatives 6 and C, Partial Excavation and On-site Incineration with In-situ Bioremediation and Active Treatment, or the selection of Alternative 5, Excavation and Incineration, would provide the greatest degree of overall protection to human health and the environment. Alternative 5, Excavation and On-Site Incineration would completely destroy the contaminants and eliminate direct contact threats and the source of contaminated ground water. Partial Excavation and On-site Incineration with In-situ Bioremediation, Alternative 6, in conjunction with Alternative C, Active Treatment, actively treats all identified wastes. However, based on other sites utilizing bioremediation, the degree of contaminant reduction is potentially less than full scale incineration but would remain protective.

Alternative C, Active Treatment, provides active measures that would be taken to treat the primary threats from creosote and PCP liquids and contaminated ground water. This alternative by itself would not treat the absorbed contamination to the subsurface soil particles. Therefore, it is necessary to combine this option with an additional soil treatment alternative to be totally effective. Contaminated pooled product and ground water would be extracted and treated to the maximum extent practicable and the treated water would be reinjected with nutrients and oxygen to reduce subsurface contamination through biodegradation. Any treated water to be discharged into surface water will meet the water discharge standards as established under the Clean Water Act 33 U.S.C. 1251 et seq., and found at 40 CFR Part 414. The extraction process would minimize the migration of contaminated ground water off-site. Oils (NAPLs) recovered from the treatment process would be incinerated either on-site or off-site at a RCRA hazardous waste facility deemed acceptable under the Superfund Off-Site Policy promulgated pursuant to CERCLA Section 121(d)(3), 42 U.S.C. § 9621(d)(3).

The stabilization alternative, Alternative 4, was initially expected to provide overall protection above the levels provided by the capping alternative, Alternative 3. However, treatability studies have shown stabilization technology to be questionable due to the oily nature of the waste materials, as presented in the discussion of this alternative. The potential of stabilized soils to leach organic contaminants to the ground water would remain, although the ability of those contaminants to leach would be less than currently exists. The technology would not sufficiently stabilize the contaminated material to be considered a permanent remedy and, therefore, would require NAPL and ground water actions such as Alternatives C or D.

Consolidation and Multi-Layered Capping (Alternative 3) provides protection by employing measures to isolate contaminants from human contact and the environment. It is also compatible with options C and D for the contaminated liquids alternatives. The cap would reduce the infiltration of surface water and would have to be maintained on an indefinite basis. Capping, and containment or active treatment, do nothing to treat the subsurface soils that act as a source of ground water contamination. Therefore, this remedy does not provide as much protection to human health or the environment as the previously discussed alternatives.

Containment, Alternative D, would provide moderate human health and environmental protection in conjunction with the capping alternative for soil remediation. Contaminated ground water would be contained by a slurry wall and minimal pump and treat operations would be conducted indefinitely. However, this alternative is not expected to provide as much overall protection to human health and the environment as that of Alternative C, Active Treatment, because the remaining contamination has the potential to migrate through the containment wall.

The No Action and the Institutional Control alternatives for both liquids and soils do not provide overall protection to human health, welfare, or the environment. As documented in the RI, contamination is currently continuing to seep from the site into Creosote Branch, and as such remains an environmental threat. The tar mat area contains surface contamination that is above health-based levels and, therefore, warrants action. The institutional

controls alternative, Alternative B, would not prevent the seepage of contaminated materials into Creosote Branch, but would only provide minimal controls against trespassing and future development in the area. The potential would remain for contaminants to spread into the ground water and to disperse surface contamination during flood or rainfall events.

In summary, the no action and institutional controls alternatives for both liquids and surface materials in the tar mat area do not protect human health, welfare, or the environment. These alternatives are not considered appropriate for this site and as such are not discussed further for the other eight criteria.

8.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

Compliance with ARARS addresses whether a remedy will meet all the applicable or relevant and appropriate requirements of other Federal and state environmental statutes or provides a basis for invoking a waiver. Identified ARARS for this project include provisions of the Clean Water Act, 33 U.S.C. § 1251 et seq., the Resource Conservation and Recovery Act, 42 U.S.C. § 6901 et seq., the Safe Drinking Water Act, 33 U.S.C. § 300f et seq., and the Clean Air Act, 42 U.S.C. § 7401 et seq. All ARARS can be met for all alternatives and a detailed discussion of ARARS for the selected remedy is presented in following sections.

8.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Long term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. This criterion includes the consideration of residual risk and the adequacy and reliability of controls.

The alternative remedies for the soils/sludges decrease in effectiveness as one reviews the options ranging from incineration to a combination incineration/bioremediation to stabilization and finally capping. The incineration alternative provides long term effectiveness by destroying the organic contaminants. A combination of Alternatives 6 and C, Partial Excavation and On-site

Incineration with In-situ Bioremediation and Active Treatment, would offer the second best option with regard to long term effectiveness. The primary difference between incineration and bioremediation is that the bioremediation alternative is anticipated to take approximately 5 times as long as incineration and may not ultimately achieve as much contamination reduction as that of incineration. However, it is believed that through long term treatment the contamination can be reduced to acceptable concentrations to provide long term protection.

Although the stabilization alternative, Alternative 4, may involve some chemical fixation of the contaminants, the fixation of wastes with high concentrations of organic compounds, such as those found at American Creosote, have not been demonstrated to be effective as documented by treatability studies and as experienced at other wood treating Superfund sites. The multi-layer clay cap, Alternative 3, would address the moderately contaminated surface and subsurface soils, but the soils would remain as a potential source of ground water contamination. Thus, multi-layer capping is only effective as long as a continuous ground water control mechanism is in place and the cap is maintained.

The active treatment alternative for contaminated liquids (Alternative C) would employ proven technologies for extraction and treatment of contaminated ground water. However, the contaminated liquids and ground water pump and treatment system is not technologically capable of completely removing subsurface contamination, and so some residual contamination will remain unless it is combined with a treatment alternative. Contaminants would be removed to the maximum extent practicable, resulting in the permanent treatment of the extracted contaminants and the minimization of the potential migration of contaminants to drinking water zones below the contaminated aquifer. Alternative D, containment, is believed to be less effective in the long term than active treatment because contaminants might eventually migrate through the barrier into the ground water.

8.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies a remedy may employ.

The incineration alternative (Alternative 5) would reduce the toxicity, mobility, and volume of excavated contaminated material through the permanent destruction of the organics. Treatability tests have shown that the incineration ash would be below the remediation levels established in the Summary of Site Risks section of this ROD. The combination of Incineration with In-situ Bioremediation (Alternative 6) in conjunction with Active Treatment (Alternative C) would also reduce mobility, volume and toxicity, although to a lesser degree than full scale incineration, but it would still remain protective. It is believed that the reduction of mobility and volume of contamination for a combination of Alternatives C and 6 would be comparable to that of full scale incineration (Alternative 5). However, the reduction of toxicity is anticipated to be somewhat higher for Alternative 5 than the aforementioned combination of Alternatives C and 6.

The stabilization alternative (Alternative 4) would reduce the mobility somewhat (*i.e.*, approximately 40% as determined by leachability tests), although the potential remains for future leaching of contaminants into the ground water. For surface and subsurface soils the capping alternative (Alternative 3) would not involve any treatment.

Under the active treatment alternative (Alternative C) the contaminated liquids and ground water would be extracted and treated. The contaminated oils from this process would be ultimately destroyed at an acceptable on-site or off-site incinerator, thereby significantly reducing toxicity, mobility and volume. The ground water containment alternative (Alternative D) would reduce mobility of the contaminants through containment. However, this reduction is not through treatment. In addition, toxicity and volume would not be reduced for Alternative D.

8.5 SHORT TERM EFFECTIVENESS

Short term effectiveness refers to the period of time needed to complete the remedy and address any adverse impacts on human health and the environment that may be posed during the construction and implementation of the remedy until cleanup levels are achieved.

Alternative 6, Partial Excavation and Incineration with In-situ Bioremediation, in conjunction with Alternative C, Active Treatment, is anticipated to take approximately 30 years. Alternatives 3 and 4, Multi-Layered Capping and Stabilization, could be constructed within 4 years. However, as discussed previously, these alternatives would have to be conducted in conjunction with ground water alternatives C or D, active treatment or containment, which could involve continuous operation and maintenance (O&M) for 30 years or more. The incineration option could be completed within 6 years of implementation.

Precautions would be taken in all alternatives involving site activities to eliminate any risk to the public and site workers. During the implementation of any ground water, source treatment, or capping alternative, there would be potential short term risks to site workers during consolidation and treatment of the contaminated material. Some increase in air emissions may occur as a result of excavation during any of the soil/sludge alternatives. However, engineering controls and air monitoring will reduce the potential for any adverse impacts during implementation of the remedy. A contingency plan would be developed to address any potential air emissions detected during remedial activities.

8.6 IMPLEMENTABILITY

Implementability addresses the ease with which a potential remedy can be put in place. Factors such as availability of materials and services and administrative feasibility are considered.

All alternatives have been considered implementable and administratively feasible, and the materials and services needed for all proposed alternatives are readily available. The construction of a multi-layered clay cap over the contaminated material would be easily implemented. Increased difficulty would

result from implementing the bioremediation, incineration and stabilization alternatives as compared with capping, although all these alternatives can be implemented. The excavation, dewatering and incineration process would require more specialized equipment than that for capping. However, this equipment is readily available in the construction industry. Ground water alternatives are also easily implemented, although the construction of a slurry wall would be more difficult than that of a pump and treatment system.

8.7 COST

The estimated costs are presented in the previous pages and range from \$16 million for a capping alternative to \$187 million for an incineration alternative. The stabilization and incineration alternatives present options on the amount of treatment of the contaminated materials and provides options as to the volume of material to be treated. However, anything less than full excavation still requires the control or treatment of subsurface areas to prevent continued contaminant migration. The cost for active liquid treatment (\$6 million) is approximately equal to that of the containment option (\$5 million), with the advantage of the active liquid treatment option being that it provides actual treatment and reduction of the human health and environmental risks. It is believed that the combination of Alternatives 6 and C meet the same overall goals as that of Alternative 5, full scale incineration, at a quarter of the cost (\$40 million instead of \$187 million)

8.8 STATE ACCEPTANCE

The final proposed plan was a joint release by EPA and LDEQ and as such it reflects LDEQ's views on the selected remedy as outlined below. For this project LDEQ must contribute 10 percent of the remedy construction costs and formally concur with the deletion of the site from the National Priorities List upon completion of the remediation process.

8.9 COMMUNITY ACCEPTANCE

EPA recognizes that the community in which a Superfund site is located is the principal beneficiary of all remedial actions undertaken. EPA also recognizes that it is its responsibility to inform interested citizens of the nature of Superfund environmental problems and solutions, and to learn from the community what its desires are regarding these sites.

During the 90 days provided for public comment on this site, the community was requested to comment on proposed remedies which included a Multi-layered Clay Cap and Active Treatment, Alternatives 3 and C, full-scale incineration, Alternative 5, and Partial excavation and On-site Incineration in conjunction with Active Treatment, Alternatives 6 and C. During the public meeting of September 15, 1992, the city council, mayor and over 50 individuals from the local area responded to EPA's proposed alternatives to remediate the site. The number of people at this meeting was significantly greater than the August 3, 1992, meeting that was attended only by 4 individuals. Based on the comments from both meetings, the local community strongly favors a treatment alternative and strongly opposes any no action or institutional control alternative. During these meetings no individuals indicated any opposition to on-site incineration. The community favors full scale incineration at a cost of approximately \$187 million. However, based on comments received during the comment period, bioremediation may also meet the community's goals at a substantial savings to the State and Federal Governments.

9.0 THE SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the detailed analysis of alternatives using the nine criteria, and public comments, both EPA and the State of Louisiana have determined that Alternative 6, Partial Excavation and On-site Incineration with In-situ Bioremediation, in conjunction with Alternative C, Active Treatment, is the most appropriate remedy for the American Creosote Site in Winnfield, Louisiana. This alternative will address the NAPLs and the subsurface source of ground water contamination and any significant threats from direct contact of surface contamination.

The surface soils in the area between the tar mat and Creosote Branch are not being removed as part of this remedy because of the potential effects on wetlands. The maximum concentration of B(a)P equivalents in this area is 7,500 µg/kg. This concentration is still below the 1×10^{-4} goal for remediation and is near the remediation goal of 3,000 µg/kg for the other soils. These soils are not considered a significant threat to ground water or to human health because of direct contact. Furthermore, if the soils between the tar mat and Creosote Branch were removed the existing wetlands would be drastically damaged.

Approximately 25,000 cubic yards of creosote- and PCP- contaminated sludges will be excavated from the tar mat area. The organic contaminants will be incinerated on-site and the treated soils will then be returned to the excavated areas, which will be regraded, capped, and revegetated. The removal and treatment of the tar mat materials will allow the function of the wetland to recover in this distressed area. The remaining 250,000 cubic yards of subsurface soils in the process and impoundment areas would be treated through in-situ bioremediation. This process would be a long-term remedial action in which nutrients and oxygen would be injected into the subsurface to promote biological degradation of PAHs and PCP. This alternative would also involve the removal and treatment of NAPLs and contaminated ground water by pumping and treatment. The estimated cost for this component of the remedy is: Capital costs - \$29 million, annual O&M costs - \$500,000 , and present worth - \$40 million.

9.1 SENSITIVITY ANALYSIS FOR SELECTED REMEDY

As part of this study, in an effort to more accurately assess the viability of this remedial action in light of potential waste volume increases during actual remediation, a sensitivity analysis was conducted. The intent of this analysis was to determine if unexpected volume increases would adversely impact the selection of this particular alternative. (Waste volume was determined to be the most critical factor affecting cost.)

The evaluation revealed that even if the volume of contaminated sludge to be incinerated was to double, from 25,000 to 50,000 cubic yards, the cost for this remedy would only increase to

approximately \$45 million which is well within the range of plus 50 percent for the cost estimate presented in this Record of Decision. This unanticipated increase would, therefore, not adversely affect the remedy selection decision.

Since the majority of the remedial action involves insitu bioremediation, and the extent of the area needing treatment is well defined, volume increases are not expected to impact this aspect of the cleanup. Also, another advantage of insitu remedial technologies is that they are generally less susceptible to cost increases due to changing site conditions such as extensive buried debris, etc.

9.2 CLEANUP LEVELS

9.2.1 SOILS/SLUDGES

The tar mat area will be removed and incinerated on-site to eliminate a major potential source for direct contact and a potential source of surface and ground water contamination. The residual contamination within the process and impoundment areas will be remediated through the use of in-situ bioremediation. During excavation and incineration of the tar mat areas any sludges within the tar mat area that contain greater than 3,000 $\mu\text{g/kg}$ for B(a)P equivalents and/or greater than 50,000 $\mu\text{g/kg}$ for PCP will be removed. The soils between the tar mat area and the Creosote Branch will not be excavated as outlined previously.

The rationale for selection of a 1×10^{-5} (3,000 $\mu\text{g/kg}$ for B(a)P equivalents and 50,000 $\mu\text{g/kg}$ for PCP) as opposed to the point of departure stated under the National Contingency Plan (1×10^{-6}) is based on technological implementability and cost. EPA determined that if the 1×10^{-6} point of departure goal was strictly adhered to at this site all technologies would be precluded from consideration except for incineration. This was not considered reasonable since alternatives were available that could treat to the National Contingency Plan risk level of 1×10^{-4} to 1×10^{-6} , which according to EPA is protective.

EPA has found that bioremediation would not achieve the same level of destruction as incineration, however, by using a 10^{-5} cleanup level it was found to be technological achievable at a substantially lower cost. From a cost basis, bioremediation offers a substantial cost savings of approximately \$150 million as compared to full scale incineration while achieving a cleanup goal within the allowable risk range of 1×10^{-4} to 1×10^{-6} . However, this does not preclude the use of incineration for the tar mat area as previously detailed because this material is not appropriate for bioremediation.

The health-based criteria for the incinerator ash are established as having the following maximum concentrations for the following compounds, if present:

Naphthalene	-----	1,500 $\mu\text{g/kg}$
Pentachlorophenol	-----	7,400 $\mu\text{g/kg}$
Pyrene	-----	1,500 $\mu\text{g/kg}$
Toluene	-----	1,500 $\mu\text{g/kg}$
Xylenes	-----	28,000 $\mu\text{g/kg}$
Lead	-----	33,000 $\mu\text{g/kg}$
Dioxins and furans as 2,3,7,8 TCDD	-----	1 $\mu\text{g/kg}$
B(a)P equivalents	-----	3,000 $\mu\text{g/kg}$

The remediation goals for the subsurface soils that are to be addressed through in-situ bioremediation are B(a)P concentrations of less than 3,000 $\mu\text{g/kg}$ and PCP concentrations less than 50,000 $\mu\text{g/kg}$. A waiver of these provisions will be considered during the remedial action if the goals for ground water are achieved as documented in the following pages.

The selected remedy will include ecological monitoring for an estimated period of 5 to 10 years after implementation of the remedial activities. The extent of ecological studies will be determined as part of the Remedial Design efforts and will include evaluation of wetlands and streams as EPA and LDEQ consider appropriate.

9.2.2 GROUND WATER

The goal of the incineration and in-situ bioremediation phases as previously described is to remove the source of shallow ground water contaminants so as to reduce and/or eliminate the potential threat of contamination impacting deeper drinking water aquifers and, if technologically achievable, to restore the shallow ground water to a potential future beneficial use.

The soils in the area between the tar mat and Creosote Branch are not being removed as part of this remedy. These soils are not considered a significant threat to ground water and involve an area defined as a wetlands. The wetlands would be destroyed if these soils were excavated and as discussed in the Summary of Site Risks section of this ROD the soils are within the EPA's acceptable risk range. Removal of the source of contamination from the tar mat area and in-situ bioremediation of the process and impoundment areas will allow the restoration of the ground water. A remediation goal of 0.2 micrograms per liter ($\mu\text{g}/\text{l}$) for benzo(a)pyrene and 5 micrograms per liter ($\mu\text{g}/\text{l}$) for benzene will be utilized for the shallow ground water in this area. The ability to achieve cleanup goals at all points throughout the area of attainment, or plume, cannot be determined until the monitoring system has been implemented, or modified as necessary based on engineering design changes.

If the selected remedy cannot meet the health-based remediation goals, at any or all of the monitoring points during implementation, contingency measures and goals as discussed below may replace the selected remedy and goals. These measures are still considered to be protective of human health and the environment, and are technically practicable under the corresponding circumstances.

The selected remedy will include ground water monitoring for an estimated period of 5-10 years after completion of on-site remedial activities, during which time the effectiveness of source destruction will be carefully monitored on a regular basis. Once this system has been operating for a 5-10 year period, then an

evaluation of the need for additional pumping and treating will be conducted. Based on this evaluation the operating system may include:

- a) discontinuing operation of extraction wells in the area where cleanup goals have been attained;
- b) alternating pumping at wells to eliminate stagnation points; and
- c) pulse pumping to allow aquifer equilibration and encourage adsorbed contaminants to partition into ground water.
- d) other items as necessary to achieve goals of this ROD.

If, in EPA's and LDEQ's judgment, implementation of the selected remedy clearly demonstrates, in corroboration with strong hydrogeological and chemical evidence, that it will be technically impracticable to achieve and maintain remediation goals throughout the area of attainment, the contingency plan will be implemented. At a minimum, and as a necessary condition for invoking the contingency plan, it must be demonstrated that contaminant levels have ceased to decline over time and are remaining constant at some statistically significant level above remediation goals, in a discrete portion of the area of attainment, as verified by multiple monitoring wells.

Where such a contingency situation arises, ground water extraction and treatment would typically continue as necessary to achieve mass reduction and remediation goals throughout the rest of the area attainment.

If it is determined, on the basis of the preceding criteria and the system performance data, that certain portions of the aquifer cannot be restored to their beneficial use, all of the following measures involving long term management may occur, for an indefinite period of time, as a modification of the existing system:

- a) low level pumping will be implemented as a long-term gradient control, or containment, measure;
- b) chemical-specific ARARs will be waived for the cleanup of those portions of the aquifer based on the technical impracticability of achieving further contaminant reduction; and/or
- c) institutional controls will be implemented to restrict access to those portions of the aquifer which remain above health-based goals, should this aquifer be proposed for use as a drinking water source.

The decisions to invoke any or all of these measures may be made during periodic reviews of the remedial action.

An Explanation of Significant Differences will be issued to inform the public of the details of these actions should they occur.

10.0 STATUTORY DETERMINATIONS

Under CERCLA Section 121, 42 U.S.C. § 9621, EPA must select remedies that are protective of human health and the environment, comply with Applicable or Relevant and Appropriate Requirements (ARARs), (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

10.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy protects human health and the environment through incineration of heavily-contaminated creosote and pentachlorophenol sludges and in-situ bioremediation of less contaminated subsurface soils. Incineration and in-situ bioremediation of the sludges and soils in conjunction with active

treatment of contaminated NAPLs and ground water will eliminate a major source and continual threat of ground water contamination. The current cancer risk associated with these soils is 3.8×10^{-4} , while the ground water cancer risk is 7.5×10^{-2} . By excavating the heavily-contaminated sludges and treating them in an incinerator, and by applying in-situ bioremediation of the contaminated subsurface soils the source of ground water contamination will be significantly reduced to within EPA's acceptable risk range of 10^{-4} to 10^{-6} . There are no short term threats associated with the selected remedy that cannot be readily controlled. In addition, no adverse cross-media impacts are expected from the remedy.

10.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

The selected remedy of excavation and on site incineration will comply with all applicable or relevant and appropriate requirements (ARARS). The ARARS are presented below:

Chemical-Specific ARARS:

Safe Drinking Water Act Maximum Contaminant Levels (MCLs)
(40 CFR Part 141)

Clean Water Act Federal Water Quality Criteria (FWQC)
(40 CFR Part 414)

Safe Drinking Water Act Maximum Contaminant Level (MCL) of
5 $\mu\text{g/l}$ for benzene - 40 CFR Part 141

Location-Specific ARARS:

Clean Water Act Section 404
(Wetland Protection)

Action-Specific ARARs:

40 CFR Part 264 Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities. In particular subparts B, C, D, G, I, J, K, L, O, AA, and BB may be relevant and appropriate during construction operations.

Clean Water Act for NPDES Discharges - 40 CFR Part 122 and 40 CFR Part 414 for discharges of organic chemicals.

Other Criteria, Advisories, or Guidance To Be Considered (TBCs) for This Remedial Action:

EPA and the State will determine the need to file a deed notice advising of Site hazards

E.O. 11990, Protection of Wetlands, which requires that Federal agencies conduct an evaluation to assess the impacts of an action on wetlands

Clean Air Act National Emission Standards for Hazardous Air Pollutants (NESHAPS) - 40 CFR Part 61

Clean Air Act National Ambient Air Quality Standards (NAAQS) - 40 CFR Part 50

RCRA Land Disposal Restrictions (LDRs) - 40 CFR Part 268 for U-051 wastes (Creosote)

10.3 COST EFFECTIVENESS

EPA believes this remedy will eliminate the risks to human health at an estimated cost of \$40 million. Therefore, the selected remedy provides an overall effectiveness proportionate to its costs, such that it represents a reasonable value for the money that will be spent. The selected remedy assures a much higher degree of certainty that the remedy will be effective in the long term because of the significant reduction of the toxicity and mobility of the wastes achieved through the incineration, in-situ bioremediation and active treatment components.

10.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES (OR RESOURCE RECOVERY TECHNOLOGIES) TO THE MAXIMUM EXTENT PRACTICABLE

EPA and the State of Louisiana have determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost effective manner for the final remedy at the American Creosote site. Of those alternatives that are protective of human health and the environment and that comply with ARARs, EPA and the State have determined that the selected remedy provides the best balance of trade-offs in terms of long term effectiveness and permanence, reduction in toxicity, mobility, or volume achieved through treatment, short term effectiveness, implementability, and cost, while also considering the statutory preference for treatment as a principal element and considering State and community acceptance.

The selected remedy treats the principal threats posed by the sludges, soils and ground water through achieving significant creosote and pentachlorophenol reductions. This remedy provides the most effective treatment of the alternatives considered, utilizes innovative treatment alternatives were appropriate, and will cost less than off-site disposal. The selection of treatment of the contaminated sludges and soils is consistent with program expectations that indicate that highly toxic and mobile wastes are a priority for treatment and whose elimination is often necessary to ensure the long term effectiveness of a remedy.

10.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

By treating the contaminated ground water onsite, by utilizing in-situ bioremediation of the absorbed subsurface contamination, and treating the heavily contaminated sludges by incineration, the selected remedy addresses the principal threats posed by the site through the use of treatment technologies. By utilizing treatment as a significant portion of the remedy, the statutory preference for remedies that employ treatment as a principal element is satisfied.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

A Proposed Plan was released for public comments on July, 29, 1992. The Proposed Plan identified Alternatives 3, RCRA Compliant Capping and C, Active Treatment of Contaminated Ground Water and Liquids (wood treating fluids) as the proposed remedy for the American Creosote site. On August 3, 1992, EPA held a public meeting with transcripts taken and subsequently added to the Administrative Record. The public meeting was attended by representatives from LDEQ and Louisiana's Office of Public Health.

Subsequent evaluations within EPA and discussions with the State and the community (based on the August 3, 1992, public meeting) revealed that incineration of the wastes may be more effective in meeting goals to remediate the site. On August 26, 1992, EPA received a written request from the Mayor of Winnfield requesting an extension to the comment period and an additional meeting. The public comment period was subsequently extended for an additional 30 days and a second public meeting was held on September 15, 1992. Due to this reassessment of preferred remedial alternatives, EPA issued a public notice in the local Winnfield newspaper, which published articles about the possible use of on-site incineration in early September, 1992.

During the public meeting of September 15, 1992, the city council and mayor, and over 50 individuals from the Winnfield area, responded to EPA's proposed alternatives to remediate the site. The number of people at this meeting was significantly greater than the previous one that was attended only by 4 individuals. Based on the comments from both meetings, the local community favored on-site incineration at a cost of \$187 million.

