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Agency

Office of
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Remedial Response

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September 1989

EPA

Superfund Record of Decision:

Newsom Brothers/Old Reichhold, MS

50272-101

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Newsom Brothers/Old Reichhold, MS
First Remedial Action - Final

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16. Abstract (Limit: 200 words)

The 81-acre Newsom Brothers/Old Reichhold site is in Marion County, Columbia, Mississippi. The site is in a predominantly residential area and was used as a wood processing facility under several owners from 1936 until 1977, when a fire and explosion destroyed the facility. Site activities included producing tall oils, turpentine, calcium and zinc resinates, and polymerized and rubber resins. Furthermore, PCP was apparently mixed with diesel oil and sold, and xylenes were used in a number of processes. A State investigation in 1976 revealed that wastewater containing phenols, oil, and grease was discharging to a small creek. Further investigations resulted in EPA performing an immediate removal action in 1984, which included the removal of over 600 surface drums from the site and excavating and draining two ponds, one of which was subsequently filled with clean fill. Onsite buried drum areas were the target of another EPA removal action conducted in 1987-88. Approximately 3,900 drums were excavated and shredded, drum contents were disposed of offsite, and 1,920 tons of soil were removed. In addition there is an extensive system of concrete drains that served to collect and drain spilled wastes and rainwater that has an area of runoff of approximately 300,000 square feet. There is an estimated 650 cubic yards of bulk hazardous substances remaining onsite consisting of black tar-like waste material and a resin material in three excavations and in the drainage (Continued on next page)

17. Document Analysis a. Descriptors
Record of Decision - Newsom Brothers/Old Reichhold, MS
First Remedial Action - Final
Contaminated Media: soil, sediment, bulked wastes
Key Contaminants: VOCs (benzene, toluene, xylenes), other organics (PAHs, PCBs, PCP), metals

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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16. Abstract (Continued)

system. The primary contaminants of concern in the soil, sediment, and bulked wastes are organics including PAHs, PCBs, and PCP; and metals.

The selected remedial action for this site includes excavation and offsite disposal of 30,300 cubic yards of contaminated soil and 7,300 cubic yards of contaminated pond and creek sediment; excavation and offsite incineration of 650 cubic yards of tar-like waste material and any soil/sediment containing RCRA hazardous wastes, followed by offsite disposal; draining, filling, and capping onsite ponds; recontouring the site; and ground water monitoring for five years. The estimated present worth cost for this remedial action is $14,180,000, which includes an estimated present worth O&M cost of $520,225.

SUPERFUND FACT SHEET

NEWSOM BROTHERS/
OLD REICHHOLD COMPANY
COLUMBIA,
MARION COUNTY, MISSISSIPPI
December, 1989

INTRODUCTION

This fact sheet on the Newsom Brothers/Old Reichhold Co. Superfund site in Columbia, Mississippi, has been prepared by the Region IV Office of the U.S. Environmental Protection Agency (EPA). The purpose of this fact sheet is to update interested citizens and local officials on the current status of the cleanup project.

CURRENT STATUS - THE RECORD OF DECISION

The Record of Decision (ROD) for the Newsom Brothers site was signed by the EPA Region IV Regional Administrator on September 18, 1989. Activities at the Newsom Brothers site will be conducted under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, or "Superfund"), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA).

EPA has begun making arrangements for the cleanup of the site. This is called the Remedial Design/Remedial Action (RD/RA) phase of the project. The intent of the RD/RA is to implement the ROD.

Implementation of the ROD includes, off-site treatment and disposal of contaminated soil, sediment, and hazardous substances, at facilities approved under the Resource Conservation and Recovery Act (RCRA). Soil and sediment will be excavated and taken to an off-site facility for disposal. Hazardous substances will be treated at an off-site treatment unit prior to disposal. Careful screening of the waste will be performed to insure that the materials meet requirements for safe disposal. **MONITORING WILL BE CONDUCTED DURING THE REMEDIAL ACTION TO INSURE THE SAFETY OF RESIDENTS AND WORKERS ON AND NEAR THE SITE.**

CORRECTION TO ROD TABLE 4.5

The ROD as issued in September 1989 had a typographical error in Table 4.5. The new table contains the correct soil cleanup levels for the carcinogens (potential cancer causing compounds) benzene, chloroform, and pentachlorophenol. The error read micro-grams per kilogram (ug/kg) which should have been milligrams per kilogram (mg/kg).

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

NEWSOM BROTHERS/REICHHOLD CHEMICAL COMPANY SITE
COLUMBIA, MISSISSIPPI

Prepared By

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV
ATLANTA, GEORGIA

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Newsom Brothers/Reichhold Chemical Company
Columbia, Marion County, Mississippi

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Newsom Brothers site, Columbia, Mississippi, and is developed in accordance with CERCLA, as amended by SARA, and to the extent practicable, the National Contingency Plan. This decision is based on the administrative record for the site. The index identifies the items that comprise the administrative record upon which the selection of the remedial action is based. The major items that were used in the decision process were:

- -Remedial Investigation Report, Phase I, Newsom Brothers site
- -Remedial Investigation Report, Phase II, Newsom Brothers site
- -Endangerment Assessment Report, Newsom Brothers site
- -Feasibility Report, Newsom Brothers site
- -Responsiveness Summary

-State of Mississippi Recommendations

-Community Acceptance

-Staff Recommendations and Reviews

The State of Mississippi has concurred on the selected remedy.

DESCRIPTION OF THE REMEDY

This remedy is the final remedial action for the site. The function of this remedy is to reduce the risks associated with exposure to contaminated on-site soils, sediments and waste materials.

The major components of the selected remedy include:

- No remedial action is planned for groundwater; monitoring will be continued on-and off-site for five years
- Black tar-like waste material will be removed from the site and rendered non hazardous through thermal destruction before landfilling at an approved RCRA facility.
- Contaminated soils and sediments will be excavated and removed from the site and disposed of at an approved facility.
- On-site ponds will be filled and capped and the site will be recontoured to prevent runoff and ponding of water.

DECLARATION

The selected remedy is protective of human health and the environment, attains requirements that are applicable or relevant and appropriate, and is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. However, because treatment of a portion of the material was not found to be practicable for the site this remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. Since no hazardous substances will remain onsite above health-based levels, and no onsite disposal will occur, the five year facility review will not apply to this action.

September 18, 1989
Date

Lee A. Dehlmann, II for
Greer C. Tidwell
Regional Administrator

RECORD OF DECISION

REMEDIAL ALTERNATIVE SELECTION

NEWSOM BROTHERS/REICHHOLD CHEMICAL COMPANY SITE

COLUMBIA, MISSISSIPPI

Prepared By

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV
ATLANTA, GEORGIA

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COLUMBIA, MISSISSIPPI

1.0 Introduction

The Newsom Brothers/Reichhold Chemical Company site was proposed for inclusion on the National Priorties List (NPL) in 1984. In 1986, the Environmental Protection Agency (EPA) finalized the site's inclusion on the NPL. The site has been the subject of a Remedial Investigation (RI) and Feasibility Study (FS) performed for the EPA by its contractor Camp, Dresser and McKee (CDM). Regulatory direction has been provided by Region IV throughout the Remedial RI/FS. The RI report, which examines air, sediment, soil, surface water and groundwater contamination at the site, was issued November 21, 1988. The FS, which develops and examines alternatives for remediation of the site was issued in draft form to the public January 24, 1989 and was finalized on March 30, 1989.

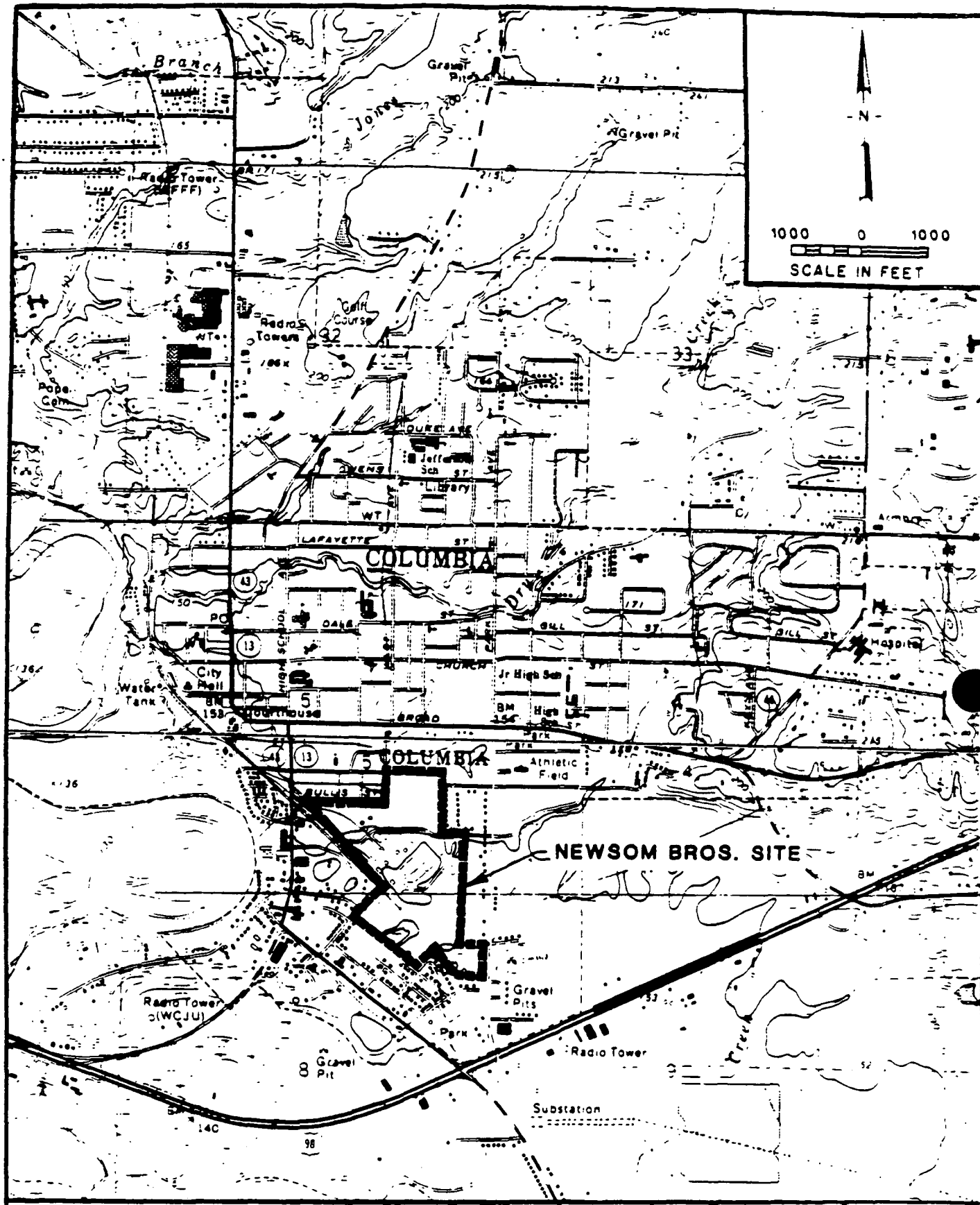
This Record of Decision has been prepared to summarize the remedial alternative selection process and to present the recommended remedial alternative.

1.1 Site Location And Description

The Newsom Brothers site is located in Marion County, Columbia, Mississippi at coordinates 31°14'42" North latitude and 89°49'37" West longitude (Figure 1-1). The 81-acre site is bordered on the north by residences along Bullis, Wade, and Pearl Streets, and on the east by residences along Chinaberry and Park Avenues. The Illinois Central Gulf Railroad parallels most of the site's southwestern border. Further to the southwest, across the railroad, lies a moderately developed commercial area. Scattered residences are also located to the south. A chain-link fence surrounds the entire facility.

The site's main processing facilities were located in the west-central portion of the site (Figure 1-2). Of significance are an extensive system of concrete drains that apparently served to collect and drain spilled wastes and rainwater, two 100,000-gallon storage tanks which reportedly contained diesel oil, several smaller tanks and boilers, one incinerator, and one boiler building used to heat "Dowtherm." The extent of the area of runoff (Old Processing Area in Figure 1-2) drained by the concrete drainage system is approximately 300,000 ft^2.

North of the processing area is a 20-acre field sparsely covered with short grass. The southeast quadrant of the site contains three ponds (North,



REM II

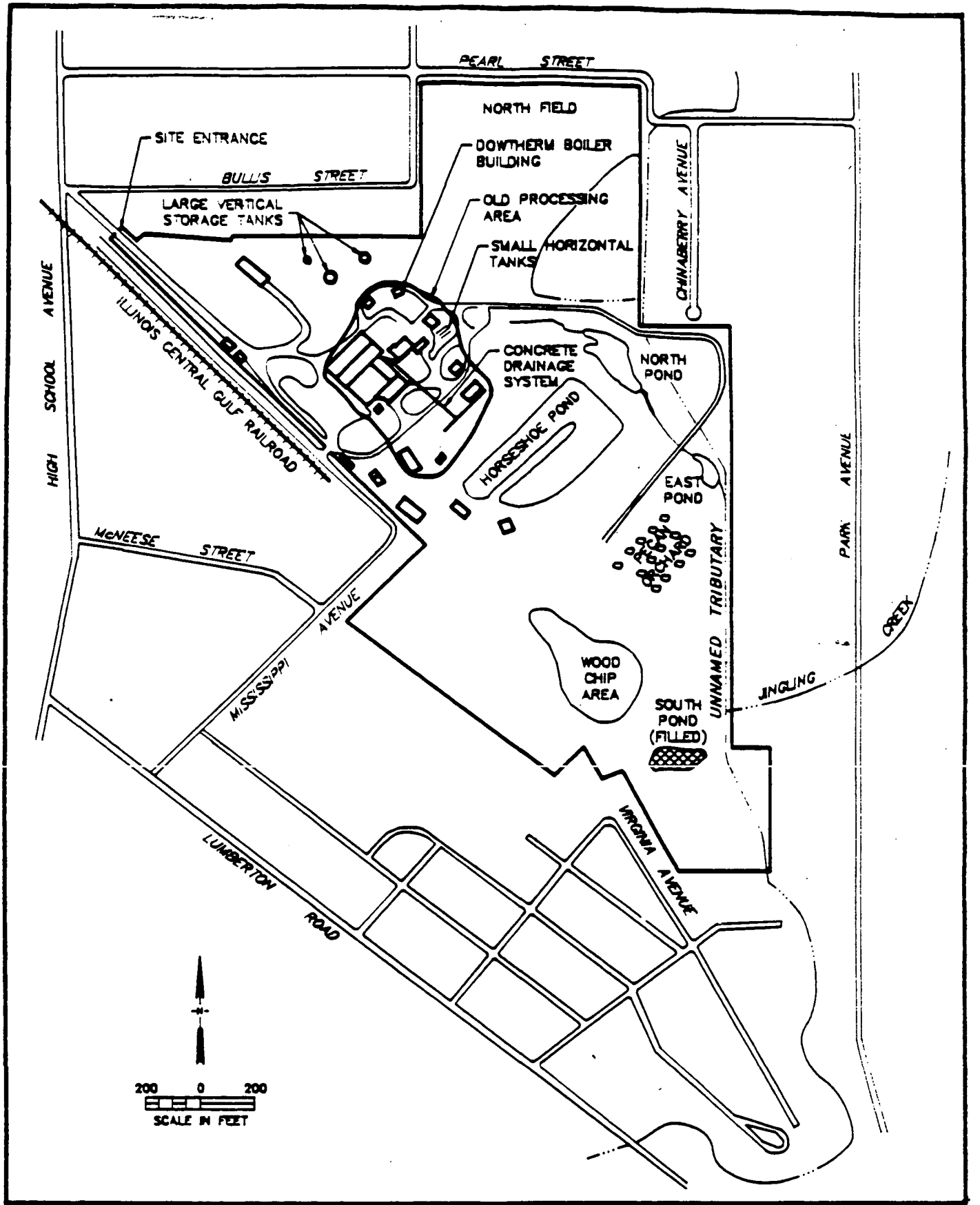
SITE MAP

FIGURE NO.

1-1

NEWSOM BROTHERS SITE

COLUMBIA, MISSISSIPPI



REM II

SITE FEATURES MAP

NEWSOM BROTHERS SITE

COLUMBIA, MISSISSIPPI

FIGURE NO.

1-2

East and Horseshoe), a pecan orchard, and the remnants of a wood chip pi
A fourth pond located in the extreme south was filled in 1984 during an
emergency response action.

Several areas of buried material were identified during the remedial investigation of the site. Buried drums were found in the North Pond and Pecan Orchard areas. EPA returned to the site in November 1987 to remove these drums. During this removal action, additional areas of buried materials were discovered and investigated through additional field work.

1.2 Site History

From the early 1930s until 1943, J. J. White Lumber Company operated a sawmill on the Newsom Brothers Site. The Southern Naval Stores Company, Limited, concurrently ran an operation called Naval Stores on various parcels of the site, from 1936 to 1951. Naval Stores produced wood derivatives such as resin, turpentine, pine oil, and tall oil. This company appears to have been owned and operated by several people, but the plant consistently produced the same wood-derived products. From the 1950s until 1965, the site was owned and operated by Leach Brothers Inc. and the operation became known as Southern Naval Stores, Division of Leach Brothers, Inc. Reasor Chemical Corporation owned the site from 1965 to 1972, and Chem-Pro International Inc. owned it from 1972 to 1974.

Southern Naval Stores Company, Limited, Reasor Chemical Corporation, and Chem-Pro International, Inc. ran similar production processes. These involved grinding pine stumps and digesting them with a boiling liquor of sodium hydroxide and sodium sulfite. The products were tall oils, which are 35 to 40 percent resin and 50 to 60 percent fatty acids. Turpentine was also extracted from the pine stumps using naptha. In addition, Reasor Chemical Corporation specifically manufactured calcium and zinc resinates, polymerized resin, and rubber resins.

In January 1975, Reichhold Chemicals, Inc. (Reichhold) took over ownership and operations at the site. Details of operations are sketchy, but pentachlorophenol (PCP) was apparently mixed with diesel oil, and sold. The PCP and diesel oil were mixed and heated using Dowtherm as a heat transfer medium. In other operations, boron trifluoride was mixed with phenol and di-isobutylene to form octal phenol resin. Xylenes were also used in number of processes. An unlined horseshoe shaped pond was used for cooling the process discharge.

In April 1976, before Reichhold Chemicals abandoned operations at the site, the Mississippi Air and Water Pollution Control Commission investigated a reported fish kill in a small creek downstream from the Reichhold Chemicals

facility. Through the investigation, the state commission discovered that the company had no discharge permit yet was discharging wastewater containing phenols, oil, and grease into a nearby stream.

