# RECORD OF DECISION
# SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

# ESCAMBIA WOOD TREATING COMPANY SUPERFUND SITE

## OPERABLE UNIT 2
## (GROUND WATER)

PENSACOLA, ESCAMBIA COUNTY, FLORIDA


PREPARED BY:

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA, GEORGIA



SEPTEMBER 2008

# TABLE OF CONTENTS

## PART 1: THE DECLARATION



## PART 2: THE DECISION SUMMARY

## LIST OF FIGURES



## LIST OF TABLES



## LIST OF APPENDICES

## LIST OF ACRONYMS and ABBREVIATIONS

| | |
|---|---|
| ADD | average daily dose |
| amsl | above means sea level |
| ARAR | applicable or relevant and appropriate requirement |
| Black & Veatch | Black & Veatch Special Projects Corporation |
| bls | below land surface |
| BRA-HH | Baseline Risk Assessment for Human Health |
| CCA | chromated copper arsenate |
| CDD | chlorinated dibenzo-p-dioxins |
| CDM | Camp, Dresser and McKee, Inc. |
| CERCLA | Comprehensive Environmental Response Compensation Liability Act |
| CFR | Code of Federal Regulations |
| CLP | Contract Laboratory Program |
| $cm^2$ | square centimeter |
| COC | chemical of concern |
| COPC | chemical of potential concern |
| CSF | cancer slope factor |
| cy | cubic yards |
| DO | dissolved oxygen |
| DP | dilute plume |
| DPT | direct push technology |
| EPA | U.S. Environmental Protection Agency |
| ERT | Emergency Response Team |
| ESD | Explanation of Significant Differences |
| FAC | Florida Administrative Code |
| FDEP | Florida Department of Environmental Protection |
| FDER | Florida Department of Environmental Regulation |
| FS | Feasibility Study |
| ft bls | feet below land surface |
| GRA | general response action |
| HCP | high concentration plume |
| HI | hazard index |
| HQ | hazard quotient |
| ILCR | incremental lifetime cancer risk |
| ISEB | *in situ* enhanced bioremediation |
| LADD | lifetime average daily dose |
| LMJA | Larry M. Jacobs & Associates, Inc |
| LPZ | Low permeability zone |
| $m^3$/kg | cubic meter per kilogram |
| MCL | maximum contaminant level |
| µg | microgram |
| µg/L | micrograms per liter |
| mg/kg | milligrams per kilogram |
| mg/kg-day | milligrams per kilogram per day |
| mg/L | milligrams per liter |
| MPZ | Main producing zone |

| | |
|---|---|
| M/T/V | mobility/toxicity/volume |
| NCP | National Contingency Plan |
| NOV | Notice of Violation |
| NPDES | National Pollutant Discharge Elimination System |
| O&M | operation and maintenance |
| OU | Operable Unit |
| PAH | polynuclear aromatic hydrocarbons |
| PCE | tetrachloroethylene |
| PCP | pentachlorophenol |
| POTW | Public Owned Treatment Works |
| RCRA | Resource Conservation and Recovery Act |
| RAGS | risk assessment guidance |
| RD | Remedial Design |
| RfC | reference concentration |
| RAO | Remedial Action Objective |
| RME | reasonable maximum exposure |
| RI | Remedial Investigation |
| ROD | Record of Decision |
| SARA | Superfund Amendments and Reauthorization Act |
| "Site" | Escambia Wood Treating Superfund Site |
| SGA | sand and gravel aquifer |
| SP | source plume |
| SVOC | semi-volatile organic compounds |
| SZ | Suficial zone |
| TBC | to-be-considered |
| TCDD | tetrachloro-dibenzo-p-dioxin |
| TEQ | toxicity equivalent quotient |
| TOP | Temporary Operating Permit |
| TPH | total petroleum hydrocarbons |
| UWF | University of West Florida |
| WHO | World Health Organization |

# PART 1: THE DECLARATION

## 1.1 Site Name and Location

This Record of Decision (ROD) is for the Escambia Wood Treating Company (ETC) Superfund Site, Operable Unit 2 (Ground Water) that is located at 3910 North Palafox Street in the city of Pensacola, Escambia County, Florida. The U.S. Environmental Protection Agency (EPA) Site Identification Number for the ETC Superfund Site is FLD008168346.

## 1.2 Statement of Basis and Purpose

This decision document presents the Selected Remedy for the Escambia Wood Treating Company Superfund Site (the "Site"), OU2 (Ground Water) that was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record for the Site. This decision represents the final remedy selection for the Site, and, following completion of the remedial action, the Site will be ready for reuse. The State of Florida, as represented by the Florida Department of Environmental Protection (FDEP), has been the support agency during the remedial investigation/feasibility study process for the Site. In accordance with 40 Code of Federal Regulations (CFR) Section 300.430, as the support agency, FDEP has provided input during the process.

## 1.3 Assessment of Site

The response action selected in this ROD is necessary to protect the public health or welfare and the environment from actual or threatened releases of hazardous substances to the environment.