In response to comments received during the public comment period of July 29 to September 29, 1992, continuing discussions within EPA between technical and managerial personnel, and ongoing discussions between EPA and LDEQ, it was determined that further consideration of bioremediation was necessary. On March 1, 1993, LDEQ and EPA issued a final proposed plan based on an extensive review of all the comments received during the previous comment period and an additional review of the state of technologies being used to remediate wood treating sites.

The final proposed plan for the American Creosote site combined elements of remedies previously proposed and added in-situ biological treatment for the bulk of the buried contaminated soils. The suggested remedy consisted of the following components:

- (1) Pump, separate and treat liquid contaminants. LNAPLs and DNAPLs would be pumped from the zones of pooled product beneath the site, separated from the water, and destroyed by on- or off- site incineration. (Proposed in July, 1992.)
- (2) On site incineration of 25,000 cubic yards of highly contaminated tars and sludges. 25,000 cubic yards of tars and sludges located in the "sludge overflow area" of the site, which is the most highly contaminated material, would be excavated and thermally treated on-site. Ash, would be landfilled on-site. (Proposed in August, 1992.)
- (3) In-situ biological treatment of 250,000 cubic yards of contaminated soils. The remainder of the site's contaminated soils/sludges from process areas and buried pits would be addressed in-situ by injecting, via wells, nutrients, microbes and oxygen as is necessary to attain stated treatment goals. The ground water extraction system used for NAPL recovery would also be used to hydraulically control any off-site migration of ground water contamination and allow for recirculation of the bacteria for efficient treatment.

Because of the expected pace of remediation, the EPA would categorize this site remediation as a Long Term Remedial Action. What this means is the EPA will be responsible for 90% funding beyond the customary 1 year time period; 90% funding will continue until such time as the established remediation goals are met. The State of Louisiana will be responsible for 10% of the costs. This component is innovative and is expected to provide permanent treatment. (Based on comments/ information received during the public comment period.)

- (4) Capping of surface contaminated soils, decontamination and on-site landfilling of process equipment and scrap. Grading and capping would be done to complement the above remedial actions. (Proposed in July, 1992.)

The net cost of this set of remedies was estimated between \$40-\$50 million which is significantly less than the total cost of the incineration remedial option (approximately \$185 million) and more environmentally protective than the original pumping/capping proposal. Biological treatment of creosote-contaminated soils is being attempted at numerous wood treater sites nationwide. Although biological treatment for the site was initially screened from consideration early in the Feasibility Study, in light of the comments received and technical information, and considering the extreme cost of complete on-site incineration, the EPA and LDEQ believe this innovative technology warrants implementation.

Based on the comments received during both comment periods and the aforementioned discussions, EPA and the State of Louisiana have selected Alternative 6, Partial Excavation and On-site Incineration with In-situ Bioremediation, in conjunction with Alternative C, Active Treatment of NAPLs and Contaminated Ground water, as the remedy for addressing contaminated materials at the American Creosote site.

A response to the comments received during both comment periods is included in the Responsiveness Summary that is part of this ROD. This decision document presents the selected remedial action that was chosen in accordance with the CERCLA, the administrative record, and to the extent practicable, the National Contingency Plan (NCP), 40 CFR Part 300.

APPENDIX A

AMERICAN CREOSOTE WORKS, INC.

PREVIOUS INVESTIGATIONS

Appendix A: Surface Soil Sample Results from Previous Investigations at the American Creosote Site

[illegible]

U - Undetected (Detection limit unknown)

NA - Not Analyzed

Location/Station #	68	66	67	71	60	61	51	53	58	57	54	
Analyte (ug/kg)												
acenaphthene	1600000	U	U	U	U	U	U	U	U	U	U	
fluoranthene	2400000	390000	2200000	92000	1100	320	U	U	100	U	760	
naphthalene	880000	U	U	U	260	U	U	U	U	U	U	
benzo(a)anthracene	380000	80000	160000	20000	1620	230	U	U	U	U	770	
benzo(a)pyrene	120000	35000	U	12000	630	150	U	U	U	U	940	
benzo(b)fluoranthrene	160000	100000	260000	31000	1700	500	U	U	U	390	2200	
benzo(k)fluoranthrene	U	67000	U	28000	1800	390	U	U	U	U	2000	
chrysene	380000	150000	410000	38000	1100	400	U	U	U	U	1100	
acenaphthylene	U	U	U	U	240	U	U	U	U	U	250	
anthracene	510000	77000	130000	U	340	U	U	U	U	U	U	
benzo(ghi)perylene	U	U	U	U	1200	190	U	U	U	U	800	
fluorene	1200000	U	100000	U	U	U	U	U	U	U	U	
phenanthrene	4100000	79000	1000000	U	590	U	U	U	U	U	U	
dibenzo(a,h)anthracene	U	U	U	U	170	U	U	U	U	U	U	
indeno(1,2,3-cd)pyrene	U	25000	U	11000	1100	210	U	U	U	U	870	
pyrene	1900000	380000	1300000	79000	1400	380	U	200	120	U	1300	
B(a)P EQUIVALENTS	177800	63500	46100	21470	1313	287	-	-	-	39	1448	
Total PAHs	13630000	1423000	7560000	311000	12250	2770	U	200	220	390	10990	
pentachlorophenol	U	790000	5000000	U	U	U	U	U	U	U	U	
dibenzofuran	870000	U	U	U	U	U	U	U	U	U	U	
2-methylnaphthalene	610000	U	U	U	U	U	U	U	U	U	U	
Total tetrachlorofurans	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	
pentachlorofurans	U	NA	NA	0.068	NA	NA	NA	NA	NA	NA	NA	
hexachlorofurans	16	NA	NA	1.7	NA	NA	NA	NA	NA	NA	NA	
heptachlorofurans	170	NA	NA	6.3	NA	NA	NA	NA	NA	NA	NA	
octachlorofurans	310	NA	NA	7.1	NA	NA	NA	NA	NA	NA	NA	
Total tetrachlorodioxins	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	
2,3,7,8 -tetrachlorodioxins	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	
pentachlorodioxins	2.5	NA	NA	0.17	NA	NA	NA	NA	NA	NA	NA	
hexachlorodioxins	93	NA	NA	9	NA	NA	NA	NA	NA	NA	NA	
heptachlorodioxins	2200	NA	NA	160	NA	NA	NA	NA	NA	NA	NA	
octachlorodioxins	2700	NA	NA	140	NA	NA	NA	NA	NA	NA	NA	

U - Undetected (Detection limit unknown)

NA - Not Analyzed

U - Undetected (Detection limit unknown)

NA - Not Analyzed

Location/Station #	83	84	85	88	89	90	82	87				
Depth	(4-6ft)	(4-6ft)	(4-6ft)	(18-21ft)	(18-21ft)	(18-21ft)	(4-6ft)	(18-21ft)				
Analyte (ug/kg)												
acenaphthene	10000	150000	U	250000	U	U	U	U				
fluoranthene	16000	290000	U	350000	U	U	U	U				
naphthalene	22000	260000	U	550000	U	U	U	U				
benzo(a)anthracene	U	66000	U	52000	U	U	U	U				
benzo(a)pyrene	U	40000	U	U	U	U	U	U				
benzo(b)fluoranthrene	U	75000	U	31000	U	U	U	U				
benzo(k)fluoranthrene	NA	NA	NA	NA	NA	NA	NA	NA				
chrysene	U	85000	U	57000	U	U	U	U				
acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA				
anthracene	U	110000	U	80000	U	U	U	U				
benzo(ghi)perylene	NA	NA	NA	NA	NA	NA	NA	NA				
fluorene	U	170000	U	240000	U	U	U	U				
phenanthrene	30000	500000	U	680000	U	U	U	U				
dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA				
indeno(1,2,3-cd)pyrene	U	16000	U	U	U	U	U	U				
pyrene	16000	220000	U	260000	U	U	U	U				
B(a)P EQUIVALENTS	-	56550	-	8870	-	-	-	-				
Total PAHs	94000	1982000	U	2530000	U	U	U	U				
pentachlorophenol	U	U	U	100000	U	U	U	U				
dibenzofuran	U	98000	U	160000	U	U	U	U				
2-methylnaphthalene	11000	160000	U	150000	U	U	U	U				
Total tetrachlorofurans	U	U	U	U	U	U	U	U				
pentachlorofurans	U	U	U	U	U	U	U	U				
hexachlorofurans	3	U	U	9.1	11	0.11	U	U				
heptachlorofurans	23	0.86	1	75	69	0.75	U	U				
octachlorofurans	35	1.3	1.9	100	94	0.94	U	U				
Total tetrachlorodioxins	U	U	U	U	U	U	U	U				
2,3,7,8-tetrachlorodioxin	U	U	U	U	U	U	U	U				
pentachlorodioxins	U	U	U	U	U	U	U	U				
hexachlorodioxins	0.49	U	U	4.7	7.3	0.055	U	U				
heptachlorodioxins	37	2.5	3.1	200	200	2.4	0.08	U				
octachlorodioxins	190	11	27	600	610	11	4.1	U				

U - Undetected (Detection limit unknown)
NA - Not Analyzed

Appendix A (cont.): Subsurface Soil Sample Results from Previous Investigations at the American Creosote Site												
Location/Station #	WC1	WC2	C3	C4	C5	C6	C7	C8	WA1	A2	A3	A4
Depth	11.3 ft	9 ft	10 ft	9 ft	14.5 ft	12 ft	12.9 ft	10.5 ft	9 ft	3.5 ft	3 ft	3 ft
Analyte (ug/kg)												
acenaphthene	U	U	U	160000	U	U	U	U	99000	1300000	U	U
fluoranthene	U	U	U	210000	U	U	U	U	80000	3000000	7200	6400
naphthalene	U	U	U	900000	U	U	U	U	580000	940000	U	U
benzo(a)anthracene	U	U	U	35000	U	U	U	U	14000	430000	U	U
benzo(a)pyrene	U	U	U	13000	U	U	U	U	6300	120000	U	U
benzo(b)fluoranthrene	U	U	U	16000	U	U	U	U	8600	210000	U	U
benzo(k)fluoranthrene	U	U	U	U	U	U	U	U	U	U	U	U
chrysene	U	U	U	30000	U	U	U	U	13000	400000	U	U
acenaphthylene	U	U	U	12000	U	U	U	U	U	U	U	U
anthracene	U	U	U	87000	U	U	U	U	43000	1900000	24000	U
benzo(ghi)perylene	U	U	U	U	U	U	U	U	U	U	U	U
fluorene	U	U	U	170000	U	U	U	U	100000	1700000	U	10000
phenanthrene	U	U	U	490000	U	U	U	U	240000	6300000	10000	U
dibenzo(a,h)anthracene	U	U	U	U	U	U	U	U	U	U	U	U
indeno(1,2,3-cd)pyrene	U	U	U	U	U	U	U	U	U	U	U	U
pyrene	U	U	U	140000	U	U	U	U	59000	2000000	6500	5700
B(a)P EQUIVALENTS	-	-	-	18100	-	-	-	-	8490	188000	-	-
Total PAHs	U	U	U	2263000	U	U	U	U	1242900	1830000	47700	22100
pentachlorophenol	U	U	U	U	U	U	U	U	U	U	U	U
dibenzofuran												
2-methylnaphthalene	U	U	U	200000	U	U	U	U	140000	400000	U	U
1-methylnaphthalene	U	U	U	94000	U	U	U	U	77000	250000	U	U
2,3-dimethyl naphthalene	U	U	U	17000	U	U	U	U	14000	80000	U	U
2,6-dimethyl naphthalene	U	U	U	40000	U	U	U	U	28000	140000	U	U

U - Undetected (Detection limit unknown)

Appendix A (cont.): Sediment Sample Results from Previous Investigations at the American Creosote Site											
Location/Station #	16	18	19	23	31	37	38	21	22	24	14
Analyte (ug/kg)											
acenaphthene	U	U	U	8300	U	U	U	U	U	480000	U
fluoranthene	U	U	1700	220000	5400000	5400	U	U	U	900000	U
naphthalene	U	U	330	U	U	U	U	U	U	830000	U
benzo(a)anthracene	U	U	U	31000	820000	10000	15000	U	U	110000	U
benzo(a)pyrene	U	U	U	U	270000	15000	30000	U	U	U	U
benzo(b)fluoranthrene	U	U	730	23000	1400000	25000	33000	U	U	89000	U
benzo(k)fluoranthrene	U	U	U	U	U	13000	41000	U	U	U	U
chrysene	U	U	590	36000	1400000	14000	34000	U	U	120000	U
acenaphthylene	U	U	U	U	230000	6400	U	U	U	U	U
anthracene	U	U	U	52000	1200000	6600	U	U	U	150000	U
benzo(ghi)perylene	U	U	U	U	U	8500	18000	U	U	U	U
fluorene	U	U	U	100000	U	U	U	U	U	480000	U
phenanthrene	U	U	1100	240000	800000	U	U	U	U	1800000	U
indeno(1,2,3-cd)pyrene	U	U	U	U	U	9400	20000	U	U	U	U
pyrene	U	U	1300	150000	6400000	11000	17000	U	U	570000	U
B(a)P EQUIVALENTS	-	-	79	5760	506000	19400	39440	-	-	21100	
Total PAHs	U	U	5750	860300	17920000	124300	208000	U	U	5529000	U
pentachlorophenol	U	U	670	29000	6000000	U	U	U	U	U	U
dibenzofuran	U	U	U	79000	U	U	U	U	U	320000	U
2-methylnaphthalene	U	U	U	U	U	U	U	U	U	230000	U
Total tetrachlorofurans	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pentachlorofurans	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
hexachlorofurans	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
heptachlorofurans	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
octachlorofurans	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total tetrachlorodioxins	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8 -tetrachlorodioxins	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pentachlorodioxins	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
hexachlorodioxins	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
heptachlorodioxins	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
octachlorodioxins	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

U - Undetected (Detection limit unknown)

NA - Not Analyzed

Appendix A (cont.): Sediment Sample Results from Previous Investigations at the American Creosote Site									
Location/Station #	26	27	30	32	35	36	13	15	
Analyte (ug/kg)									
acenaphthene	U	3300	37000	U	U	U	U	U	
fluoranthene	200	2600	57000	3700	U	U	U	270	
naphthalene	U	4900	120000	U	U	U	U	U	
benzo(a)anthracene	U	890	17000	2500	U	U	U	U	
benzo(a)pyrene	U	370	28000	6000	U	U	U	U	
benzo(b)fluoranthrene	U	500	35000	12000	U	U	U	U	
benzo(k)fluoranthrene	U	460	U	U	U	U	U	U	
chrysene	U	980	20000	4000	U	U	U	U	
acenaphthylene	U	330	15000	2000	U	U	U	U	
anthracene	U	1600	18000	U	U	U	U	U	
benzo(ghi)perylene	U	U	U	5700	U	U	U	U	
fluorene	U	3200	38000	U	U	U	U	U	
phenanthrene	U	5900	76000	U	U	U	U	300	
indeno(1,2,3-cd)pyrene	U	U	U	5000	U	U	U	U	
pyrene	220	2500	60000	4200	U	U	U	240	
B(a)P EQUIVALENTS	-	545	33400	7990	-	-	-	-	
Total PAHs	420	27530	521000	45100	U	U	U	810	
pentachlorophenol	U	U	U	U	U	U	U	U	
dibenzofuran	U	2300	31000	U	U	U	U	U	
2-methylnaphthalene	U	1700	43000	U	U	U	U	U	
Total tetrachlorofurans	NA	NA	NA	NA	NA	NA	NA	NA	
pentachlorofurans	NA	NA	NA	NA	NA	NA	NA	NA	
hexachlorofurans	NA	NA	NA	NA	NA	NA	NA	NA	
heptachlorofurans	NA	NA	NA	NA	NA	NA	NA	NA	
octachlorofurans	NA	NA	NA	NA	NA	NA	NA	NA	
Total tetrachlorodioxins	NA	NA	NA	NA	NA	NA	NA	NA	
2,3,7,8 -tetrachlorodioxins	NA	NA	NA	NA	NA	NA	NA	NA	
pentachlorodioxins	NA	NA	NA	NA	NA	NA	NA	NA	
hexachlorodioxins	NA	NA	NA	NA	NA	NA	NA	NA	
heptachlorodioxins	NA	NA	NA	NA	NA	NA	NA	NA	
octachlorodioxins	NA	NA	NA	NA	NA	NA	NA	NA	
U - Undetected (Detection limit unknown)									
NA - Not Analyzed									

NA - Not Analyzed

Appendix A (cont.): Sediment Sample Results from Previous Investigations at the American Creosote Site											
Location/Station #	25	28	29	33	34	11	12	17	39	40	41
Analyte (ug/kg)											
acenaphthene	U	U	930000	U	1100000	U	U	U	U	U	U
fluoranthene	2100	550000	3100000	71000	2500000	U	U	460	U	U	2300
naphthalene	U	U	U	U	2700000	U	U	U	U	U	U
benzo(a)anthracene	1500	100000	480000	U	550000	U	U	U	U	U	540
benzo(a)pyrene	3900	35000	140000	U	270000	U	U	U	U	U	500
benzo(b)fluoranthrene	8400	130000	450000	U	590000	U	U	510	U	U	720
benzo(k)fluoranthrene	U	U	U	U	U	U	U	U	U	U	670
chrysene	3400	130000	500000	U	580000	U	U	300	U	U	900
acenaphthylene	860	U	U	U	100000	U	U	U	U	U	U
anthracene	1500	4100	410000	U	820000	U	U	U	U	U	230
benzo(ghi)perylene	2900	U	U	U	U	U	U	U	U	U	U
fluorene	U	U	670000	U	1600000	U	U	U	U	U	U
pbenanthrene	1100	47000	1700000	50000	4800000	U	U	U	U	U	310
indeno(1,2,3-cd)pyrene	2800	U	U	U	110000	U	U	U	U	U	U
pyrene	2100	470000	2200000	44000	2000000	U	U	420	U	U	1700
B(a)P EQUIVALENTS		59300	238000	-	400800	-	-	54	-	-	697
Total PAHs	30560	1466100	10580000	165000	17720000	U	U	1690	U	U	7870
pentachlorophenol	U	U	U	U	U	U	U	U	U	U	U
dibenzofuran	U	U	320000	U	U	U	U	U	U	U	U
2-methylnaphthalene	U	U	U	U	1000000	U	U	U	U	U	U
Total tetrachlorofurans	NA	NA	NA	NA	NA	NA	U	NA	U	NA	NA
pentachlorofurans	NA	NA	NA	NA	NA	NA	U	NA	U	NA	NA
hexachlorofurans	NA	NA	NA	NA	NA	NA	U	NA	U	NA	NA
heptachlorofurans	NA	NA	NA	NA	NA	NA	U	NA	1.4	NA	NA
octachlorofurans	NA	NA	NA	NA	NA	NA	U	NA	2.1	NA	NA
Total tetrachlorodioxins	NA	NA	NA	NA	NA	NA	U	NA	U	NA	NA
2,3,7,8 -tetrachlorodioxins	NA	NA	NA	NA	NA	NA	U	NA	U	NA	NA
pentachlorodioxins	NA	NA	NA	NA	NA	NA	U	NA	U	NA	NA
hexachlorodioxins	NA	NA	NA	NA	NA	NA	U	NA	U	NA	NA
heptachlorodioxins	NA	NA	NA	NA	NA	NA	0.33	NA	4.7	NA	NA
octachlorodioxins	NA	NA	NA	NA	NA	NA	2.50	NA	15	NA	NA

U - Undetected (Detection limit unknown)
NA - Not Analyzed

Appendix A (cont.): Groundwater Sample Results from Previous Investigations at the American Creosote Site						
Location/Station #	WB1	WC1	WC2	WD2	WD5	WE1
Analyte (ug/l)						
acenaphthene	6240	123	454	533	8160	U
fluoranthene	8830	U	33.0	356	10600	U
naphthalene	35100	42	90.2	7040	18300	U
benzo(a)anthracene	1310	11.3	16.6	64	1310	U
benzo(a)pyrene	356	U	U	U	313	U
benzo(b)fluoranthrene	626	U	79.0	U	515	U
benzo(k)fluoranthrene	U	U	U	U	U	U
chrysene	1280	U	72	1190	1190	U
acenaphthylene	U	U	U	U	802	U
anthracene	3750	U	U	304	3540	U
benzo(ghi)perylene	U	U	U	U	U	U
fluorene	7370	U	468	7690	U	U
phenanthrene	21800	42.4	172	960	19700	U
dibenzo(a,h)anthracene	U	U	U	U	U	U
indeno(1,2,3-cd)pyrene	U	U	U	U	U	U
pyrene	5500	U	30.6	287	7540	U
B(a)P EQUIVALENTS	563	1	10	18	515	-
Total PAHs	92162	218.7	1415.4	18424	838700	U
pentachlorophenol	U	U	U	U	U	U
2-methylnaphthalene	6430	U	12.0	859	4660	U
1-methylnaphthalene	3150	U	169	U	2520	U
2,3-dimethylnaphthalene	781	U	U	U	1880	U
2,6-dimethylnaphthalene	1050	U	U	U	2840	U

U - Undetected (Detection limit unknown)

APPENDIX B

AMERICAN CREOSOTE WORKS, INC.

SURFACE SOIL ANALYTICAL SAMPLING
RESULTS

FIELD SAMPLE NUMBER: EPA SAMPLE NUMBER: DEPTH	SS-11-SL-001 QF0170	SS-12-SL-001 QF0171	SS-13-SL-001 QF0216	SS-14-SL-001 QF0217	SS-15-SL-001 QF0218	SS-16-SL-001 QF0219	SS-17-SL-001 QF0220	SS-18-SL-001 QF0174	SS-19-SL-001 QF0221	SS-21-SL-001 QF0238										
VOA ANALYTES (40)	ug/Kg	Q	ug/Kg	Q	ug/Kg	Q	ug/Kg	Q	ug/Kg	Q										
VINYL CHLORIDE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
1,1-DICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
TRANS-1,2-DICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
1,1-DICHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
CIS-1,2-DICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
CHLOROFORM	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
1,1,1-TRICHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
CARBON TETRACHLORIDE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
BENZENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
1,2-DICHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
TRICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
BROMODICHLOROMETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
TOLUENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
TETRACHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
CHLOROBENZENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
1,1,2,2-TETRACHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
ETHYLBENZENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
BROMOFORM	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
M,P-XYLENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
O-XYLENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
PAH ANALYTES (330)	QF0170	Q	QF0171	Q	QF0216	Q	QF0217	Q	QF0218	Q	QF0219	Q	QF0220	Q	QF0174	Q	QF0221	Q	QF0240	Q
NAPHTHALENE	-	UJ	-	UJ	35.00	J	110.00	J	-	UJ	320.00	J	200.00	J	129.00	J	210.00	J	-	R
ACENAPHTHYLENE	-	UJ	-	UJ	55.00	J	280.00	J	150.00	J	200.00	J	770.00	J	-	UJ	75.00	J	-	R
ACENAPHTHENE	-	UJ	45.00	J	48.00	J	90.00	J	39.00	J	84.00	J	160.00	J	121.00	J	430.00	J	110.00	R
FLUORENE	-	UJ	54.00	J	45.00	J	83.00	J	42.00	J	2400.00	J	810.00	J	980.00	J	650.00	J	-	R
PHENANTHRENE	62.00	J	1392.00	J	270.00	J	560.00	J	190.00	J	5300.00	J	3800.00	J	3355.00	J	4900.00	J	190.00	R
ANTHRACENE	-	UJ	345.00	J	110.00	J	400.00	J	2600.00	J	24000.00	J	12000.00	J	12837.00	J	370.00	J	80.00	R
FLUORANTHENE	441.00	J	23146.00	J	640.00	J	1000.00	J	1400.00	J	2500.00	J	17000.00	J	20307.00	J	7000.00	J	770.00	R
PYRENE	394.00	J	45648.00	J	680.00	J	1100.00	J	1900.00	J	3100.00	J	17000.00	J	42183.00	J	4900.00	J	860.00	R
BENZ(A)ANTHRACENE	142.00	J	28973.00	J	470.00	J	2600.00	J	2200.00	J	1700.00	J	9700.00	J	17344.00	J	1500.00	J	1100.00	R
CHRYSENE	240.00	J	29904.00	J	-	UJ	1300.00	J	1400.00	J	1800.00	J	14000.00	J	24151.00	J	2000.00	J	1200.00	R
BENZO(B)/(K)FLUORANTHENE	383.00	J	29712.00	J	1600.00	J	5100.00	J	3700.00	J	5200.00	J	19000.00	J	47469.00	J	2300.00	J	2300.00	R
BENZO(A)PYRENE	102.00	J	17026.00	J	450.00	J	2100.00	J	1400.00	J	1800.00	J	7800.00	J	13772.00	J	710.00	J	1600.00	R
INDENO(1,2,3-CD)PYRENE	96.00	J	6849.00	J	200.00	J	3100.00	J	1900.00	J	2200.00	J	7700.00	J	11858.00	J	590.00	J	1200.00	R
DIBENZ(A,H)ANTHRACENE	-	UJ	3754.00	J	-	UJ	1300.00	J	710.00	J	960.00	J	3400.00	J	5285.00	J	230.00	J	240.00	R
BENZO(G,H,I)PERYLENE	154.00	J	5255.00	J	310.00	J	3000.00	J	1900.00	J	2100.00	J	7400.00	J	9151.00	J	500.00	J	650.00	R
B(A)P Equivalence Conc.	167		27632		677		4493		2904		3688		14980		26966		1399		2312	
Total PAHs	2014		192103		4913		22123		19531		53664		120740		208942		26365		10300	
PHENOL ANALYTES (1700)	QF0170	Q	QF0171	Q	QF0216RE	Q	QF0217RE	Q	QF0218RE	Q	QF0219RE	Q	QF0220RE	Q	QF0174	Q	QF0221	Q	QF0238RE	Q
PHENOL	-	UJ	-	UJ	640.00	J	620.00	J	710.00	J	700.00	J	700.00	J	-	UJ	-	UJ	-	UJ
2-CHLOROPHENOL	-	UJ	-	UJ	150.00	J	150.00	J	150.00	J	190.00	J	140.00	J	-	UJ	-	UJ	-	UJ
O-CRESOL	0.04	J	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
M/P-CRESOL	-	UJ	-	UJ	-	UJ	-	UJ	130.00	J	120.00	J	110.00	J	-	UJ	230.00	J	710.00	J
2-NITROPHENOL	-	UJ	-	UJ	-	UJ	-	UJ	130.00	J	-	UJ	90.00	J	-	UJ	-	UJ	-	UJ
2,4-DIMETHYLPHENOL	6.30	J	0.77	J	102.00	J	90.00	J	97.00	J	150.00	J	110.00	J	0.22	J	-	UJ	-	UJ
2,4-DICHLOROPHENOL	-	UJ	-	UJ	-	UJ	-	UJ	51.00	J	-	UJ	-	UJ	-	UJ	500.00	J	720.00	J
4-CHLORO-3-METHYLPHENOL	-	UJ	-	UJ	41.00	J	110.00	J	-	UJ	110.00	J	73.00	J	-	UJ	-	UJ	-	UJ
2,4,5/6-TRICHLOROPHENOL	-	UJ	-	UJ	-	UJ	56.00	J	50.00	J	47.00	J	240.00	J	-	UJ	-	UJ	-	UJ
2,4-DINITROPHENOL	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
4-NITROPHENOL	-	UJ	-	UJ	66.00	J	57.00	J	60.00	J	73.00	J	74.00	J	-	UJ	-	UJ	-	UJ
2,3,4,6-TETRACHLOROPHENOL	0.12	J	0.04	J	-	UJ	51.00	J	-	UJ	110.00	J	180.00	J	0.28	J	1900.00	J	710.00	J
4,6-DINITRO-2-METHYLPHENOL	-	UJ	-	UJ	52.00	J	44.00	J	61.00	J	47.00	J	46.00	J	-	UJ	-	UJ	70.00	J
PENTACHLOROPHENOL	0.27	J	0.30	J	200.00	J	1400.00	J	320.00	J	2300.00	J	2100.00	J	8.60	J	1400.00	J	-	UJ