Reichhold Chemicals continued operations at the property until March 1977, when an explosion and fire in one of the boiler units destroyed most of the processing facility. The Company subsequently abandoned the site. Employees of the George Byrd Bulldozer Company have filed depositions reporting that they used earth moving equipment to dig large holes in which Reichhold Chemicals personnel buried many drums. In their deposition the bulldozer company employees reported that this burial took place in five separate areas on the Newsom Brothers Site. A geophysical survey conducted by CDM, November 1986 through January 1987, located two burial sites.

In 1980 and 1981, ownership of the 81-acre site transferred to R. R. Newsom, Sr. and R. R. Newsom, Jr. (owners of the New-Cros Construction) Company and Mr. William Earl Stogner (owner of Stogner Trucking Company). The Newsoms' owned a total of 49 acres and Mr. Stogner owned 32 acres of the site property Both Stogner and the Newsoms' had buildings on the property from which they operated their respective trucking and construction businesses. A furniture shop currently rents and operates from one of the buildings owned by Mr. Stogner. Only a few of the original Reichhold Chemicals buildings currently remain on the property; some were destroyed in the March 1977 explosion and fire and others dismantled by Reichhold upon leaving the site.

In November 1988 Mr. Stogner and the Newsoms' were awarded damages as a result of a lawsuit against Reichhold Chemicals. Reichhold Chemicals reassumed ownership of the property at that time.

1.3 Site Activities

In January 1984, the Mississippi Department of Natural Resources (MDNR) Bureau of Pollution Control (BPC) received a letter from an area resident who is a former federal Occupational Safety and Health Administration inspector. In his letter, the former inspector warned of possible contamination to the Columbia city water supply system (consisting of four groundwater wells about 1,200 feet northeast of the site) he felt was resulting from pollution at the Newsom Brothers Site. In February 1984, BPC sampled two of the city's water supply wells, the city water distribution system, and several locations at the Newsom Brothers Site (including sludge from the old plant sump, water from the old treatment pond, soil in a drum disposal area, and onsite well water). Concurrent with the BPC study, EPA's Environmental Services Division (ESD) also sampled the city water supply wells. EPA and BPC detected low levels of several volatile organic chemicals, including benzene, acetone, methyl ethyl ketone, and chloroform in the city water supply wells. Although the city wells supply water to almost all Columbia residents, EPA was able to locate 13 private wells in

the south Columbia area. Following analysis of the results of the EPA and BPC studies, EPA conducted an additional sampling investigation of the site to determine the extent of the contamination problem. In March 1984, EPA's Field Investigation Team (FIT) collected samples from area private wells, the Columbia city supply wells, and onsite soils, sediments, streams, and other private wells in the area. BPC's sampling efforts revealed the presence of dioxins (not the 2, 3, 7, 8-tetrachlorodibenzo-dioxin isomer) in the soil at the former chemical plant site, but at levels that the Centers for Disease Control considered not to pose a health threat to community residents. EPA performed an immediate removal action that involved removing over 600 surface drums and partial drums from the site and draining the North and South ponds. EPA filled the South Pond with clay and graded it.

While EPA's immediate removal action was proceeding, the Mississippi BPC received reports from local residents who had become ill after eating fish caught in the Horseshoe Pond. After receiving these reports, fish tissue samples were taken by the Mississippi BPC, no hazardous constituents were revealed. After EPA completed its immediate removal action and left the site in April 1984, several Columbia residents reported to the BPC that some drums remained at the site. BPC investigated and arranged for the removal and disposal of those drums.

Based on three sets of samples taken by the BPC in February 1984, the state attempted to locate the source of volatile organic contamination detected in the city wells. A comparison of the contaminants found in the city water supply wells and the pollutants found on the Newsom Brothers Site led the BPC to conclude that the Newsom Brothers Site was not the source of the contamination. The groundwater flow, which runs east to west, or from the direction of the wells toward the site, supported the BPC's tentative conclusion. Further sampling and investigation in 1984 led the BPC to believe that the city well contamination was caused by several leaking underground gasoline storage tanks near the wells. The BPC removed several tanks in 1984 and tested soil and groundwater near the tanks. Test results revealed the presence of gasoline constituents, including benzene, which was the contaminant of greatest concern in the two contaminated city wells.

Later in 1984, the Newsom Brothers Site was proposed by EPA for inclusion on EPA's National Priorities List (NPL). In 1986, EPA finalized the site's inclusion on the NPL.

In 1985, the BPC installed nine monitor wells in the area around the city's water treatment plant. In June 1985, the BPC sampled those wells and found significant quantities of the same chemicals originally found in the city water supply in only one well.

In early 1986, the current property owners (R. R. Newsom, Sr., R. R. Newsom, Jr., and William Earl Stogner) filed and $100 million federal lawsuit against Reichhold Chemicals, claiming that Reichhold knowingly sold them contaminated land. To support the suit, the property owners hired a chemical testing company to sample chemicals found in buried drums at the site. The test results reported by the chemical testing company in the summer of 1986 showed that the drums contained benzene, toluene, and xylene, in addition to other pollutants.

Onsite drum burial areas identified during the Phase I RI were the target of an EPA removal action conducted from November 2, 1987 through February 7, 1988. The Roy F. Weston, Inc. Technical Assistance Team (TAT) performed the removal under contract with EPA. During the removal action, approximately 3,900 drums were excavated and shredded. Four major areas of drum burial and an additional number of smaller drum burial pits were identified through the geophysical surveys performed by TAT during the removal action.

An estimated 1,640 tons of contaminated soil were removed from the North Pond Area and 280 tons of soil removed from the Wood Chip Area. During the removal of drums from the North Pond Area, approximately 775 nearby residents were relocated for two days to entirely eliminate any potential hazard associated with the removal action. The drums were moved to a central area of the site in the vicinity of the Wood Chip Area and shredded. The waste contained in the drums was disposed in bulk form at an offsite location. Several other areas containing buried materials were identified onsite, including two steel tanks in the North Field, chemical burial areas in the North Field, pecan orchard, and Wood Chip Areas, and trash disposal areas in the Wood Chip Area.

2.0 Enforcement Analysis

The Newsom Brothers/Reichhold Chemicals site was placed on the NPL in June 1986. EPA determined that Southern Naval Stores, Inc., Leach Brothers, Inc., Reasor Chemicals Co., Reichhold Chemical Co., R.R. Newsom and W.E. Stogner were potentially reponsible parties (PRP) for the contamination of the site. The PRP's were sent notice letters to allow them the opportunity to conduct the site related remedial investigations and feasibility studies (RI/FS). Since all PRP's declined to participate EPA assumed lead responsibility for the site. With the recent completion of RI/FS activities at the site EPA has begun negotiations with Reichhold Chemicals on a Consent Decree for a Remedial Design/Remedial Action (RD/RA) for the site. If agreement can be reached, the Consent Decree will be signed by the participants shortly after approval of this Record of Decision and will be submitted to the appropriate federal district court for entry.

Additionally, EPA and the Department of Justice have entered into settlem negotiations with Reichhold Chemicals for recovery of site related costs incurred by EPA. Reichhold has submitted a payment of $1 million to EPA for partial reimbursement of expenses incurred to date. Notice letters will be sent to all identified PRP's to allow them the opportunity to participate in the RD/RA stage of the cleanup.

3.0 Current Site Status

3.1 Hydrogeologic Setting

The Newsom Brothers site is located over the Pearl River alluvium, within the Coastal Plain Province of Mississippi, a thick blanket of southwestward sloping sediments. In Marion County, the sediments are greater than 30,000 feet thick. Near the base of the sediments, a thick deposit of salt (the Louann Salt) is present, and in places has formed upward piercing diapirs. These salt domes have been the target of oil and gas exploration throughout southern Mississippi. Above the salt bed is a varying sequence of sandstones, shales, clays and limestones, that extends upward to the surface.

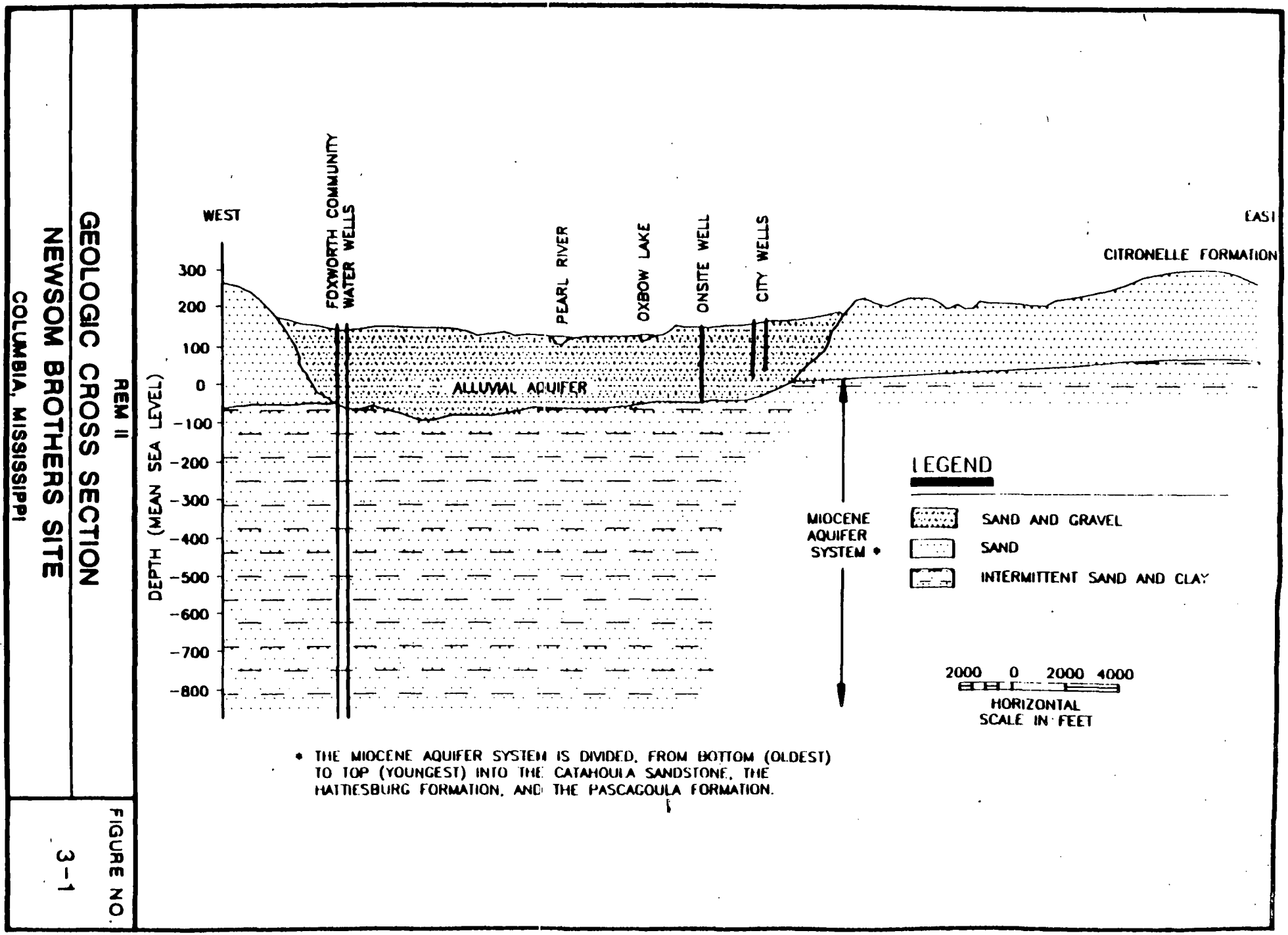
The occurrence of fresh groundwater in Marion County is limited to the upper 1,500 feet. Below this depth the water is saline. The major aquifers within the fresh water zone occur within Miocene and younger sediments.

The Columbia water supply wells produce groundwater from the alluvial aquifer associated with the Pearl River. According to the electric logs of two of the city supply wells, the alluvial deposit is approximately 146 feet thick, and is underlain by clay, probably of the Graham Ferry and/or Pascagoula Formation (Figure 3-1). One of the city wells, located 1,200 feet east of the site, encountered 100 feet of clay prior to termination. The well did not completely penetrate the clay layer. Two electric logs of the nearby Foxworth Community water supply wells show the clay underlying the alluvial aquifer to be about 200 feet thick. Therefore, on the basis of these limited data, the clay appears to be laterally consistent, and is believed to confine and protect the underlying Miocene aquifer system.

Since the Columbia city well field is located approximately 1,200 feet to the northeast of the site a series of aquifer performance tests were performed to determine if groundwater from beneath the Newsom Brothers site could be drawn into the city wells. The tests showed that the groundwater beneath the site flows to the west and away from the city wells and would not be drawn back into the city wells under the worst case scenario.

3.2 Groundwater

A total of 34 monitoring wells were installed on and off of the



REM II

GEOLOGIC CROSS SECTION

NEWSOM BROTHERS SITE

COLUMBIA, MISSISSIPPI

FIGURE NO. 3-1

site (Figure 3-2) to sample groundwater in the shallow and deep zones of the alluvial aquifer. Some organic compounds were detected in samples from few of the wells; however, most were detected at low estimated concentrations near detection limits. No contaminant plume was identified.

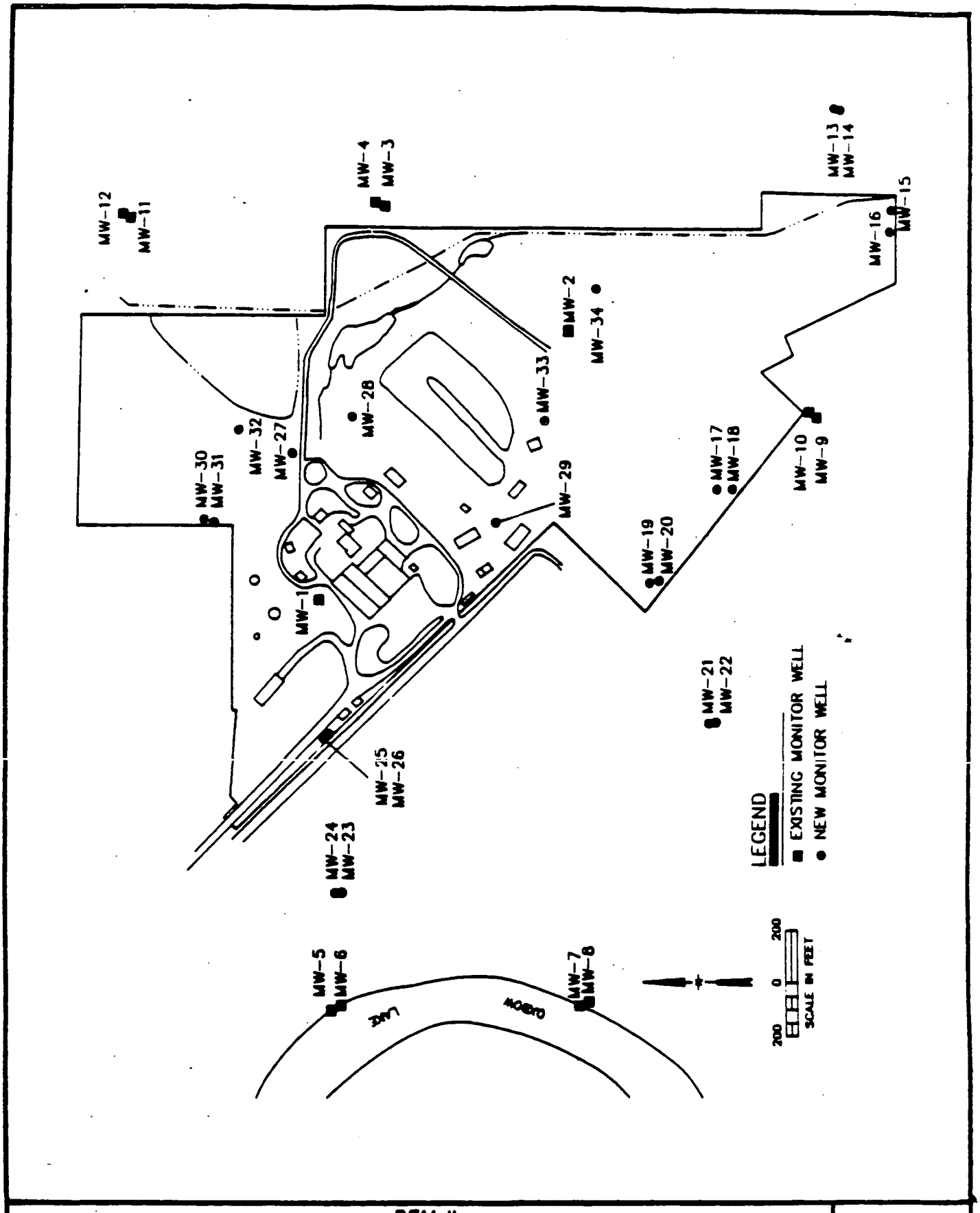
Both temporary and permanent groundwater monitor wells were installed during the Phase I RI at the Newsom Brothers Site. Sampling conducted at the permanent monitor wells showed that no chemicals were detected above National Primary Drinking Water Standards. One onsite temporary monitor well contained concentrations of toluene which exceeded the proposed Maximum Concentration Level Goals (MCLGs). Due to the observations in this temporary monitor well, substantial additional groundwater monitor well installation was proposed for the site during the Phase II RI.

Sampling and analysis of the new permanent groundwater monitor wells installed during the Phase II RI showed concentrations of organic chemicals in 3 of 27 sampled wells. The organics detected were benzene, ethyl benzene, 1,1,1-trichloroethane, di-n-butylphthalate, trimethylbicycloheptanone, and bis(2-ethyl hexyl)phthalate. Contract Laboratory Program (CLP) analyses detected benzene in monitor wells MW-01 (5 ug/l) and MW-17 (1 ug/l-estimated); Ethylbenzene (1 ug/l-estimated), 1,1,1-trichloroethane (3 ug/l-estimated), D-n-butyl pthalate (3 ug/l-estimated), and trimethylbicycloheptanone (700 ug/l estimated) were also detected in MW-17. Bis(2-ethylhexyl) pthalate (a common laboratory contaminant) was detected in MW-01. A few other miscellaneous organic compounds were tentatively detected at low estimated values.

The inorganic chemicals detected above background levels during sampling of the new wells were aluminum, barium, beryllium, calcium, copper, iron, lead, magnesium, manganese, mercury, selenium, sodium, and vanadium. Lead was the only inorganic contaminant detected above MCLs. Lead was detected in three monitoring wells (MW-19 (120 ug/l), MW-23 (84 ug/l) and MW-27 (160 ug/l). However, since the sampling of drilling muds used during well installation revealed elevated lead levels, lead detected in well samples is not considered to be an indication of lead contamination in groundwater but is a result of residual lead contributed by the drilling muds.