FIELD SAMPLE NUMBER: EPA SAMPLE NUMBER: DEPTH	SS-01-SL-001 QF0175	SS-02-SL-001 QF0173	SS-03-SL-001 QF0176	SS-04-SL-001 QF0177	SS-05-SL-001 QF0213	SS-06-SL-001 QF0222	SS-07-SL-001 QF0182	SS-08-SL-001 QF0178	SS-09-SL-001 QF0179	SS-10-SL-001 QF0169										
VOA ANALYTES (40)	µg/Kg	Q	µg/Kg	Q	µg/Kg	Q	µg/Kg	Q	µg/Kg	Q										
VINYL CHLORIDE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
1,1-DICHLOROETHENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
TRANS-1,2-DICHLOROETHENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
1,1-DICHLOROETHANE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
CIS-1,2-DICHLOROETHENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
CHLOROFORM	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
1,1,1-TRICHLOROETHANE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
CARBON TETRACHLORIDE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
BENZENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
1,2-DICHLOROETHANE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
TRICHLOROETHENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
BROMODICHLOROMETHANE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
TOLUENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
TETRACHLOROETHENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
CHLOROBENZENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
1,1,2,2-TETRACHLOROETHANE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
ETHYLBENZENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
BROMOFORM	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
M,P-XYLENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
O-XYLENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ										
PAH ANALYTES (330)	QF0175RE	Q	QF0173	Q	QF0176RE	Q	QF0177RE	Q	QF0213	Q	QF0222	Q	QF0182	Q	QF0178RE	Q	QF0179RE	Q	QF0169	Q
	µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg	
NAPHTHALENE	960.00	J	163.00	J	310.00	J	76.00	J	650.00	J	31.00	J	188.00	J	290.00	J	200.00	J	41.00	J
ACENAPHTHYLENE	1200.00	J	UJ	UJ	670.00	J	2000.00	J	700.00	J	95.00	J	615.00	J	110.00	J	140.00	J	UJ	UJ
ACENAPHTHENE	570.00	J	687.00	J	1700.00	J	1500.00	J	630.00	J	49.00	J	910.00	J	120.00	J	240.00	J	UJ	UJ
FLUORENE	690.00	J	1092.00	J	1100.00	J	6700.00	J	2300.00	J	38.00	J	2160.00	J	120.00	J	510.00	J	UJ	UJ
PHENANTHRENE	7600.00	J	3316.00	J	6300.00	J	13000.00	J	9200.00	J	300.00	J	UJ	UJ	1300.00	J	1700.00	J	92.00	J
ANTHRACENE	4600.00	J	27440.00	J	6700.00	J	5300.00	J	20000.00	J	450.00	J	UJ	UJ	1200.00	J	29000.00	J	UJ	UJ
FLUORANTHENE	24000.00	J	30846.00	J	UJ	UJ	16000.00	J	15000.00	J	1200.00	J	UJ	UJ	3500.00	J	32000.00	J	202.00	J
PYRENE	24000.00	J	28631.00	J	UJ	UJ	16000.00	J	16000.00	J	1300.00	J	UJ	UJ	4500.00	J	55000.00	J	215.00	J
BENZ(A)ANTHRACENE	23000.00	J	13094.00	J	UJ	UJ	950.00	J	10000.00	J	1400.00	J	UJ	UJ	4200.00	J	14000.00	J	161.00	J
CHRYSENE	16000.00	J	14948.00	J	37000.00	J	730.00	J	7600.00	J	840.00	J	41755.00	J	3100.00	J	13000.00	J	247.00	J
BENZO(B)/(K)FLUORANTHENE	UJ	UJ	19278.00	J	UJ	UJ	1700.00	J	19000.00	J	3200.00	J	UJ	UJ	7100.00	J	16000.00	J	490.00	J
BENZO(A)PYRENE	11000.00	J	7234.00	J	24000.00	J	260.00	J	6900.00	J	1200.00	J	16099.00	J	2800.00	J	5200.00	J	109.00	J
INDENO(1,2,3-CD)PYRENE	UJ	UJ	4531.00	J	8800.00	J	720.00	J	8200.00	J	1500.00	J	UJ	UJ	3400.00	J	3900.00	J	188.00	J
DIBENZ(A,H)ANTHRACENE	16000.00	J	1845.00	J	4400.00	J	260.00	J	3400.00	J	610.00	J	10193.00	J	1300.00	J	1600.00	J	UJ	UJ
BENZO(G,H,I)PERYLENE	15000.00	J	3917.00	J	7600.00	J	750.00	J	7000.00	J	1500.00	J	7360.00	J	2900.00	J	3000.00	J	299.00	J
B(A)P Equivalence Conc.	29460		12919		29650		864		14096		2428		26710		5601		10320		195	
Total PAHs	144620		157022		98580		65946		126580		13713		79280		35940		175490		2044	
PHENOL ANALYTES (1700)	QF0175	Q	QF0173	Q	QF0176	Q	QF0177	Q	QF0213RE	Q	QF0222	Q	QF0182RE	Q	QF0178	Q	QF0179	Q	QF0169	Q
	µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg	
PHENOL	UJ	UJ	UJ	UJ	UJ	UJ	0.06	J	480.00	J	UJ	UJ	40.00	J	UJ	UJ	UJ	UJ	UJ	UJ
2-CHLOROPHENOL	0.33	J	UJ	UJ	UJ	UJ	UJ	J	96.00	J	UJ	UJ	130.00	J	UJ	UJ	UJ	UJ	UJ	UJ
O-CRESOL	0.01	R	0.08	J	UJ	UJ	UJ	J	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
M/P-CRESOL	UJ	UJ	UJ	UJ	UJ	UJ	0.13	J	UJ	UJ	220.00	J	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
2-NITROPHENOL	UJ	UJ	UJ	UJ	UJ	UJ	UJ	J	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
2,4-DIMETHYLPHENOL	0.13	R	4.40	J	0.07	R	0.06	R	70.00	J	UJ	UJ	UJ	UJ	0.07	R	0.25	R	0.44	J
2,4-DICHLOROPHENOL	UJ	UJ	UJ	UJ	UJ	UJ	UJ	J	84.00	J	UJ	UJ	460.00	J	UJ	UJ	UJ	UJ	UJ	UJ
4-CHLORO-3-METHYLPHENOL	UJ	UJ	UJ	UJ	UJ	UJ	UJ	J	97.00	J	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
2,4,5/6-TRICHLOROPHENOL	UJ	UJ	UJ	UJ	UJ	UJ	0.14	J	68.00	J	300.00	J	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
2,4-DINITROPHENOL	UJ	UJ	UJ	UJ	UJ	UJ	0.83	J	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
4-NITROPHENOL	UJ	UJ	UJ	UJ	UJ	UJ	0.56	J	83.00	J	UJ	UJ	56.00	J	UJ	UJ	UJ	UJ	UJ	UJ
2,3,4,6-TETRACHLOROPHENOL	0.33	J	0.12	J	1.30	J	3.00	J	30.00	J	UJ	UJ	450.00	J	1.00	J	1.00	J	0.12	J
4,6-DINITRO-2-METHYLPHENOL	UJ	UJ	UJ	UJ	0.21	R	0.98	J	71.00	J	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
PENTACHLOROPHENOL	0.76	R	0.21	J	29.00	J	5.00	J	2100.00	J	250.00	J	890.00	J	0.23	J	1.60	R	0.19	J

FIELD SAMPLE NUMBER: EPA SAMPLE NUMBER: DEPTH (ft)	SS5-SS-001 SF 2490	SS5-SS-002 SF 2491	SS5-SS-003 SF 2492	MW2-SS-001 SF 2507	MW2-SS-002 SF 2516	MW2A-SS-002 SF 2475DL	BH9-SS-001 SF 2514
VOAs	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
DILUTION FACTOR	1.00	1.00	1.00	1.00	1.00	10.00	1.00
BENZENE	0.20 U	0.10 U	0.10 U	0.17 U	0.17 U	1.60 UD	0.16 U
CHLOROBENZENE	0.20 U	0.20 U	0.20 U	0.21 U	0.21 U	1.90 UD	0.19 U
1,2-DICHLOROBENZENE	0.30 U	0.30 U	0.30 U	0.34 U	0.34 U	3.20 UD	0.32 U
1,3-DICHLOROBENZENE	0.20 U	0.20 U	0.20 U	0.27 U	0.25 U	2.50 UD	0.26 U
1,4-DICHLOROBENZENE	0.20 U	0.20 U	0.20 U	0.25 U	0.25 U	2.30 UD	0.23 U
ETHYL BENZENE	0.10 U	0.10 U	0.10 U	0.11 U	0.10 U	4.40 D	0.09 U
TOLUENE	0.10 U	0.10 U	0.10 U	0.13 U	0.13 U	4.10 D	0.12 U
XYLENES	0.30 U	0.30 U	0.30 U	0.36 U	0.35 U	29.40 D	0.33 U
EPA SAMPLE NUMBER:	SF 2490	SF 2491	SF 2492	SF 2507	SF 2516	SF 2475	SF 2514
PHENOLS	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
DILUTION FACTOR	0.167	0.167	0.167	0.167	0.167	0.167	0.167
PHENOLS	42.90 U	42.50 U	42.60 U	49.00 U	48.00 U	45.10 U	46.00 U
2-METHYL PHENOL	19.70 U	19.50 U	19.60 U	22.00 U	22.00 U	20.70 U	21.00 U
3-METHYL PHENOL	19.70 U	19.50 U	19.60 U	22.00 U	22.00 U	20.70 U	21.00 U
4-METHYL PHENOL	19.70 U	19.50 U	19.60 U	22.00 U	22.00 U	20.70 U	21.00 U
2,4-DIMETHYL PHENOL	12.70 U	12.60 U	12.70 U	14.00 U	14.00 U	13.40 U	14.00 U
2-CHLORO PHENOL	11.60 U	11.50 U	11.50 U	13.00 U	13.00 U	12.20 U	12.00 U
2,4-DICHLORO PHENOL	12.70 U	12.60 U	12.70 U	14.00 U	14.00 U	13.40 U	14.00 U
4-CHLORO-3-METHYL PHENOL	34.80 U	34.40 U	34.50 U	39.00 U	39.00 U	36.50 U	37.00 U
2,4-DINITROPHENOL	19.70 U	19.50 U	19.60 U	22.00 U	22.00 U	20.70 U	21.00 U
2-NITROPHENOL	15.10 U	14.90 U	15.00 U	17.00 U	17.00 U	15.80 U	16.00 U
2,4,6-TRICHLOROPHENOL	11.60 U	11.50 U	11.50 U	13.00 U	13.00 U	12.20 U	12.00 U
4,6-DINITRO-2-METHYL PHENOL	19.70 U	19.50 U	19.60 U	22.00 U	22.00 U	20.70 U	21.00 U
4-NITROPHENOL	13.90 U	13.80 U	13.80 U	16.00 U	16.00 U	14.60 U	15.00 U
PENTACHLOROPHENOL	11.60 U	11.50 U	11.50 U	13.00 U	13.00 U	12.20 U	12.00 U
EPA SAMPLE NUMBER:	SF 2490DL	SF 2491DL	SF 2492DL	SF 2507DL	SF 2516	SF 2475DL	SF 2514
PAHS	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
DILUTION FACTOR	400.00	400.00	200.00	10.00	1.00	100.00	1.00
ACENAPHTHENE	6234.10 D	4845.00 D	4951.00 D	1680.00 D	3.30 U	3812.40 D	12.70 P
ACENAPHTHYLENE	6952.50 DU	6888.60 DU	3452.20 DU	197.00 DU	19.60 U	1827.00 DU	18.50 U
ANTHRACENE	3997.70 D	10792.20 D	37497.00 D	2520.00 D	26.00 P	803.90 D	50.90 P
BENZO(A)ANTHRACENE	4797.20 D	6755.50 D	3201.00 D	500.00 D	12.30	814.90 D	50.30 P
BENZO(A)PYRENE	8088.10 D	7590.10 D	4998.00 D	127.00 D	22.10	421.40 D	60.00 P
BENZO(B)FLUORANTHENE	7439.20 D	10420.20 D	6523.00 D	161.00 D	25.00 P	408.00 D	59.20 P
BENZO(G,H,I)PERYLENE	3951.30 D	6819.70 D	2612.00 D	19.70 DU	6.10 P	182.70 DU	29.40 P
BENZO(K)FLUORANTHENE	3592.10 D	6842.70 D	4566.00 D	117.00 D	17.60 P	281.40 D	59.20 P
CHRYSENE	3661.60 D	471.90 D	2196.00 D	354.00 D	5.90	601.70 D	31.80 P
DIBENZO(A,H)ANTHRACENE	6208.00 D	6370.00 D	3401.00 D	65.80 DU	15.40	609.00 DU	60.90 P
FLUORANTHENE	8377.80 D	7182.50 D	6301.00 D	2200.00 D	31.90 P	3739.30 D	113.00 P
FLUORENE	7960.60 D	5970.10 D	6114.00 D	7490.00 D	24.70	12302.10 D	65.30 P
INDENO(1,2,3-CD)PYRENE	6767.10 D	6808.30 D	4757.00 D	19.70 DU	22.10	182.70 DU	39.40 P
NAPHTHALENE	6952.50 DU	6888.60 DU	3452.20 DU	3830.00 D	19.60 U	5213.20 D	18.50 U
PHENANTHRENE	3997.70 D	10792.20 D	37497.00 D	2520.00 D	26.00 P	803.90 D	50.90 P
PYRENE	5110.10 D	4292.80 D	5895.00 D	792.00 D	6.50 U	1012.20 D	92.30 P
Total PAHs	80182.60	95953.20	130509.00	22291.00	235.10	30214.40	775.30
B(A)P Equivalence Conc.	16592.28	17047.49	10325.66	208.34	45.26	577.85	142.03

APPENDIX C

AMERICAN CREOSOTE WORKS, INC.

**SEDIMENT AND SURFACE WATER ANALYTICAL
RESULTS**

FIELD SAMPLE NUMBER: EPA SAMPLE NUMBER: DEPTH (ft)	SD3-SD-001 SF 2451	SD3-SD-002 SF 2452	SD3-SD-003 SF 2453	SW8-SD-001 SF 2499	SW3-SW-001 SF 2454	SW3-SW-002 SF 2455
VOAs	µg/Kg	µg/Kg	µg/Kg	µg/L	µg/L	µg/L
DILUTION FACTOR	1.00	1.00	1.00	1.00	1.00	1.00
BENZENE	0.20 U	0.20 U	0.20 U	0.13 U	0.13 U	0.13 U
CHLOROBENZENE	0.20 U	0.20 U	0.20 U	0.16 U	0.16 U	0.16 U
1,2-DICHLOROBENZENE	0.40 U	0.30 U	0.40 U	0.26 U	0.26 U	0.26 U
1,3-DICHLOROBENZENE	0.30 U	0.30 U	0.30 U	0.21 U	0.21 U	0.21 U
1,4-DICHLOROBENZENE	0.30 U	0.20 U	0.30 U	0.19 U	0.19 U	0.19 U
ETHYL BENZENE	0.10 U	0.10 U	1.10	0.08 U	0.08 U	0.08 U
TOLUENE	0.10 U	0.10 U	0.80	0.10 U	0.10 U	0.10 U
XYLENES	0.40 U	0.30 U	2.70	0.27 U	0.27 U	0.27 U
EPA SAMPLE NUMBER:	SF 2451	SF 2452	SF 2453	SF 2499	SF 2454	SF 2455
PHENOLS	µg/Kg	µg/Kg	µg/Kg	µg/L	µg/L	µg/L
DILUTION FACTOR	0.167	0.167	0.167	0.001	0.001	0.001
PHENOLS	51.70 U	47.00 U	53.60 U	2.20 U	2.20 U	2.20 U
2-METHYL PHENOL	23.70 U	21.60 U	24.60 U	1.00 U	1.00 U	1.00 U
3-METHYL PHENOL	23.70 U	21.60 U	24.60 U	1.00 U	1.00 U	1.00 U
4-METHYL PHENOL	23.70 U	21.60 U	24.60 U	1.00 U	1.00 U	1.00 U
2,4-DIMETHYL PHENOL	15.40 U	14.00 U	15.90 U	0.63 U	0.63 U	0.63 U
2-CHLORO PHENOL	14.00 U	12.70 U	14.50 U	0.58 U	0.58 U	0.58 U
2,4-DICHLORO PHENOL	23.70 U	14.00 U	15.90 U	0.68 U	0.68 U	0.68 U
4-CHLORO-3-METHYL PHENOL	41.90 U	38.10 U	43.50 U	1.80 U	1.80 U	1.80 U
2,4-DINITROPHENOL	23.70 U	21.60 U	24.60 U	1.00 U	1.00 U	1.00 U
2-NITROPHENOL	18.20 U	16.50 U	18.80 U	0.77 U	0.77 U	0.77 U
2,4,6-TRICHLOROPHENOL	14.00 U	12.70 U	14.50 U	0.58 U	0.58 U	0.58 U
4,6-DINITRO-2-METHYL PHENOL	23.70 U	21.60 U	24.60 U	1.00 U	1.00 U	1.00 U
4-NITROPHENOL	16.80 U	15.20 U	17.40 U	0.70 U	0.70 U	0.70 U
PENTACHLOROPHENOL	14.00 U	12.70 U	14.50 U	0.59 U	0.59 U	0.59 U
EPA SAMPLE NUMBER:	SF 2451DL	SF 2452DL	SF 2453DL	SF 2499	SF 2454	SF 2455
PAHS	µg/Kg	µg/Kg	µg/Kg	µg/L	µg/L	µg/L
DILUTION FACTOR	20.00	20.00	20.00	1.00	1.00	1.00
ACENAPHTHENE	199.70 D	525.40 D	320.30 D	0.900	0.075 U	0.075 U
ACENAPHTHYLENE	419.00 DU	380.70 DU	434.80 DU	0.450 U	0.450 U	0.450 U
ANTHRACENE	68.20 D	60.70 D	76.80 D	0.060	0.030 U	0.030 U
BENZO(A)ANTHRACENE	255.60 D	145.90 D	337.70 D	0.720	0.045 U	0.045 U
BENZO(A)PYRENE	173.20 D	11.20 D	184.10 D	0.075 U	0.075 U	0.075 U
BENZO(B)FLUORANTHENE	166.20 D	132.00 D	147.80 D	0.045 U	0.045 U	0.045 U
BENZO(G,H,I)PERYLENE	69.40 D	38.10 DU	110.90 D	0.045 U	0.045 U	0.045 U
BENZO(K)FLUORANTHENE	137.80 D	126.90 DU	140.00 D	0.150 U	0.150 U	0.150 U
CHRYSENE	41.90 DU	165.00 D	43.50 DU	0.045 U	0.045 U	0.045 U
DIBENZO(A,H)ANTHRACENE	183.00 D	126.90 DU	82.20 D	0.150 U	0.150 U	0.150 U
FLUORANTHENE	821.20 D	538.10 D	566.70 D	1.910	0.150 U	0.150 U
FLUORENE	571.20 D	318.50 D	1031.90 D	0.578	0.075 U	0.075 U
INDENO(1,2,3-CD)PYRENE	111.70 D	38.10 DU	118.30 D	0.045 U	0.045 U	0.045 U
NAPHTHALENE	419.00 DU	380.70 DU	434.80 DU	1.200	0.450 U	0.450 U
PHENANTHRENE	68.20 D	60.70 D	76.80 D	0.060	0.030 U	0.030 U
PYRENE	340.80 D	218.30 D	194.20 D	0.150 U	0.150 U	0.150 U
Total PAHs	3166.20	2175.80	3387.70	5.43	0.00	0.00
B(A)P Equivalence Conc.	423.33	40.64	340.68	0.07	0.00	0.00

FIELD SAMPLE NUMBER: EPA SAMPLE NUMBER: DEPTH (ft)	SW8-SD-001 SF 2500	SW3-SW-001 SF 2471	SW3-SW-002 SF 2472	SD3-SD-001 SF 2459	SD3-SD-002 SF 2460	SD3-SD-003 SF 2461
METALS	µg/L	µg/L	µg/L	mg/Kg	mg/Kg	mg/Kg
ALUMINUM	321.00	340.00	2610.00	1150.00	2030.00	1480.00
ANTIMONY	49.00 U	50.00 B	49.00 U	10.00 U	9.40 U	11.30 U
ARSENIC	84.00 U	84.00 U	84.00 U	24.00 B	20.50 B	19.40 U
BARIUM	90.00 B	82.00 B	94.00 B	224.00	4480.00	408.00
BERYLLIUM	2.00 B	2.00 B	2.00 B	0.61 B	0.58 B	0.69 B
CADMIUM	4.00 U	4.00 U	4.00 U	0.81 U	0.96	0.92 U
CALCIUM	70800.00	49200.00	51600.00	2760.00	41200.00	3010.00
CHROMIUM	6.00 B	8.00 B	11.00	4.30	7.10	4.40
COBALT	9.00 U	9.00 U	9.00 U	2.00 B	3.10 B	2.50 B
COPPER	3.00 B	8.00 B	4.00 B	3.10 B	3.10 B	2.80 B
IRON	1220.00	743.00	1440.00	2450.00	10600.00	2210.00
LEAD	50.00 U	50.00 U	50.00 U	18.90 B	27.10 B	11.50 U
MAGNESIUM	4360.00 B	2300.00 B	2390.00 B	103.00 B	337.00 B	185.00 B
MANGANESE	208.00	102.00	110.00	52.70	221.00	34.10
NICKEL	10.00 U	10.00 U	10.00 U	5.30 B	4.20 B	3.50 B
POTASSIUM	2220.00 B	1760.00 B	2580.00 B	69.20 B	97.70 B	68.50 B
SELENIUM	143.00 B	126.00 B	105.00 B	22.20 B	30.70 B	21.20 U
SILVER	3.00 U	3.00 U	3.00 U	0.61 U	0.58 U	0.69 U
SODIUM	20100.00	7050.00	7600.00	88.90 B	373.00 B	98.60 B
THALLIUM	181.00 B	152.00 B	239.00 B	98.80	125.00	117.00
VANADIUM	7.00 B	6.00 U	6.00 B	4.50 B	6.70 B	5.80 B
ZINC	49.00	42.00	44.00	26.00	37.40	20.10
MOLYBDENUM	50.00 U	50.00 U	50.00 U	10.20 U	9.60 U	11.50 U
PHOSPHORUS	141.00 B	83.00 B	150.00	83.00	136.00	63.60
STRONTIUM	485.00	276.00	306.00	13.20	247.00	24.40
EPA SAMPLE NUMBER:				SF 2468	SF 2469	SF 2470
DIOXINS				µg/Kg	µg/Kg	µg/Kg
2378-TCDD				U	U	U
2378-TCDF				U	U	U
12378-PeCDF				U	U	U
12378-PeCDD				U	U	U
23478-PeCDF				U	U	0.3470
123478-HxCDF				U	U	U
123678-HxCDF				U	U	U
123478-HxCDD				U	U	U
123678-HxCDD				U	U	U
123789-HxCDD				U	U	U
234678-HxCDF				U	U	U
123789-HxCDF				U	U	U
1234678-HpCDF				0.1072 J	0.3263 J	0.3896 J
1234678-HpCDD				0.4359 J	0.3263 J	2.0837 J
1234789-HpCDD				U	U	U
OCDD				5.3465 J	3.8824 J	22.4049 J
OCDF				0.4081 J	0.2827 J	1.9734 J
TCDD Equivalence				0.0100	0.0100	0.0800