3.3 Surface Water

The predominant surface water feature in proximity to the site is the Pearl River. The Pearl River and its tributaries drain about 6,630 square miles of central and southern Mississippi. The river flows north to south along the west side of the city of Columbia and empties into the Gulf of Mexico near Bogalusa, Louisiana. From 1938 to 1968, the average discharge of the Pearl River was approximately 8,693 cubic feet per second (cfs). Some



REM II

MONITOR WELL LOCATIONS

NEWSOM BROTHERS SITE

COLUMBIA, MISSISSIPPI

FIGURE NO.

3-2

flooding is common, partly due to the relatively flat and low-lying alluvial plains. On April 9, 1938, the river discharge reached 72,600 cfs. During flooding events, large portions of the site may be underwater for an extended period of time. Flooding occurs due to rising water levels in nearby low areas and overflowing of local streams.

Surface water was sampled both onsite (concrete drainage system and onsite ponds) and offsite (unnamed tributary and Jingling Creek) during the Phase I RI. Mercury detected at both onsite and offsite locations, was the only contaminant exceeding the Mississippi Ambient Water Quality Criteria (MAWQC) of 0.2 ug/l. However, only one sampling point, in Jingling Creek, contained mercury at a concentration (2.3 ug/l) exceeding the 2 ug/l. All other detected mercury values ranged from 0.1 ug/l to 0.5 ug/l, and all values were reported as estimated and with only presumptive evidence of the material. Therefore, no clear indication of surface water contamination could be drawn from these samples.

3.4 Sediment

Indicator chemicals were identified in the Phase I RI during sampling of onsite sediments. Copper, phenols, ethyl benzene and total xylenes were detected in sediment samples taken from the concrete drainage system. Sediment in the North Pond, the drainage ditch immediately upgradient from the North Pond, and the East Pond contained elevated levels of a variety of organic chemicals. The North and East Ponds were sampled again during the Phase II RI to confirm the results of Phase I. Sediment samples collected from Jingling Creek upstream and downstream from the site did not contain detectable levels of contaminants of concern. Results of sediment sampling are presented in Table 3-1.

3.5 Soil

Over 300 soil samples have been taken at various depths across the site (Figure 3.3). The samples were taken at one foot, five feet, and some at 10 feet. A variety of soil contaminants were detected at scattered locations at the site during the Phase I RI, conducted in late 1986 to early 1987. The inorganic chemicals most frequently detected in the soil were beryllium, cobalt, and nickel. The organic chemicals frequently detected were, xylenes, Arochlor 1254 and polycyclic aromatic hydrocarbons (PAHs). Based on these results, a soil sampling and analysis program was included in the Phase II RI conducted in 1988.

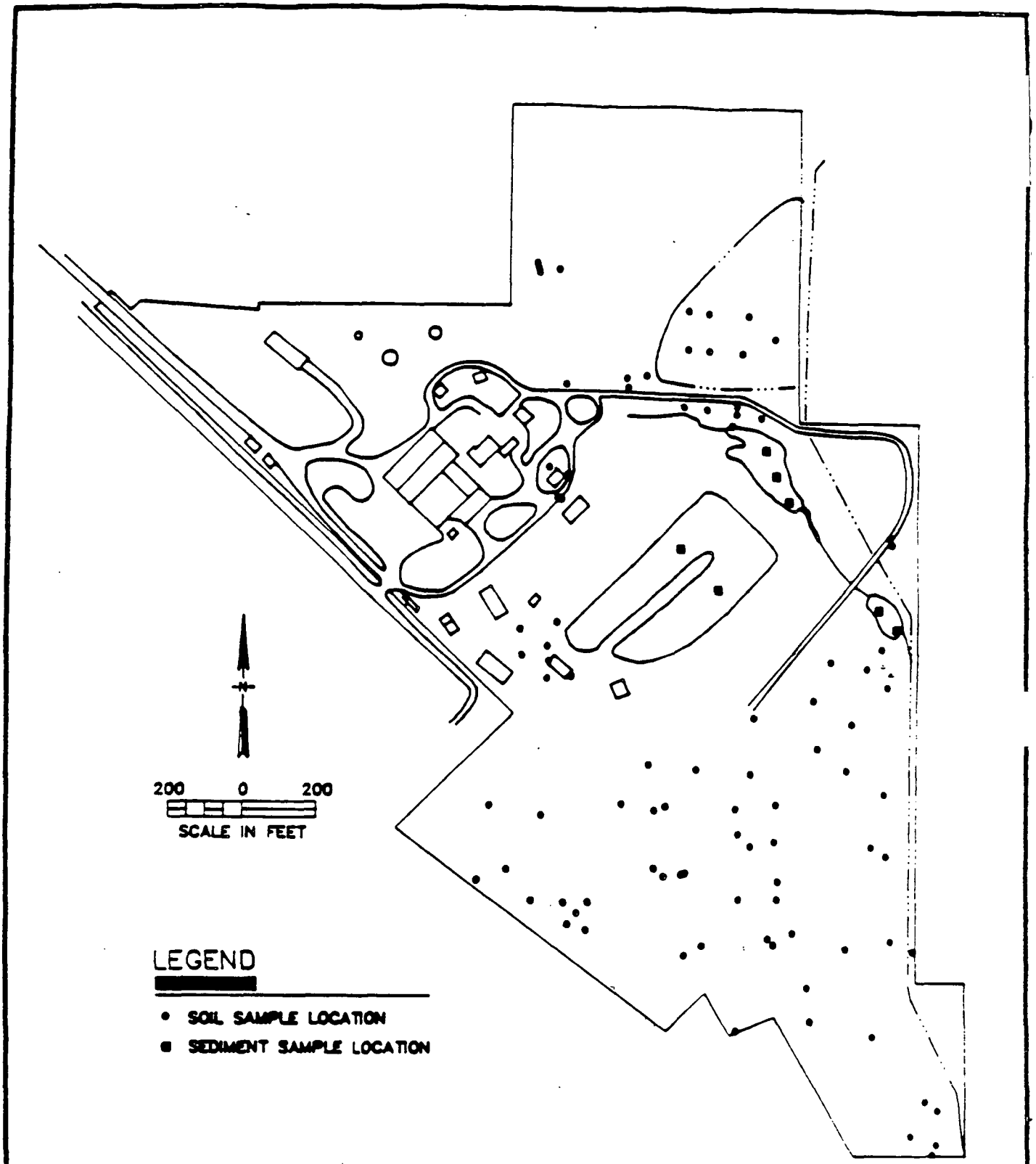
Soil sampling at the Newsom Brothers Site during the Phase II RI indicated a wide variety of organic and inorganic chemicals present at various areas of the site. These chemicals were generally found in isolated samples, rather than at consistent locations throughout the site. The major organic

TABLE 3-1

SEDIMENT SAMPLING DATA
REMSON BROTHERS SITE
COLUMBIA, MISSISSIPPI

Chemical	North Pond	East Pond	Horseshoe Pond	Concrete Drainage System
Compound	ug/kg	ug/kg	ug/kg	ug/kg
Phenol	62	ND	ND	
Pentachlorophenol	117	ND	ND	9,000
Toluene	122	ND	ND	
Xylenes	80,000	ND	ND	1,300,000
PCB	10,000	ND	ND	
Ethyl Benzene	7,700	ND	ND	210,000
Benzo (b) Flouranthene	—	37,500	16,300	—
2 Methylnapthalene	—	200,000	—	—

* ND - This compound analyyzed for but not detected.



REM II

SOIL AND SEDIMENT SAMPLE LOCATIONS

NEWSOM BROTHERS SITE

COLUMBIA, MISSISSIPPI

FIGURE NO. 3-3

chemicals detected in soils were toluene, ethyl benzene, phenol, pentachlorophenol, and xylenes. The major inorganic chemicals were barium, chromium, copper, nickel, and vanadium. The frequency of detection and concentrations of chemicals of concern in soil samples collected at the site are presented in Table 3.2

3.6 Hazardous Substances

Hazardous substances were identified onsite and sampled during the RI. Materials observed in drums and onsite storage tanks were removed during the EPA expedited removal action. The estimated 650 cubic yards of bulk hazardous substances remaining onsite consists of black tar-like waste material and a resin material which is found in three locations onsite and in the concrete drainage system (Figure 3-4). This material was sampled both during the Phase I and Phase II RI and was found to contain high levels of a variety of organic compounds. The concentrations of chemicals found in the drummed material and waste material is listed in Tables 3-3 and 3-4.

3.7 Site Risk/Endangerment Assessment

An endangerment assessment (EA) was performed for the Newsom Brothers site to evaluate potential impacts on human health and the environment in the absence of further remedial action. The analytical results of the samples collected from the various media at the site were reviewed to determine which of the chemicals detected are potentially site related and of potential concern at the site. Chemicals detected frequently and present at concentrations above those considered to occur naturally (background) were chosen as chemicals of potential concern for the site and were assessed for overall threat to human health and the environment. These chemicals are listed in Table 3-5.

3.7.1 Human Exposure Pathways

Potential pathways by which human populations could be exposed to chemicals of potential concern currently and in the future were identified and selected for evaluation. Identification and selection of pathways was based primarily on considerations of chemical migration and current or hypothetical future land use conditions of the site and surrounding area. The exposure pathways selected for evaluation under current land use conditions are the following:

- direct contact (incidental ingestion and dermal absorption) with contaminated soil by workers and trespassers (children) at the site;
- inhalation by on-site workers and residents bordering the site, of vapors emitted from the soil
- direct contact with wastes (incidental ingestion and dermal absorption) by workers and trespassers (children) onsite;

TABLE 3-2

CHEMICALS OF POTENTIAL CONCERN
IN ONE-FOOT SOIL SAMPLES FROM WHOLE SITE
NEWSOM BROTHERS SITE
COLUMBIA, MISSISSIPPI

Chemical	Frequency of Detection	CONCENTRATION (mg/kg) Geometric Mean	Maximum	Background
ORGANICS				
Noncarcinogenic PAHs				
Benzo(g,h,i)perylene	3/68	0.020	12	<0.33
Naphthalene	4/68	0.019	1	<0.33
2-methylnaphthalene	3/37	0.42	3.2	<0.33
Acenapthene	2/68	0.018	0.22	<0.33
Fluoranthene	4/68	0.019	4.7	<0.33
Pyrene	6/68	0.022	3.5	<0.33
Anthracene	2/68	0.018	0.30	<0.33
Phenanthrene	3/68	0.019	1.3	<0.33
Total:	10/68	0.54	26	—
Carcinogenic PAHs				
Indeno(1,2,3,cd)pyrene	3/68	0.020	2.3	<0.33
Chrysene	4/68	0.019	3.1	<0.33
Benzo(a)anthracene	3/67	0.020	2.2	<0.33
Benzo(b and/or k) fluoranthene	2/68	0.02	5.0	<0.33
Benzo(a)pyrene	3/68	0.020	1.4	<0.33
Dibenz(a,h)anthracene	1/68	0.018	0.37	<0.33
Total:	5/68	0.12	14	—
Toluene	39/131	0.054	34	<0.005
Ethylbenzene	9/132	0.025	40	<0.005
Benzoic Acid	13/31	2.7	140	<1.6
Pentachlorophenol	12/132	0.25	64	<1.6
INORGANICS				
Barium	35/36	37	640	32-160
Calcium	28/36	1,100	8,800	<1,000-3,600
Copper	19/36	8.5	91	4-<5
Lead	32/35	16	320	6-26
Manganese	36/36	120	1,600	240-1,400
Zinc	18/36	19	540	11-140

TABLE 3-3

CONCENTRATIONS OF CHEMICALS IN WASTE MATERIALS SAMPLES BASED ON EPA REMOVAL ACTIVITIES
NEWSOM BROTHERS SITE
COLUMBIA, MISSISSIPPI

	All Concentrations in (mg/kg)			
Chemical	Conc. Range in Old Processing Area Wastes (a)	Conc. Range in North Field Wastes (b)	Conc. Range in Pecan Orchard and Woodchip Area Wastes (c)	Concentration Range in Background Soil (c)
Organics				
Acetone	ND	ND	ND	<0.005
Benzene	0.47-94.2	279	0.74-950	<0.005
Butylbenzyl-phthalate	341 - 1,500	ND	ND	<0.33
Chloroform	111	103	3.5-10.4	<0.005
DEHP	0.45-1.8	0.29-28	0.18-4.7	<0.33
Di-n-butyl-phthalate	0.13-1.5	2.0-17.6	0.85-15	<0.33
Ethylbenzene	7.5-91.5	0.26-13,500	0.26-23,800	<0.005
Methylbenzene isomers	ND	3.7	26.8-90.7	<0.005
Naphthalene	ND	1.3	ND	<0.33
Pentachlorophenol	0.68-643	ND	ND	<1.6
Phenanthrene	ND	ND	ND	<0.33
Phenol	ND	7.7	0.15-2.97	<0.33
1,1,2,2-Tetrachloroethane	0.27	ND	ND	<0.005
Toluene	10.4-119	0.58-12,870	0.11-8,300	0.0035
Total Xylenes	27.2-3,080	0.63-8,280	181-54,300	<0.005
Trichloroethene	0.50	ND	ND	<0.005
Inorganics				
Arsenic	0.001-0.78	0.005-3.0	0.03-2.9	<2
Chromium	0.03-79	0.34-86	2.3-76	5.3-8
Cobalt	ND	9.0	7.1-10.4	<10
Copper	0.03-73	0.9-6.9	0.2-122	4-<5
Iron	20.3-4,183	6,180-9,970	94-7,310	5,700-13,000
Nickel	1.2-60	0.008-6.0	0.13-8	<8
Tin	71	ND	ND	<8
Titanium	ND	ND	ND	ND

(a) Sample taken from EPA removal action samples 1387, 1360, 1360A, 1357, 1358 and 1359.

(b) Samples taken from EPA removal action samples 1361, 1362, 1363, 1364, 1365, 1366, 1367, 1368, 1369, 1370, 1354, 1355, 1356, P and R.

(c) Samples taken from EPA removal action samples A, B, C, D, E, J, K, L, M, N, O, S and U.

(d) Samples taken from CLP soil samples SS-34 and SS-49 from Phase I RI.

ND = Not detected.

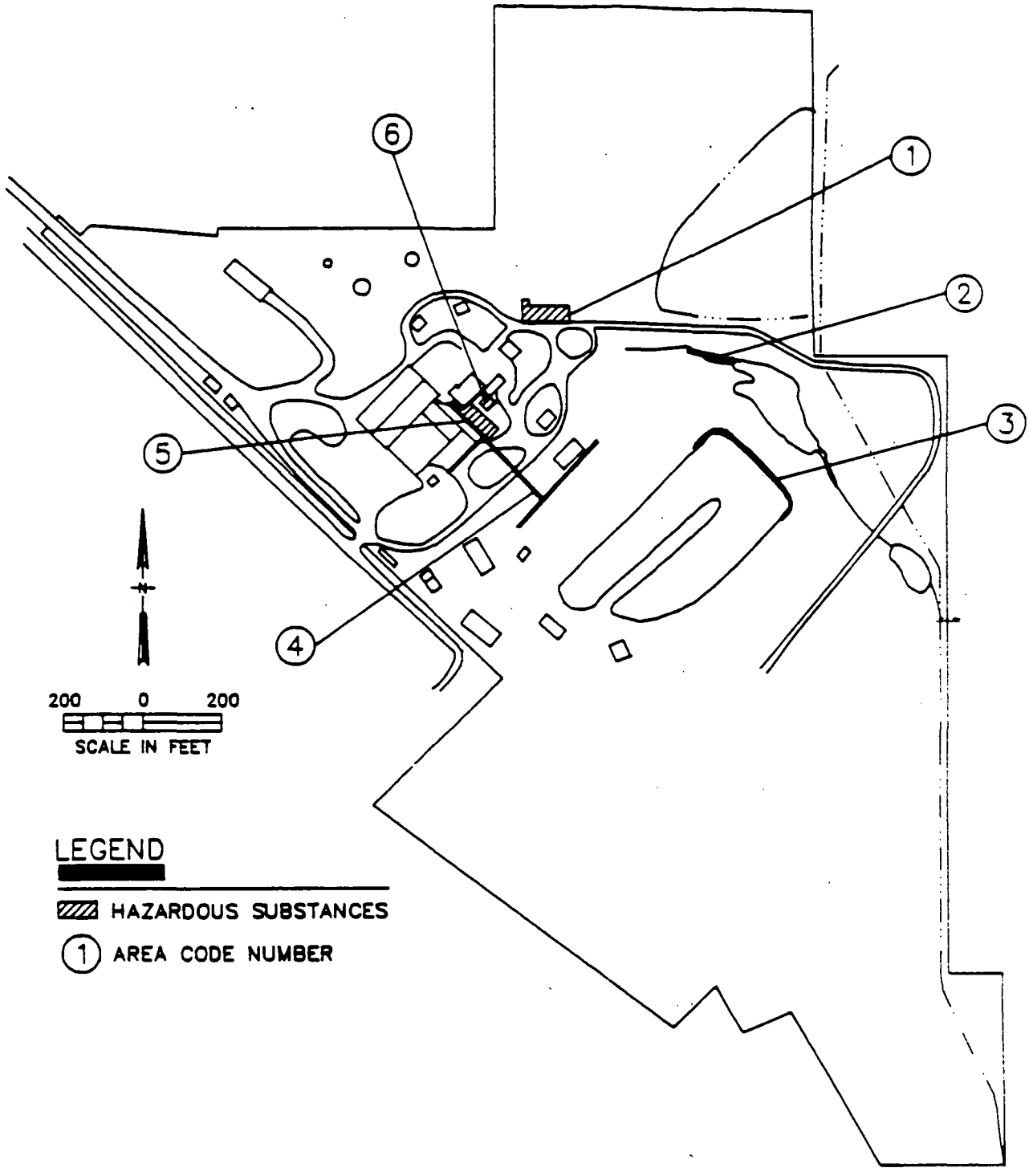
510A/3

TABLE 3-4

CONCENTRATIONS OF CHEMICALS IN WASTE AND DRUM MATERIAL SAMPLES
BASED ON EPA CLP ANALYSES
NEWSOM BROTHERS SITE
COLUMBIA, MISSISSIPPI

Chemicals	Concentration In Drum Material (mg/kg)	On-Ground Waste Material Geometric Mean (mg/kg)	On-Ground Waste Material Maximum (mg/kg)
Organics			
Acetone	140	ND	ND
Ethylbenzene	130	NA	970
Pentachlorophenol	1,200	3,200	3,200
Phenanthrene	ND	2,035	3,200
Phenol	1,800	NA	40
Toluene	17	ND	ND
Total Xylenes	640	3,000	3,000
Inorganics			
Arsenic	ND	NA	0.012
Chromium	0.12	NA	0.042
Cobalt	ND	NA	0.02
Copper	0.038	1.71	56
Iron	1.7	251	730
Lead	ND	78	78
Titanium	ND	NA	0.23
Tentatively Identified Compounds			
A-pinene	—	4,000	4,000
A-Terpineol	—	4,000	4,000
Borneol	—	1,000	1,000
C4-,C8-, and C9-alkylphenol	1E-08	4,300	4,300
Camphene	—	700	700
Camphor	—	600	600
Cymenol	—	300	300
Dihydrodihydroxyphenylbenzopyranone	—	5,000	5,000
Endoborneol	—	900	900
Hexadecanoic acid	—	1,000	1,000
Isoborneol	—	400	400
Limonene	—	1,000	1,000
Methoxypropenylbenzene	—	800	800
Methylapiete	—	2,000	2,000
Methylmethylcyclohexanemethanol	—	—	—
Methylmethylethylidenecyclohexene	—	400	400
Phenylethylphenol	—	300	300
Octahydrodimethylphenanthrenecarboxylic acid	—	5,000	5,000
Terpin hydrate	—	2,500	3,000
Tetrachlorophenol	—	200	200
Tetramethylbutylphenol	—	2,000	2,000
Tetramethylphenanthrene	—	400	400
Trimethylbicycloheptanol	—	800	800
Trimethylbicycloheptanone	—	400	400
Trimethylcyclohexenemethanol	—	2,000	2,000

ND = Not Detected
— = Data not available or compound not observed in particular sample.
NA = Not applicable. Chemical was detected infrequently, and the use of one-half the detection limit in calculating a geometric mean results in a mean concentration that exceeds the maximum. Therefore, a mean will not be reported.



REM II

HAZARDOUS SUBSTANCES REMEDIATION AREAS

NEWSOM BROTHERS SITE

COLUMBIA, MISSISSIPPI

FIGURE NO. 3-4

TABLE 3-5

SUMMARY OF CHEMICALS OF POTENTIAL CONCERN[c]
NEWSOM BROTHERS SITE
COLUMBIA, MISSISSIPPI

Old Processing Area Soils	Pecan Orchard and Woodchip Area Soils	North Field Soils	Horseshoe Pond Surface Water/ Sediments	East Pond Sediments
Barium	Benzoic acid	Barium	Benzo(b)fluoranthene[b]	Copper
Benzoic acid	Copper	Copper	Copper[b]	PAHs
Calcium	Ethylbenzene	Ethylbenzene	Iron[b]	Xylenes
Copper	PAHs	Pentachlorophenol	Magnesium[b]	
Ethylbenzene	PCDDs/PCDFs	Toluene		
PAHs	Pentachlorophenol			
PCDDs/PCDFs	Toluene			
Pentachloropohenol				
Toluene				
Zinc				

Alluvial Aquifer Ground Water	Drainage Areas and Creeks Surface Water/Sediment	Concrete Drains Surface Water/Sediment	North Pond Surface Water/Sediment
Beryllium	Benzoic acid[a]	Antimony[a]	Aluminum[b]
Bis(2-ethylhexyl)phthalate	Beryllium[b]	Beryllium[b]	Arochlor 1254[b]
Copper	Calcium[b]	Carbon disulfide[a]	Barium[b]
Iron	Carbon disulfide[a]	Cobalt[b]	Bis(2-ethylhexyl)phthalate[b]
Lead	Cobalt[b]	Copper[a,b]	Calcium[b]
Sodium	Copper[a,b]	Ethylbenzene[a,b]	Chloroform[b]
1,1,1-trichloroethane	Di-n-octylphthalate[a]	2-Methylphenol[b]	Chromium[b]
Trichloroethene	Ethylbenzene[b]	4-Methylphenol[a,b]	Copper[b]
	Magnesium[b]	PAHs[b]	Ethylbenzene[b]
	Methyl butyl ketone[b]	Pentachlorophenol[a,b]	Iron[b]
	PAHs[b]	Total xylenes[a,b]	Lead[b]
	Potassium[b]	Trichloroethene[a]	Magnesium[b]
	Sodium[b]		Pentachlorophenol[b]
	Toluene[b]		Phenol[b]
	Total xylenes[b]		Total xylenes[b]
	Vanadium[b]		Toluene[b]
			Zinc[b]

[a] Water
[b] Sediments or soils
[c] Chemicals detected in more than 5% of samples and present at concentrations exceeding twice the maximum background concentration.

- direct contact with pond sediments (dermal absorption only) by trespassers while wading.

The above-mentioned potential exposure pathways would also apply in the future. Additional hypothetical human exposure pathways that were selected for evaluation and may be relevant for the future if the site were developed for residential use or if groundwater from the alluvial aquifer at the site were used for drinking, are the following:

- direct contact with wastes, soils, and pond sediments placed on ground surface (incidental ingestion and dermal absorption) by future residents of the site; and

- ingestion of groundwater from the alluvial aquifer by future onsite residents.

3.7.2 HUMAN HEALTH RISK ASSESSMENT

Risks from the exposures identifed above were evaluated first by comparing concentrations of chemicals of potential concern at points of potential exposure with ARARs. ARARs are not available for all chemicals in all media and therefore risks were quantitatively assessed for human exposures to these chemicals of potential concern at the site.

Quantitative risk assessment involves estimating chronic daily intakes (CDIs) by potentially exposed populations based on the assumed exposure scenario. Chronic daily intakes are expressed as the amount of a substance taken into the body per unit body weight per unit time, or mg/kg bw/day. A CDI is averaged over a lifetime for a carcinogen and over the period of exposure for a noncarcinogen. These intakes are then combined with reference doses (RfDs) or cancer potency factors to derive estimates of noncarcinogenic hazard or excess lifetime cancer risks, respectively, to the potentially exposed populations For noncarcinogens, results are presented as the ratio of the intake of each chemical to its RfD, and as the hazard index, which is the sum of the ratios of the intake of each chemical to its Rfd. A hazard index exceeding one indicates that a health hazard might result from such exposures. For carcinogens the excess lifetime cancer risk was estimated. EPA recommends that the total carcinogenic risk to individuals resulting from exposure at a Superfund site be reduced to zero where possible. However, according to agency policy, the target total individual carcinogenic risk resulting from exposures may range between 10^{-4} to 10^{-7} (i.e., one excess cancer in every 10,000 and 10,000,000 individuals, respectively, exposed throughout their lifetime).

ARARs were available only for certain chemicals in groundwater. Only maximum concentrations of lead exceed the MCL of 0.05 mg/L. It should be noted, however that lead was also detected in water samples collected from sampling/drilling equipment and may be more indicative of equipment

contamination than groundwater contamination. Although no standards or criteria were identified for chemicals in soils or sediments, guidance levels for PCDDs/PCDFs and PCBs (which although not standards or criteria, may be considered relevant and appropriate requirements), were identified.. The toxicity equivalent (i.e., equivalent to the carcinogenic toxicity of 2, 3, 7, 8-TCDD) concentration of PCDDs/PCDFs detected in the soils at the site were below the Centers of Disease Control (CDC) recommended level of 1 ug/kg for residential areas. The PCB concentrations at the site (in the North Pond sediments) were below the EPA TSCA guidance level 10 mg/kg for unrestricted access areas.

3.7.2.1 QUANTITATIVE ESTIMATES OF RISK

Because ARARs are not available for all chemicals in all media, risks also were quantitatively assessed for all potential exposure pathways outlined previously. The results of this assessment are discussed below.

3.7.2.1.1 Estimates of Risks under Current Land-use Conditions

In the direct contact with contaminated surface soil pathways, current exposure was evaluated for workers in the old processing area, North Field and in the pecan orchard/woodchip area, and for trespassers (older children) in these site areas. For the exposure of workers to soils, an upperbound excess cancer risk of approximately 10^{-5} was indicated under the conditions and assumptions of the plausible maximum scenario, primarily due to exposure to cPAHs in the old processing area. For the exposure of trespassing children to soils under maximum conditions, an upperbound exq cancer risk of 10^{-6} was estimated again due to the presence of cPAHs in the old processing area. Estimated cancer risks of PCDD/PCDFs under these exposure scenarios did not signficantly contribute to the total estimated upperbound cancer risk estimates. Average scenarios for exposure of both workers and children yielded upperbound cancer risks less than or equal to 10^{-8}. The hazard index was greater than 1 for these current soil exposure scenarios only under the maximum exposure conditions, with the dominant chemical of concern being total PCDDs/PCDFs in the old processing area evaluated as noncarcinogens. Inhalation of toluene volatilizing from the surface soils resulted in exposure intakes less than the risk reference dose and therefore are not likely to result in health effects to potentially exposed populations.

Current exposure pathways involving direct contact with wastes by trespassers and workers did not involve potential carcinogens, and noncarcinogenic hazard indices were less than one under both average and maximum exposure conditions. It should be noted, however, that due to the lack of quantitative toxicological information on tentatively identified compounds (TICs) found in the various wastes on site, the risk evaluation of the wastes did not consider the potential health effects of exposure to the TICs by individuals. TICs as a mixture may augment the toxic effects of each chemical individually. These toxic effects may include adverse effects on behavior, the central nervous system, effects on gestation, other systematic effects, and potential neoplastic effects. TIC areas are associated with the tar-like waste material which will be removed from the site.

The exposure scenario involving children currently wading in either North Pond, Horseshoe Pond, or East Pond and dermally absorbing sediment contaminants yielded carcinogenic risks of 10^{-6} only under maximum exposure conditions, primarily due to cPAHs in the East Pond Horseshoe Pond and PCBs in North Pond. Noncarcinogenic hazard indices for this exposure pathway were less than one for all on-site ponds.

3.7.2.1.2 Estimates of Risk under Hypothetical Future Land-use Conditions

For future lifetime residential exposures, direct contact with surface soils, wastes, and pond sediments spread on the site surface, were evaluated. Cancer risks estimated using average exposure conditions for all of these future direct contact pathways were less than or equal to 10^{-7}. For direct contact future pathways involving soils, only the maximum exposure conditions yielded risks on the the order of 10^{-5}, primarily due to the presence of cPAHs in the old processing area. Average exposure conditions for this scenario yielded cancer risks of approximately 10^{-8}. For direct contact with sediments, maximum cancer risks of 10^{-5} were estimated for North Pond due to PCBs. The maximum cancer risk estimates calculated for direct contact with sediments in East Pond and Horseshoe Pond were approximately 10^{-5}, with cPAHs as the significant chemicals of concern. No carcinogenic chemicals of concern were identified in the wastes. However, as noted above, although risks cannot be quantitatively evaluated, the TICs found in the wastes may produce adverse health impacts on exposed future residents.

The only future direct contact pathway yielding a hazard index greater that one was the possible maximum soil pathway involving direct contact by future lifetime residents, with total PCDD/PCDFs evaluated as noncarcinogens being the significant chemicals of concern. Hazard indices for direct contact with wastes or sediments by future lifetime residents under average and maximum exposure conditions were less than one.

Comsumption of groundwater from the alluvial aquifer from beneath the site was evaluated under a potential future use scenario. Cancer risks were 10^{-6} and 10^{-3} under average and maximum exposure conditions, respectively. Maximum lead concentrations yielded a noncarcinogenic hazard index greater than one. It has been determined however, that the lead found was residual contamination from drilling muds.

The great majority of the human health excess lifetime cancer risks calculated for current and future exposure to the chemicals of concern at the Newsom Brothers site discussed above are well within or lower than the target risk range of 10^{-4} to 10^{-7} that EPA has used under Superfund. It should be noted that PAHs and PCDD/PCDF compounds, detected at low levels primarily in the old processing area of the site, are likely to have been formed in the explosion which occurred at the site. PAHs are ubiquitous in the environment and the levels of cPAHs observed in the site soils are within their range of urban background levels although above those levels thought to represent rural background. It should also be noted that most of the PAHs in the old processing area and other site study areas were detected

in less than 8% of the samples collected and analyzed. This low frequen of detection may not be representative of actual site conditions. Furthermore, the risks associated with exposure to the carcinogenic PAHs are probably overestimated due to the application of the potency factor for benzo(a)pyrene to other PAHs which may be less potent.

Table 3.6 summarizes the risks determined under the exposure pathways and conditions presented.

3.7.3 Environmental Receptors

Potential environmental impacts of the chemicals of potential concern at the Newsom Brothers site also were evaluated. Plant and animal species potentially exposed to the chemicals of potential concern at the site were identified based on a knowledge of the site and surrounding habitat. Individual species or communities were selected as indicators of potential impacts at the Newsom Brothers site, and exposure of these receptors was quantified. Receptors for which exposure was quantified were terrestrial plants, small mammals, birds, and aquatic life. The available toxicological literature was reviewed to identify exposure concentrations or doses potentially associated with adverse effects in plants and wildlife. Toxicity values derived for terrestrial plants and animals from the available literature and Ambient Water Quality Criteria (AWQC) developed by EPA for the environmental impacts at the Newsom Brothers site.

Risks were assessed by comparing the reported environmental concentratio[illegible]or the estimated dose with the selected toxicity value. Absolute conclusio[illegible] regarding the potential environmental impacts of the Newsom Brothers site cannot be made because there are many uncertainties surrounding the estimates of toxicity and exposure. However, given the available data and limitations, several general conclusions regarding the potential for environmental impacts are presented below.

The maximum concentration of copper and zinc in the soils of the site exceed levels that are known to be phytotoxic in at least some species. Small mammals and birds that potentially use the surface water of the site as a drinking water source do not appear to be at increased risk of adverse impacts, as the estimated intakes are well below those estimated to be associated with toxic effects. Toxic effects to some species of aquatic life may be occuring in some of the surface waters on site as a result of exposure to pentachorophenol and copper found in the surface waters and PAHs and PCBs in the sediments. These contaminants do not appear to be moving downstream to any extent, and are apparently not impacting the waters of the lower portions of Jingling Creek.

3.7.3.1 Endangered, Threatened and Rare Species

Two species classified by the state as threatened and by the Federal governmental as endangered are known to occur in Marion County. These are the Ringed Sawback Turtle (*Graptemys oculifera*) and the Gopher Tortoise (*Gopherus polyphemus*). U.S. Fish and Wildlife Service has stated that species are not likely to extend into the site and no sightings have bee reported.

TABLE 3-6

SUMMARY OF POTENTIAL RISKS ASSOCIATED WITH EXPOSURE TO CHEMICALS OF CONCERN[a]
NEWSOM BROTHERS SITE
COLUMBIA, MISSISSIPPI

	CDI:RfD Index for Noncarcinogenic Effects		Lifetime Excess Cancer Risk (Upperbound)	
Pathway/Chemical	Average	Maximum	Average	Maximum
Current Direct Contact with Soils by Workers				
PCDDs/PCDFs	$5x10^{-3}$	$8x10^{0}$	$1x10^{-8}$	$1x10^{-6}$
CPAHs	NQ	NQ	$4x10^{-8}$	$2x10^{-5}$
Total:	$5x10^{-3}$ (<1)	$9x10^{0}$ (<1)	$6x10^{-8}$	$2x10^{-5}$
Current Direct Contact with Soils by Children Trespassers				
Lead	$2x10^{-3}$	$2x10^{-1}$	NQ	NQ
PCDDs/PCDFs	$1x10^{-3}$	$5x10^{0}$	$1x10^{-9}$	$2x10^{-7}$
PAHs (Carcinogenic)	NQ	NQ	$1x10^{-9}$	$3x10^{-6}$
Total:	$3x10^{-3}$ (<1)	$5x10^{0}$ (>1)	$3x10^{-9}$	$3x10^{-6}$
Inhalation of Vapors from Surface Soil				
Toluene	$2x10^{-4}$ (<1)	$1x10^{-1}$ (<1)	NQ	NQ
Current Direct Contact with Drummed Wastes by Children Trespassers				
Pentachlorophenol	$3x10^{-3}$	$2x10^{-2}$	NQ	NQ
Phenol	$4x10^{-3}$	$2x10^{-2}$	NQ	NQ
Total:	$7x10^{-3}$ (<1)	$4x10^{-2}$ (<1)	NQ	NQ
Current Direct Contact With On-Ground Wastes by Children Trespassers				
Pentachlorophenol	$8x10^{-3}$	$5x10^{-2}$	NQ	NQ
Lead	$1x10^{-2}$	$4x10^{-2}$	NQ	NQ
Total:	$2x10^{-2}$ (<1)	$1x10^{-1}$ (<1)	NQ	NQ

TABLE 3-6
(Continued)

Pathway/Chemical	CDI:RfD Index for Noncarcinogenic Effects		Lifetime Excess Cancer Risk (Upperbound)	
	Average	Maximum	Average	Maximum
Current Direct Contact with Drum Wastes by Workers				
Pentachlorophenol	$1x10^{-2}$	$3x10^{-2}$	NQ	NQ
Phenol	$1x10^{-2}$	$4x10^{-2}$	NQ	NQ
Total:	$3x10^{-2}$ (<1)	$7x10^{-2}$ (<1)	NQ	NQ
Current Direct Contact With On-Ground Wastes by Workers				
Pentachlorophenol	$3x10^{-2}$	$8x10^{-2}$	NQ	NQ
Lead	$4x10^{-2}$	$8x10^{-2}$	NQ	NQ
Total:	$8x10^{-2}$ (<1)	$2x10^{-1}$ (<1)	NQ	NQ
Current Dermal Contact with Pond Sediments by Children While Wading				
North Pond:				
PCBs	NQ	NQ	$4x10^{-10}$	$2x10^{-6}$
Phenol	$7x10^{-8}$	$2x10^{-4}$	NQ	NQ
DEHP	$5x10^{-6}$	$1x10^{-4}$	NQ	NQ
Chloroform	$3x10^{-6}$	$1x10^{-4}$	NQ	NQ
Total:	$8x10^{-6}$ (<1)	$5x10^{-4}$ (<1)	NQ	NQ
Horseshoe Pond:				
cPAHs	NQ	NQ	$5x10^{-10}$	$2x10^{-6}$
East Pond:				
cPAHs	NQ	NQ	$3x10^{-10}$	$4x10^{-6}$
Future Direct Contact with Soils by Lifetime Residents				
Old Processing Area:				
cPAHs	NQ	NQ	$3x10^{-9}$	$7x10^{-5}$
PCDDs/PCDFs	$7x10^{-4}$	$8x10^{0}$	$1x10^{-8}$	$4x10^{-6}$
Total:	$7x10^{-4}$ (<1)	$8x10^{0}$ (>1)	$2x10^{-8}$	$7x10^{-5}$