FIELD SAMPLE NUMBER: EPA SAMPLE NUMBER: DEPTH	SD-01-SD-001 QF0180	SD-02-SD-001 QF0181	SD-03-SD-001 QF0193	SD-04-SD-001 QF0188	SD-05-SD-001 QF0189	SD-07-SD-001 QF0190	SD-08-SD-001 QF0223	SD-09-SD-001 QF0227	SD-10-SD-001 QF0228									
VOA ANALYTES (40)	µg/Kg	Q	µg/Kg	Q	µg/Kg	Q	µg/Kg	Q	µg/Kg	Q	µg/Kg	Q	µg/Kg	Q	µg/Kg	Q	µg/Kg	Q
VINYL CHLORIDE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
1,1-DICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
TRANS-1,2-DICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
1,1-DICHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
CIS-1,2-DICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
CHLOROFORM	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
1,1,1-TRICHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
CARBON TETRACHLORIDE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
BENZENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
1,2-DICHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
TRICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
BROMODICHLOROMETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
TOLUENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
TETRACHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
CHLOROBENZENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
1,1,2,2-TETRACHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
ETHYLBENZENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
BROMOFORM	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
M,P-XYLENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
O-XYLENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
PAH ANALYTES (330)	QF0180 µg/Kg	Q	QF0181 µg/Kg	Q	QF0193RE µg/Kg	Q	QF0188 µg/Kg	Q	QF0189 µg/Kg	Q	QF0190 µg/Kg	Q	QF0223 µg/Kg	Q	QF0230 µg/Kg	Q	QF0229 µg/Kg	Q
NAPHTHALENE	-	UJ	26.00	J	270.00	J	54.00	J	-	UJ	77.00	J	38.00	J	-	R	-	R
ACENAPHTHYLENE	-	UJ	-	UJ	52.00	J	-	J	-	UJ	160.00	J	72.00	J	-	R	-	R
ACENAPHTHENE	-	UJ	78.00	J	460.00	J	500.00	J	-	UJ	1100.00	J	530.00	J	-	R	-	R
FLUORENE	-	UJ	82.00	J	570.00	J	420.00	J	-	UJ	1200.00	J	630.00	J	-	R	48.00	R
PHENANTHRENE	-	UJ	282.00	J	1700.00	J	120.00	J	-	UJ	2600.00	J	780.00	J	74.00	R	230.00	R
ANTHRACENE	-	UJ	27.00	J	270.00	J	74.00	J	-	UJ	770.00	J	290.00	J	-	R	-	R
FLUORANTHENE	-	UJ	247.00	J	1700.00	J	1900.00	J	-	UJ	4300.00	J	3000.00	J	160.00	R	490.00	R
PYRENE	-	UJ	239.00	J	1500.00	J	3000.00	J	-	UJ	4000.00	J	2500.00	J	190.00	R	590.00	R
BENZ(A)ANTHRACENE	-	UJ	159.00	J	450.00	J	1300.00	J	-	UJ	1800.00	J	1000.00	J	270.00	R	520.00	R
CHRYSENE	-	UJ	136.00	J	480.00	J	1300.00	J	-	UJ	1800.00	J	770.00	J	280.00	R	560.00	R
BENZO(B)/(K)FLUORANTHENE	-	UJ	384.00	J	670.00	J	2100.00	J	-	UJ	3000.00	J	1600.00	J	590.00	R	990.00	R
BENZO(A)PYRENE	-	UJ	151.00	J	370.00	J	820.00	J	-	UJ	1600.00	J	630.00	J	660.00	R	700.00	R
INDENO(1,2,3-CD)PYRENE	-	UJ	102.00	J	250.00	J	560.00	J	-	UJ	1200.00	J	530.00	J	360.00	R	650.00	R
DIBENZ(A,H)ANTHRACENE	-	UJ	-	UJ	68.00	J	320.00	J	-	UJ	4600.00	J	110.00	J	-	R	130.00	R
BENZO(G,H,I)PERYLENE	-	UJ	133.00	J	230.00	J	460.00	J	-	UJ	1000.00	J	370.00	J	310.00	R	600.00	R
B(A)P Equivalence Conc.	0		217		580		1549		0		6818		1061		785		1052	
Total PAHs	0		2046		9040		12928		0		29207		12850		2894		5508	
PHENOL ANALYTES (1700)	QF0180RE µg/Kg	Q	QF0181RE µg/Kg	Q	QF0193 µg/Kg	Q	QF0188 µg/Kg	Q	QF0189 µg/Kg	Q	QF0190 µg/Kg	Q	QF0223 µg/Kg	Q	QF0227RE µg/Kg	Q	QF0228RE µg/Kg	Q
PHENOL	-	UJ	-	UJ	-	UJ	2.70	J	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
2-CHLOROPHENOL	170.00	J	-	UJ	60.00	J	37.00	J	-	UJ	-	UJ	1200.00	J	60.00	J	130.00	J
O-CRESOL	-	UJ	-	UJ	-	UJ	7.10	R	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
M/P-CRESOL	-	UJ	-	UJ	-	UJ	3.20	R	-	UJ	-	UJ	290.00	J	-	UJ	97.00	J
2-NITROPHENOL	-	UJ	-	UJ	65.00	R	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
2,4-DIMETHYLPHENOL	-	UJ	-	UJ	24.00	R	40.00	R	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
2,4-DICHLOROPHENOL	690.00	J	490.00	J	-	UJ	-	UJ	-	UJ	-	UJ	430.00	J	810.00	J	450.00	J
4-CHLORO-3-METHYLPHENOL	-	UJ	-	UJ	12.00	R	14.00	R	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
2,4,5/6-TRICHLOROPHENOL	-	UJ	-	UJ	3.00	R	1.70	R	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
2,4-DINITROPHENOL	-	UJ	-	UJ	32.00	R	-	R	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
4-NITROPHENOL	-	UJ	-	UJ	-	UJ	-	R	-	UJ	-	UJ	-	UJ	120.00	J	-	UJ
2,3,4,6-TETRACHLOROPHENOL	450.00	J	380.00	J	-	UJ	48.00	J	62.00	R	-	UJ	-	UJ	760.00	J	420.00	J
4,6-DINITRO-2-METHYLPHENOL	-	UJ	-	UJ	-	UJ	-	UJ	-	R	-	UJ	-	UJ	87.00	R	-	R
PENTACHLOROPHENOL	-	UJ	-	UJ	17.00	R	69.00	J	-	R	-	UJ	160.00	R	1100.00	J	-	UJ

FIELD SAMPLE NUMBER: EPA SAMPLE NUMBER: DEPTH	SW-01-SW-001 QF0184	SW-02-SW-001 QF0183	SW-03-SW-001 QF0197	SW-04-SW-001 QF0186	SW-05-SW-001 QF0187	SW-06-SW-001 QF0203	SW-08-SW-001 QF0224							
VOA ANALYTES (20)	µg/L	Q	µg/L	Q	µg/L	Q	µg/L	Q	µg/L	Q	µg/L	Q		
VINYL CHLORIDE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ		
1,1-DICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ		
TRANS-1,2-DICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ		
1,1-DICHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ		
CIS-1,2-DICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ		
CHLOROFORM	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ		
1,1,1-TRICHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ		
CARBON TETRACHLORIDE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ		
BENZENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ		
1,2-DICHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ		
TRICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ		
BROMODICHLOROMETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ		
TOLUENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ		
TETRACHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ		
CHLOROBENZENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ		
1,1,2,2-TETRACHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ		
ETHYLBENZENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ		
BROMOFORM	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ		
M,P-XYLENE	-	UJ	-	UJ	-	UJ	-	UJ	15.00	J	-	UJ		
O-XYLENE	-	UJ	-	UJ	-	UJ	-	UJ	-	-	-	UJ		
PAH ANALYTES (20)	QF0184 µg/L	Q	QF0183 µg/L	Q	QF0197 µg/L	Q	QF0186 µg/L	Q	QF0187 µg/L	Q	QF0203RE µg/L	Q	QF0224 µg/L	Q
NAPHTHALENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
ACENAPHTHYLENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
ACENAPHTHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
FLUORENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
PHENANTHRENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
ANTHRACENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
FLUORANTHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
PYRENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
BENZ(A)ANTHRACENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
CHRYSENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
BENZO(B)/(K)FLUORANTHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
BENZO(A)PYRENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
INDENO(1,2,3-CD)PYRENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
DIBENZ(A,H)ANTHRACENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
BENZO(G,H,I)PERYLENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
B(A)P Equivalence Conc.	0		0		0		0		0		0		0	
Total PAHs	0		0		0		0		0		0		0	
PHENOL ANALYTES (50)	QF0184 µg/L	Q	QF0183 µg/L	Q	QF0197 µg/L	Q	QF0186 µg/L	Q	QF0187 µg/L	Q	QF0203 µg/L	Q	QF0224 µg/L	Q
PHENOL	-	R	-	R	-	R	-	UJ	-	UJ	-	R	-	UJ
2-CHLOROPHENOL	-	R	-	R	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
O-CRESOL	-	R	-	R	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
M/P-CRESOL	-	R	-	R	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
2-NITROPHENOL	-	R	-	R	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
2,4-DIMETHYLPHENOL	-	R	-	R	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
2,4-DICHLOROPHENOL	-	R	-	R	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
4-CHLORO-3-METHYLPHENOL	-	R	-	R	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
2,4,5/6-TRICHLOROPHENOL	-	R	-	R	-	UJ	-	R	-	R	-	R	-	R
2,4-DINITROPHENOL	-	R	-	R	-	UJ	-	-	-	-	-	-	-	-
4-NITROPHENOL	-	R	-	R	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
2,3,4,6-TETRACHLOROPHENOL	-	R	-	R	-	UJ	99.00	J	140.00	J	-	UJ	-	UJ
4,6-DINITRO-2-METHYLPHENOL	-	R	-	R	-	UJ	-	-	-	-	-	UJ	-	UJ
PENTACHLOROPHENOL	-	R	-	R	68.00	J	-	UJ	-	UJ	-	UJ	-	UJ

FIELD SAMPLE NUMBER: EPA SAMPLE NUMBER: DEPTH (ft)	SD11-SD-001 SF 2907
- BNA	µg/Kg
DILUTION FACTOR	10.00
bis(2-CHLOROETHYL)ETHER	120000.00 U
1,3-DICHLOROBENZENE	120000.00 U
1,4-DICHLOROBENZENE	120000.00 U
1,2-DICHLOROBENZENE	120000.00 U
2,2'-oxybis(1-CHLOROPROPANE)	120000.00 U
N-NITROSO-DI-N-PROPYLAMINE	120000.00 U
HEXACHLOROTHANE	120000.00 U
NITROBENZENE	120000.00 U
ISOPHORONE	120000.00 U
bis(2-CHLOROETHOXY)METHANE	120000.00 U
1,2,4-TRICHLOROBENZENE	120000.00 U
NAPHTHALENE	77000.00 J
4-CHLOROANILINE	120000.00 U
HEXACHLOROBUTADIENE	120000.00 U
2-METHYLNAPHTHALENE	62000.00 J
HEXACHLOROCYCLOPENTADIENE	120000.00 U
2-CHLORONAPHTHALENE	120000.00 U
2-NITROANILINE	300000.00 U
DIMETHYLPHTHALATE	120000.00 U
ACENAPHTHYLENE	5300.00 J
3-NITROANILINE	300000.00 U
ACENAPHTHENE	76000.00 J
DIBENZOFURAN	77000.00 J
2,4-DINITROTOLUENE	120000.00 U
2,6-DINITROTOLUENE	120000.00 U
DIETHYLPHTHALATE	120000.00 U
4-CHLOROPHENYL PHENYLETHER	120000.00 U
FLUORENE	72000.00 J
4-NITROANILINE	300000.00 U
N-NITROSODIPHENYLAMINE	120000.00 U
4-BROMOPHENYL-PHENYLETHER	120000.00 U
HEXACHLOROBENZENE	120000.00 U
PHENANTHRENE	290000.00 J
ANTHRACENE	7300.00 J
CARBAZOLE	120000.00 U
DI-N-BUTYLPHTHALATE	260000.00 J
FLUORANTHENE	210000.00 J
PYRENE	120000.00 U
BUTYLBENZYLPHTHALATE	120000.00 U
3,3'-DICHLOROBENZIDINE	120000.00 U
BENZO(A)ANTHRACENE	48000.00 J
bis(2-ETHYLHEXYL)PHTHALATE	120000.00 U
CHRYSENE	53000.00 J
DI-N-OCTYLPHTHALATE	120000.00 U
BENZO(B)FLUORANTHENE	23000.00 J
BENZO(K)FLUORANTHENE	39000.00 J
BENZO(A)PYRENE	22000.00 J
INDENO(1,2,3-CD)PYRENE	120000.00 U
DIBENZO(A,H)ANTHRACENE	120000.00 U
BENZO(G,H,I)PERTYLENE	120000.00 U
Total PAHs	1217300.00
B(A)P Equivalence Conc.	33530.00

APPENDIX D

AMERICAN CREOSOTE WORKS, INC.

**SUBSURFACE SOIL ANALYTICAL SAMPLING
RESULTS**

FIELD SAMPLE NUMBER: EPA SAMPLE NUMBER: DEPTH	MM-03A-SS-001 QF0198 0-10'	MM-03A-SS-002 QF0199 15'	MM-04-SS-001 QF0209 5'	MM-04-SS-002 QF0210 15'	MM-05-SS-001 QF0211 0-10'	MM-05-SS-002 QF0212 2-5'	MM-06-SS-001 QF0207 1-10'	MM-06-SS-002 QF0208 15'	MM-07-SS-001 QF0303 0-10'	MM-07-SS-002 QF0305 19'										
VOA ANALYTES (40)	µg/Kg	Q	µg/Kg	Q	µg/Kg	Q	µg/Kg	Q	µg/Kg	Q										
VINYL CHLORIDE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
1,1-DICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
TRANS-1,2-DICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
1,1-DICHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
CIS-1,2-DICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
CHLOROFORM	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
1,1,1-TRICHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
CARBON TETRACHLORIDE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ										
BENZENE	-	UJ	-	21.00	J	180.00	J	29.00	J	24.00	J	120.00	J	790.00	J	-	UJ			
1,2-DICHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	UJ			
TRICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	UJ			
BROMODICHLOROMETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	UJ			
TOLUENE	-	UJ	-	76.00	J	630.00	J	25.00	J	18.00	J	230.00	J	1200.00	J	-	UJ			
TETRACHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	UJ			
CHLOROBENZENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	UJ			
1,1,2,2-TETRACHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	UJ			
ETHYLBENZENE	-	UJ	-	350.00	J	400.00	J	100.00	J	550.00	J	290.00	R	590.00	R	-	UJ			
BROMOFORM	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	UJ			
M,P-XYLENE	-	UJ	-	190.00	J	1100.00	J	54.00	J	-	UJ	340.00	J	1200.00	J	-	UJ			
O-XYLENE	-	UJ	-	50.00	J	610.00	J	1200.00	J	55.00	J	150.00	R	970.00	R	-	UJ			
PAH ANALYTES (330)	QF0198RE µg/Kg	Q	QF0199RE µg/Kg	Q	QF0209 µg/Kg	Q	QF0210 µg/Kg	Q	QF0211 µg/Kg	Q	QF0212 µg/Kg	Q	QF0207 µg/Kg	Q	QF0208 µg/Kg	Q	QF0304 µg/Kg	Q	QF0306 µg/Kg	Q
NAPHTHALENE	130.00	J	-	UJ	30000.0	R	120000.0	J	41000.0	J	-	UJ	260000.0	J	-	R	-	UJ	-	UJ
ACENAPHTHYLENE	9000.00	J	-	UJ	8300.0	R	28000.0	J	9200.0	J	-	UJ	19000.0	J	82000.0	R	-	UJ	-	UJ
ACENAPHTHENE	14000.00	J	-	UJ	91000.0	R	61000.0	J	170000.0	J	-	UJ	240000.0	J	-	R	-	UJ	70.00	J
FLUORENE	16000.00	J	-	UJ	300000.0	R	-	UJ	270000.0	R	120.00	J	-	UJ	75000.0	R	-	UJ	50.00	J
PHENANTHRENE	22000.00	J	-	UJ	-	R	-	UJ	40000.0	J	390.00	J	-	UJ	380000.0	R	38.00	R	110.00	J
ANTHRACENE	28000.00	J	-	UJ	-	R	-	UJ	-	UJ	120.00	J	-	UJ	-	R	-	UJ	-	UJ
FLUORANTHENE	7500.00	J	-	UJ	-	R	-	UJ	-	UJ	150.00	J	-	UJ	210000.0	R	180.00	J	80.00	J
PYRENE	12000.00	J	-	UJ	14000.0	R	23000.0	J	17000.0	J	110.00	J	22000.0	J	-	R	220.00	J	76.00	J
BENZ(A)ANTHRACENE	-	UJ	-	UJ	-	R	-	UJ	-	UJ	-	UJ	-	UJ	-	R	140.00	J	52.00	J
CHRYSENE	4000.00	J	-	UJ	96000.0	R	-	UJ	84000.0	R	-	UJ	-	UJ	19000.0	R	180.00	J	44.00	J
BENZO(B)/(K)FLUORANTHENE	1700.00	R	-	UJ	-	R	300.0	UJ	-	UJ	-	UJ	-	UJ	39000.0	R	190.00	J	50.00	J
BENZO(A)PYRENE	10000.00	J	-	UJ	26000.0	R	34000.0	J	25000.0	R	-	UJ	30000.0	R	-	R	110.00	J	-	UJ
INDENO(1,2,3-CD)PYRENE	4500.00	J	-	UJ	-	R	31000.0	J	-	UJ	-	UJ	-	UJ	23000.0	R	-	UJ	-	UJ
DIBENZ(A,H)ANTHRACENE	8200.00	J	-	UJ	26000.0	R	-	UJ	23000.0	R	-	UJ	22000.0	J	-	R	-	UJ	-	UJ
BENZO(G,H,I)PERYLENE	2700.00	J	100.00	J	-	R	25000.0	J	-	UJ	-	UJ	-	UJ	11000.0	R	-	UJ	-	UJ
B(A)P Equivalence Conc.	18860	-	0	-	52960	-	37130	-	48840	-	0	-	52000	-	6390	-	145	-	11	-
Total PAHs	139730	-	100	-	591300	-	322300	-	679200	-	890	-	1073000	-	839000	-	1058	-	532	-
PHENOL ANALYTES (1700)	QF0198 µg/Kg	Q	QF0199 µg/Kg	Q	QF0209RE µg/Kg	Q	QF0210RE µg/Kg	Q	QF0211RE µg/Kg	Q	QF0212 µg/Kg	Q	QF0207RE µg/Kg	Q	QF0208RE µg/Kg	Q	QF0303 µg/Kg	Q	QF0305 µg/Kg	Q
PHENOL	-	UJ	390.00	R	-	UJ	-	UJ	-	UJ	-	UJ	17000.0	J	-	UJ	-	R	970.00	R
2-CHLOROPHENOL	44.00	J	-	UJ	990.00	J	2000.00	J	1700.0	J	1600.00	J	1300.0	J	97000.0	J	260.00	J	280.00	J
O-CRESOL	5.00	R	-	UJ	-	UJ	2500.00	J	39.0	J	63.00	J	9300.0	J	35000.0	J	-	UJ	-	UJ
M/P-CRESOL	3.00	J	-	UJ	620.00	J	5200.00	J	700.0	J	-	UJ	26000.0	J	-	UJ	140.00	R	180.00	R
2-NITROPHENOL	-	J	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ	66.00	J
2,4-DIMETHYLPHENOL	29.00	R	-	UJ	-	UJ	9200.00	J	-	UJ	-	UJ	12000.0	J	42000.0	J	220.00	J	110.00	J
2,4-DICHLOROPHENOL	-	UJ	-	UJ	-	UJ	-	UJ	260.0	J	-	UJ	-	UJ	-	UJ	57.00	J	-	UJ
4-CHLORO-3-METHYLPHENOL	15.00	R	-	UJ	3700.00	J	210.00	J	90.0	R	-	UJ	20000.0	J	650.0	J	-	UJ	-	UJ
2,4,5/6-TRICHLOROPHENOL	3.00	R	190.00	J	100.00	J	1100.00	J	300.0	J	-	UJ	930.0	J	2000.0	J	380.00	J	220.00	J
2,4-DINITROPHENOL	35.00	R	-	UJ	1600.00	J	4500.00	R	2800.0	R	-	UJ	8900.0	R	47000.0	R	-	UJ	-	UJ
4-NITROPHENOL	8.00	R	-	UJ	1300.00	J	3700.00	J	1800.0	J	-	UJ	4900.0	J	15000.0	J	-	UJ	-	UJ
2,3,4,6-TETRACHLOROPHENOL	63.00	R	1200.00	J	2700.00	J	7000.00	R	6500.0	J	54.00	J	24000.0	J	14000.0	J	-	UJ	-	UJ
4,6-DINITRO-2-METHYLPHENOL	42.00	R	-	R	2200.00	R	5300.00	R	2700.0	R	-	UJ	13000.0	R	40000.0	R	-	UJ	-	UJ
PENTACHLOROPHENOL	2107.00	R	770.00	J	13000.00	J	14000.00	J	110000.0	J	150.00	J	450000.0	J	310000.0	J	92.00	J	-	UJ

FIELD SAMPLE NUMBER: EPA SAMPLE NUMBER: DEPTH	MW-01-SS-001 QF0293 36'	MW-01-SS-002 QF0295 51'	MW-01A-SS-001 QF0298 0-10'	MW-01A-SS-002 QF0297	MW-02-SS-001 QF0233 31-35'	MW-02-SS-002 QF0269 51'	MW-02A-SS-001 QF0205 0-10'	MW-02A-SS-002 QF0206 15'	MW-03-SS-001 QF0265 32'	MW-03-SS-002 QF0301 51'
VOA ANALYTES (40)	µg/Kg	Q	µg/Kg	Q	µg/Kg	Q	µg/Kg	Q	µg/Kg	Q
VINYL CHLORIDE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
1,1-DICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
TRANS-1,2-DICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
1,1-DICHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
CIS-1,2-DICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
CHLOROFORM	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
1,1,1-TRICHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
CARBON TETRACHLORIDE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
BENZENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
1,2-DICHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
TRICHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
BROMODICHLOROMETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
TOLUENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
TETRACHLOROETHENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
CHLOROBENZENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
1,1,2,2-TETRACHLOROETHANE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
ETHYLBENZENE	-	UJ	320.00	J	-	UJ	-	UJ	-	UJ
BROMOFORM	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
M,P-XYLENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
O-XYLENE	-	UJ	-	UJ	-	UJ	-	UJ	-	UJ
							13.00	J		
							89.00	J		

FIELD SAMPLE NUMBER: EPA SAMPLE NUMBER: DEPTH	BH-09-SS-002 QF0255 9.5'	BH-10-SS-001 QF0252 5'	BH-11-SS-001 QF0237 5'	BH-12-SS-001 QF0244 5'	BH-13-SS-001 QF0243 5'	BH-14-SS-001 QF0259 0-10'	BH-14-SS-002 QF0261 10-14.5'	BH-14-SS-003 QF0263 18-21'	BH-15-SS-001 QF0231 4-5'
VOA ANALYTES (40)	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
VINYL CHLORIDE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
1,1-DICHLOROETHENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
TRANS-1,2-DICHLOROETHENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
1,1-DICHLOROETHANE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
CIS-1,2-DICHLOROETHENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
CHLOROFORM	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
1,1,1-TRICHLOROETHANE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
CARBON TETRACHLORIDE	UJ	UJ	UJ	UJ	UJ	150.00	65.00	24.00	UJ
BENZENE	UJ	24.00	UJ	UJ	UJ	UJ	UJ	UJ	UJ
1,2-DICHLOROETHANE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
TRICHLOROETHENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
BROMODICHLOROMETHANE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
TOLUENE	9.40	270.00	UJ	UJ	UJ	410.00	81.00	32.00	UJ
TETRACHLOROETHENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
CHLOROBENZENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
1,1,2,2-TETRACHLOROETHANE	UJ	UJ	UJ	UJ	UJ	290.00	36.00	UJ	UJ
ETHYLBENZENE	39.00	550.00	UJ	UJ	UJ	UJ	UJ	UJ	UJ
BROMOFORM	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
M,P-XYLENE	100.00	1100.00	UJ	UJ	UJ	550.00	61.00	470.00	UJ
O-XYLENE	52.00	640.00	UJ	740.00	UJ	350.00	1800.00	180.00	UJ
PAA ANALYTES (330)	QF0256	QF0251	QF0258	QF0246	QF0245	QF0260	QF0262	QF0264	QF0232
	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
NAPHTHALENE	6000.00	28000.00	UJ	UJ	UJ	58000.0	2600.00	130.00	UJ
ACENAPHTHYLENE	770.00	850.00	UJ	UJ	UJ	6100.0	760.00	UJ	UJ
ACENAPHTHENE	6000.00	16000.00	UJ	UJ	UJ	64000.0	1400.00	150.00	UJ
FLUORENE	6000.00	22000.00	UJ	UJ	UJ	57000.0	2000.00	180.00	UJ
PHENANTHRENE	21000.00	38000.00	80.00	UJ	UJ	100000.0	5700.00	470.00	UJ
ANTHRACENE	3000.00	12000.00	UJ	UJ	UJ	UJ	5600.00	92.00	UJ
FLUORANTHENE	12000.00	25000.00	170.00	UJ	UJ	100000.0	2700.00	150.00	UJ
PYRENE	10000.00	19000.00	150.00	UJ	UJ	54000.0	2100.00	93.00	UJ
BENZ(A)ANTHRACENE	3000.00	5700.00	UJ	UJ	UJ	97000.0	590.00	UJ	UJ
CHRYSENE	2900.00	4900.00	UJ	UJ	UJ	330.0	640.00	UJ	UJ
BENZO(B)/(K)FLUORANTHENE	3900.00	10000.00	70.00	UJ	UJ	65000.0	6900.00	1300.00	UJ
BENZO(A)PYRENE	2100.00	2500.00	260.00	UJ	UJ	36000.0	11000.00	1100.00	UJ
INDENO(1,2,3-CD)PYRENE	1200.00	1000.00	UJ	UJ	UJ	12000.0	3200.00	230.00	UJ
DIBENZ(A,H)ANTHRACENE	240.00	300.00	UJ	UJ	UJ	UJ	690.00	780.00	UJ
BENZO(G,H,I)PERYLENE	1000.00	880.00	UJ	UJ	UJ	12000.0	3000.00	UJ	UJ
B(A)P Equivalence Conc.	3179	4519	267	0	0	53403	12765	1640	0
Total PAHs	79110	186130	730	0	0	661430	48880	4675	0
PHENOL ANALYTES (1700)	QF0255	QF0252	QF0257	QF0244RE	QF0243RE	QF0259	QF0261	QF0263	QF0231RE
	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
PHENOL	UJ	UJ	54.00	UJ	UJ	1100.0	UJ	60.00	UJ
2-CHLOROPHENOL	1300.00	750.00	UJ	200.00	150.00	3200.0	1600.00	1800.00	120.00
O-CRESOL	UJ	300.00	UJ	UJ	UJ	UJ	810.00	690.00	UJ
M/P-CRESOL	270.00	440.00	240.00	110.00	UJ	6100.0	1700.00	1000.00	UJ
2-NITROPHENOL	UJ	UJ	UJ	UJ	UJ	510.0	UJ	UJ	UJ
2,4-DIMETHYLPHENOL	UJ	1400.00	UJ	UJ	UJ	21000.0	2200.00	590.00	UJ
2,4-DICHLOROPHENOL	UJ	UJ	UJ	UJ	350.00	UJ	UJ	UJ	490.00
6-CHLORO-3-METHYLPHENOL	240.00	1400.00	UJ	UJ	UJ	UJ	5400.00	110.00	UJ
2,4,5/6-TRICHLOROPHENOL	UJ	550.00	UJ	UJ	280.00	11000.0	900.00	UJ	210.00
2,4-DINITROPHENOL	910.00	1800.00	UJ	UJ	UJ	220000.0	1900.00	870.00	UJ
4-NITROPHENOL	190.00	1300.00	UJ	UJ	UJ	820000.0	1300.00	UJ	UJ
2,3,4,6-TETRACHLOROPHENOL	1200.00	710.00	1900.00	500.00	340.00	270000.0	1600.00	1400.00	360.00
4,6-DINITRO-2-METHYLPHENOL	240.00	1600.00	UJ	UJ	UJ	170000.0	1800.00	UJ	UJ
PENTACHLOROPHENOL	820.00	1700.00	1900.00	UJ	UJ	200000.0	6800.00	740.00	UJ

FIELD SAMPLE NUMBER: EPA SAMPLE NUMBER: DEPTH	BH-01-SS-001 QF0283 1-12'	BH-01-SS-002 QF0285 20'	BH-03-SS-001 QF0291 .5-6'	BH-04-SS-001 QF0287 0-12'	BH-04-SS-002 QF0289 20'	BH-06-SS-001 QF0271 0-12'	BH-06-SS-002 QF0273 20'	BH-08-SS-001 QF0250 4'	BH-08-SS-002 QF0248 10'	BH-09-SS-001 QF0253 5'
VOA ANALYTES (40)	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
VINYL CHLORIDE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
1,1-DICHLOROETHENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
TRANS-1,2-DICHLOROETHENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
1,1-DICHLOROETHANE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
CIS-1,2-DICHLOROETHENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
CHLOROFORM	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
1,1,1-TRICHLOROETHANE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
CARBON TETRACHLORIDE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
BENZENE	240.00	130.00	63.00	220.00	4.00	7.90	53.00	100.00	100.00	100.00
1,2-DICHLOROETHANE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
TRICHLOROETHENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
BROMODICHLOROMETHANE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
TOLUENE	540.00	710.00	520.00	140.00	20.00	6.10	160.00	250.00	250.00	250.00
TETRACHLOROETHENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
CHLOROBENZENE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
1,1,2,2-TETRACHLOROETHANE	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
ETHYLBENZENE	810.00	1800.00	870.00	510.00	1400.00	14.00	96.00	130.00	130.00	130.00
BROMOFORM	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
M,P-XYLENE	760.00	1100.00	850.00	240.00	32.00	4.30	230.00	300.00	300.00	300.00
O-XYLENE	370.00	610.00	390.00	UJ	UJ	UJ	UJ	UJ	UJ	UJ
PAH ANALYTES (330)	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
NAPHTHALENE	120000.0	48000.00	4900.00	47000.00	30000.00	180.00	36000.00	38000.00	38000.00	38000.00
ACENAPHTHYLENE	UJ	1400.00	2900.00	4800.00	UJ	UJ	700.00	2100.00	2100.00	2100.00
ACENAPHTHENE	37000.0	35000.00	48000.00	48000.00	320.00	35000.00	170.00	31000.00	33000.00	33000.00
FLUORENE	51000.0	38000.00	10000.00	59000.00	270.00	34000.00	140.00	32000.00	35000.00	35000.00
PHENANTHRENE	UJ	93000.00	UJ	79000.00	420.00	44000.00	550.00	45000.00	42000.00	42000.00
ANTHRACENE	UJ	UJ	UJ	UJ	130.00	UJ	64.00	UJ	330.00	330.00
FLUORANTHENE	UJ	46000.00	740.00	77000.00	74.00	47000.00	35.00	42000.00	49000.00	49000.00
PYRENE	4700.0	41000.00	UJ	9000.00	60.00	44000.00	30.00	41000.00	47000.00	47000.00
BENZ(A)ANTHRACENE	10000.0	12000.00	21000.00	UJ	110.00	13000.00	67.00	10000.00	15000.00	15000.00
CHRYSENE	110000.0	11000.00	6700.00	18000.00	120.00	11000.00	58.00	10000.00	14000.00	14000.00
BENZO(B)/(K)FLUORANTHENE	35000.0	3900.00	1300.00	28000.00	UJ	4000.00	UJ	15000.00	22000.00	22000.00
BENZO(A)PYRENE	31000.0	3500.00	3100.00	31000.00	UJ	3400.00	UJ	3200.00	4900.00	4900.00
INDENO(1,2,3-CD)PYRENE	UJ	1000.00	UJ	UJ	UJ	1500.00	UJ	1000.00	320.00	320.00
DIBENZ(A,H)ANTHRACENE	UJ	480.00	UJ	15000.00	UJ	260.00	UJ	210.00	UJ	UJ
BENZO(G,H,I)PERYLENE	12000.0	840.00	440.00	UJ	UJ	910.00	UJ	700.00	UJ	UJ
B(A)P Equivalence Conc.	36600	5780	5397	48980	12	5620	7	6110	8772	173
Total PAHs	410700	335120	51100	415800	1504	270770	1294	267810	302650	1140
PHENOL ANALYTES (1700)	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
PHENOL	13000.0	8700.0	5500.00	UJ	UJ	1800.0	6600.00	5100.0	9100.00	990.00
2-CHLOROPHENOL	650.0	3100.0	870.00	2800.00	240.00	UJ	340.00	1700.0	3200.00	3200.00
O-CRESOL	5500.0	1800.0	1700.00	160.00	UJ	550.0	1900.00	3200.0	10000.00	200.00
M/P-CRESOL	16000.0	6000.0	5800.00	470.00	240.00	1800.0	6500.00	8900.0	UJ	UJ
2-NITROPHENOL	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
2,4-DIMETHYLPHENOL	9300.0	1300.0	5900.00	1500.00	UJ	820.0	1100.00	4500.0	3200.00	3200.00
2,4-DICHLOROPHENOL	17000.0	5100.0	7000.00	UJ	UJ	UJ	UJ	UJ	UJ	UJ
4-CHLORO-3-METHYLPHENOL	320.0	1800.0	760.00	3400.00	UJ	2600.0	UJ	3900.0	3700.00	3700.00
2,4,5/6-TRICHLOROPHENOL	800.0	10000.00	870.00	430.00	UJ	210.0	UJ	590.0	UJ	UJ
2,4-DINITROPHENOL	6600.0	540.0	7100.00	2300.00	UJ	2000.0	UJ	10000.0	9600.00	9600.00
4-NITROPHENOL	4900.0	560.0	4900.00	1400.00	UJ	1600.0	190.00	2600.0	2300.00	2300.00
2,3,4,6-TETRACHLOROPHENOL	5800.0	1500.0	13000.00	4200.00	560.00	13000.0	89.00	8200.0	4800.00	4800.00
4,6-DINITRO-2-METHYLPHENOL	13000.0	500.0	11000.00	2200.00	UJ	2400.0	92.00	6800.0	3600.00	3600.00
PENTACHLOROPHENOL	170000.0	2300.0	27000.00	17000.00	UJ	300000.0	1700.00	140000.0	83000.00	83000.00

FIELD SAMPLE NUMBER:	MW-08-SS-001	MW-08-SS-002		
EPA SAMPLE NUMBER:	QF0200	QF0201		
DEPTH	0-10'	15'		
VOA ANALYTES (40)	µg/Kg	Q	µg/Kg	Q
VINYL CHLORIDE	-	UJ	-	UJ
1,1-DICHLOROETHENE	-	UJ	-	UJ
TRANS-1,2-DICHLOROETHENE	-	UJ	-	UJ
1,1-DICHLOROETHANE	-	UJ	-	UJ
CIS-1,2-DICHLOROETHENE	-	UJ	-	UJ
CHLOROFORM	-	UJ	-	UJ
1,1,1-TRICHLOROETHANE	-	UJ	-	UJ
CARBON TETRACHLORIDE	-	UJ	-	UJ
BENZENE	-	UJ	-	UJ
1,2-DICHLOROETHANE	-	UJ	-	UJ
TRICHLOROETHENE	-	UJ	-	UJ
BROMODICHLOROMETHANE	-	UJ	-	UJ
TOLUENE	-	UJ	-	UJ
TETRACHLOROETHENE	-	UJ	-	UJ
CHLOROBENZENE	-	UJ	-	UJ
1,1,2,2-TETRACHLOROETHANE	-	UJ	-	UJ
ETHYLBENZENE	-	UJ	-	UJ
BROMOFORM	-	UJ	-	UJ
M,P-XYLENE	-	UJ	-	UJ
O-XYLENE	-	UJ	-	UJ
PAH ANALYTES (330)	QF0200RE	Q	QF0201RE	Q
	µg/Kg		µg/Kg	
NAPHTHALENE	-	UJ	-	UJ
ACENAPHTHYLENE	-	UJ	-	UJ
ACENAPHTHENE	-	UJ	-	UJ
FLUORENE	-	UJ	-	UJ
PHENANTHRENE	23.00	J	-	UJ
ANTHRACENE	-	UJ	-	UJ
FLUORANTHENE	62.00	J	-	UJ
PYRENE	91.00	J	-	UJ
BENZ(A)ANTHRACENE	-	UJ	-	UJ
CHRYSENE	65.00	J	-	UJ
BENZO(B)/(K)FLUORANTHENE	-	UJ	-	UJ
BENZO(A)PYRENE	-	UJ	-	UJ
INDENO(1,2,3-CD)PYRENE	-	UJ	-	UJ
DIBENZ(A,H)ANTHRACENE	-	UJ	-	UJ
BENZO(G,H,I)PERYLENE	56.00	J	-	UJ
B(A)P Equivalence Conc.	1		0	
Total PAHs	297		0	
PHENOL ANALYTES (1700)	QF0200	Q	QF0201	Q
	µg/Kg		µg/Kg	
PHENOL	-	UJ	780.00	J
2-CHLOROPHENOL	-	UJ	-	UJ
O-CRESOL	-	UJ	-	UJ
M/P-CRESOL	160.00	J	120.00	J
2-NITROPHENOL	-	UJ	-	UJ
2,4-DIMETHYLPHENOL	-	UJ	-	UJ
2,4-DICHLOROPHENOL	540.00	J	-	UJ
4-CHLORO-3-METHYLPHENOL	-	UJ	-	UJ
2,4,5/6-TRICHLOROPHENOL	240.00	J	2300.00	J
2,4-DINITROPHENOL	-	R	-	R
4-NITROPHENOL	-	UJ	-	UJ
2,3,4,6-TETRACHLOROPHENOL	2000.00	J	-	UJ
4,6-DINITRO-2-METHYLPHENOL	-	UJ	-	UJ
PENTACHLOROPHENOL	750.00	J	-	UJ

FIELD SAMPLE NUMBER:	MW1A-SS-002	MW7-SS-001	BH3-SS-001			
EPA SAMPLE NUMBER:	SF 2539	SF 2527	SF 2523DL			
DEPTH (ft)	20'	0 - 10'	0.5-6'			
VOAs	µg/Kg	Q	µg/Kg	Q		
DILUTION FACTOR	1.00		1.00	250.00		
BENZENE	0.16	U	0.15	41.90	U	
CHLOROBENZENE	0.20	U	0.19	51.60	U	
1,2-DICHLOROBENZENE	0.33	U	0.31	83.90	U	
1,3-DICHLOROBENZENE	0.27	U	0.25	67.70	U	
1,4-DICHLOROBENZENE	0.24	U	0.22	61.30	U	
ETHYL BENZENE	0.10	U	0.09	2430.00	D	
TOLUENE	0.13	U	0.12	410.00	D	
XYLENES	0.34	U	0.32	6210.00	D	
EPA SAMPLE NUMBER:	SF 2539	SF 2527	SF 2523			
PHENOLS	µg/Kg	Q	µg/Kg	Q	µg/Kg	Q
DILUTION FACTOR	0.167		0.167		0.167	
PHENOLS	47.00	U	44.00	U	48.00	U
2-METHYL PHENOL	21.00	U	20.00	U	22.00	U
3-METHYL PHENOL	21.00	U	20.00	U	22.00	U
4-METHYL PHENOL	21.00	U	20.00	U	22.00	U
2,4-DIMETHYL PHENOL	14.00	U	13.00	U	14.00	U
2-CHLORO PHENOL	13.00	U	18.00	U	13.00	U
2,4-DICHLORO PHENOL	14.00	U	13.00	U	14.00	U
4-CHLORO-3-METHYL PHENOL	38.00	U	35.00	U	39.00	U
2,4-DINITROPHENOL	21.00	U	20.00	U	22.00	U
2-NITROPHENOL	16.00	U	15.00	U	17.00	U
2,4,6-TRICHLOROPHENOL	13.00	U	18.00	U	13.00	U
4,6-DINITRO-2-METHYL PHENOL	21.00	U	20.00	U	22.00	U
4-NITROPHENOL	15.00	U	14.00	U	16.00	U
PENTACHLOROPHENOL	13.00	U	18.00	U	13.00	U
EPA SAMPLE NUMBER:	SF 2539DL	SF 2527DL	SF 2523DL			
PAHS	µg/Kg	Q	µg/Kg	Q	µg/Kg	Q
DILUTION FACTOR	1.00	UD	10.00		2000.00	
ACENAPHTHENE	31.60	UD	217.00	D	728000.00	D
ACENAPHTHYLENE	190.00	UD	177.00	UD	38700.00	UD
ANTHRACENE	12.60	UD	92.30	D	666000.00	D
BENZO(A)ANTHRACENE	19.00	UD	532.00	D	75800.00	D
BENZO(A)PYRENE	31.60	UD	507.00	D	37300.00	D
BENZO(B)FLUORANTHENE	19.00	UD	421.00	D	40900.00	D
BENZO(G,H,I)PERYLENE	19.00	UD	99.00	D	3870.00	UD
BENZO(K)FLUORANTHENE	63.20	UD	378.00	D	25500.00	D
CHRYSENE	19.00	UD	537.00	D	70800.00	D
DIBENZO(A,H)ANTHRACENE	63.20	UD	246.00	D	12900.00	UD
FLUORANTHENE	63.20	UD	934.00	D	232000.00	D
FLUORENE	31.60	UD	966.00	D	1800000.00	D
INDENO(1,2,3-CD)PYRENE	19.00	UD	276.00	D	3870.00	UD
NAPHTHALENE	190.00	UD	177.00	D	466000.00	D
PHENANTHRENE	12.60	UD	92.30	UD	666000.00	D
PYRENE	63.20	UD	642.00	D	181000.00	D
Total PAHs	0.00		6024.30		9183300.00	
B(A)P Equivalence Conc.	0.00		919.07		52228.00	

FIELD SAMPLE NUMBER:	BH16-SS-001	BH16-SS-002	BH16-SS-003	BH16-SS-004	BH16-SS-006	BH17-SS-001	BH18-SS-001	BH19-SS-001	BH20-SS-001
EPA SAMPLE NUMBER:	SF 2581	SF 2582	SF 2583	SF 2584	SF 2585	SF 2904	SF 2905DL	SF 2906	SF 2908
DEPTH (ft)	28'	38'	47'	58'	74'	8'	10'	10'	9'
BNA	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
DILUTION FACTOR	1.00	200.00	1.00	20.00	1.00	1.00	2.00	100.00	10.00
bis(2-CHLOROETHYL)ETHER	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
1,3-DICHLOROBENZENE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
1,4-DICHLOROBENZENE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
1,2-DICHLOROBENZENE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
2,2'-oxybis(1-CHLOROPROPANE)	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
N-NITROSO-DI-N-PROPYLAMINE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
HEXACHLOROETHANE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
NITROBENZENE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
ISOPHORONE	12000.00	67000.00	2200.00	32000.00	770.00	6000.00	5700.00	310000.00	11000.00
bis(2-CHLOROETHOXY)METHANE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
1,2,4-TRICHLOROBENZENE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
NAPHTHALENE	66000.00	250000.00	410.00	8500.00	420.00	410.00	800.00	42000.00	6200.00
4-CHLOROANILINE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
HEXACHLOROBUTADIENE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
2-METHYLNAPHTHALENE	34000.00	120000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4600.00
HEXACHLOROCYCLOPENTADIENE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
2-CHLORONAPHTHALENE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
2-NITROANILINE	29000.00	170000.00	1000.00	21000.00	1100.00	990.00	1700.00	110000.00	10000.00
DIMETHYLPHTHALATE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
ACENAPHTHYLENE	770.00	2400.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
3-NITROANILINE	29000.00	170000.00	1000.00	21000.00	1100.00	990.00	1700.00	110000.00	10000.00
ACENAPHTHENE	21000.00	72000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	3300.00
DIBENZOFURAN	26000.00	89000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	3000.00
2,4-DINITROTOLUENE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
2,6-DINITROTOLUENE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
DIETHYLPHTHALATE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
4-CHLOROPHENYL PHENYLETHER	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
FLUORENE	22000.00	68000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	3800.00
4-NITROANILINE	29000.00	170000.00	1000.00	21000.00	1100.00	990.00	1700.00	110000.00	10000.00
N-NITROSODIPHENYLAMINE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
4-BROMOPHENYL-PHENYLETHER	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
HEXACHLOROBENZENE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
PHENANTHRENE	56000.00	260000.00	56.00	8500.00	420.00	410.00	1700.00	42000.00	14000.00
ANTHRACENE	8200.00	20000.00	410.00	8500.00	20.00	410.00	1700.00	42000.00	1300.00
CARBAZOLE	2500.00	7200.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	420.00
DI-N-BUTYLPHTHALATE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
FLUORANTHENE	28000.00	96000.00	33.00	8500.00	420.00	410.00	1700.00	42000.00	990.00
PYRENE	19000.00	70000.00	10.00	8500.00	420.00	410.00	1700.00	42000.00	410000.00
BUTYLBENZYLPHthalATE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
3,3'-DICHLOROBENZIDINE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
BENZO(A)ANTHRACENE	4300.00	15000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
bis(2-ETHYLHEXYL)PHTHALATE	12000.00	67000.00	31.00	8500.00	120.00	410.00	1700.00	42000.00	4200.00
CHRYSENE	4400.00	15000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
DI-N-OCTYLPHTHALATE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
BENZO(B)FLUORANTHENE	2000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	2100.00
BENZO(K)FLUORANTHENE	2000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	2100.00
BENZO(A)PYRENE	2300.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	930.00
INDENO(1,2,3-CD)PYRENE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	480.00
DIBENZO(A,H)ANTHRACENE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
BENZO(G,H,I)PERYLENE	12000.00	67000.00	410.00	8500.00	420.00	410.00	1700.00	42000.00	4200.00
Total PAHs	235970.00	868400.00	99.00	0.00	20.00	0.00	800.00	0.00	448100.00
B(A)P Equivalence Conc.	3174.00	1650.00	0.00	0.00	0.00	0.00	0.00	0.00	1427.00

FIELD SAMPLE NUMBER:	SS5-SS-001	SS5-SS-002	SS5-SS-003	BH3-SS-001	BH9-SS-001	MW1A-SS-001	BH3-SS-001	BH9-SS-001	MW1A-SS-001
EPA SAMPLE NUMBER:	SF 2493	SF 2494	SF 2495	SF 2549	SF 2515	SF 2547	SF 2549	SF 2515	SF 2547
DEPTH (ft)	0.5' - 6'	0.5' - 6'	0.5' - 6'	0.5' - 6'	5'	0 - 10'	0.5' - 6'	5'	0 - 10'
METALS	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
ALUMINUM	4240.00	5560.00	6670.00	17700.00	13200.00	5370.00	17700.00	13200.00	5370.00
ANTIMONY	8.50	7.90	9.10	11.50	7.90	8.50	11.50	7.90	8.50
ARSENIC	20.00	13.50	16.30	25.60	13.50	14.50	25.60	13.50	14.50
BARIUM	2230.00	2320.00	2140.00	962.00	253.00	139.00	962.00	253.00	139.00
BERYLLIUM	0.69	0.65	0.74	0.71	0.64	0.52	0.71	0.64	0.52
CADMIUM	1.00	0.65	0.74	1.40	0.64	0.69	1.40	0.64	0.69
CALCIUM	13700.00	13000.00	16200.00	29600.00	803.00	3020.00	29600.00	803.00	3020.00
CHROMIUM	6.10	8.10	9.10	16.90	11.80	8.80	16.90	11.80	8.80
COBALT	3.00	3.20	3.50	7.10	10.00	3.60	7.10	10.00	3.60
COPPER	23.40	37.60	26.30	26.80	5.60	15.20	26.80	5.60	15.20
IRON	11900.00	11300.00	13200.00	15500.00	8530.00	4000.00	15500.00	8530.00	4000.00
LEAD	22.70	31.30	23.10	15.50	8.90	8.60	15.50	8.90	8.60
MAGNESIUM	331.00	435.00	488.00	4230.00	816.00	2480.00	4230.00	816.00	2480.00
MANGANESE	128.00	141.00	134.00	144.00	722.00	45.60	144.00	722.00	45.60
NICKEL	3.30	6.50	5.00	9.60	4.30	6.20	9.60	4.30	6.20
POTASSIUM	186.00	309.00	278.00	930.00	508.00	1010.00	930.00	508.00	1010.00
SELENIUM	16.00	18.10	22.00	21.60	14.80	15.90	21.60	14.80	15.90
SILVER	0.52	0.48	0.56	0.71	0.48	0.52	0.71	0.48	0.52
SODIUM	434.00	424.00	489.00	2000.00	1450.00	538.00	2000.00	1450.00	538.00
THALLIUM	160.00	217.00	253.00	31.00	15.30	27.80	31.00	15.30	27.80
VANADIUM	11.80	11.30	14.10	48.90	18.20	7.30	48.90	18.20	7.30
ZINC	71.00	76.00	116.00	48.20	14.80	41.60	48.20	14.80	41.60
MOLYBDENUM	8.70	8.10	9.30	11.80	8.10	8.60	11.80	8.10	8.60
PHOSPHORUS	131.00	139.00	128.00	613.00	28.30	324.00	613.00	28.30	324.00
STRONTIUM	95.20	96.80	98.30	376.00	32.90	65.80	376.00	32.90	65.80
DIOXINS	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
2378-TCDD	U	U	U	U	U	U	U	U	U
2378-TCDF	U	U	U	U	U	U	U	U	U
12378-PeCDF	U	U	U	U	U	U	U	U	U
12378-PeCDD	U	U	U	U	U	U	U	U	U
23478-PeCDF	U	U	U	U	U	U	U	U	U
123478-HxCDF	U	U	U	U	U	U	U	U	U
123678-HxCDF	U	U	U	U	U	U	U	U	U
123478-HxCDD	U	U	U	U	U	U	U	U	U
123678-HxCDD	3.4722	3.5459	3.3829	2.12	0.6304	2.12	3.5459	3.3829	2.12
123789-HxCDD	2.1167	2.5699	2.0360	1.42	0.2169	1.42	2.5699	2.0360	1.42
234678-HxCDF	U	U	U	U	U	U	U	U	U
123789-HxCDF	U	U	U	U	U	U	U	U	U
1234678-HpCDF	23.7014	21.8857	22.3124	10.34	2.9892	10.34	21.8857	22.3124	10.34
1234678-HpCDD	291.8809	289.9030	309.3229	99.74	18.1289	99.74	289.9030	309.3229	99.74
1234789-HpCDF	1.6633	1.4480	1.4480	0.80	0.64	0.80	1.4480	1.4480	0.80
OCDD	1420.6901	1470.1196	1383.7875	862.10	117.1610	862.10	1470.1196	1383.7875	862.10
OCDF	164.1590	154.9121	159.7943	70.40	15.0575	70.40	154.9121	159.7943	15.0575
TCDD Equivalence	5.3200	5.4700	5.4800	3.2260	0.6900	0.0020	5.4700	5.4800	0.0020

APPENDIX E

AMERICAN CREOSOTE WORKS, INC.