TABLE 3-6
(Continued)

Pathway/Chemical	CDI:RfD Index for Noncarcinogenic Effects		Lifetime Excess Cancer Risk (Upperbound)	
	Average	Maximum	Average	Maximum
Pecan Orchard/Woodchip Area:				
cPAHs	NQ	NQ	$2x10^{-7}$	$1x10^{-5}$
PCDDs/PCDFs	$5x10^{-4}$	$2x10^{-1}$	$2x10^{-10}$	$2x10^{-8}$
Total:	$5x10^{-4}$ (<1)	2x10-1(<1)	$2x10^{-7}$	$1x10^{-5}$
North Field:				
Barium	$1x10^{-4}$ (<1)	$9x10^{-3}$ (<1)	NQ	NQ
Future Direct Contact With On-Ground Wastes by Lifetime Residents				
Pentachlorophenol	$5x10^{-3}$	$9x10^{-2}$	NQ	NQ
Lead	$6x10^{-3}$	$9x10^{-2}$ (<1)	NQ	NQ
Total:	$1x10^{-2}$ (<1)	$2x10^{-1}$ (<1)	NQ	NQ
Future Direct Contact with Drum Wastes by Lifetime Residents				
Phenol	$2x10^{-3}$	$4x10^{-2}$	NQ	NQ
Pentachlorophenol	$2x10^{-3}$	$3x10^{-2}$	NQ	NQ
Total:	$4x10^{-3}$ (<1)	$7x10^{-2}$ (<1)	NQ	NQ
Future Direct Contact with Sediments by Lifetime Residents				
North Pond:				
PCBs	NQ	NQ	$7x10^{-8}$	$8x10^{-5}$
Phenol	$2x10^{-6}$	$1x10^{-3}$	NQ	NQ
DEHP	$5x10^{-5}$	$8x10^{-4}$	$2x10^{-8}$	$2x10^{-7}$
Chloroform	$3x10^{-5}$	$7x10^{-4}$	$3x10^{-8}$	$5x10^{-7}$
Lead	$3x10^{-3}$	$4x10^{-2}$	NQ	NQ
Total:	$3x10^{-3}$ (<1)	$5x10^{-2}$ (<1)	$1x10^{-7}$	$8x10^{-5}$
East Pond:				
cPAHs	NQ	NQ	$3x10^{-8}$	$5x10^{-5}$
Xylenes	$4x10^{-6}$	$7x10^{-5}$	NQ	NQ
Copper	$8x10^{-6}$	$3x10^{-3}$	NQ	NQ
Total:	$1x10^{-5}$	$3x10^{-3}$	$3x10^{-8}$	$5x10^{-5}$

TABLE 3-6
(Continued)

Pathway/Chemical	CDI:RfD Index for Noncarcinogenic Effects		Lifetime Excess Cancer Risk (Upperbound)	
	Average	Maximum	Average	Maximum
Horseshoe Pond:				
cPAHs	NQ	NQ	$5x10^{-6}$	$2x10^{-5}$
Consumption of Ground Water from Alluvial Aquifer				
Bis(2-ethylhexyl) phthalate	$9x10^{-3}$	$4x10^{0}$	$3x10^{-6}$	$1x10^{-3}$
Trichloroethene	NQ	NQ	$6x10^{-7}$	$6x10^{-7}$
Lead	$5x10^{-1}$ (<1)	$8x10^{0}$ (>1)	NQ	NQ
Total:	$5x10^{-1}$ (<1)	$8x10^{0}$ (>1)	$3x10^{-6}$	$1x10^{-3}$

(a) The chemicals presented in this table are those that significantly contribute to the overall carcinogenic and noncarcinogenic risk for a particular pathway.

NQ = Not Quantified.

4.0 Cleanup Criteria

Cleanup objectives at the Newsom Brothers Site are based on protection of public health and the environment and are consistent with Section 300.68 of the NCP, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by SARA, EPA guidance, and state local regulations. The cleanup levels for each contaminant of concern at the Newsom Brothers Site have been developed based on the following objectives:

- The protection of the public health and environment (i.e., terrestrial and aquatic wildlife) from exposure to contaminated soil, pond sediment, and hazardous substances through reasonably expected current and future exposure scenarios
- The protection of onsite workers from inhalation of dust and vapors through current exposure scenarios
- The prevention of the spread of contaminants identified onsite
- The reduction of the potential for future contamination of ground and surface water

The soil and sediment cleanup goals were based on an increased potential cancer risk of 10^{-6}, which is consistent with guidance under SARA. EPA generally considers increased potential cancer risks of 10^{-4} to 10^{-7} in developing cleanup goals at Superfund sites. A risk level of 10^{-6} was selected by EPA to develop cleanup goals for chemicals at the site to ensure a high level of protection of public health at the site. In addition, exposure scenarios considered in the EA are very conservative in that the scenarios are not likely to occur at this site, but have been included to provide added protection of public health for possible future events.

4.1 Groundwater Cleanup Criteria

ARARs that apply to contaminants found in the groundwater at the Newsom Brothers Site are given in Table 4-1. Requirements were obtained from the Safe Drinking Water Act (SDWA) in the form of SDWA MCLs and SDWA MCLGs. In cases where an MCL or an MCLG has not been established, Federal Ambient Water Quality Criteria (AWQC) adjusted for drinking water, were used to establish cleanup goals.

TABLE 4-1

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR GROUND WATER
NEWSOM BROTHERS SITE
COLUMBIA, MISSISSIPPI

CHEMICALS	GROUND WATER CLEANUP GOAL (ug/l) SDWA MAXIMUM CONTAMINANT LEVEL (MCL)	SDWA MAXIMUM CONTAMINANT LEVEL GOALS (MCLG)	FEDERAL AMBIENT WATER QUALITY CRITERIA ADJUSTED FOR DRINKING WATER	GOALS SELECTED FOR SITE REMEDIATION
Inorganic				
Arsenic	50	NA	0 (0.025)	50
Chromium (hexavalent)	50	120*	50	50
Lead	50	20*	5,200	20
Mercury	2	3*	10	2
Nickel	13.4	NA	15.4	13.4
Organic				
Benzene	5	NA	0 (0.67)	5
Ethyl Benzene	NA	680*	2,400	680
Toluene	NA	2,000*	15,000	2,000
Pentachlorophenol	0.1**	220*	1,010	0.1
Polynuclear Aromatic Hydrocarbons (PAHs)	NA	NA	0 (0.0031)	10***
Phenol	NA	NA	3,500	3,500

NA = Not available/applicable.

* = Proposed value as of October 1986.

** = Proposed value as of May 22, 1989

*** = Practical Qualification Unit based on Benzo(b)fluoranthene

() = The criterion value for all carcinogens is zero. The concentration value given in parentheses is for an increased cancer risk of 10^{-6}.

Groundwater sampling conducted during the Phase II RI indicated the presence of miscellaneous organic compounds (tentatively detected) at low estimated levels. Of the inorganic compounds, lead was the only compound detected at levels above the MCL. The MCL for lead is 0.05 mg/l. Lead was detected in three wells on the site at 0.160, 0.120, and 0.084 mg/l, but lead was also a contaminant of the drilling mud used at the site. Due to the low concentration of the contaminants, no groundwater remediation is recommended at this time. However, groundwater monitoring should be continued in the future to confirm that contamination is not present in the groundwater.

A monitoring program with periodic sampling of a select number of wells would be appropriate for this purpose. The initiation of such a monitoring program should take place after the three contaminated wells have been redeveloped using a surge technique in order to remove any remaining drilling mud.

4.2 Surface Water Cleanup Criteria

Surface water was sampled to determine the potential for offsite migration of contaminants. ARARs for the contaminants detected in surface waters at the Newsom Brothers site are presented in Table 4-2. Because surface water is not a direct source of potable water, but should be safe for recreation and ingestion by aquatic organisms, site remediation goals were selected from Mississippi's AWQC. However, if the detection level is higher than the goal, the detection level is chosen as the standard for cleanup. In addition, if the AWQC was not available for a contaminant of concern, the applicable SDWA goal was selected.

No surface water remediation is required at the site because onsite sampling results yielded values below the appropriate ARAR. One offsite sample taken during the Phase I RI showed estimated mercury values above the ARAR; however, this sample does not appear to have been representative of site conditions and the result is tentative.

Surface water may be removed from onsite ponds to allow sediment remediation; however, this water is not considered hazardous and could be safely discharged to nearby surface waters. Nevertheless, the water must be analyzed, and bioassays performed, before discharge to ensure that water quality criteria are not exceeded and it is non-toxic to aquatic life.

4.3 Soil Cleanup Criteria

Considering each of the previously discussed exposure scenarios, cleanup goals were developed. The EA identified carcinogenic polyaromatic hydrocarbons (cPAH) as the only contaminants present in the soils of the site at concentrations that could possibly cause adverse human health impacts. However, the cleanup levels for carcinogenic polyaromatic hydrocarbon (cPAH) compounds in soil calculated at maximum exposure for the 10^{-6} risk level were substantially below expected background

TABLE 4-2

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
FOR SURFACE WATER
NEWSOM BROTHERS SITE
COLUMBIA, MISSISSIPPI

	SURFACE WATER CLEANUP GOAL (ug/l)			
Chemicals	SDWA Maximum Contaminant Level	SDWA Maximum Contaminant Level Goal	Mississippi Ambient Water Quality Criteria	Goals Selected for Site Remediation
Inorganic				
Arsenic	50	NA	48	48
Lead	50	20*	3.2**	3.2
Mercury	2	3*	0.012 (0.2)	0.2
Organic				
Ethylbenzene	NA	680*	NA	680
Pentachlorophenol	NA	220*	13**	13
Toluene	NA	2,000*	NA	2,000

NA = Not available/applicable.

* = Proposed value as of October 1986.

** = pH dependent. For acute toxicity of pentachlorophenol: [PCP] = $e^{1.005\ (pH\ -\ 5.290)}$

() = Current detection limit recognized by EPA is given in parentheses. If the detection limit is higher than the established criterion, the detection limit is the standard unless it is lowered.

concentrations of these compounds, a soil cleanup level of 10 mg/kg was selected for cPAHs by EPA. This cleanup level is based on natural background concentrations and risk values of the average exposure scenarios and is consistent with actions at other Superfund sites.

Several areas at the Newsom Brothers site were disturbed during the EPA removal action conducted in late 1987 through early 1988. During this removal action, buried hazardous materials were excavated and disposed of at an offsite location. In certain disturbed areas, potentially contaminated soil was used to fill the excavations. These areas are considered to require further soil remediation and removal volumes have been calculated for these areas. These volumes are presented in Table 4-3. Assumptions of the amount of soil to be removed from burial areas are included in this table, and are generally made based on information obtained from personnel involved with the EPA removal action. Inclusion of these areas in calculation of the remedial volume for the site is conservative in that no clear contamination has been identified. During the remedial action, these areas should be sampled and analyzed to refine the estimated remedial volume. Possible contaminants have been identified and health based cleanup levels are presented in Section 4.6.

4.4 Sediment Cleanup Criteria

Cleanup goals for pond sediments were developed during the exposure scenario previously described. For a scenario of future direct contact with North Pond sediments by lifetime residents, the cleanup goal for Arochlor-1254 is calculated to be 0.12 mg/kg at 10^{-6} risk. All sediments removed which contain PCBs will be treated as PCB waste in accordance with 40 C.F.R. 761.65. All other chemicals detected in the North Pond sediment present a lower than 10^{-6} risk. The cleanup goal for the sediments in the creek upgradient of the North Pond, North Pond sediments, East Pond sediments, and the Horseshoe Pond is based on cPAHs at the cleanup level of 10 mg/kg as selected EPA. This cleanup goal was selected after consideration of reasonably expected background levels for these chemicals and average exposure scenarios.

Table 4-4 contains estimates of the volume of sediment to be removed and the assumptions regarding the dimensions of the removal areas.

4.5 Hazardous Substances Cleanup Criteria

Hazardous substances were observed in the form of two separate types of waste material, tar-like waste material and a resin-type waste material. These materials were sampled during both the Phase I and Phase II RI and

TABLE 4-3

ESTIMATES OF SOIL VOLUMES THAT REQUIRE REMEDIATION
NEMSOM BROTHERS SITE
COLUMBIA, MISSISSIPPI

Location	Area Code Number	Estimated Area (ft^2)	Maximum Depth (ft)	Maximum Estimated Volume (ft^3)	Material Description	Major Contaminant	Cleanup Objective (mg/kg)
North Pond Area	1	8,160	40	326,400	Soil-Drum Burial Area	cPAHs	10
Wood Chip/South Pond Area	2	6,670	25	166,750	Soil-Drum Buried Rubble Area	cPAHs	10
	3	7,860	25	195,500	Soil-Drum Buried Chemical Area	cPAHs	10
	4	3,120	15	46,800	Soil-Diggings/ Trash Pile	cPAHs	10
	5	2,640	20	52,800	Soil-Trash Pile	cPAHs	10
	6	660	15	9,900	Soil-Debris/ Discolored Soil Area	cPAHs	10
	7	2,000	10	20,000	Soil-Trench Area	cPAHs	10

TOTAL VOLUME = 818,150 ft^3
= 30,302 yd^3

TABLE 4-4

ESTIMATES OF SEDIMENT VOLUMES THAT REQUIRE REMEDIATION
HEMSON BROTHERS SITE
COLUMBIA, MISSISSIPPI

Location	Area Code Number	Estimated Area (ft^2)	Maximum Depth (ft)	Maximum Estimated Volume (ft^3)	Material Description	Major Contaminant	Cleanup Objective (mg/kg)
North Pond Area	1	2,690	2	5,380	Sediments of Creek Upgradient of North Pond	cPAHs	10
	2	24,185	2	48,370	North Pond Sediments	Arochlor-1254	0.12
East Pond Area	3	7,340	2	14,680	East Pond Sediments	cPAHs	10
Horseshoe Pond Area	4	128,926	1	128,926	Horseshoe Pond Sediments	cPAHs	10
			TOTAL VOLUME =	197,356 ft^3 7,309 yd^3			

found to contain a wide variety of organic compounds. The hazardous substances presented difficulties in performing laboratory analysis, and presence of high concentrations of unidentified chemicals was indicated. Due to the presence of these unidentified contaminants, removal and thermal destruction of these hazardous substances is recommended. An estimated 650 cubic yards of these materials are present on the site.

4.6 Additional Health Based Cleanup Criteria

Some compounds associated with the drummed waste and other waste material removed from the site during the removal activities may be present in North Pond sediments, drainage system sediments, and in the areas where soils were returned to the excavation areas. These compounds were present in high concentrations in the waste materials. Therefore, health based cleanup level have been calculated for these compounds using the previously described exposure scenarios and protection levels. The cleanup levels for these compounds are presented in Table 4-5. Soil in the burial areas and sediments should be carefully analyzed to determine if the compounds are present at levels that require soil or sediment removal.

5.0 Alternatives Evaluation

The purpose of the remedial action at the Newsom Brothers site is to mitigate and minimize potential risks to public health, welfare, and the environment posed by contaminated site soils, sediments, and hazardous substances. initial screening of a wide range of applicable technologies was performed to identify those which best meet the criteria of section 300.68 of the National Contingency Plan (NCP). Following the initial screening of technologies, potential remedial action alternatives were identified and analyzed. Table 5-1 summarizes the technology screening process. Each of the remaining alternatives for site remediation was evaluated based on cost, technical feasibility, implementability and reliability, attainment of institutional requirements, and degree of protection of public health, welfare, and the environment. The following seven remedial action alternatives were considered:

1. No action
2. Off-site disposal of soil and sediment, and off-site thermal destruction of hazardous substances at facilities approved under RCRA
3. On-site incineration of soil, sediment, and hazardous substances
4. On-site incineration of soil and hazardous substances; on-site capping of sediment
5. On-site capping of soil and sediment; off-site incineration of hazardous substances
6. On-site encapsulation of soil and capping of sediment; off-site incineration of hazardous substances at a RCRA-approved facility
7. Solidification/Stabilization of soil and sediment; offsite disposal of hazardous substances.

TABLE 4-5

ADDITIONAL SEDIMENT/SOIL CLEANUP LEVELS
NEWSOM BROTHERS SITE
COLUMBIA, MISSISSIPPI

Contaminant	SEDIMENT/SOIL CLEANUP CONCENTRATIONS (ug/kg) Lifetime Residents
Benzene (a)	41
Chloroform (a)	197
Toluene	3.6×10^5
Xylenes	2.4×10^6
Phenol	4.8×10^4
Naphthalene	6.3×10^5
Di-N-butyl Phthalate	1.1×10^5
Ethyl Benzene	1.2×10^5
Pentachlorophenol (a,b)	1.2

a - These chemicals are carcinogens and soil cleanup levels represent a 10^{-6} risk level.

b - Pentachlorophenol has recently been reclassified by the Agency as a B2 Carcinogen. A cancer potency has not yet been determined. The information that we have is that it will most likely fall between 0.2-1.0. The more conservative value of 1.0 was used as the potency factor for determining soil cleanup levels.

TABLE 5-1

RESULTS OF PRELIMINARY SCREENING OF REMEDIAL TECHNOLOGIES
NEWSOM BROTHERS SITE
COLUMBIA, MISSISSIPPI

Possible Technologies	Screened Out (S) or Retained (R)	If Screened Out, Reason for Doing So
A. Complete or Partial Removal of Contaminated Media		
1. Excavation and Offsite Disposal		
o Soil	R	(Offsite disposal to landfill)
o Sediment	R	(Offsite disposal to landfill)
o Hazardous Substances	R	(Offsite disposal to incineration plant)
2. Excavation and Onsite Disposal		
o Soil	R/S	(Retained as part of capping and encapsulation)
o Sediment	R/S	(Retained as part of capping)
o Hazardous Substances	S	Not applicable to waste characteristics - organic content too high
B. Treatment of Contaminated Media		
1. Extraction (Flushing/Washing)		
o All media	S	Difficult to apply for contaminants with low solubility
2. Immobilization		
- Solidification/Stabilization		
o Soil	R	(Retained in conjunction with capping and vegetative cover)
o Sediment	R	(Retained in conjunction with capping and vegetative cover)
o Hazardous Substances	S	Not applicable to waste characteristics - organic content too high
- Vitrification (crystallization)		
o All media	S	Not applicable to waste characteristics/unknown reliability and effectiveness, water table too high
3. Biological Treatment		
- Land Farming		
o All media	S	Not applicable to waste characteristics/unknown reliability and effectiveness

TABLE 5-1
(continued)

Possible Technologies	Screened Out (S) or Retained (R)	If Screened Out, Reason for Doing So
- Activated Sludge		
o All media	S	Not applicable to waste characteristics/unknown reliability and effectiveness
- Composting		
o All media	S	Not applicable to waste characteristics/unknown reliability and effectiveness
4. Thermal Treatment		
- Onsite desorption		
o Soil	R	
o Sediment	R/S	(Volume too small but feasible if used with soil)
o Hazardous Substances	R/S	(Volume too small but feasible if used with soil)
C. Containment of Contaminated Media		
1. Capping		
o Soil	R	(Retained in conjunction with excavation, onsite disposal, and vegetative cover)
o Sediment	R	(Retained in conjunction with filling the ponds and vegetative cover)
o Hazardous Substances	S	Not applicable to waste characteristics
2. Encapsulation		
o Soil	R	(Retained in conjunction with excavation and onsite disposal, and vegetative cover)
o Sediment	S	Not applicable to waste characteristics
o Hazardous Substances	S	Not applicable to waste characteristics

Costs of the seven remedial alternatives are presented in Table 5-2.