**GROUND WATER ANALYTICAL SAMPLING
RESULTS**

FIELD SAMPLE NUMBER: EPA SAMPLE NUMBER: DEPTH (ft)	MW5-GW-002 SF 2577DL	MW6-GW-001 SF 2594DL	MW6-GW-002 SF 2595DL	MW7-GW-001 SF 2592	MW8-GW-001 SF 2586	MW9-GW-001 SF 2593
VOAs	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
DILUTION FACTOR	5.00	50.00	10.00	1.00	1.00	1.00
BENZENE	4.70 D	146.00 D	84.00 D	0.13 U	0.13 U	0.13 U
CHLOROBENZENE	0.80 U	1.60 U	1.60 U	0.16 U	0.16 U	0.16 U
1,2-DICHLOROBENZENE	1.30 U	2.60 U	2.60 U	0.26 U	0.26 U	0.26 U
1,3-DICHLOROBENZENE	1.10 U	2.10 U	2.10 U	0.21 U	0.21 U	0.21 U
1,4-DICHLOROBENZENE	1.00 U	1.90 U	1.90 U	0.19 U	0.19 U	0.19 U
ETHYL BENZENE	16.80 D	19.00 D	20.00 D	0.08 U	0.08 U	0.08 U
TOLUENE	5.90 D	62.00 D	163.00 D	0.10 U	0.10 U	0.10 U
XYLENES	23.10 D	97.00 D	102.00 D	0.27 U	0.27 U	0.27 U
EPA SAMPLE NUMBER:	SF 2577	SF 2594	SF 2595	SF 2592	SF 2586	SF 2593
PHENOLS	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
DILUTION FACTOR	0.0010	0.0010	0.0010	0.0010	0.001	0.001
PHENOLS	2.20 U	2.20 U	2.20 U	2.20 U	2.20 U	2.20 U
2-METHYL PHENOL	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
3-METHYL PHENOL	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
4-METHYL PHENOL	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2,4-DIMETHYL PHENOL	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U
2-CHLORO PHENOL	0.58 U	0.58 U	0.58 U	0.58 U	0.58 U	0.58 U
2,4-DICHLORO PHENOL	0.68 U	0.68 U	0.68 U	0.68 U	0.68 U	0.68 U
4-CHLORO-3-METHYL PHENOL	1.80 U	1.80 U	1.80 U	1.80 U	1.80 U	1.80 U
2,4-DINITROPHENOL	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2-NITROPHENOL	0.77 U	0.77 U	0.77 U	0.77 U	0.77 U	0.77 U
2,4,6-TRICHLOROPHENOL	0.58 U	0.58 U	0.58 U	0.58 U	0.58 U	0.58 U
4,6-DINITRO-2-METHYL PHENOL	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
4-NITROPHENOL	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
PENTACHLOROPHENOL	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U
EPA SAMPLE NUMBER:	SF 2577DL	SF 2594	SF 2595	SF 2592	SF 2586	SF 2593
PAHS	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
DILUTION FACTOR	100.00	1.00	1.00	1.00	1.00	1.00
ACENAPHTHENE	68.00 D	2250.00	3310.00	0.390	0.480	3.2900
ACENAPHTHYLENE	45.00 DU	450.00 U	450.00 U	0.450 U	0.450 U	0.4500 U
ANTHRACENE	13.00 DP	526.90	810.00	0.060	0.210 P	0.0300 U
BENZO(A)ANTHRACENE	4.50 DU	857.00	818.00	0.045 U	0.080	0.0450 U
BENZO(A)PYRENE	7.50 DU	203.40	317.00	0.075 U	0.075 U	0.0750 U
BENZO(B)FLUORANTHENE	4.50 DU	175.00	266.00	0.045 U	0.045 U	0.0450 U
BENZO(G,H,I)PERYLENE	4.50 DU	45.00 U	45.00 U	0.045 U	0.045 U	0.0450 U
BENZO(K)FLUORANTHENE	15.00 DU	91.80	234.00	0.150 U	0.150 U	0.1500 U
CHRYSENE	4.50 DU	4340.00	547.00	0.045 U	0.050	0.0045 U
DIBENZO(A,H)ANTHRACENE	15.00 DU	150.00 U	150.00 U	0.150 U	0.150 U	0.1500 U
FLUORANTHENE	23.00 DU	838.00	9880.00	0.150 U	0.890 P	0.1500 U
FLUORENE	122.00 DP	8980.00	12200.00	0.390	1.270	0.1100
INDENO(1,2,3-CD)PYRENE	4.50 DU	45.00 U	45.00 U	0.045 U	0.045 U	0.0450 U
NAPHTHALENE	748.00 D	20900.00	18500.00	0.450 U	2.290	0.4500 U
PHENANTHRENE	13.00 DP	526.00	810.00	0.060	0.210 P	0.0300 U
PYRENE	15.00 DU	637.00	666.00	0.150 U	0.300	0.1500 U
Total PAHs	964.00	40325.10	48358.00	0.90	5.78	3.40
B(A)P Equivalence Conc.	0.00	359.18	454.27	0.00	0.01	0.00

FIELD SAMPLE NUMBER:	MW1-GW-001	MW2A-GW-001	MW3-GW-001	MW3-GW-002	MW3A-GW-001	MW5-GW-001
EPA SAMPLE NUMBER:	SF 2912	SF 2573	SF 2910	SF 2911	SF 2575	SF 2580
DEPTH (ft)						
METALS	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ALUMINUM	93.00 B	604.00 U	84.00 U	84.00 U	2920.00 U	27700.00 U
ANTIMONY	49.00 U	49.00 U	49.00 U	49.00 U	49.00 U	49.00 U
ARSENIC	84.00 U	84.00 U	84.00 U	84.00 U	87.00 B	84.00 U
BARIUM	111.00 B	124.00 B	237.00 U	231.00 U	95.00 B	485.00 U
BERYLLIUM	3.00 B	3.00 B	3.00 B	3.00 B	3.00 B	3.00 B
CADMIUM	4.00 U	4.00 U	4.00 U	4.00 U	11.00 U	4.00 U
CALCIUM	4340.00 B	21400.00 U	10900.00 U	10600.00 U	21200.00 U	30700.00 U
CHROMIUM	10.00 U	6.00 U	6.00 U	6.00 U	6.00 U	31.00 U
COBALT	9.00 U	9.00 U	9.00 U	9.00 U	83.00 U	14.00 B
COPPER	5.00 B	9.00 B	5.00 B	6.00 B	7.00 B	30.00 U
IRON	2500.00 U	14200.00 U	3550.00 U	3420.00 U	118000.00 U	31100.00 U
LEAD	50.00 U	50.00 U	50.00 U	50.00 U	50.00 U	74.00 B
MAGNESIUM	1860.00 B	8280.00 U	4200.00 B	3990.00 B	8100.00 B	8180.00 U
MANGANESE	59.00 U	622.00 U	95.00 U	92.00 U	18500.00 U	408.00 U
NICKEL	15.00 U	10.00 U	10.00 U	10.00 U	18.00 U	12.00 U
POTASSIUM	3150.00 B	3250.00 B	3280.00 B	3360.00 B	1890.00 B	6000.00 U
SELENIUM	92.00 U	92.00 U	92.00 U	92.00 U	92.00 U	92.00 U
SILVER	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U
SODIUM	29600.00 U	51900.00 U	24300.00 U	23500.00 U	487000.00 U	82200.00 U
THALLIUM	92.00 B	107.00 B	60.00 U	79.00 B	60.00 U	75.00 B
VANADIUM	6.00 U	6.00 U	6.00 U	6.00 U	40.00 B	49.00 B
ZINC	16.00 B	27.00 U	18.00 B	19.00 B	43.00 U	300.00 U
MOLYBDENUM	50.00 U	50.00 U	50.00 U	50.00 U	50.00 U	50.00 U
PHOSPHORUS	298.00 U	290.00 U	172.00 U	224.00 U	1190.00 U	323.00 U
STRONTIUM	213.00 U	686.00 U	489.00 U	476.00 U	650.00 U	575.00 U
EPA SAMPLE NUMBER:						
DIOXINS						
2378-TCDD						
2378-TCDF						
12378-PeCDF						
12378-PeCDD						
23478-PeCDF						
123478-HxCDF						
123678-HxCDF						
123478-HxCDD						
123678-HxCDD						
123789-HxCDD						
234678-HxCDF						
123789-HxCDF						
1234678-HpCDF						
1234678-HpCDD						
1234789-HpCDF						
OCDD						
OCDF						
TCDD Equivalence						

FIELD SAMPLE NUMBER:	MW5-GW-002	MW6-GW-001	MW8-GW-001
EPA SAMPLE NUMBER:	SF 2578	SF 2914	SF 2909
DEPTH (ft)			
METALS	µg/L	µg/L	µg/L
ALUMINUM	13800.00 U	257.00 U	2700.00 U
ANTIMONY	49.00 U	49.00 U	49.00 U
ARSENIC	104.00 B	84.00 U	84.00 U
BARIUM	548.00 B	79.00 B	300.00 U
BERYLLIUM	3.00 B	3.00 B	3.00 B
CADMIUM	4.00 B	21.00 U	4.00 U
CALCIUM	31200.00 U	113000.00 U	22800.00 U
CHROMIUM	19.00 U	6.00 U	6.00 U
COBALT	16.00 B	133.00 U	9.00 U
COPPER	31.00 U	7.00 B	8.00 B
IRON	28200.00 U	26000.00 U	19400.00 U
LEAD	66.00 B	79.00 B	50.00 U
MAGNESIUM	7700.00 U	80900.00 U	6950.00 U
MANGANESE	419.00 U	3280.00 U	636.00 U
NICKEL	20.00 U	10.00 U	10.00 U
POTASSIUM	4900.00 B	6000.00 U	3920.00 B
SELENIUM	92.00 U	92.00 U	92.00 U
SILVER	3.00 U	3.00 U	3.00 U
SODIUM	83800.00 U	281000.00 U	39700.00 U
THALLIUM	88.00 B	60.00 U	60.00 U
VANADIUM	39.00 B	91.00 U	8.00 B
ZINC	340.00 U	126.00 U	22.00 U
MOLYBDENUM	50.00 U	50.00 U	50.00 U
PHOSPHORUS	346.00 U	270.00 U	115.00 B
STRONTIUM	574.00 U	1670.00 U	357.00 U

FIELD SAMPLE NUMBERS: SAMPLE NUMBER	MW3-GW-001 1	MW3-GW-002 2	MW6-GW-001 3	MW7-GW-001 4	MW1-GW-001 5	MW9-GW-001 6 RED HILL WELL
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BNA	2.00 U	2.00 U	5620.00	2.00 U	2.00 U	2.00 U
ACENAPHTHENE	2.00 U	2.00 U	400.00 U	2.00 U	2.00 U	2.00 U
ACENAPHTHYLENE	2.00 U	2.00 U	2350.00	2.00 U	2.00 U	2.00 U
ANTHRACENE	20.00 U	20.00 U	4000.00 U	20.00 U	20.00 U	20.00 U
BENZIDINE	10.00 U	10.00 U	2000.00 U	10.00 U	10.00 U	10.00 U
BENZOIC ACID	8.00 U	8.00 U	1600.00 U	8.00 U	8.00 U	8.00 U
BENZO(A)ANTHRACENE	8.00 U	8.00 U	1600.00 U	8.00 U	8.00 U	8.00 U
BENZO(A)PYRENE	8.00 U	8.00 U	1600.00 U	8.00 U	8.00 U	8.00 U
BENZO(B)FLUORANTHENE	8.00 U	8.00 U	1600.00 U	8.00 U	8.00 U	8.00 U
BENZO(G,H,I)PERYLENE	8.00 U	8.00 U	1600.00 U	8.00 U	8.00 U	8.00 U
BENZO(K)FLUORANTHENE	4.00 U	4.00 U	800.00 U	4.00 U	4.00 U	4.00 U
BENZYL ALCOHOL	2.00 U	2.00 U	400.00 U	2.00 U	2.00 U	2.00 U
BIS(2-CHLOROETHOXY)METHANE	2.00 U	2.00 U	400.00 U	2.00 U	2.00 U	2.00 U
BIS(2-CHLOROETHYL)ETHER	2.00 U	2.00 U	400.00 U	2.00 U	2.00 U	2.00 U
BIS(2-CHLOROISOPROPYL)ETHER	4.00 U	4.00 U	800.00 U	4.00 U	4.00 U	4.00 U
BIS-(2-ETHYLHEXYL)PHTHALATE	8.00 U	8.00 U	1600.00 U	8.00 U	8.00 U	8.00 U
4-BROMOPHENYLPHENYL ETHER	4.00 U	4.00 U	800.00 U	4.00 U	4.00 U	4.00 U
BUTYLBENZYLPHTHALATE	10.00 U	10.00 U	2000.00 U	10.00 U	10.00 U	10.00 U
CARBAZOLE	4.00 U	4.00 U	800.00 U	4.00 U	4.00 U	4.00 U
4-CHLOROANILINE	2.00 U	2.00 U	400.00 U	2.00 U	2.00 U	2.00 U
2-CHLORONAPHTHALENE	4.00 U	4.00 U	800.00 U	4.00 U	4.00 U	4.00 U
2-CHLOROPHENOL	8.00 U	8.00 U	1600.00 U	8.00 U	8.00 U	8.00 U
4-CHLOROPHENYLPHENYL ETHER	8.00 U	8.00 U	1600.00 U	8.00 U	8.00 U	8.00 U
4-CHLORO-3-METHYLPHENOL	8.00 U	8.00 U	1600.00 U	8.00 U	8.00 U	8.00 U
CHRYSENE	2.00 U	400.00 U	3530.00	2.00 U	2.00 U	2.00 U
DIBENZOFURAN	8.00 U	8.00 U	1600.00 U	8.00 U	8.00 U	8.00 U
DIBENZO(A,H)ANTHRACENE	3.00 U	3.00 U	600.00 U	3.00 U	3.00 U	3.00 U
1,2-DICHLOROBENZENE	3.00 U	3.00 U	600.00 U	3.00 U	3.00 U	3.00 U
1,3-DICHLOROBENZENE	3.00 U	3.00 U	600.00 U	3.00 U	3.00 U	3.00 U
1,4-DICHLOROBENZENE	10.00 U	10.00 U	2000.00 U	10.00 U	10.00 U	10.00 U
3,3'-DICHLOROBENZIDINE	6.00 U	6.00 U	1200.00 U	6.00 U	6.00 U	6.00 U
2,4-DICHLOROPHENOL	2.00 U	2.00 U	400.00 U	2.00 U	2.00 U	2.00 U
DIETHYLPHTHALATE	6.00 U	6.00 U	11600.00	6.00 U	6.00 U	6.00 U
2,4-DIMETHYLPHENOL	2.00 U	2.00 U	400.00 U	2.00 U	2.00 U	2.00 U
DIMETHYLPHTHALATE	30.00 U	30.00 U	6000.00 U	30.00 U	30.00 U	30.00 U
2,4-DINITROPHENOL	6.00 U	6.00 U	1200.00 U	6.00 U	6.00 U	6.00 U
2,4-DINITROTOLUENE	6.00 U	20.00 U	4000.00 U	6.00 U	6.00 U	6.00 U
2,6-DINITROTOLUENE	6.00 U	6.00 U	1200.00 U	6.00 U	6.00 U	6.00 U
2,6-DINITRO-2-METHYLPHENOL	20.00 U	20.00 U	400.00 U	20.00 U	20.00 U	20.00 U
DI-N-BUTYLPHTHALATE	2.00 U	2.00 U	800.00 U	2.00 U	2.00 U	2.00 U
DI-N-OCTYL PHTHALATE	4.00 U	4.00 U	6140.00	4.00 U	4.00 U	4.00 U
FLUORANTHENE	2.00 U	2.00 U	4410.00	2.00 U	2.00 U	2.00 U
FLUORENE	2.00 U	2.00 U	400.00 U	2.00 U	2.00 U	2.00 U
HEXACHLOROBENZENE	2.00 U	2.00 U	1000.00 U	2.00 U	2.00 U	2.00 U
HEXACHLOROBUTADIENE	5.00 U	5.00 U	2000.00 U	5.00 U	5.00 U	5.00 U
HEXACHLOROCYCLOPENTADIENE	10.00 U	10.00 U	600.00 U	10.00 U	10.00 U	10.00 U
HEXACHLOROETHANE	3.00 U	3.00 U	1600.00 U	3.00 U	3.00 U	3.00 U
INDENO(1,2,3-CD)PYRENE	8.00 U	8.00 U	800.00 U	8.00 U	8.00 U	8.00 U
ISOPHORONE	4.00 U	4.00 U	2220.00	4.00 U	4.00 U	4.00 U
2-METHYLNAPHTHALENE	2.00 U	2.00 U	23600.00	2.00 U	2.00 U	2.00 U
2-METHYLPHENOL	6.00 U	6.00 U	66300.00	6.00 U	6.00 U	6.00 U
4-METHYLPHENOL	6.00 U	6.00 U	26900.00	6.00 U	6.00 U	6.00 U
NAPHTHALENE	2.00 U	2.00 U	1600.00 U	2.00 U	2.00 U	2.00 U
2-NITROANILINE	8.00 U	8.00 U	1600.00 U	8.00 U	8.00 U	8.00 U
3-NITROANILINE	8.00 U	8.00 U	1600.00 U	8.00 U	8.00 U	8.00 U
4-NITROANILINE	2.00 U	2.00 U	400.00 U	2.00 U	2.00 U	2.00 U
NITROBENZENE	10.00 U	10.00 U	2000.00 U	10.00 U	10.00 U	10.00 U
2-NITROPHENOL	13.00 U	13.00 U	2600.00 U	13.00 U	13.00 U	13.00 U
4-NITROPHENOL	4.00 U	4.00 U	800.00 U	4.00 U	4.00 U	4.00 U
N-NITROSODIPHENYLAMINE	6.00 U	6.00 U	1200.00 U	6.00 U	6.00 U	6.00 U
N-NITROSO-DI-N-PROPYLAMINE	15.00 U	15.00 U	3000.00 U	15.00 U	15.00 U	15.00 U
PENTRACHLOROPHENOL	2.00 U	2.00 U	14000.00	2.00 U	2.00 U	2.00 U
PHENANTHRENE	4.00 U	4.00 U	52900.00	4.00 U	4.00 U	4.00 U
PHENOL	2.00 U	2.00 U	4540.00	2.00 U	2.00 U	2.00 U
PYRENE	3.00 U	3.00 U	600.00 U	3.00 U	3.00 U	3.00 U
1,2,4-TRICHLOROBENZENE	6.00 U	6.00 U	1200.00 U	6.00 U	6.00 U	6.00 U
2,4,5-TRICHLOROPHENOL	6.00 U	6.00 U	1200.00 U	6.00 U	6.00 U	6.00 U
2,4,6-TRICHLOROPHENOL	6.00 U	6.00 U	1200.00 U	6.00 U	6.00 U	6.00 U

APPENDIX F

AMERICAN CREOSOTE WORKS, INC.

**RECORD OF DECISION RESPONSIVENESS
SUMMARY**

THE RESPONSIVENESS SUMMARY

The Responsiveness Summary has been prepared to provide written responses to comments submitted regarding the Proposed Plan of Action at the American Creosote works, Inc., site.

I. Summary of Major Comments Received

Public notices announcing the public comment period and opportunity for a public meeting were printed in the Winnfield Enterprise-News American, Shreveport Times, and Monroe News Star. The first Proposed Plan was distributed to those on the site mailing list on July 29, 1992, and the Final Proposed Plan was issued on March 1, 1993, which included new individuals added to the mailing list. Public meetings were conducted on August 3, 1992, and September 15, 1992, to inform the public about the Feasibility Study Report and the Proposed Plan of Action. The first comment period began on July 29, 1992, and ended on September 28, 1992. A second comment period was conducted from March 1, 1993, to March 30, 1993, which provided the public a total of 90 days to comment on alternatives to remediate the site. At the meetings, EPA officials discussed the hazardous substance contamination problems at the site, presented the various remedial alternatives that were considered, and presented the preferred alternatives for the remediation of the American Creosote Works, Inc., site.

Approximately four people attended the first meeting, while over sixty people were in attendance at the second meeting. At both meetings, the public was given the opportunity to make comments or ask questions. A full account of the public meetings can be found in the public meeting transcripts that have been placed in the American Creosote Works, Inc., administrative record. Nine letters with comments were received during the comment periods and have also been placed in the administrative record. The Administrative Record is available for public review at the Winn Parish Public Library, Winnfield, LA, the Louisiana Department of Environmental Quality, Baton Rouge, LA, and the Environmental Protection Agency, Dallas, TX.

a) Verbal Comments

1. Comment:

Is the water table severely contaminated?

Response:

Yes. Because the ground water is in contact with contaminated soils and Non Aqueous Phase Liquids (NAPLs) whose principal hazardous substance constituents are creosote and pentachlorophenol (PCP), the shallow ground water has become highly contaminated.

2. Comment:

What is meant by an environmental threat?

Response:

An environmental threat is a threat to animals or vegetation posed by compounds, such as hazardous substances, that come into contact with those animals or vegetation through their immediate environment. In the context of the American Creosote site, this means health threats exist to fish in the Creosote Branch and to native wildlife, such as deer, mice, and fox that come into contact with contaminants related to the American Creosote Works, Inc. site. In addition, the term also includes the threat posed by contact with site-related contaminants to the wetlands and forested lands located within and surrounding the American Creosote plant.

3. Comment:

Are the current owners responsible for the site? What about previous owners, are they also responsible?

Response:

Yes, under Section 107 of the Superfund law, known as the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9607, current and past owners and operators of a facility from which there are or have been releases of hazardous substances are responsible parties for liability purposes. EPA is currently negotiating with a past owner of the site to recover past response costs incurred at the site. In addition, EPA's attempts to contact the current site owner, Reinhardt Investments, have been unsuccessful due to its failure to respond to EPA inquiries. Reinhardt Investments appears to be a shell corporation whose only known address is a post office box in the Netherlands Antilles.

4. Comment:

Who will own the property when the remediation is complete?

Response:

The answer to this question is not clear at this time, although the act of remediating a site generally does not affect the title to a property. EPA, however, will not take over ownership of the property either during or after this site is remediated. Currently, the contaminated area is owned by two companies, Reinhardt Investments that owns the property on which the wood treating operations were conducted, and Louisiana Pacific Corporation that owns part of the tar mat area. (Louisiana Pacific is not considered a liable party at this time). If the site is sold in the future, EPA will attempt to recover response costs from the proceeds. Those that are responsible for the waste, however, will not be allowed to take advantage of the Superfund cleanup to increase the value of their land without due compensation.

5. Comment:

"If you're looking for a comment, we'd like the site cleaned up to the fullest extent. Because if you don't, it will eventually be more than what you're paying now; and you'd get rid of the problem for the people that live in this area."

Response:

EPA believes the selected remedy (incineration and in-situ bioremediation) will meet the goals of this comment.

6. Comment:

If the State is responsible for a 10 percent match for construction activities, who will guarantee that the State will provide the funds?

Response:

EPA will enter into a Superfund State Contract with the State of Louisiana that is a formal contract between the State and EPA in which the State guarantees to provide its 10 percent matched funding and commit to long term operations and maintenance as defined in the ROD. EPA cannot start construction activities until the State of Louisiana signs this Superfund State Contract.

7. Comment:

What danger does the site pose for the people living close to the site and is there danger in this contamination getting into the City of Winnfield's water system.

Response:

As presented in the risk assessment portion of the ROD, there are potential direct contract threats from surface tar mat materials to any trespassers on the site. However, these risks are chronic rather than acute, which means the potential for risk increases

with an increased exposure to the contaminants rather than just coming into contact with the material once or twice. A greater risk to the public is associated with someone consuming contaminated ground water. Currently, the City of Winnfield's water system is not impacted by any of the site-related ground water contamination because it is drawn from an aquifer not affected by the site. However, the potential remains that future generations of residents within the site area may drill shallow ground water wells that intercept this contaminated ground water plume, should contaminants remain.

8. Comment:

What precautions are EPA taking to prevent trespassers from getting on-site.

Response:

EPA has constructed a fence and posted signs against trespassing at the site. EPA will try and maintain the fence until the selected remedy is implemented. During actual site remediation, site security will be the responsibility of the Remedial Action Contractor. Once the cleanup is completed, the state of Louisiana will maintain the site.

9. Comment:

The people of Winnfield would like to see some of the money associated with cleanup of the site spent in the local area.

Response:

The likelihood is that the remedial action will have a positive economic impact on the City of Winnfield and Winn Parish. The remedial action will be awarded to a qualified bidder that is selected by procedures established in the Federal Acquisition Regulations. Based on experience at other Superfund projects, the selected remedial action contractors generally spend proceeds from the contract on buying materials from local businesses and hiring

local labor. In addition, these contractors often buy homes and rent facilities in the communities surrounding the Superfund sites which should bring benefits to the affected communities. However, the Federal Acquisition Regulations do not guarantee that the contractor will hire local labor forces or purchase materials in the affected community.

10. Comment:

Has the abandoned creosote site contributed to Winn Parish having the highest cancer rate in Louisiana?

Response:

This is a very difficult issue to ascertain. The Louisiana Department of Health is preparing analyses of cancer rates within the various Parishes of Louisiana. It is not certain that Winn Parish has the highest cancer rate in Louisiana. It is also not possible at this time to attribute a specific cancer-related death or illness to the abandoned American Creosote plant. The contaminants from the abandoned plant have carcinogenic compounds which can lead to cancer. However, in order to prove the materials at the plant caused any cancer one must establish exposure by a cancer-afflicted person to these specific carcinogenic compounds from the specific site. This linkage is further complicated by an average person's exposure to other carcinogenic compound from other sources (i.e., smoking, car exhaust, natural carcinogens in foods, etc.).

11. Comment:

The subsurface beneath Winn Parish contains numerous faults which could have caused the migration of contaminants to much lower geologic formations.

Response:

Based on the extensive investigations at the site, the ground water contamination has not migrated to lower aquifers. This has been shown by analyzing ground water and subsurface soil samples in the

area of the shallow and deeper aquifers. Furthermore, there is an upward gradient from the lower aquifer toward the shallow aquifer that acts to prevent the downward migration of contaminants.

12. Comment:

How long will it take to complete incineration of all the material at the site.

Response:

The incineration aspect of the selected remedy is anticipated to take approximately 4 years from the date of remedial action solicitation. Assuming the project is advertized in the fall of 1993, the incineration could be completed as early as the end of 1997.

13. Comment:

If EPA builds an incinerator, will it be purely dedicated to cleaning up the contaminants associated with the site and not accept other wastes.

Response:

If an incinerator is constructed for the American Creosote site, it will be used only to burn contaminants related to this site. It will be fully dismantled when the contaminants at the American Creosote site have been incinerated.