All alternatives are designed to isolate or treat the volumes of soils, sediments, and waste material described in Section 3.0. These volumes of material are based on the cleanup levels for the various media as described in Section 4.0. At the completion of all remedial action alternatives the health risks posed by direct contact with contaminated media at the site would be no greater than 1×10^{-6} under the exposure scenarios described in the endangerment assessment.

5.0.1 ALTERNATIVE 1 - NO ACTION ALTERNATIVE

The National Oil and Hazardous Substances Contingency Plan requires that the no action alternative be considered during the feasibility study. The no action alternative was evaluated in the Endangerment Assessment to determine the associated health risks.

Under the no action alternative, soil, sediment and hazardous substances would remain contaminated with toxic substances regulated by local, state, and federal laws. Potential impacts of no remediation might include occupational or public exposure, decline in property values, expenditures for legal services depressed area growth, expenditures for laboratory analyses and monitoring, restricted access to the site, and environmental impacts.

Approximately four months would be required for the execution of administrative activities, selection of a contractor to provide continued maintenance at the site, and the preparation of contracts. The only capital costs associated with the no action alternative would be the placement of warning signs. Operation and maintenance costs would include periodic groundwater monitoring, analysis costs, and upkeep of the fence and ground maintenance. The following is a summary of the estimated costs associated with the no action alternative:

Present Worth Operation and Maintenance (O&M) Cost:	$ 1,005,852
Total Present Worth Cost:	$ 1,005,852

5.0.2 ALTERNATIVE 2 - OFFSITE DISPOSAL OF SOIL AND SEDIMENT, AND THERMAL DESTRUCTION OF HAZARDOUS SUBSTANCES

This alternative involves excavation and offsite disposal of contaminated soil, sediment and hazardous substances. All materials will be transported to an approved RCRA disposal facility. Due to the high levels of organic materials present in samples of the hazardous substances, this material will be subjected to thermal destruction at an offsite facility.

TABLE 5-2

COST RANKING OF REMEDIAL ACTION ALTERNATIVES
NEWSOM BROTHERS SITE
COLUMBIA, MISSISSIPPI

Number	Alternative	Estimated Cost	Rank
1	No Action	$ 1,005,852	1
5	Capping of Soil and Sediment; Offsite Disposal of Hazardous Substances	$ 8,220,717	2
6	Encapsulation of Soil; Capping of Sediment; Offsite Disposal of Hazardous Substances	$ 8,757,249	3
7	Solidification/Stabilization of Soil and Sediment; Offsite Disposal of Hazardous Substances	$10,094,345	4
4	Onsite Thermal Treatment of Soil and Hazardous Substances; Capping of Sediment	$13,688,438	5
2	Offsite Disposal of Soil, Sediment, and Hazardous Substances	$14,180,249	6
3	Onsite Thermal Treatment of Soil, Sediment, and Hazardous Substances	$15,452,473	7

Excavation of onsite sediments will require dewatering the North Pond, East Pond, Horseshoe Pond and the concrete drainage system. This water will be contained onsite by pumping to the Horseshoe Pond. The water will be analyzed and bioassays performed before discharge, to be sure that no water quality criteria are exceeded and it is non-toxic to aquatic life.

After excavation, the contaminated soil, sediment, and hazardous substances will be hauled to a RCRA approved facility. The excavated soils and sediments will be representatively analyzed to determine if they are RCRA hazardous wastes. If RCRA hazardous waste is found it will be treated prior to land disposal or a treatability variance will be sought. EP toxicity test and TCLP will be performed. Removal will be conducted in compliance with CERCLA off-site policies.

Approximately four months would be required for excavation design, contractor selection, and approval by the offsite disposal facility. This alternative could be implemented rapidly after contractor selection, and the complete remedial action should take less than six months. Groundwater monitoring would be conducted for five years following the remedial action to ensure no groundwater contamination is present at the site.

Ambient air monitoring should be conducted during excavation activities. The monitoring would be conducted at the site perimeter to ensure that nearby residents were not exposed to hazardous vapors. In addition, continuous monitoring would be conducted during excavation to provide protection of onsite workers.

The following is a summary of the estimated costs associated with this alternative:

Total Contruction Cost:	$ 13,660,024
Present Worth O&M Cost:	520,225
Total Present Worth Cost:	$ 14,180,249

5.0.3 ALTERNATIVE 3 - ONSITE THERMAL TREATMENT OF SOIL, SEDIMENT AND HAZARDOUS SUBSTANCES

This alternative allows source control for the contaminated media at the Newsom Brothers site. Surface water removed during excavation of sediments would be treated in the manner described in Alternative 2. The total volume of contaminated material to be treated is approximately 33,500 cubic yards.

A mobile thermal treatment unit is used in the economic evaluations. Low temperature thermal treatment may be used at the site to desorb the contaminants in a primary chamber and destroy them in a secondary

combustion chamber. The organic contaminants are thermally destroyed and the soil is left essentially the same.

A startup period of approximately 75 working days is to be allotted to this operation. During this time, the equipment will be tested to confirm its safety, and operating parameters will be generated for the process. Up to 150 tons of soil per day can be incinerated depending upon the condition of the soil prior to its introduction into the furnace. This implies that at best, with a least 25 percent down-time for maintenance and repairs, the around-the-clock operation would require about 540 working days. More realistically, 1.5 years should be allotted for the total incineration procedure of 50,000 tons of contaminated soils, sediment and hazardous substances. Additionally, approximately 100 days will be required for mobilization, equipment orders, and installation. No long lead equipment (exceeding 10 weeks delivery) is anticipated.

Preconstruction activities, including conceptual and final designs, specifications, and preparation of contract documents for bidding, are estimated at about 180 working days (8-1/2 months). Therefore, the overall project duration is estimated to be approximately 830 working days for the initial design phase to the completion of construction.

Monitoring concerns specific to the incineration operation are scrubber effluent composition, levels of contamination in the incinerated soil, contaminants in the stack gas, PCP content of the incoming soils, system pressure and temperature, and combustion air and scrubber water flow rates. These factors are preeminent concerns for the incineration alternative and considerable process control must be exercised due to the toxicity of materials present.

In addition to the above concerns, this remedy requires continued use of previously installed groundwater monitor wells to determine and maintain records of the groundwater quality at the site. The monitoring schedule for the groundwater phase is the same as that outlined in Alternative 2.

The following is a summary of the estimated cost associated with this alternative:

Total Construction Cost	$ 14,932,248
Present Worth O&M Cost	520,225
Total Present Worth Cost	$ 15,452,473

5.0.4 ALTERNATIVE 4 - ONSITE THERMAL TREATMENT OF SOIL AND HAZARDOUS SUBSTANCES; CAPPING OF SEDIMENTS

This alternative allows source control for the soil and hazardous substances at the Newsom Brothers Site and containment of sediments. The ponds would be dewatered in the manner outlined in Alternative 2. Capping of the North, East, and Horseshoe Ponds would be done by filling these ponds with a low permeability material such as clay, and covering with a multi-component RCRA cap. Thermal treatment would be conducted as described in Alternative 3. A startup period of approximately 75 working days is to be allotted to this operation. During this time, the equipment will be tested to confirm its safety, and operating parameters will be generated for the process. Up to 4.2 tons of soil per hour can be incinerated depending upon the condition of the soil prior to its introduction into the furnance. This implies that at best, with at least 25 percent down time for maintenance and repairs, the around-the-clock operation would require about 540 working days. More realistically, 1.5 years should be allotted for the total incineration procedure of 40,000 tons of contaminated soils and hazardous substances. Additionally, approximately 100 days will be required for mobilization, equipment orders, and installation. No long lead equipment delivery (exceeding 10 weeks) delivery is anticipated.

Preconstruction activities, including conceptual and final designs, specifications, and preparation of contract document for bidding, are estimated at about 180 working days (8-1/2 months). Therefore the overall project duration is estimated to be approximately 830 working days from the initial design phase to the completion of construction.

Monitoring for the capping of sediments includes regular inspection of the cap for signs of erosion, settlements, deterioration, or invasion of the cap by deep rooted vegetation or burrowing animals.

Monitoring concerns specific to the incineration operation are discussed in Alternative 3. In addition, this remedy requires continued use of previously installed groundwater monitor wells to determine and maintain records of the groundwater quality at the site. The monitoring schedule for the groundwater phase is to collect samples quarterly for one year and semi-annually for 29 years thereafter.

The following is a summary of the estimated cost associated with this alternative:

Total Construction Cost:	$ 12,880,846
Present Worth O&M Cost:	807,592
Total Present Worth Cost:	$ 13,688,438

5.0.5 ALTERNATIVE 5 - CAPPING OF SOIL AND SEDIMENT; OFFSITE DISPOSAL OF HAZARDOUS SUBSTANCES

Surface capping of the contaminated soil involves constructing a three layered cap according to RCRA guidelines. The onsite ponds would be dewatered in a manner described in Alternative 2. The installation of a surface cap will inhibit infiltration through the contaminated soil thereby reducing the migration of pollutants to the groundwater. The cap would be installed over the area of contaminated soil which encompasses approximately 3/4 acre. Sediment capping consists of filling the North and East Ponds with clay. Hazardous substances would be disposed of at an offsite facility.

Soil capping would first include the placement of a two foot clay layer compacted in six inch lifts. A twenty mil thick synthetic liner would then be placed over the clay. Next, a one foot thick drainage layer of gravel would be spread and a filter fabric placed on top of the gravel. The filter fabric would help to stabilize a final layer of eighteen inches of topsoil. The topsoil would be vegetated to prevent erosion. Also, the cap would have a minimum slope of two percent generally toward the southeast. Drainage would be assigned to direct surface runoff toward the present natural drainage channels. The capping of the sediments is identical in detail to Alternative 4, and the hazardous substances will be incinerated in a thermal treatment facility.

Approximately six months would be required for design and contractor selection. Assuming that weather conditions do not cause extreme delays, this alternative could be implemented in approximately one year. It is important to note that construction must be scheduled to allow for the site to be adequately vegetated immediately following final grading. The total time to excavate and cap the contaminated soil is approximately 14 months. The excavation and truck loading of the contaminated sediment and hazardous substances can be accomplished at a rate of 200 cubic yards per day (10 truckloads). At this rate, these cleanup activities will take about 20 working days. Monitoring for the capping of sediments and soils includes regular inspection of the cap for signs of erosion, settlement, deterioration, or invasion of the cap by deep rooted vegetation or burrowing animals. Groundwater monitoring would be required in conjunction with this alternative. Monitoring would involve continued use of the existing monitor wells to determine whether contaminants are leaching or migrating from the capped area. For the first year, quarterly monitoring will be required. After the first year, and depending on results from the initial monitoring period, the monitoring will be limited to twice per year for the 29 year post-closure period.

The following is a summary of the estimated costs associated with this alternative:

Total Construction Cost	$ 6,276,192
Present Worth O&M Cost	1,944,525
Total Present Worth Cost	$ 8,220,717

5.0.6 ALTERNATIVE 6 - ENCAPSULATION OF SOIL; CAPPING OF SEDIMENT; OFFSITE DISPOSAL OF HAZARDOUS SUBSTANCES

The contaminated soil will excavated and placed in a lined, onsite landfill. The landfill will be covered with a multi-component cover system to provide complete encapsulation of the soil. The onsite ponds would be dewatered in a manner described in Alternative 2. The contaminated sediment will be capped as in Alternative 4 and hazardous substances will be sent to an offsite facility as described in Alternative 2. Excavation of soil, sediment and hazardous substances could be achieved in 100 working days. Mobilization, equipment procurement, and equipment installation will require approximately 60 working days. Preconstruction activities such as design and contractor selection will add about 180 working days to the schedule. The total project time is estimated at about 340 working days.

Monitoring of the integrity of the cap will be required as described in previous alternatives. Currently installed groundwater monitor wells will be used to ensure that contaminants are not leaching or migrating from the containment area. For the first year, quarterly sampling will be required. After the first year, and depending on the results from the initial monitoring period, sampling will be reduced to twice per year for 29 years.

The following is a summary of the estimated cost associated with this alternative:

Total Construction Cost	$ 6,812,724
Present Worth O&M Cost	1,944,525
Total Present Worth Cost	$ 8,757,249

5.0.7 ALTERNATIVE 7 - SOLIDIFICATION/STABILIZATION OF SOIL AND SEDIMENT; OFFSITE DISPOSAL OF HAZARDOUS SUBSTANCES

This alternative involves the use of source controls to reduce leaching and migration of contaminants to the groundwater. The onsite ponds would be dewatered in the manner described in Alternative 2. Solidification /stabilization techniques would be applied to the contaminated soils and sediments, and hazardous substances would be sent to an offsite facility for disposal.

The solidification of the hazardous waste area, which could be acomplished by several methods, would involve a cementacious fixation of the contaminated soil enabling it to be permanently stored at the site. One of the most common solidification methods is to excavate the contaminated soil, transport it to an onsite cement batch plant, mix the wastes directly with Portland cement and other aggregates, and deposit the mixture back into the excavation for permanent solidification. This method would include excavation of all material and solidification/stabilization of 37,611 cy. of soil and sediment. Likewise, bulk solids found onsite would also be combined with soils during solidification and replaced onsite. This would be accomplished by creating mixtures of soil and sediment to be treated in the solidification process. The exact mixture of soil, sediment, cement and other aggregates to be used would be developed through treatability studies to be conducted prior to the remedial action.

Approximately six months would be required for contractor selection and mobilization. The solidification/stabilization activities would have a duration of approximately five months. The construction should be scheduled to allow for vegetation to immediately follow final grading in the late summer or early fall. The total time to implement this alternative would be approximately 18 months.

The stabilized area should be inspected on a regular basis for signs of erosion, settlement, or subsidence. It is recommended that inspections be conducted frequently in the first 6 months when problems are most likely to appear. Any signs of unexpected settling or subsidence should be addressed immediately by removing the overburden and inspecting and repairing the affected areas.

Groundwater monitoring would be required in conjunction with this alternative. Monitoring would involve continued use of existing monitor wells to determine whether contaminants are leaching or migrating from the solidified mass or the capped area. For the first year, quarterly monitoring will be required. After the first year, and depending on results from the initial monitoring period, the monitoring period, the monitoring will be limited to twice per year for 29 years.

Air monitoring during construction will be necessary to ensure that a safe working environment is maintained and that no threat to the public health or the environment is created by air emissions or dust from the site.

The following is a summary of the estimated costs associated with this alternative:

Total Construction Cost	$ 8,525,802
Present Worth O&M Cost	1,568,543
Total Present Worth Cost	$10,094,345

5.1 Alternative Comparison

Prior to selection of the preferred alternative all alternatives were evaluated based on the following criteria:

- Overall protectiveness of human health and the environment
- Compliance with applicable or relevant and appropriate requirements (ARAR's)
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume
- Implementability
- Short-term effectiveness
- Cost
- State acceptance
- Community acceptance

A summary of this evaluation follows.

Long-term and short-term effectiveness and overall protectiveness of human health and the environment.

Each of the alternatives evaluated, with the exception of no action, provides for protection of human health and the environment by removing the potential for exposure to contaminants at the site. Onsite incineration of the contaminated material is the most protective alternative since the contaminants are reduced to non-harmful compounds. Therefore, the long-term effectiveness of this alternative is excellent. The short-term effectiveness of the remedy is also good. However, some local impacts may exist due to the start up of the equipment and operation. Slight risks may be incurred by residents due to partially incinerated compounds. However, risks associated with incinerators are considered to be less than a 10^{-6} level. Time for cleanup completion is 2.4 years and is the longest of the alternatives.

Offsite disposal of the contaminated material at a RCRA approved facility reduces the potential for exposure of human and environmental receptors by placement and isolation of the materials at a location that is known to be safe for disposal and containment due to favorable geologic conditions and strict adherence to best management practices. The short-term effectiveness of this remedy is good since the remedy relies on established earth moving techniques and duration of the cleanup is one year. Short-term risks due to transporation of the wastes offsite are incurred. Under Alternative 2, the most contaminated portion of the waste will be incinerated thereby permanently rendering the waste non-hazardous. Since the remainder of the contaminated material will be removed from the site, the alternative will provide a high degree of long-term protection for the receptors at the site. Alternative 7 (solidification/fixation) relies on a technology which is unproven for long term containment of the type of organic wastes found at the site. However, tests conducted on the short term effectiveness of the technology in containing organic wastes have indicated that it can be effective if applied properly. Unfortunately, the overall effectiveness of this remedy to protect human health and the environment is currently unknown. The alternatives that rely on onsite containment by way of capping or encapsulation of the wastes (Alternatives 4, 5, 6) would isolate contaminants into one area and reduce the potential for human exposure; however, due to the potential for site flooding and the shallow groundwater at the site the ability of the action to isolate the waste from the environment is limited. Short term effectiveness may be good, however, longer term effectiveness of these containment remedies would not be reliable.

5.1.1 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME

Thermal treatment of contaminants uses heat under controlled conditions to break down organic wastes into gases, water vapor, and ash. This technology effectively reduces the mobility, toxicity, and volume of the contaminants by destruction of the compounds. The ash from the process can be landfilled as non-hazardous material. Waste gas emissions are trapped by control devices before they can be released to the air. Effluent from the control equipment may require further treatment before disposal. Alternative 3 relies on thermal treatment of all contaminated media at the site. Other treatment alternatives use thermal destruction to destroy the heavily contaminated tar-like waste material. Alternative 4 uses thermal treatment of contaminated soil to eliminate the toxicity, mobility, and volume of the waste. The offsite disposal alternative does destroy most contaminated portion of the waste through thermal treatment but the majority of the soil and sediment would be landfilled without treatment.