14. Comment:

What are the potential effects on the community related to incineration.

Response:

There should not be any adverse effects on human health or the environment. The operation of an incinerator at the American Creosote site will be overseen by representatives of EPA to ensure protection of human health and the environment. There are possible

air emissions resulting from the excavation of the contaminated sludges prior to the incineration of these materials. However, the contract to conduct the remedial action places engineering controls on these operations to reduce the chances of such emissions. Furthermore, the attainment of all substantive permitting standards applicable to the operation of hazardous waste incinerators will ensure the protection of the community.

In addition, the Agency for Toxic Substances and Disease Registry in February, 1992, issued a document entitled "Public Health Overview of Incineration as a Means to Destroy Hazardous Wastes," which states "ATSDR believes that a properly designed and operated incinerator can effectively destroy certain kinds of hazardous wastes in a manner that is protective of public health." The contaminants at the site have been proven to be effectively destroyed by incineration treatability studies and therefore, there are not expected to be any harmful impacts on the community.

15. Comment:

Will anyone have to be relocated during construction.

Response:

Based on available information, it does not appear necessary to relocate anyone during the implementation of the remedial action.

16. Comment:

Will the City of Winnfield be assessed any charge?

Response:

No. EPA has determined that the City is not a liable party pursuant to Section 107 of CERCLA, 42 U.S.C. § 9607. Therefore, it has no liability for response costs incurred at the site.

17. Comment:

Can the material from the American Creosote site be moved to Texas, Oklahoma, etc.

Response:

PA has determined the most cost effective and protective measure to address human health and the environment is to treat the contaminated materials on-site.

18. Comment:

What happens if incineration doesn't work?

Response:

Treatability studies and experience at other sites have shown that incineration should effectively destroy the contaminants to below health-based limits. However, if incineration and in-situ bioremediation prove unable to attain those goals, then EPA would re-evaluate other remedial technologies and would meet with the community and representatives of the State to propose alternate remedial solutions for the site.

19. Comment:

A city councilman from the district that includes the American Creosote site stated a preference for Alternative 5, On-site Incineration.

Response:

This comment was considered in the formulation of the final remedy. Community support was an important factor in the Region's decision to incinerate the highly contaminated sludges.

20. Comment:

Will there be any odors during the remediation?

Response:

During the remediation air emissions will be controlled to ensure protection of human health and the environment. There may be an occasional odor associated with the excavation operation. The incinerator, however, should not emit significant odors.

21. Comment:

One individual stated "I recommend if it's going to be cleaned up, you know, clean it all up. There is no use in cleaning a portion of it."

Response:

EPA agrees; the selected alternative is protective and provides a permanent remedy to the hazards associated with the site.

b) Written Comments

1. Comment:

On August 26, 1992, EPA received a letter from the Mayor of Winnfield requesting another public meeting with an extension of time for the public comment period. It also stated "We feel that the waste at the American Creosote Site should be actively treated, contained, capped and monitored. This includes both liquid and solid, surface and subsurface. This appears to be in agreement with your stated preferred alternative."

Response:

EPA, Region 6, did extend the original public comment period by 30 days and held a second meeting on September 15, 1992. Based on preliminary discussions between EPA and the State of Louisiana, EPA had issued a recommendation in the July 29, 1992, Proposed Plan for capping surface wastes and pumping and treatment contaminated

ground water and subsurface oils. Subsequent evaluations within EPA, and discussions with the State and the community (based on the August 3, 1992, public meeting), have shown that incineration of the wastes may be more acceptable in meeting goals to remediate the site. In response to this, EPA issued a notice and the local news media published articles about the possible use of on-site incineration in early September, 1992.

During the public meeting of September 15, 1992, the city council, the Mayor, and over 50 individuals from the local area responded to EPA's proposed alternatives to remediate the site. The number of people at this meeting was significantly greater than attended the previous one that was attended only by 4 individuals. Based on the comments from both meetings it appears that the local community favors on-site incineration as presented in the Administrative Record transcripts from the public meetings. No opposition to on-site incineration was voiced by any individual at either public meeting.

EPA and LDEQ evaluated written and verbal comments recorded during the aforementioned comment period and considered the cost for full-scale incineration at approximately \$185 million. In March 1993, LDEQ and EPA released a new proposed remedy for the American Creosote site which combined elements of remedies previously proposed and added in-situ biological treatment for the bulk of the buried contaminated soils. The suggested remedy consisted of the following components:

- (1) Pump, separate and treat liquid contaminants. Light nonaqueous phased liquids (LNAPLs) and dense nonaqueous phased liquids (DNAPLs) would be pumped from the zones of pooled product beneath the site, separated from the water, and destroyed by on- or off- site incineration. (Proposed in July, 1992.)
- (2) On site incineration of 25,000 cubic yards of highly contaminated tars and sludges. 25,000 cubic yards of tars and sludges located in the "sludge overflow area" of the site, which is the most highly contaminated material, would be excavated and thermally treated on-site. The incinerator ash would be landfilled on-site. (Proposed in August, 1992.)

- (3) In-situ biological treatment of 250,000 cubic yards of contaminated soils. The remainder of the site's contaminated soils/sludges from process areas and buried pits would be addressed in-situ by injecting, via wells, nutrients, microbes and oxygen as is necessary to attain stated treatment goals. The ground water extraction system used for NAPL recovery would also be used to hydraulically control any off-site migration of ground water contamination and allow for recirculation of the bacteria for efficient treatment.

Because of the expected pace of remediation, the EPA would categorize this site remediation as a Long Term Remedial Action. What this means is that implementation of this alternative is expected to take several years. The EPA will be responsible for 90% funding beyond the customary 1 year time period of the completed remedy. 90% funding will continue until such time as the established remediation goals are met. The State of Louisiana will be responsible for 10% of the costs. This component is innovative and is expected to provide permanent treatment. (Based on comments/ information received during the public comment period).

- (4) Capping of surface contaminated soils, decontamination and on-site landfilling of process equipment and scrap. Grading and capping would be done to complement the above remedial actions. (Proposed in July, 1992).

The net cost of this set of remedies was estimated between \$40-\$50 million, which is significantly less than the total cost of the incineration remedial option (approximately \$185 million) and more environmentally protective than the original pumping/capping proposal. Biological treatment of creosote-contaminated soils is being attempted at numerous wood treater sites nationwide. Although biological treatment for the site was initially screened from consideration early in the Feasibility Study, in light of the comments received and considering the extreme cost of complete on-site incineration, the EPA and LDEQ believe this innovative technology warrants implementation.

2. Comment:

On August 26, 1992, EPA received a letter from the Louisiana Pacific Corporation, which owns the property on which the tar mat area is located. The letter recommended removal of the tar mat materials and materials along the natural drainage from the tar mat area. The letter also recommended additional surface soil sampling in the area between the tar mat and Creosote Branch and full scale remediation of the ground water in the same area "to the same degree and in the same time frame as the ground water on the American Creosote site." Furthermore, the letter suggests that EPA consider purchasing the Louisiana Pacific Corporation property on which the contamination is located.

Response:

EPA's selected remedy would remove and treat contaminated materials from the tar mat area and its related drainage area. The soils in the area between the tar mat and Creosote Branch have been sufficiently sampled and are not being removed as part of this remedy. These soils are not considered a significant threat to ground water and involve an area defined as a wetlands. The wetlands would be destroyed if these soils were excavated and, as discussed in the Summary of Site Risks section of this ROD, the soils are within the EPA's acceptable risk range. Removal of the source of contamination from the impoundment, process, and tar mat areas will allow the restoration of ground water by natural attenuation. In addition, EPA does not acquire property for the convenience of the landowner, but takes actions to protect the human health or the environment. CERCLA § 104(e)(3)(D), 42 U.S.C. § 9604(e)(3)(D), permits EPA to gain access to the property on which contamination is found to effectuate a response action. Therefore, EPA's selected remedy calls for a response action pursuant to CERCLA Section 106, 42 U.S.C. § 9606, and it is not the intent of the EPA to purchase property but to address this threat to human health or the environment.

3. Comment:

EPA received a letter from a resident of Winnfield, Louisiana stating "My personal opinion is that EPA clean up the entire area as soon as possible. I don't know enough about the options to say which I prefer. Your choice would be the best I'm sure."

Response:

EPA appreciates the faith of the public and will make every effort to address the site as soon as possible. It is believed that the selected remedy will meet the goals of this comment.

4. Comment

EPA received a letter dated September 21, 1992, from a commercial remediation contractor recommending bioremediation for the creosote-contaminated soils. Their information indicated that the contractor could process approximately 240 tons of contaminated material in three-day cycles and that the cost would be between \$50 to \$75 per ton (not including excavation costs). Using these values and considering that the site contains approximately 275,000 cubic yards of contaminated material, which equals about 385,000 tons, it would take almost 13 years to remediate the site at a cost of about \$25 million (not including excavation and dewatering).

Response:

Even considering this information, it is believed that in-situ bioremediation will be the most cost effective remedy for reducing concentrations of subsurface contamination. It is expected that a savings of over \$50 million as compared to ex-situ bioremediation will be realized. In addition, as stated in the ROD, it is necessary to incinerate the highly contaminated sludges which are not conducive to bioremediation.

5. Comment

EPA received a letter from a resident of Winnfield, Louisiana on September 29, 1992, stating "It is my belief and desire that you use Alternative 5C (On-site Incineration) and remove all contamination once and for all so that our children and grandchildren would have a safe place to live."

Response:

EPA and LDEQ believe that the selected remedy will achieve the same goals as indicated at a substantial savings using a combination of incineration and in-situ bioremediation, rather than full-scale incineration.

6. Comment:

EPA received a letter on September 29, 1992, from one of the businesses located in Winnfield, Louisiana, that stated "Of the options presented at the meeting, in my opinion, Option 5C (incineration) would be the most feasible and safest for the citizens of this community."

Response:

See response to Comment 5.

7. Comment:

EPA received a letter dated March 25, 1993, from a commercial incineration company regarding a closed loop incineration system that reportedly could conduct the work at a substantially reduced cost than presented in the Feasibility Study.

Response:

The selected remedy includes partial excavation and incineration of the sludges, and the cost estimates are presented as estimates only and are accurate for comparative purposes at the ROD stage. The

cost estimate will be refined during the Remedial Design, and if the commentor takes the opportunity to submit a proposal and bid according to the planned solicitation, then its proposal will be evaluated under the terms of the Federal Acquisition Regulations (FARS).

8. Comment:

The Louisiana-Pacific Corporation submitted two additional comments in a letter dated March 26, 1993. The first comment dealt with the word "site" and requested that a drawing be prepared showing property lines and identifying that contamination has been identified and will be remediated on Louisiana-Pacific Corporation's property. The second comment dealt with deed notices or deed restrictions placed on Louisiana-Pacific Corporation's property that is currently contaminated.

Response:

When applying the term "site" to a Superfund site, EPA uses the definition as consisting of the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action. EPA recognizes that contamination from the wood treating facility is located on Louisiana-Pacific Corporation's property and is addressing the contamination as specified in the ROD. At this stage it is unnecessary to show property boundaries. EPA will coordinate with the Louisiana-Pacific Corporation to gain access to conduct the remedial action.

At this time it appears that all contaminated sludges above health-based standards on the Louisiana-Pacific property will be incinerated. As such it appears that it may be unnecessary at the time of completion of incineration operations to place deed notices or deed restrictions on this property.

9. Comment:

EPA received a letter from the City of Winnfield's Director of Public Works which indicated a preference for full-scale incineration. However, the letter also recognized that if that alternative was not implemented that support would be given to the proposed remedy as outlined in the March 1, 1993, Final Proposed Plan.

Response:

No response necessary.

APPENDIX G

AMERICAN CREOSOTE WORKS, INC.

**RECORD OF DECISION ADMINISTRATIVE
RECORD INDEX**

ADMINISTRATIVE RECORD INDEX

INTERIM

SITE NAME: American Creosote Site

SITE NUMBER: LAD 000239814

INDEX DATE: 02/24/92

ADMINISTRATIVE RECORD INDEX

INTERIM

SITE NAME: American Creosote Site
SITE NUMBER: LAD 000239814

DOCUMENT NUMBER: 000001 - 000026
DOCUMENT DATE: Undated
NUMBER OF PAGES: 26
AUTHOR: Office of Waste Programs Enforcement
COMPANY/AGENCY: U.S. EPA
RECIPIENT: File
DOCUMENT TYPE: Users Manual
DOCUMENT TITLE: Compendium of CERCLA Response Selection Guidance Documents

DOCUMENT NUMBER: 000027 - 000029
DOCUMENT DATE: 06/11/85
NUMBER OF PAGES: 3
AUTHOR: Larry Fitzgerald
COMPANY/AGENCY: Louisiana Department of Environmental Quality
RECIPIENT: Thomas H. Patterson, Enforcement Program Manager, Louisiana
Dept. of Environmental Quality
DOCUMENT TYPE: General Inspection Report
DOCUMENT TITLE: Re: Previous infraction/Follow-up inspection

DOCUMENT NUMBER: 000030 - 000030
DOCUMENT DATE: 03/16/87
NUMBER OF PAGES: 1
AUTHOR: Buddy Parr
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: Files
DOCUMENT TYPE: Record of Communication (ROC)
DOCUMENT TITLE: Re: Follow-up action needed to determine exact site
boundaries to identify the area owned by Stallworth Timber

DOCUMENT NUMBER: 000031 - 000031
DOCUMENT DATE: 03/16/87
NUMBER OF PAGES: 1
AUTHOR: Pat Hammack
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: File
DOCUMENT TYPE: Site Identification Form
DOCUMENT TITLE: Potential Hazardous Waste Site Identification concerning
possible removal action at site

ADMINISTRATIVE RECORD INDEX

INTERIM

SITE NAME: American Creosote Site
SITE NUMBER: LAD 000239814

DOCUMENT NUMBER: 000032 - 000075
DOCUMENT DATE: 05/14/87
NUMBER OF PAGES: 44
AUTHOR: Linda E. Wilson, Technical Assistant Team (TAT)
COMPANY/AGENCY: Ecology and Environment, Inc.
RECIPIENT: Pat Hammack, On Scene Coordinator (OSC), U.S. EPA Region 6
DOCUMENT TYPE: Site Report
DOCUMENT TITLE: Site Assessment on American Creosote Co. Site/Wood Treatment Facility updating 04/27/87 interim site assessment report

DOCUMENT NUMBER: 000076 - 000085
DOCUMENT DATE: 07/27/87
NUMBER OF PAGES: 10
AUTHOR: Keith Bradley, Field Investigation Team (FIT), Regional Project Officer (RPO)
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: Martha McKee, Chief, Compliance Section, U.S. EPA Region
DOCUMENT TYPE: Preliminary Assessment Report
DOCUMENT TITLE: The report identifies hazardous material, contaminants, and structures within the area

DOCUMENT NUMBER: 000086 - 000102
DOCUMENT DATE: 08/03/87
NUMBER OF PAGES: 17
AUTHOR: Joe Phillips
COMPANY/AGENCY: ICF Technology
RECIPIENT: U.S. EPA Region 6
DOCUMENT TYPE: Report with attachment A and B
DOCUMENT TITLE: Potential Hazardous Waste Site - Site Inspection Report

DOCUMENT NUMBER: 000103 - 000213
DOCUMENT DATE: 08/12/87
NUMBER OF PAGES: 111
AUTHOR: Linda E. Wilson, U.S. EPA Region 6, TAT
COMPANY/AGENCY: Ecology and Environment, Inc.
RECIPIENT: Jim Staves, OSC, U.S. EPA Region 6,
DOCUMENT TYPE: Site Sampling Plan
DOCUMENT TITLE: The plan identifies potentially hazardous materials and characteristics of appropriate methods of removing the creosote

ADMINISTRATIVE RECORD INDEX

INTERIM

SITE NAME: American Creosote Site
SITE NUMBER: LAD 000239814

DOCUMENT NUMBER: 000214 - 000214
DOCUMENT DATE: 08/13/87
NUMBER OF PAGES: 1
AUTHOR: James C. Staves, OSC
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: Hilton Frey, Chief, Superfund Compliance Section, U.S. EPA Region 6
DOCUMENT TYPE: Memorandum
DOCUMENT TITLE: Re: Removal Action at the American Creosote Site, Winnfield, Louisiana; recommends the initiation of potential responsible party (PRP) search to find PRPs to assist in removal

DOCUMENT NUMBER: 000215 - 000255
DOCUMENT DATE: 08/21/87
NUMBER OF PAGES: 41
AUTHOR: Dave Wineman, FIT RPO
COMPANY/AGENCY: U.S EPA Region 6
RECIPIENT: Martha McKee, Chief, Compliance, U.S. EPA Region 6
DOCUMENT TYPE: Report and Attachments
DOCUMENT TITLE: Site Inspection Report describing ground and migration contaminants

DOCUMENT NUMBER: 000256 - 000257
DOCUMENT DATE: 09/02/87
NUMBER OF PAGES: 2
AUTHOR: Oscar Cabra, Jr., P.E., Water Supply Branch
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: Martha McKee, Chief, Superfund Compliance Section, U.S. EPA Region 6
DOCUMENT TYPE: Comments on Site Inspection Report
DOCUMENT TITLE: Re: Recommendation that groundwater sampling be included in the sampling survey

DOCUMENT NUMBER: 000258 - 000315
DOCUMENT DATE: 10/13/87
NUMBER OF PAGES: 58
AUTHOR: Peter Frasca, Ph.D.
COMPANY/AGENCY: Electron-Microscopy Service Laboratories Inc.
RECIPIENT: Ecology & Environment, Inc.
DOCUMENT TYPE: Lab report
DOCUMENT TITLE: Asbestos fiber analysis - North Tank & South Pipe

ADMINISTRATIVE RECORD INDEX

INTERIM

SITE NAME: American Creosote Site
SITE NUMBER: LAD 000239814

DOCUMENT NUMBER: 000316 - 000505
DOCUMENT DATE: 10/22/87
NUMBER OF PAGES: 190
AUTHOR: Ann Looney, TAT
COMPANY/AGENCY: Ecology & Environment, Inc.
RECIPIENT: Jim Staves, OSC, U.S. EPA Region 6,
DOCUMENT TYPE: Report and Attachments
DOCUMENT TITLE: Immediate Removal Potential Report; Sampling Mission

DOCUMENT NUMBER: 000506 - 000572
DOCUMENT DATE: 10/23/87
NUMBER OF PAGES: 67
AUTHOR: Ann Looney, TAT
COMPANY/AGENCY: Ecology & Environment, Inc.
RECIPIENT: Jim Stavens, OSC, U.S. EPA Region 6
DOCUMENT TYPE: Report and Attachments
DOCUMENT TITLE: Immediate Removal Potential Report - Sampling for asbestos analysis

DOCUMENT NUMBER: 000573 - 000573
DOCUMENT DATE: 11/25/87
NUMBER OF PAGES: 1
AUTHOR: James C. Staves, OSC
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: Brent Truskowski, Superfund Compliance Section, U.S. EPA Region 6
DOCUMENT TYPE: Memorandum
DOCUMENT TITLE: Re: Precautions that have been proposed for the site

DOCUMENT NUMBER: 000574 - 000576
DOCUMENT DATE: 11/30/87
NUMBER OF PAGES: 3
AUTHOR: Allyn M. Davis, Director, Hazardous Waste Management Division
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: William Shuler Jr., Winnfield, LA
DOCUMENT TYPE: 104(e) letter
DOCUMENT TITLE: A discovery letter notifying any person who generates, stores, treats, transports or otherwise handles or has handled hazardous waste, shall upon request furnish information relating to such wastes

ADMINISTRATIVE RECORD INDEX

INTERIM

SITE NAME: American Creosote Site
SITE NUMBER: LAD 000239814

DOCUMENT NUMBER: 000577 - 000579
DOCUMENT DATE: 11/30/87
NUMBER OF PAGES: 3
AUTHOR: Allyn M. Davis, Director, Hazardous Waste Management Division
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: William Shuler, Jr.
DOCUMENT TYPE: 104(e) Letter
DOCUMENT TITLE: Re: Request to provide answers to questions about disposal practices at the American Creosote site in Winnfield, Louisiana

DOCUMENT NUMBER: 000580 - 000582
DOCUMENT DATE: 12/07/87
NUMBER OF PAGES: 3
AUTHOR: Allyn M. Davis, Director, Hazardous Waste Management Division
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: Dennis Stallworth, President, Stallworth Timber Co. Inc.
DOCUMENT TYPE: 104(e) Letter
DOCUMENT TITLE: Re: Request to provide answers to questions about disposal practices at the American Creosote Site in Winnfield, Louisiana

DOCUMENT NUMBER: 000583 - 000586
DOCUMENT DATE: 12/07/87
NUMBER OF PAGES: 4
AUTHOR: Allyn M. Davis, Director, Hazardous Waste Management Division
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: Dennis Stallworth, President, Stallworth Timber Co. Inc.
DOCUMENT TYPE: 104(e) Request Letter
DOCUMENT TITLE: Any person who generates, stores, treats, transports or otherwise handles or has handled hazardous wastes, shall upon request furnish information of such wastes

DOCUMENT NUMBER: 000587 - 000590
DOCUMENT DATE: 01/05/88
NUMBER OF PAGES: 4
AUTHOR: George Pettigrew and Mark McInahan, Ph.D.
COMPANY/AGENCY: Agency for Toxic Substances and Disease Registry
RECIPIENT: James C. Staves, OSC, U.S. EPA Region 6
DOCUMENT TYPE: Memorandum
DOCUMENT TITLE: Re: Health Consultation - American Creosote Company

ADMINISTRATIVE RECORD INDEX

INTERIM

SITE NAME: American Creosote Site
SITE NUMBER: LAD 000239814

DOCUMENT NUMBER: 000591 - 000594
DOCUMENT DATE: 01/07/88
NUMBER OF PAGES: 4
AUTHOR: James W. Thames, General Manager
COMPANY/AGENCY: Stallworth Timber Company, Inc.
RECIPIENT: Brent Truskowski, U.S. EPA Region 6
DOCUMENT TYPE: 104(e) Response Letter
DOCUMENT TITLE: A response answering questions from a 104(e) letter dated 12/7/87

DOCUMENT NUMBER: 000595 - 000653
DOCUMENT DATE: 01/22/88
NUMBER OF PAGES: 59
AUTHOR: Ann L. Looney, TAT
COMPANY/AGENCY: Ecology & Environment, Inc.
RECIPIENT: James Staves, OSC, U.S. EPA Region 6
DOCUMENT TYPE: Information Management Report
DOCUMENT TITLE: Removal Technology Alternatives

DOCUMENT NUMBER: 000654 - 000670
DOCUMENT DATE: 01/27/88
NUMBER OF PAGES: 17
AUTHOR: Frances Verhalen, FIT Environmental Scientist
COMPANY/AGENCY: Ecology and Environment, Inc.
RECIPIENT: Dave Wineman, Regional Project Officer (RPO)
DOCUMENT TYPE: Memorandum with attachment
DOCUMENT TITLE: Re: Sampling location descriptions for American Creosote Works site, attached site location maps

DOCUMENT NUMBER: 000671 - 000683
DOCUMENT DATE: 02/02/88
NUMBER OF PAGES: 13
AUTHOR: Bill Barham
COMPANY/AGENCY: Ecology and Environment, Inc.
RECIPIENT: Greg McAnarney, Ecology and Environment
DOCUMENT TYPE: Plan
DOCUMENT TITLE: Hazardous and Toxic Materials Team Site Safety Plan concerning massive on-site and off-site surface contamination

ADMINISTRATIVE RECORD INDEX

INTERIM

SITE NAME: American Creosote Site
SITE NUMBER: LAD 000239814

DOCUMENT NUMBER: 000684 - 000693
DOCUMENT DATE: 02/29/88
NUMBER OF PAGES: 10
AUTHOR: James C. Staves, OSC
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: Robert E. Layton Jr., Regional Administrator
DOCUMENT TYPE: Action Memorandum
DOCUMENT TITLE: Request for Removal Action at the American Creosote site

DOCUMENT NUMBER: 000694 - 000710
DOCUMENT DATE: 03/07/88
NUMBER OF PAGES: 17
AUTHOR: Christopher L. Quina, U.S. EPA Region 6, TAT
COMPANY/AGENCY: Ecology & Environment, Inc.
RECIPIENT: Jim Staves, OSC, U.S. EPA Region 6
DOCUMENT TYPE: Report and Attachments
DOCUMENT TITLE: Site Assessment - EPA Environmental Response Team Extent of Contamination Project Oversight

DOCUMENT NUMBER: 000711 - 000719
DOCUMENT DATE: 03/24/88
NUMBER OF PAGES: 9
AUTHOR: Ann L. Looney, TAT
COMPANY/AGENCY: Ecology & Environment, Inc.
RECIPIENT: Greg Fife, OSC, U.S. EPA Region 6
DOCUMENT TYPE: Correspondence and Attachments
DOCUMENT TITLE: Letter indentifying surrounding property owners whose property may be enclosed by the fence surrounding the site

DOCUMENT NUMBER: 000720 - 000727
DOCUMENT DATE: 04/01/88
NUMBER OF PAGES: 8
AUTHOR: Tom Nystrom, Gene Keepper
COMPANY/AGENCY: Ecology and Environment, Inc.
RECIPIENT: File
DOCUMENT TYPE: Trip Report
DOCUMENT TITLE: Wetland Delineation Trip Report concerning investigation of two sites that were found to have wetlands present

ADMINISTRATIVE RECORD INDEX

INTERIM

SITE NAME: American Creosote Site
SITE NUMBER: IAD 000239814

DOCUMENT NUMBER: 000728 - 000728
DOCUMENT DATE: 04/05/88
NUMBER OF PAGES: 1
AUTHOR: Brent J. Truskowski
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: James Thames, Stallworth Timber Company
DOCUMENT TYPE: Correspondence
DOCUMENT TITLE: Re: Access to the American Creosote site for sampling purposes