If the solidication technology of Alternative 7 was successfully implemen the mobility of the waste would be greatly reduced since the contaminants would be bound in a solid mass and thus eliminate the production of leachate. In addition some of the contaminants may be chemically bonded to the matrix and thereby reduce the toxicity. The volume of the contaminants would be unchanged.

5.1.2 IMPLEMENTABILITY

The implementability of all the alternatives were carefully evaluated during the Feasibility Study (FS). The timeframes for implementation of each of the alternatives are presented in Table 5-1. Alternatives 4, 5, and 6 rely primarily on disposal practices that are well established and use common earth moving and landfill equipment and materials, and are easily implemented. Alternative 2 also uses earth moving technology to prepare the contaminated material for offsite disposal. The additional step of transporting the material to the final disposal site is required. On-site thermal treatment is also established technology using commercially available mobile incinerators. The implementation time for this action is the longest of all the final alternatives. The success of the solidification/fixation technology on organic compounds at the present time is not presently proven. Long-term treatability tests would be necessary to determine the effectiveness of the implementation of this alternative.

5.1.3 COST

A comparison of the estimated costs of the remedial alternatives are included in Table 5-2.

5.1.4 COMPLIANCE WITH ARARs

A list of the State, Federal, and Local ARARs that apply to the

remedial action at this site are presented in Table 5-3. The various remedial action alternatives would be performed to comply with these requirements and necessary permits must be acquired before remedial action activities begin. Some problems may exist in complying with the ARARs. For example, for onsite landfilling activities in Alternatives 4, 5, 6, and 7, FEMA and RCRA floodplain criterion may preclude landfilling on major portions of the site. RCRA requirements and restrictions on landfilling certain types of contaminants may require pretreatment of certain material to reduce contaminant concentration prior to offsite disposal.

5.1.5 STATE ACCEPTANCE

Consultations with the State of Mississippi were held during the development of the remedial alternatives and the proposed plan. Mississippi officals stated a preference for the offsite disposal alternative. On-site incineration was not supported due to the location of the site in the center of Columbia, the close proximity of many residents, and the potential for operational problems with the mobile incinerator. Alternatives that utilized on-site disposal were not favored due to the shallow groundwater (10-15 ft) and the potential for flooding of the site. Solidification/fixation of the contaminated material was not favored since the effectiveness of the technology on organic wastes is unknown and may not be protective.

5.1.6 COMMUNITY ACCEPTANCE

Discussion were held with the community leaders, elected officals, and citizens of Columbia during the alternative selection process. During these discussions a very strong preference was expressed for a remedy that would be completed quickly and permanently remove the contaminated material from the site. Opposition was expressed for any alternative that would allow untreated contaminants to remain on the site. Opposition to onsite incineration was expressed due to fears over possible accidents and incinerator emissions harming the nearby residents. The solidification alternative was opposed since the technology is unproven. The preferred alternative was to remove the contaminated material from the site and treat the waste as required for offsite disposal.

6.0 Recommended Alternative And Statutory Determination

Based on consideration of the requirements of CERCLA, the detailed evaluation of the alternatives, and public comments, both EPA and the State

TABLE 5-3

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR REMEDIAL ACTIONS
NEMSON BROTHERS SITE
COLUMBIA, MISSISSIPPI

Requirement	Applicable Criteria
Federal	
Toxic Substances Control Act (TSCA)	Empowers EPA to take necessary steps to limit the manufacture, processing, distribution, use and disposal of a chemical substance that may present an unreasonable risk or injury to health or to the environment.
Occupational Safety and Health Administration (OSHA) [29 CFR 1910.120]	Regulates employees' safety and health at hazardous waste operations and during emergency response to hazardous substance incidents.
Resource Conservation and Recovery Act (RCRA) and the Hazardous and Solid Waste Amendments of 1984 (HSWA)	Regulates the treatment and disposal of hazardous waste in land treatment units (40 CFR Part 264). Relevant and appropriate for: - cap design and onsite landfill design for RCRA hazardous wastes. - ground water monitoring and post closure care for all alternatives leaving wastes onsite. - solidification/stabilization technologies with regard to decharacterization of hazardous wastes. - disposal of the hazardous wastes at an offsite RCRA landfill.
Comprehensive Environmental Response and Liability Act (CERCLA) (1980) and Superfund Amendments and Reauthorization Act (SARA) (1986)	Applicable to the selection of a remedy as well as all other activities associated with the remedial investigation and feasibility study. Requires reassessment of the site every five years for remedies selected that retain hazardous wastes onsite.
U.S. Department of Transportation and Mississippi Public Service Commission Regulations (40 CFR263, 45 FR12743, 45 FR33151, 45 FR85022, 45 FR86908, 45 FR86973 and 48 FR14153)	Regulates transportation of hazardous materials for disposal at an offsite facility.
Federal Water Quality Criteria	Sets criteria for water quality based on the kind and extent of all identifiable effects on health and welfare by pollutants in any body of water, including ground water. Applicable to wastewater discharges from dredging, dewatering, and decontamination activities, implementation of a remedy for the onsite ponds, and ground water monitoring.

TABLE 5-3
(Continued)

Requirement	Applicable Criteria
Clean Air Act	Relevant and appropriate for preventing, abating, and controlling air pollution caused by air contaminants being discharged into the atmosphere as particulates, smoke, fly ash, solvent, and other chemicals or combinations thereof.
State	
Mississippi Ambient Water Quality Criteria (WQC)	Similar to Federal Water Quality Criteria (WQC). However, if Mississippi Ambient WQC are more stringent, they are selected over the Federal WQC.
Mississippi Air Pollution Control Regulations	Similar to Clean Air Act. However, if Mississippi Air Pollution Control Regulations are more stringent, they are selected over Clean Air Act standards.
Mississippi Pollution Control Permit Board Regulations on Landfills	Relevant and appropriate for siting of landfill.
Local	
FEMA Regulations and RCRA Floodplain Criterion [44 CFR Parts 59-77 and 40 CFR 264.18(b)]	Relevant and appropriate for consideration of onsite landfill and capping alternatives.

of Mississippi have determined that alternative 2; offsite disposal of contaminated soils and sediments with offsite incineration of waste material, is the most appropriate remedy for the Newsom Brothers site in Columbia, Mississippi. The action is completely described in Section 6.1.

The response objectives for this remedial action are to control exposure of contact with soils, sediments, and waste material to an acceptable 10^{-6} level. In determining an acceptable cleanup level, the ARARs of environmental laws and the exposure levels calculated in the endangerment assessment were reviewed and assessed.

Both Federal and State ARARs were reviewed to determine if there were any standards indicating acceptable levels of contaminants in soils. The results of this review indicate that no Federal or State legal standards exist for the contaminants in soil or sediments at this site. Therefore, soil and sediment cleanup levels were determined using site specific analysis based on potential human health and environmental effects. The cleanup levels for each media are presented in Section 4.0. The volumes of materials to be excavated from the site are discussed in Section 6.1.

The potential ARARs and health based cleanup criteria were analyzed during the RI/FS to determine volumes of soil and sediments to be excavated and removed from the site. Because this alternative involves the excavation and placement of hazardous substances (soil, sediments, and waste), the RCRA land disposal restrictions could be potential ARARs. Pentachlorophenol, toluene, and xylenes are known to occur on the site. Pentachlorophenol was detected in the tar-like waste material present on the site. This material is to be incinerated prior to land disposal. Xylenes and toluenes are present on site in certain areas, however, these compounds may not be present at concentrations that will require further cleanup. Future soil and sediment screening will determine the levels that exist on the site. If levels that require cleanup are detected, treatment of the material to reduce concentrations of these contaminants may be necessary prior to land disposal, in order to comply with land disposal restrictions. The PAHs present on the site are not RCRA listed waste and land disposal restrictions do not apply to this contaminant at the present time.

6.0.1 Statutory Determinations

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for this site must comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws unless a statutory waiver is justified. The selected remedy also must be cost-effective and utilize

permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute included 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 statuatory requirements:

6.0.2 Protection Of Human Health And The Environment

The selected remedy protects human health through destruction of the heavily contaminated tar-like waste material by offsite thermal destruction and deposition of the residual in a RCRA approved landfill. The remainder of the contaminated soils and sediments will be isolated from environmental and human contact by excavation and removal from the site and placement in a RCRA approved secure landfill. Materials that pose a health risk in excess of the 1×10^{-6} level will be removed from the site. There are no known short-term threats associates with the remedy that cannot be readily controlled.

6.0.3 Compliance With ARARs

The selected remedy will attain all applicable or relevant and appropriate chemical, action and location specific requirement. The ARARs are presented below:

For Transportation of Hazardous Wastes:
- U.S. Department of Transportation
- Mississippi Public Service Commission Regulation
- (40 CFR 263, 45 FR 12743, 45 FR 33151, 45 FR 85022, 45 FR 86908 45 FR 86973, 48 FR 14153)

For Offsite Thermal Destruction:
- Federal Clean Air Act
- State Air Pollution Control Regulations

For Dwatering Ponds:
- Federal and State Water Quality Criteria
- National Pollution Discharge Elimination System (NPDES)

For Offsite Disposal:
- Resource Conservation and Recovery Act
- Hazardous and Solid waste Amendments
- Land Disposal Restrictions
- Waste Acceptance at the Treatment, Storage and Disposal Facility
- CERCLA offsite disposal policy

Cleanup Criteria:
- Toxic Substances Control Act
- PCB Spill Policy

6.0.4 Cost Effectiveness

The selected remedy is cost effective because it has been determined to provide overall effectiveness proportional to its costs. The net present worth is estimated at a cost of $14,180,000. The estimated cost are within an order of magnitude of the other potential alternatives. The alternatives that rely on onsite disposal are less expensive, however the site is not suitable for onsite disposal due to shallow groundwater and potential for surface water flooding. Therefore, onsite disposal does not offer a safe remedy for containment of the wastes and is not cost effective. Onsite incineration, which has similar but higher cost, would be a cost effective remedy that destroys the hazardous constituents present on the site but implementation would be difficult due to the uncertainity over the volume of the material to be treated and the lack of acceptance of this alternative by the State and community. Additionally the chosen alternative has the potential for further reduction of costs through careful screening of the various media prior to transportation of material to the disposal site.

This screening could significantly reduce the volumes of materials to be removed from the site. The solidification/stabilization alternative is innovative technology and is less expensive, however its effectiveness is unproven for the type of wastes present at the site. Investment of funds for use of this technology may prove to be ineffecient if the alternative fails.

6.0.5 Utilization Of Permanent Solutions And Alternative Treatment Technologies To The Maximum Extent Practicable

EPA and the State of Mississippi 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 final source control at the Newsom Brothers site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA and the State have determined that this selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume achieved through treatment, short term effectiveness, implementability cost, and State and community acceptance.

While the selected remedy does not offer as high a degree of long term effectiveness and permanence as the onsite incineration it will significantly reduce the hazards posed by the contaminated soils at the site through disposal at a secure containment facility with offsite incineration of the heavily contaminated tar-like waste material. The remaining contaminants can be managed with a high degree of certainity over the long term. Since the State and community would not accept onsite incineration and the effectiveness of other alternatives is questionable the selected remedy is the only practicable alternative available. Offsite incineration of the total volume of contaminated material was initially considered but was not found to be cost effective because of the large volumes of materials that potentially would be treated. The implementation time of the selected remedy is approximately six months compared to an estimated two and

one-half years for onsite incineration.

The selection of incineration of the contaminated black tar-like waste material is consistent with program expectations that indicated potentially highly toxic wastes are a priority for treatment and often necessary to ensure long term effectiveness of a remedy. The less contaminated material can be effectively contained in an approved facility. The only alternatives offering treatment for all of the contaminated material is onsite incineration. This remedy was rejected for the reasons discussed above. The selected remedy can be implemented quickly and with less difficulty than the other alternatives while offering a high degree of protection of human health and the environment, is approved of by the State and local community, and is therefore determined to be most appropriate for use at the Newsom Brothers site.

6.1 Description Of Alternative

The recommended alternative, Alternative 2, for remediation of contamination at the Newsom Brothers site includes the following components:

- Groundwater monitoring.

- Draining of onsite ponds.

- Excavation of contaminated pond and creek sediments (estimated 7,309 cu. yards) for offsite disposal at an approved facility.

- Filling of onsite ponds with clean fill material.

- Excavation of contaminated soils (estimated 30,302 cu. yards) for offsite disposal at an approved facility.

- Excavation of remaining tar-like waste material (estimated 650 cu. yards) for offsite thermal destruction and disposal at an approved facility.

- Recontouring land surface to prevent erodable material from reaching area surface water.

All components of the proposed remedy must be included in the remedial action in order to reduce potential human health risks from the contaminants at the site to the proposed 10^{-6} protection level. This protection level was established as an added measure of protection due to the density of residential housing adjacent to the site and due to the location of the site near the central business district of Columbia, Mississippi.

Removal of all of the black tar-like waste material from the locations on

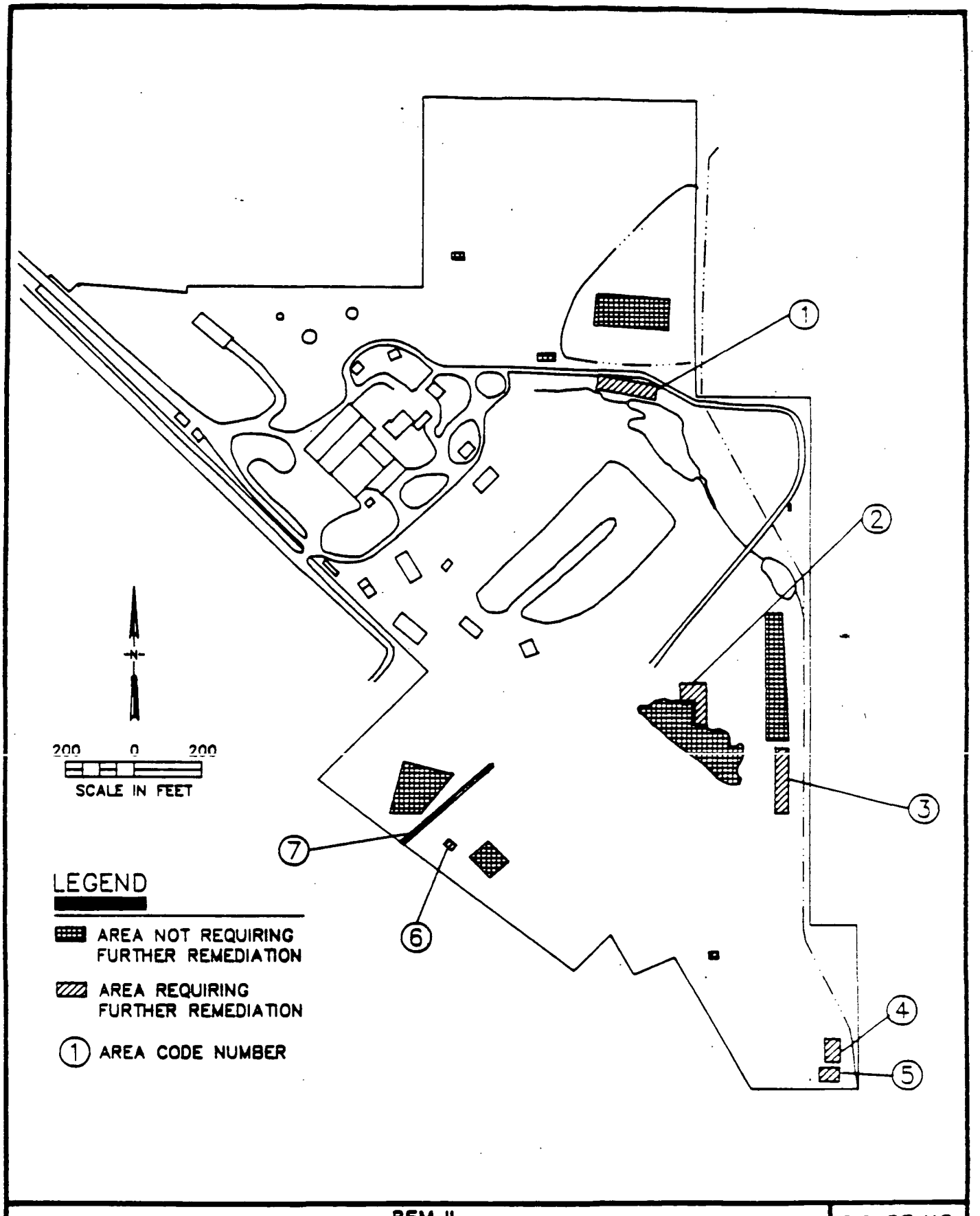
the site, shown in Figure 6-1, is necessary due to the contaminant levels in the material. Since small amounts of this material are scattered across site surface, a careful survey of the entire site will be necessary to ensure that all of the material is located and removed. The underground and surface drainage system must also be surveyed for this material. Due to the high levels of organic substances present in samples of this material it will be subjected to thermal destruction offsite at a RCRA approved facility. The residual material from the thermal treatment will be landfilled at an offsite RCRA approved facility. The contaminated sediments from the three onsite ponds and drainage areas must be removed from the site. The sediments must be screened for the presence of contaminants in excess of the cleanup standards listed in Section 4.0. The ponds and sediments must be dewatered prior to the sediment removal. All water must be analyzed before discharge to ensure water quality criteria are met and no toxic substances are discharged in toxic amounts. Treatment of the discharge water will be required if necessary. Since discharge will occur onsite, no NPDES permit will be required. The primary contaminants identified in the pond sediments are polyaromatic hydrocarbons (PAH's) at a maximum concentration of 37.5 ppm in the East Pond, and Polychlorinated biphenyls (PCBs) in the North Pond at a maximum concentration of 10 ppm. Additional analytical results indicated that PCBs may be present up to 110 ppm in North Pond sediments. The contaminated soils are located in the areas shown in Figure 6-1. Careful analytical screening of the soil in these areas must be completed prior to removal of the contaminated soil for offsite disposal at an approved facility. The screening will identify areas that are contaminated above the cleanup criteria detailed in Table 4-5.

Following the excavation activities, the areas must be backfilled to prevent ponding of water. The site must be recontoured and seeded and mulched to prevent the transport of erodable material to offsite areas and area streams.