DOCUMENT NUMBER: 000729 - 000729
DOCUMENT DATE: 04/05/88
NUMBER OF PAGES: 1
AUTHOR: Brent J. Truskowski
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: William Pharr, Louisiana Pacific Lumber Company
DOCUMENT TYPE: Correspondence
DOCUMENT TITLE: Re: Access to Louisiana Pacific Lumber Company's property for purposes of a removal action to be performed by EPA

DOCUMENT NUMBER: 000730 - 000730
DOCUMENT DATE: 04/05/88
NUMBER OF PAGES: 1
AUTHOR: Brent J. Truskowski
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: William Shuler, Jr.
DOCUMENT TYPE: Correspondence
DOCUMENT TITLE: Re: Access to property for purpose of fencing the American Creosote site

DOCUMENT NUMBER: 000731 - 000905
DOCUMENT DATE: 04/05/88
NUMBER OF PAGES: 175
AUTHOR: Kenneth Tyson and Kwasi Boateng
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: Harry Compton and George Prince
DOCUMENT TYPE: Report and Attachments
DOCUMENT TITLE: Final Draft Report - Environmental investigation of the American Creosote Chemical site

ADMINISTRATIVE RECORD INDEX

INTERIM

SITE NAME: American Creosote Site
SITE NUMBER: LAD 000239814

DOCUMENT NUMBER: 000906 - 000906
DOCUMENT DATE: 04/19/88
NUMBER OF PAGES: 1
AUTHOR: Keith Newsom
COMPANY/AGENCY: Louisiana-Pacific Corporation
RECIPIENT: Brent Truskowski, U.S. EPA Region 6
DOCUMENT TYPE: Letter
DOCUMENT TITLE: Louisiana-Pacific (LP) grants EPA permission to access the property with a stipulation that LP is allowed to harvest timber

DOCUMENT NUMBER: 000907 - 000907
DOCUMENT DATE: 04/21/88
NUMBER OF PAGES: 1
AUTHOR: Allyn M. Davis, Hazardous Waste Management Division
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: William B. DeVille, Administrator, Louisiana Department of Environmental Quality
DOCUMENT TYPE: Transmittal Letter without Attachment
DOCUMENT TITLE: Re: Administrative Order issued by the EPA to the Stallworth Timber Company; no attachments

DOCUMENT NUMBER: 000908 - 000926
DOCUMENT DATE: 04/21/88
NUMBER OF PAGES: 19
AUTHOR: J. Hilton Frey, Chief, Superfund Compliance Section
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: James Thames, Stallworth Timber Company
DOCUMENT TYPE: Letter and Administrative Order
DOCUMENT TITLE: Explaining procedures that the Stallworth Timber Company would have to perform in pursuant to Section 106(a) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980

DOCUMENT NUMBER: 000927 - 000945
DOCUMENT DATE: 04/21/88
NUMBER OF PAGES: 19
AUTHOR: Donald L. Perry, Ph.D.
COMPANY/AGENCY: Enviromed Laboratories, Inc.
RECIPIENT: Peterson Reidel
DOCUMENT TYPE: Lab Report
DOCUMENT TITLE: Organic analyses report of toxics taken from water tanks on 04/05/88

ADMINISTRATIVE RECORD INDEX

INTERIM

SITE NAME: American Creosote Site
SITE NUMBER: LAD 000239814

DOCUMENT NUMBER: 000946 - 000949
DOCUMENT DATE: 04/26/88
NUMBER OF PAGES: 4
AUTHOR: Harry R. Compton, Environmental Response Branch (ERB)
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: Jim Staves, OSC
DOCUMENT TYPE: Memorandum
DOCUMENT TITLE: Executive Summary and final report for the American Creosote Site

DOCUMENT NUMBER: 000950 - 000951
DOCUMENT DATE: 05/01/88
NUMBER OF PAGES: 2
AUTHOR: Barbara Biggers, Emergency Response Branch
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: Public
DOCUMENT TYPE: Information Bulletin
DOCUMENT TITLE: Re: Construction of fencing/warning signs around the American Creosote facility

DOCUMENT NUMBER: 000952 - 000952
DOCUMENT DATE: 05/04/88
NUMBER OF PAGES: 1
AUTHOR: Billy Thames, General Manager
COMPANY/AGENCY: Stallworth Timber Company, Inc.
RECIPIENT: Brent Truskowski, Superfund Compliance Section, U.S. EPA Region 6
DOCUMENT TYPE: Letter
DOCUMENT TITLE: Re: Administrative Order - Billy Thames is designated as facility coordinator as requested by the order

DOCUMENT NUMBER: 000953 - 000957
DOCUMENT DATE: 05/16/88
NUMBER OF PAGES: 5
AUTHOR: James C. Staves, OSC
COMPANY/AGENCY: U.S. EPA, Region 6
RECIPIENT: Stallworth Timber Company, Inc.
DOCUMENT TYPE: Record of Communication
DOCUMENT TITLE: Conference call with Stallworth Timber Company Representative to ensure Work Plan would be available on 05/23/88

ADMINISTRATIVE RECORD INDEX

INTERIM

SITE NAME: American Creosote Site
SITE NUMBER: LAD 000239814

DOCUMENT NUMBER: 000958 - 000992
DOCUMENT DATE: 05/18/88
NUMBER OF PAGES: 35
AUTHOR: Keith S. Kline
COMPANY/AGENCY: ATEC Associates, Inc.
RECIPIENT: Dennis Heuring, TMS Analytical Services, Inc.
DOCUMENT TYPE: Lab Report
DOCUMENT TITLE: Report of test results taken on site on 05/10/88

DOCUMENT NUMBER: 000993 - 001137
DOCUMENT DATE: 05/25/88
NUMBER OF PAGES: 145
AUTHOR: Dave Wineman, FIT RPO, Hazardous Waste Section
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: Martha McKee, Chief, Compliance Section, U.S. EPA Region 6
DOCUMENT TYPE: Memo with attachment
DOCUMENT TITLE: Sampling Inspection Report with attached sample location maps, organic analysis summary and chain of custody records

DOCUMENT NUMBER: 001138 - 001139
DOCUMENT DATE: 05/27/88
NUMBER OF PAGES: 2
AUTHOR: James C. Staves, OSC
COMPANY/AGENCY: U.S. EPA, Region 6
RECIPIENT: Robert E. Layton Jr., P.E., U.S. EPA, Region 6
DOCUMENT TYPE: Memorandum
DOCUMENT TITLE: Re: Request for Redirection of Approved Funds for American Creosote Site

DOCUMENT NUMBER: 001140 - 001141
DOCUMENT DATE: 05/27/88
NUMBER OF PAGES: 2
AUTHOR: B. Truskowski
COMPANY/AGENCY: U.S. EPA, Region 6
RECIPIENT: Billy Thames, Stallworth Timber Company
DOCUMENT TYPE: ROC
DOCUMENT TITLE: Re: Stallworth's refusal to perform removal action, permits access to site by EPA

ADMINISTRATIVE RECORD INDEX

INTERIM

SITE NAME: American Creosote Site
SITE NUMBER: LAD 000239814

DOCUMENT NUMBER: 001142 - 001142
DOCUMENT DATE: 06/09/88
NUMBER OF PAGES: 1
AUTHOR: Unspecified
COMPANY/AGENCY: Unspecified
RECIPIENT: U.S. EPA Region 6 Site Files
DOCUMENT TYPE: Attendees List
DOCUMENT TITLE: 06/09/88 meeting concerning American Creosote site

DOCUMENT NUMBER: 001143 - 001144
DOCUMENT DATE: 07/21/88
NUMBER OF PAGES: 2
AUTHOR: Oscar Cabra, Jr., P.E., Chief, Water Supply Branch
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: Presley Hatcher, Acting Chief, Superfund Compliance Section,
U.S. EPA Region 6
DOCUMENT TYPE: Memorandum
DOCUMENT TITLE: Comments on CERCLA Investigation Reports Re: No contaminants
were detected, no further action regarding drinking water
necessary at this time

DOCUMENT NUMBER: 001145 - 001325
DOCUMENT DATE: 09/13/88
NUMBER OF PAGES: 181
AUTHOR: Technical Assistance Team
COMPANY/AGENCY: Ecology and Environment, Inc.
RECIPIENT: J. Chris Petersen, U.S. EPA, Region 6
DOCUMENT TYPE: Report
DOCUMENT TITLE: Site Assessment Report on American Creosote, Winnfield,
Louisiana

DOCUMENT NUMBER: 001326 - 001326
DOCUMENT DATE: 09/13/88
NUMBER OF PAGES: 1
AUTHOR: Jo Ann Woods, Emergency Response Branch
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: Hilton Frey, Chief, Enforcement Compliance, U.S. EPA Region 6
DOCUMENT TYPE: Memorandum
DOCUMENT TITLE: Re: Notification of a Proposed Time-Critical Removal Action
at the American Creosote site

ADMINISTRATIVE RECORD INDEX

INTERIM

SITE NAME:
SITE NUMBER: American Creosote Site
LAD 000239814

DOCUMENT NUMBER: 001327 - 001331
DOCUMENT DATE: 09/13/88
NUMBER OF PAGES: 5
AUTHOR: Unspecified
COMPANY/AGENCY: U.S. EPA, Region 6
RECIPIENT: Public
DOCUMENT TYPE: Notice of Public Availability
DOCUMENT TITLE: Removal Administrative Record File, American Creosote Site,
Winnfield, Louisiana

DOCUMENT NUMBER: 001332 - 001349
DOCUMENT DATE: 02/10/89
NUMBER OF PAGES: 18
AUTHOR: James C. Staves, OSC
COMPANY/AGENCY: U.S. EPA, Region 6
RECIPIENT: Robert E. Layton Jr., U.S. EPA, Region 6
DOCUMENT TYPE: Action Memorandum
DOCUMENT TITLE: Re: Request for Removal Action at American Creosote Site,
Winnfield, Louisiana

DOCUMENT NUMBER: 001350 - 001367
DOCUMENT DATE: 02/13/89
NUMBER OF PAGES: 18
AUTHOR: Unspecified
COMPANY/AGENCY: U.S. EPA, Region 6
RECIPIENT: Stallworth Timber Company, Inc.
DOCUMENT TYPE: Administrative Order
DOCUMENT TITLE: Re: Orders company to appoint a facility coordinator,
develop work plan in 14 days, and reimburse EPA for costs
within 60 days upon receipt of invoice

DOCUMENT NUMBER: 001368 - 001389
DOCUMENT DATE: 02/16/89
NUMBER OF PAGES: 22
AUTHOR: Unspecified
COMPANY/AGENCY: Unspecified
RECIPIENT: U.S. EPA Region 6 Site Files
DOCUMENT TYPE: Index
DOCUMENT TITLE: Removal Administrative Record Index for American Creosote site

ADMINISTRATIVE RECORD INDEX

INTERIM

SITE NAME: American Creosote Site
SITE NUMBER: LAD 000239814

DOCUMENT NUMBER: 001390 - 001390
DOCUMENT DATE: 02/28/89
NUMBER OF PAGES: 1
AUTHOR: James W. Thames, General Manager
COMPANY/AGENCY: Stallworth Timber Company
RECIPIENT: Buddy Parr, U.S. EPA Region 6
DOCUMENT TYPE: ROC
DOCUMENT TITLE: Re: Request for extension on the requirement in the Administrative Order (AO) that the company submit a plan for cleaning up the site within 14 days of effective date of the AO

DOCUMENT NUMBER: 001391 - 001391
DOCUMENT DATE: 03/16/89
NUMBER OF PAGES: 1
AUTHOR: Buddy Parr
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: Files
DOCUMENT TYPE: ROC
DOCUMENT TITLE: Re: Meeting held between EPA and Stallworth Timber Company in response to AO issued 2/13/89 directing Stallworth to perform certain removal actions at site

DOCUMENT NUMBER: 001392 - 001580
DOCUMENT DATE: 03/30/89
NUMBER OF PAGES: 189
AUTHOR: Technical Assistance Team (TAT)
COMPANY/AGENCY: Ecology and Environment, Inc.
RECIPIENT: J. Chris Petersen, Deputy Project Officer, U.S. EPA Region 6
DOCUMENT TYPE: Report
DOCUMENT TITLE: Technical Assistance Report - Project Support for Proposed Removal Actions at American Creosote site

DOCUMENT NUMBER: 001581 - 001583
DOCUMENT DATE: 04/06/89
NUMBER OF PAGES: 3
AUTHOR: Robert A. Matthews
COMPANY/AGENCY: McKenna, Conner & Cuneo Law Firm
RECIPIENT: Buddy Parr, U.S. EPA Region 6
DOCUMENT TYPE: Correspondence
DOCUMENT TITLE: Re: In the Matter of Stallworth Timber Co., Inc., Respondent, Regarding American Creosote Site; financial inability to fully cooperate with Administrative Order Docket Number CERCLA-VI-04-89

ADMINISTRATIVE RECORD INDEX

INTERIM

SITE NAME: American Creosote Site
SITE NUMBER: IAD 000239814

DOCUMENT NUMBER: 001584 - 001586
DOCUMENT DATE: 04/06/89
NUMBER OF PAGES: 3
AUTHOR: Robert A. Matthews
COMPANY/AGENCY: McKenna, Conner & Cuneo
RECIPIENT: Buddy Parr, Cost Recovery Section, U.S. EPA Region 6
DOCUMENT TYPE: Letter
DOCUMENT TITLE: Re: Stallworth Timber Co. - Administrative Order; Stallworth Timber Co. is willing to cooperate with EPA, however, Stallworth Timber Co. is financially incapable of funding the cleanup

DOCUMENT NUMBER: 001587 - 001587
DOCUMENT DATE: 04/11/89
NUMBER OF PAGES: 1
AUTHOR: H.J. Parr, Chief, Cost Recovery Section
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: Billy Thames, General Manager, Stallworth Timber Company
DOCUMENT TYPE: Correspondence
DOCUMENT TITLE: Re: Refusal by Stallworth Timber Company to comply with Administrative Order issued to conduct removal actions at site

DOCUMENT NUMBER: 001588 - 001601
DOCUMENT DATE: 06/23/89
NUMBER OF PAGES: 14
AUTHOR: TAT
COMPANY/AGENCY: Ecology and Environment, Inc.
RECIPIENT: J. Chris Petersen, Deputy Project Officer, U.S. EPA, Region 6
DOCUMENT TYPE: Report
DOCUMENT TITLE: Special Projects Report - "Notice of Public Availability" of the Administrative Record on American Creosote Site, Winnfield, Louisiana

DOCUMENT NUMBER: 001602 - 001606
DOCUMENT DATE: 07/26/89
NUMBER OF PAGES: 5
AUTHOR: Gregory E. Fife, OSC
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: Robert E. Layton, Jr., P.E., Regional Administrator, U.S. EPA Region 6
DOCUMENT TYPE: Action Memorandum
DOCUMENT TITLE: Re: Request for ceiling increase of \$467,700 to continue removal action at American Creosote site

ADMINISTRATIVE RECORD INDEX

INTERIM

SITE NAME: American Creosote Site
SITE NUMBER: LAD 000239814

DOCUMENT NUMBER: 001607 - 001628
DOCUMENT DATE: 09/13/89
NUMBER OF PAGES: 22
AUTHOR: Ann L. Looney Jarboe, Region 6, Technical Assistance Team (TAT)
COMPANY/AGENCY: Ecology and Environment, Inc.
RECIPIENT: Greg Fife, OSC, U.S. EPA Region 6
DOCUMENT TYPE: Technical Report
DOCUMENT TITLE: Removal Report - American Creosote Site

DOCUMENT NUMBER: 001629 - 001637
DOCUMENT DATE: 02/26/90
NUMBER OF PAGES: 9
AUTHOR: Charles A. Gazda, Chief, Emergency Response Branch
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: Sam Becker, Chief, Superfund Enforcement Branch, U.S. EPA Region 6
DOCUMENT TYPE: Memorandum
DOCUMENT TITLE: Re: Enclosure of After Action Memorandum - American Creosote, Site ID #G3

DOCUMENT NUMBER: 001638 - 001658
DOCUMENT DATE: 06/12/90
NUMBER OF PAGES: 21
AUTHOR: Troy M. Naquin, Region 6, TAT
COMPANY/AGENCY: Ecology and Environment, Inc.
RECIPIENT: Greg Fife, OSC, U.S. EPA Region 6
DOCUMENT TYPE: Technical Report
DOCUMENT TITLE: Site Assessment Report - American Creosote Site, attachments include location maps and photodocumentation

DOCUMENT NUMBER: 001659 - 001667
DOCUMENT DATE: 06/25/91
NUMBER OF PAGES: 9
AUTHOR: Allyn M. Davis
COMPANY/AGENCY: Hazardous Waste Management Division, U.S.EPA Region 6
RECIPIENT: Mr. William Jacob Shuler, Jr.
DOCUMENT TYPE: 104(e) Letter
DOCUMENT TITLE: Letter requesting information regarding the American Creosoting Site

ADMINISTRATIVE RECORD INDEX

INTERIM

SITE NAME: American Creosote Site
SITE NUMBER: LAD 000239814

DOCUMENT NUMBER: 001668 - 001675
DOCUMENT DATE: 06/25/91
NUMBER OF PAGES: 8
AUTHOR: Allyn M. Davis
COMPANY/AGENCY: Hazardous Waste Management Division, U.S. EPA Region 6
RECIPIENT: John Ball
DOCUMENT TYPE: 104(e) Letter
DOCUMENT TITLE: Letter requesting information relating to the American Creosoting Site

DOCUMENT NUMBER: 001676 - 001677
DOCUMENT DATE: 12/12/91
NUMBER OF PAGES: 2
AUTHOR: Robert A. Matthews
COMPANY/AGENCY: McKenna & Cuneo
RECIPIENT: John Dugdale, Esq., Office of Regional Counsel, U.S. EPA Region 6
DOCUMENT TYPE: Letter
DOCUMENT TITLE: Letter confirms Stallworth's financial inability to participate in removal activities. Due to Stallworth's financial position, Stallworth waives its rights to receive an EPA Special Notice.

DOCUMENT NUMBER: 001678 - 002029
DOCUMENT DATE: 01/31/92
NUMBER OF PAGES: 352
AUTHOR: William A. Koski, P.E., Deputy Project Manager
COMPANY/AGENCY: CDM Federal Programs Corporation
RECIPIENT: Burt Griswold, Remedial Project Manager, U.S. EPA Region
DOCUMENT TYPE: Cover Letter and Plan
DOCUMENT TITLE: Field Sampling Plan for Remedial Investigations/Feasibility Study

ADMINISTRATIVE RECORD INDEX

ADDENDUM

SITE NAME: AMERICAN CREOSOTE SITE

SITE NUMBER: LAD 000239814

INDEX DATE: 07/23/92

INTRODUCTION

Section 113(j)(1) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) provides that judicial review of any issues concerning the adequacy of any response action shall be limited to the administrative record which has been compiled for the site at issue.

Section 113(k)(1) of CERCLA, requires that the United States Environmental Protection Agency (Agency) establish administrative records for the selection of CERCLA response actions. The administrative record is the body of documents upon which the Agency based its selection of a response action must be documented thoroughly in the administrative record. The Agency must ensure that the record is a compilation of documents leading up to and reflecting the Agency's response decision.

In accordance with U.S. EPA Headquarters OSWER Directive 9833.3, Section 113(k) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended in 1986 by the Superfund Amendments and Reauthorization Act (SARA) the U.S. EPA is required to compile and make available to the public Administrative Records containing documents used to support response actions authorized under CERCLA and SARA. The Administrative Records are to be maintained at the relevant U.S. EPA Regional Offices as well as "at or near the facility at issue."

This Administrative Record File Index consists of information upon which the Agency based its decision on selection of response actions. It is a subset of information included in the site files. The records in this Administrative Record File Index have been arranged in chronological order (from the earliest date to the most recent date), based on the date of the corresponding document. Each document contained in the Administrative Record File has been stamped with sequential document numbers, to assist in the location of the document within the Record File.

This Administrative Record File Index has been compiled in accordance with OSWER Directive Number 9833.1a Interim Guidance on Administrative Records for Decisions on Selection of CERCLA Response Actions. This guidance reflects, to the extent practicable revisions being made to the National Contingency Plan (NCP).

* I. CHRONOLOGICAL LISTING *

ADMINISTRATIVE RECORD INDEX

ADDENDUM

SITE NAME: AMERICAN CREOSOTE SITE
SITE NUMBER: LAD 000239814

DOCUMENT NUMBER: 002030 - 002171
DOCUMENT DATE: 06/08/92
NUMBER OF PAGES: 142
AUTHOR: A. Siag and J.W. Lee
COMPANY/AGENCY: Acurex Environmental Corporation Incineration Research Facility
RECIPIENT: U.S. EPA Region 6 Site Files
DOCUMENT TYPE: Report
DOCUMENT TITLE: "Evaluating the Thermal Treatability of Contaminated Soils from the Popple and American Creosote Superfund Sites" (Superfund Technical Assistance Response Team Screening Tests)

DOCUMENT NUMBER: 002172 - 002360
DOCUMENT DATE: 06/26/92
NUMBER OF PAGES: 189
AUTHOR: Staff Consultants
COMPANY/AGENCY: CDM Federal Programs Corporation
RECIPIENT: U.S. EPA Region 6 Site Files
DOCUMENT TYPE: Remedial Investigation/Feasibility Study
DOCUMENT TITLE: Remedial Investigation/Feasibility Study Report - Volume 1 (Sections 1-8)

DOCUMENT NUMBER: 002361 - 002496
DOCUMENT DATE: 06/26/92
NUMBER OF PAGES: 136
AUTHOR: Staff Consultants
COMPANY/AGENCY: CDM Federal Programs Corporation
RECIPIENT: U.S. EPA Region 6 Site Files
DOCUMENT TYPE: Remedial Investigation/Feasibility Study
DOCUMENT TITLE: Remedial Investigation/Feasibility Study Report - Volume 2 (Sections 9-11)

DOCUMENT NUMBER: 002497 - 003210
DOCUMENT DATE: 06/26/92
NUMBER OF PAGES: 714
AUTHOR: Staff Consultants
COMPANY/AGENCY: CDM Federal Programs Corporation
RECIPIENT: U.S. EPA Region 6 Site Files
DOCUMENT TYPE: Remedial Investigation/Feasibility Study
DOCUMENT TITLE: Remedial Investigation/Feasibility Study Report - Volume 3 (Appendixes A-E)

ADMINISTRATIVE RECORD INDEX

ADDENDUM

SITE NAME: AMERICAN CREOSOTE SITE
SITE NUMBER: LAD 000239814

DOCUMENT NUMBER: 003211 - 003888
DOCUMENT DATE: 06/26/92
NUMBER OF PAGES: 678
AUTHOR: Staff Consultants
COMPANY/AGENCY: CDM Federal Programs Corporation
RECIPIENT: U.S. EPA Region 6 Site Files
DOCUMENT TYPE: Remedial Investigation/Feasibility Study
DOCUMENT TITLE: Remedial Investigation/Feasibility Study Report - Volume 4
(Appendix E)

DOCUMENT NUMBER: 003889 - 004339
DOCUMENT DATE: 06/26/92
NUMBER OF PAGES: 451
AUTHOR: Staff Consultants
COMPANY/AGENCY: CDM Federal Programs Corporation
RECIPIENT: U.S. EPA Region 6 Site Files
DOCUMENT TYPE: Remedial Investigation/Feasibility Study
DOCUMENT TITLE: Remedial Investigation/Feasibility Study Report - Volume 5
(Appendixes F-G)

DOCUMENT NUMBER: 004340 - 004341
DOCUMENT DATE: 07/13/92
NUMBER OF PAGES: 002
AUTHOR: Paul A. Karas, Task Manager
COMPANY/AGENCY: CDM Federal Programs Corporation
RECIPIENT: Robert Griswold, RPM, Superfund Branch, U.S. EPA Region 6
DOCUMENT TYPE: Correspondence
DOCUMENT TITLE: Re: Revised Feasibility Study (Volume 2 of 5) and minor changes and additions to other sections and appendices

DOCUMENT NUMBER: 004342 - 004369
DOCUMENT DATE: 07/13/92
NUMBER OF PAGES: 028
AUTHOR: David W. Charters, Ph.D. Environmental Response Team
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: U.S. EPA Region 6 Site Files
DOCUMENT TYPE: Report
DOCUMENT TITLE: "Wetland Delineation Report for the American Creosote Site"

ADMINISTRATIVE RECORD INDEX

ADDENDUM

SITE NAME: AMERICAN CREOSOTE SITE
SITE NUMBER: LAD 000239814

DOCUMENT NUMBER: 004370 - 004448
DOCUMENT DATE: 07/13/92
NUMBER OF PAGES: 079
AUTHOR: EPA Staff
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: U.S. EPA Region 6 Site Files
DOCUMENT TYPE: Raw Data
DOCUMENT TITLE: "Raw Data from Stabilization Treatability Study for American Creosote Works, Inc"

DOCUMENT NUMBER: 004449 - 004663
DOCUMENT DATE: 07/13/92
NUMBER OF PAGES: 215
AUTHOR: Staff Consultants
COMPANY/AGENCY: CDM Federal Programs Corporation
RECIPIENT: U.S. EPA Region 6 Site Files
DOCUMENT TYPE: Risk Assessment
DOCUMENT TITLE: "Risk Assessment for the American Creosote Site"

DOCUMENT NUMBER: 004664 - 004721
DOCUMENT DATE: 07/20/92
NUMBER OF PAGES: 058
AUTHOR: EPA Staff
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: U.S. EPA Region 6 Site Files
DOCUMENT TYPE: Report
DOCUMENT TITLE: "Ecological Risk Assessment for the American Creosote Site, Winnfield, LA"

DOCUMENT NUMBER: 004722 - 004743
DOCUMENT DATE: 07/22/92
NUMBER OF PAGES: 022
AUTHOR: EPA Staff
COMPANY/AGENCY: U.S. EPA Region 6
RECIPIENT: U.S. EPA Region 6 Site Files
DOCUMENT TYPE: Announcement for Proposed Plan
DOCUMENT TITLE: "EPA Announces Proposed Plan"