6.2 Operation And Maintenance

A three to four-man crew will be required to conduct the excavation activities. These personnel will ensure that the materials sent offsite meet all requirements for shipment and disposal of hazardous substances. The contractor is expected to maintain equipment and materials as needed to conduct the excavation and packaging for offsite disposal. This includes maintenance personnel, parts, materials, etc. Routine maintenance activities to be conducted are:

* Periodic testing of personnel protective equipment and monitoring devices
* Maintaining and repairing equipment
* Maintaining logs of data collected



REM II

SOIL REMEDIATION AREAS

NEWSOM BROTHERS SITE

COLUMBIA, MISSISSIPPI

FIGURE NO.

6-1

* Coordination for proper replacement backfilling with clean soil

* Dust control

Ambient air monitoring should be conducted during excavation activities. The monitoring would be conducted at the site perimeter to ensure that nearby resident were not exposed to hazardous vapors. In addition, continuous monitoring would be conducted during excavation to provide protection of onsite workers. Groundwater monitoring would be conducted at selected wells for five years to ensure no groundwater contamination was present at the site.

6.3 Cost

The summary of the estimated costs associated with the completion of the remedy is presented in Table 6-1.

6.4 Schedule

Approximately four months would be required for excavation design, contractor selection, and approval by the offsite disposal facility. This alternative could be implemented rapidly after contractor selection, and the complete remedial action should take less than six months. Groundwater monitoring would be conducted for five years following the remedial actio

6.5 Future Action

Since all contaminated media will be removed from the site future activities will be limited to groundwater monitoring at existing monitoring wells. The monitoring will continue for five years at selected wells.

7.0 Community Relations

The local community has been very interested and involved in the site status during the RI/FS and removal actions related to this site. Therefore, community relations activities have remained an important aspect throughout the RI/FS process. A public meeting was held in Columbia, Mississippi on August 6, 1986, to inform concerned citizens and receive comments on the proposed RI/FS Work Plan. After completion of the first phase of the RI another public meeting was held on September 22, 1987. The purpose of this meeting was to discuss the findings of the RI, announce plans of an immediate drum removal activity, and to solicit community input for the removal activity. The meeting was attended by several hundred local citizens and many comments were received on the drum removal proposal. Many

TABLE 6-1
DETAILED COST ANALYSIS (PRESENT WORTH COST)
OF PROPOSED REMEDIAL ACTION AT THE
NEWSOM BROTHERS SITE

ITEM DESCRIPTION	UNITS	QUANTITY	UNIT PRICE DOLLARS	TOTAL COST DOLLARS
MOBILIZATION				
Transport Equipment & Staff	ea	1	$40,000.00	$40,000
Temporary Facilities	ea	1	$40,000.00	$40,000
LAND & SITE DEVELOPMENT - Soil and Sediment				
Site Preparation	acre	6	$3,000.00	$18,000
Excavation & Dust Control	cy	37,611	$20.00	$752,220
Backfill & Placing	cy	37,611	$12.50	$470,138
Load & Offsite Hauling	cy	37,611	$185.00	$6,958,035
Pond Fill Material	cy	33,216	$12.50	$415,200
Filling Ponds & Dust COntrol	cy	33,216	$30.00	$996,480
RECOVERY & DISCHARGE OF SURFACE WATER	lump sum	1	$100,000.00	$100,000
LAND & SITE DEVELOPMENT - Hazardous Substances				
Site Preparation	acre	0.5	$3,000.00	$1,500
Excavation, Dust Control & Hauling to Thermal Treatment Plant	cy	650	$200.00	$130,000
Backfill & Placing	cy	650	$12.50	$8,125
OFFSITE INCINERATION - Hazardous Substances	cy	650	$800.00	$520,000
EQUIPMENT & MATERIALS				
Health & Safety Equipment	ea	1	$20,000.00	$20,000
SAMPLING & TESTING	day	100	$700.00	$70,000
AIR QUALITY MONITORING	week	20	$1,000.00	$20,000
CONTRACTOR'S SUPERVISION	ea	1	5.0%	$527,985
SUBTOTAL - Capital Cost				$11,087,682
LEGAL FEES, LICENSES & PERMIT COSTS (2% of Capital Cost)				$221,754
ENGINEERING & ADMINISTRATIVE COSTS (10% of Capital Cost)				$1,108,768
SUBTOTAL				$12,418,204
CONTINGENCY (10% of Subtotal)				$1,241,820
TOTAL CONSTRUCTION COST				$13,660,025
PRESENT WORTH O&M COST				$520,225
TOTAL PRESENT WORTH COST				$14,180,249

A-2.WK1

TABLE 6-1 (Continued)
OPERATION & MAINTENANCE COSTS
Period of Operation: 5 years
Discount Rate: 10% per year

ITEM DESCRIPTION	UNITS	QUANTITY (units/yr)	UNIT PRICE DOLLARS	TOTAL ANNUAL COST, DOLLARS	OPERATION TIME, YEARS	PRESENT WORTH
SHORT TERM MONITORING						
Personnel	hrs	200	$50	$10,000	1	$9,09
Supplies	ea	12	$1,000	$12,000	1	$10,90
Quarterly Well Sampling & Laboratory Testing (20 wells)	ea	80	$2,000	$160,000	1	$145,45
LONG TERM MONITORING						
Personnel	hrs	100	$50	$5,000	4	$15,849
Supplies	ea	12	$1,000	$12,000	4	$38,036
Semiannual Well Sampling & Laboratory Testing (20 wells)	ea	40	$2,000	$80,000	4	$253,589
SUBTOTAL				$279,000		$472,931
CONTINGENCY - Cost Based on 10% of Subtotal				$27,900		$47,293
TOTAL				$306,900		$520,225

A-2.WK1

informational meetings were held with local community leaders and elected officials during the removal activity. In November 1988, EPA established an Administrative Record for the Newsom Brothers site at the South Mississippi Regional Library, in Columbia, Mississippi. By January 24, 1989, the RI, draft FS, and final Endangerment Assessment reports were submitted to the repository in Columbia, Mississippi. A public meeting was held at Columbia High School in January 24, 1989, to present the findings of the RI/FS, Endangerment Assessment, and EPA's preferred remedial alternative. Public comment on the proposed plan and study findings was solicited at this time. Prior to the public meeting EPA had issued press releases, Public Notices, Fact Sheets, and the Proposed Plan to keep the public informed of the activities at the site. Following the January 24, 1989, public meeting a 30 day public comment period was opened and the comment period ended February 24, 1989. A discussion of the comments received is included in the responsiveness summary in the Appendix.

APPENDIX A

RESPONSIVENESS SUMMARY

NEWSOM BROTHERS SITE

RESPONSIVENESS SUMMARY FOR THE PROPOSED REMEDIAL ACTION PLAN

TABLE OF CONTENTS

RESPONSIVENESS SUMMARY
NEWSOM BROTHERS SUPERFUND SITE

This community relations responsiveness summary is divided into the following sections:

Section I — Overview. This section discusses EPA's preferred alternative for remedial action, and public reaction to this alternative.

Section II — Background on Community Involvement and Concerns. This section provides a brief history of community interest and concerns raised during remedial planning activities at the Newsom Brothers site.

Section III — Summary of Major Comments Received During the Public Comment Period and the EPA Responses to the Comments. Both written and oral comments are categorized by relevant topics. EPA responses to these major comments are also provided.

Section IV — Remaining Concerns. This section describes remaining community concerns that EPA and the State of Mississippi should be aware of in conducting the remedial design and remedial action at the Newsom Brothers site.

I. OVERVIEW

The remedy proposed by EPA for the Newsom Brothers site was total excavation and off-site removal of contaminated soil. The State of Mississippi concurred with this proposed alternative. The strong consensus from the community was also support for this alternative. They did express concerns, however, regarding its implementation, particularly in regard to dust control. Questions were also raised regarding other potential sources of contamination in the community and the health study currently underway. Voluminous comments and questions were received from Reichhold Chemical Company, a potentially responsible party. Their comments focused on (to be provided by David Melgaard).

II. BACKGROUND ON CITIZEN INVOLVEMENT AND CONCERNS

This site started as a removal action in 1984. Because the site is situated in the center of town, community interest in the site has been strong. One community group, Stop Toxic On-site Pollution (STOP) has taken the lead in expressing the concerns of the community to EPA and the State of Mississippi. Community

relations at the site was extensive, with EPA making many contacts with local officials and scheduling several meetings with citizens.

To get public input on the proposed remedy, EPA held a 30-day public comment period from January 24 to February 24, 1989. EPA's community relations efforts included a fact sheet that was sent to interested citizens in January 1989, a public meeting notice that appeared in the Hattiesburg American on January 22, 1989, and the Columbia Progress on January 19 and 22, 1989, and a public meeting that was held January 24, 1989. Approximately 250 citizens attended the meeting. Site repositories contain the RI/FS and other relevant documents. EPA also had many contacts with local officials and citizens' groups throughout the remedy selection process.

III. SUMMARY OF MAJOR COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND THE EPA RESPONSES TO THE COMMENTS

Concerns and questions on the proposed remedy for the Newsom Brothers site received at the public meeting January 24, 1989 and during the public comment period can be grouped into four categories:

A. Implementation of Remedy

B. Health Concerns

C. Off-site Contamination

D. Miscellaneous

A summary of the comments and EPA's responses to them is provided below.

A. IMPLEMENTATION OF REMEDY

- Overall, citizens are pleased with the chosen remedy. They have major concerns, however, about the dust that may rise during clean-up activities.

  EPA Response: The dust problem will be addressed in the remedial design and common dust control measures, such as sprinkling water or spreading dust suppresant materials, will be taken to control the dust during remedial action.

- Many citizens had questions about the amount of soil that will be removed.

EPA Response: This issue will also be addressed during the remedial design phase. According to reports from the removal, digging may be 30-35 feet deep in some areas and 15-20 feet in others. Tests will be conducted and excavation will continue as long as contamination is found.

Citizens asked if the soil that is removed will be replaced with new soil.

EPA Response: EPA does not want to lower any water levels for areas that might be flood prone, so bringing soil in to refill excavated areas will be considered. Final site restoration is part of the proposed remedy.

Citizens questioned the safety of the fumes that may be emitted during the excavation.

EPA Response: Fumes that are at any levels of concern are not anticipated. During the removal operation, the tests conducted did not indicate any large concentrations of fumes of any concern.

One citizen asked why there were no plans for evacuating area residents, as was done during the removal.

EPA Response: Most of the material has already been removed. There are no drums remaining that could explode so the precaution is not necessary.

The STOP representative stated that the community would like to see a safety plan in place before any remedial activity begins at the site.

EPA Response: The health and safety plan is an integral part of all remedial actions. Site security, dust control, and vapor monitoring are all considered during the feasibility study. Safety plans will be included in all of the design documents, which will be available to the public at the information repositories.

Citizens were interested in acquiring someone to perform independent oversight of the remedial activities.

EPA Response: EPA offers Technical Assistance Grants (TAGs) to communities that qualify to hire a consultant to monitor the project. Information on TAGs is available in the information repositories.

B. HEALTH CONCERNS

- Citizens questioned the methodologies being used for the health study.

  EPA Response: The Agency for Toxic Substances and Disease Registry (ATSDR) is conducting the health study and is determining the methodologies.

- One citizen asked if there was a correlation between the chemicals at the site and the number of children in the community who have been sick.

  EPA Response: The health assessment being conducted by ATSDR is currently underway and should be completed within the next two months.

- Several citizens said that their animals died after being in contact with flood water that had run off the site. Others stated that the crops growing in their gardens are inedible. One citizen said that his grandson has an incurable disease that his doctor attributes to the contamination.

  EPA Response: EPA must rely on what studies have shown and the evaluation of the situation is that when the cleanup is complete, the site will not pose a significant health risk to anyone who lives near the site. The Mississippi State Department of Health offered to investigate the child's disease.

C. OFF-SITE CONTAMINATION

- Many citizens expressed concern about contamination they are aware of off-site. Citizens attested to drums buried under construction sites and placed ir an old garbage dump.

  EPA Response: The State of Mississippi, Department of Natural Resources, Bureau of Pollution Control has stated that it will look at these sites to determine if there are environmental problems. The off-site testing that EPA has conducted to date show no indication of chemicals off-site at levels of concern.

  Several citizens asked if EPA had tested areas around the site for contamination.

EPA Response: EPA has performed tests on the soil. No contaminated soil has been detected in the off-site areas adjacent to the site.

- One citizen has drums behind her house which, she says, EPA promised to remove but never has.

EPA Response: EPA will look into the problem.

D. MISCELLANEOUS

- Citizens asked for a commitment from EPA that the site will be restored to what the citizens consider to be a livable environment; they want every piece of contamination removed.

EPA Response: EPA is committed to making the site area livable which is done by reducing the contamination to a level that is acceptable for both environmental and public health concerns.

- Citizens expressed concern over the amount of input the potentially responsible party (PRP) will have regarding clean-up activities.

EPA Response: By law, the PRPs must have the opportunity to participate in the cleanup.

IV. REMAINING CONCERNS

Local residents expressed several remaining concerns in regard to remedial operations at the Newsom site. They remain concerned about the dust that will rise during the clean-up, about off-site contamination, and about the results of the ATSDR health study. EPA will continue to coordinate with the other agencies involved and to get site information to the citizens.

Addendum

Responses to Reichhold's Comments Submitted On the RI/FS and Proposed Plan

Malcolm Pirnie, Inc. and ENVIRON Corporation were asked to review the Endangerment Assessment (EA) conducted by ICF-Clement Associates and a Feasibility Study conducted by Camp Dresser and McKee, and submit public comments on behalf of Reichhold Chemicals, Inc. (Reichhold) which has been identified as a potentially responsible party at the site.

The PRP's. concerns over USEPA's proposed remedial action for the site are summarized and EPA's responses follow.

[1]

COMMENT - The Remedial Investigation for the Site does not provide compelling or in many cases any evidence of chemical contamination in the areas that are targeted for excavation in the USEPA remedy.

RESPONSE - Several areas listed as requiring soil remediation are areas that contained buried drums and/or chemicals. These areas were excavated and the contaminated material and drums were removed and transported offsite for disposal during the 1987-1988 removal activity. Soil that was not obviously contaminated yet surrounded the excavated contaminated material was returned to the burial areas after these burial areas were lined with plastic. Through association with the contaminated drums and/or chemicals the soil may also have become contaminated. The limited sampling conducted during the remedial investigation did not detect the presence of materials contaminated in excess of cleanup standards in some of the burial areas. A complete screening of the soils in these areas will be necessary to determine the total amount of contaminated materials that will have to be remediated.

[2]

COMMENT - As documented in the Endangerment Assessment (EA) for the site, the average levels of chemicals of concern in soils and sediments do not pose significant health risks, even if lifetime human exposure is postulated. In fact, the average risks claimed in the EA are overstated.

RESPONSE - In order to ensure a high level of protection, the Endangerment Assessment (EA) used conservative current and future use scenarios to assess the potential threat to human health and the environment posed by the site if no cleanup occurred. Both average and maximum exposure scenarios were considered in the establishment of cleanup standards. The EA utilized the most accurate and current information available to establish the risks

levels for the chemicals that were detected in the contaminated media at the site.

[3]

COMMENT - USEPA's proposed soil cleanup goal for carcinogenic polynuclear aromatic hydrocarbons (cPAHs) is roughly equivalent to the amount of cPAH's consumed by someone eating an 8 oz. charcoal broiled steak every two years for a lifetime. This is a prospect that few people would consider excessively risky.

RESPONSE - The soil cleanup levels for carcinogenic PAH's have been reassessed based on available literature on normal background concentrations present in the region and known health effects of the compounds. Urban background levels range from zero to 22 ppm. The cleanup criteria has been revised to an action level of 10 ppm in soil. This number is based concentrations known to occur naturally in urban areas and the health based cleanup criteria for average exposure scenarios established in the EA to provide protection to the 10^{-6} level.

[4]

COMMENT - Cleanup levels estimated for the site are inappropriately stringent, in that they are based upon exposure scenarios that are unrealistic. Use of more realistic, yet still conservative, exposure scenarios would have yielded substantially higher cleanup targets, even if the residual risk level is kept as low as 10-6 (i.e., a one-in-a-million chance of developing cancer through lifetime exposure at the site.)

RESPONSE - The cleanup levels are based on scenarios that are considered by EPA to be realistic and appropriate for the area under study.

[5]

COMMENT - The USEPA remedy incurs but does not evaluate risks of transportation related fatalities that are substantial relative to the health risks estimated in the Endangerment Assessment for lifetime exposure at the site. While excavation and off-site transportation of some material may be cost-justified, the amount of material to be moved off-site should be limited to the extent feasible given the transportation risk.

RESPONSE - EPA does realize the risks associated with highway transportation. We will implement stringent safety requirements for offsite transport of material. These safety requirements will

be implemented to protect citizens from highway incurred dangers during transport and eliminate the potential exposure to contaminated material from the site by thorough decontamination and inspection procedures. These safety requirements will be included in the health and safety plan for the site and will become an integral part of the cleanup operation. To further ensure the safety of the citizens of the area, transportation routes and safety procedures will be coordinated closely with City of Columbia and Marion County officials, as well as state Departments of Transportation.

[6]

COMMENT - The USEPA remedy is inconsistent with the intent of Congress as expressed in the Superfund Amendments and Reauthorization Act of 1986. Remedies that offered permanent solutions were clearly favored and Congress clearly indicated its desire to minimize movement of waste material to different landfill sites around the United States.

RESPONSE - This remedy will utilize permanent solutions to the maximum extent practical for this site. The remedy calls for offsite thermal destruction and disposal of the most heavily contaminated portion of the material. The remainder of the material will be transported to an approved secure landfill that is permitted to receive material that is within the 10^{-4} to 10^{-6} risk range for permanent disposal. Some additional pretreatment may be necessary prior to disposal of the waste.

[7]

COMMENT - Remedies are available and feasible for this site that utilize on-site permanent solutions such as bioremediation, and limit the amount of soil sent off-site to material which is not amenable to on-site treatment. Such an approach reduces transportation risks and provides lower exposure and risk for citizens of the communities involved.

The Feasibility Study (FS) has eliminated technologies during the screening process which should have been retained. Furthermore, in developing remedial actions, the FS has inappropriately evaluated them against the nine criteria identified in the USEPA guidance on conducting Feasibility Studies.

RESPONSE - Section 5.0 of the ROD lists the various technologies that were considered for use at this site. The entire list of technologies was carefully evaluated based on the criteria listed in the Feasibility Study (FS). The method used to screen the

various alternatives closely follows EPA guidance. The complete method used to screen the various technologies is presented in the FS. Bioremediation was eliminated from consideration for use due to the unproven ability of the technology to reduce the targeted compound to cleanup levels. Encapsulation, vegetative cover, and capping received a thorough consideration for use at the site. Section 5.0 of the ROD evaluates these alternatives. A full discussion of technologies considered is included in the FS and further discussions of the alternative selection process are in the ROD.