## 1.4 Description of Selected Remedy

The overall cleanup strategy for the OU2 final remedy is aggressive treatment of source areas which act as a source for continued contamination of the ground water and active in situ treatment of ground water contaminated above selected natural attenuation monitoring criteria. A key objective of the aggressive treatment is to address principal threat waste and create aquifer conditions suitable for ISEB. The selected remedy for OU2 is compatible and works in conjunction with the remedy for OU1 (Soil). Following completion of the remedy for OU2 the remedy will be protective of both human and ecological receptors and will attain unlimited use and unrestricted exposure criteria. The selected remedy is compatible with the planned future use of the Site. The major components of the selected remedy include:

- Installation of vertical and horizontal injection and extraction wells;
- ISCO and ISEB using vertical and horizontal wells in source plume areas (SP-4);
- ISEB in high concentration plume areas (HCP-3);
- MNA in dilute plume areas (DP-2);
- Operation & Maintenance;
- Institutional controls; and
- Five-Year Reviews.

The proximity of the Site to another active CERCLA site (the Agrico Chemical Superfund Site) to the southwest requires close coordination and consultation with risk managers for that site. The concern was that implementing remedial alternatives at the OU2 might adversely impact the ongoing remedial activities at the Agrico site. This consideration was made during the development and evaluation of remedial alternatives for the Site.

## 1.5 Statutory Determinations

The Selected Remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action (unless justified by a waiver), and is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for OU2 and satisfies the statutory preference for remedies that employ treatment to reduce toxicity, mobility, or volume as a principal element in conjunction with the remedy for OU1 (soil). The remedy eliminates human and ecological exposure to contaminated ground water, permanently controls the mobility of the contaminants, and is protective of ground water resources. Of the contaminants being addressed through OU2 naphthalene is the most significant. Naphthalene occurs at concentrations that indicate the likely presence of dense non-aqueous phase liquid (DNAPL). Naphthalene has been found in the source area at more than 50% of the pure phase solubility of naphthalene.. DNAPL would act as source material for ongoing groundwater contamination and is considered a principal threat waste.

Because this remedy will take in excess of five years from construction start to attain unlimited use and unrestricted exposure criteria, a statutory review will be conducted within five years of construction of the remedy to ensure that the remedy remains protective of human health and the environment as the cleanup progresses.

## 1.6 Data Certification Checklist

The following information is included in The Decision Summary, Part 2 of this ROD. Additional information can be found in the Administrative Record file for this Site.

- ❑ Chemicals of concern (COPCs) and their respective concentrations (pages 31-32)
- ❑ Baseline risk represented by the COPCs (pages 35-36)
- ❑ Cleanup levels established for COPCs and the basis for these levels (page 37)
- ❑ How source materials constituting principal threats are addressed (page 80)
- ❑ Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of ground water applied in the Baseline Risk Assessment for Human Health (BRA-HH) and ROD (page 28)
- ❑ Potential land and ground water use that will be available at the Site as a result of the Selected Remedy (pages 28)
- ❑ Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (pages 87, 88)
- ❑ Key factor(s) that led to selecting the remedy (i.e. describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) (page 67 - 70)

## 1.7 Authorizing Signatures

Franklin E. Hill, Director
Superfund Division
U.S. Environmental Protection Agency, Region 4

9/29/08
Date

# PART 2: THE DECISION SUMMARY

## 2.1 Site Name, Location, and Brief Description

This ROD is for the Escambia Wood Treating Company Superfund Site (the "Site"), OU2 (Ground Water) that is located at 3910 North Palafox Street in the city of Pensacola, Escambia County, Florida. The Site location is shown on Figure 1. A down gradient Superfund site, Agrico Chemical, shown on Figure 1, is not part of the ETC facility. The EPA is the lead agency for this Site, and the EPA Site Identification Number is FLD008168346. Site remediation will be conducted and financed by the Superfund program, with the State of Florida's Department of Environmental Protection administering a State Cost Share of ten percent of the remedial action costs.

ETC OU2 consists of the contaminated groundwater resulting from releases from the ETC facility. Residential properties located both north and south of the Site have been the subject of a National Relocation Pilot Project that served as an interim action for the remediation of OU1. This remedial action provides a final remedy for ground water that, in conjunction with the remedy for OU1, will permanently address contamination attributable to the Site and is consistent with the planned future use of the Site.

The Site is an abandoned wood preserving facility that operated from 1942 until its closing in 1982. The Site is located at approximately 30° 27' 19" north latitude and 87° 13' west longitude. The ETC property occupies approximately 26 acres. The facility is bordered on the north by residential neighborhoods, on the west by Palafox Street, on the east by the CSX Railroad Switchyard, and on the south by an abandoned concrete plant and small industrial park. During its operation, the facility treated utility poles, foundation pilings, and lumber with creosote and PCP. Prior to the OU1 residential relocation, the population surrounding the Site was distributed as follows: 0-.25 miles (180); 0.25 miles (540); 0.5 – 1 mile (8,909); 1.0-2.0 miles (24,094). Three schools with an enrollment of approximately 2700 students are located between 0.5 and 1 mile from the Site. Figure 1 illustrates the neighborhoods around the ETC Site.

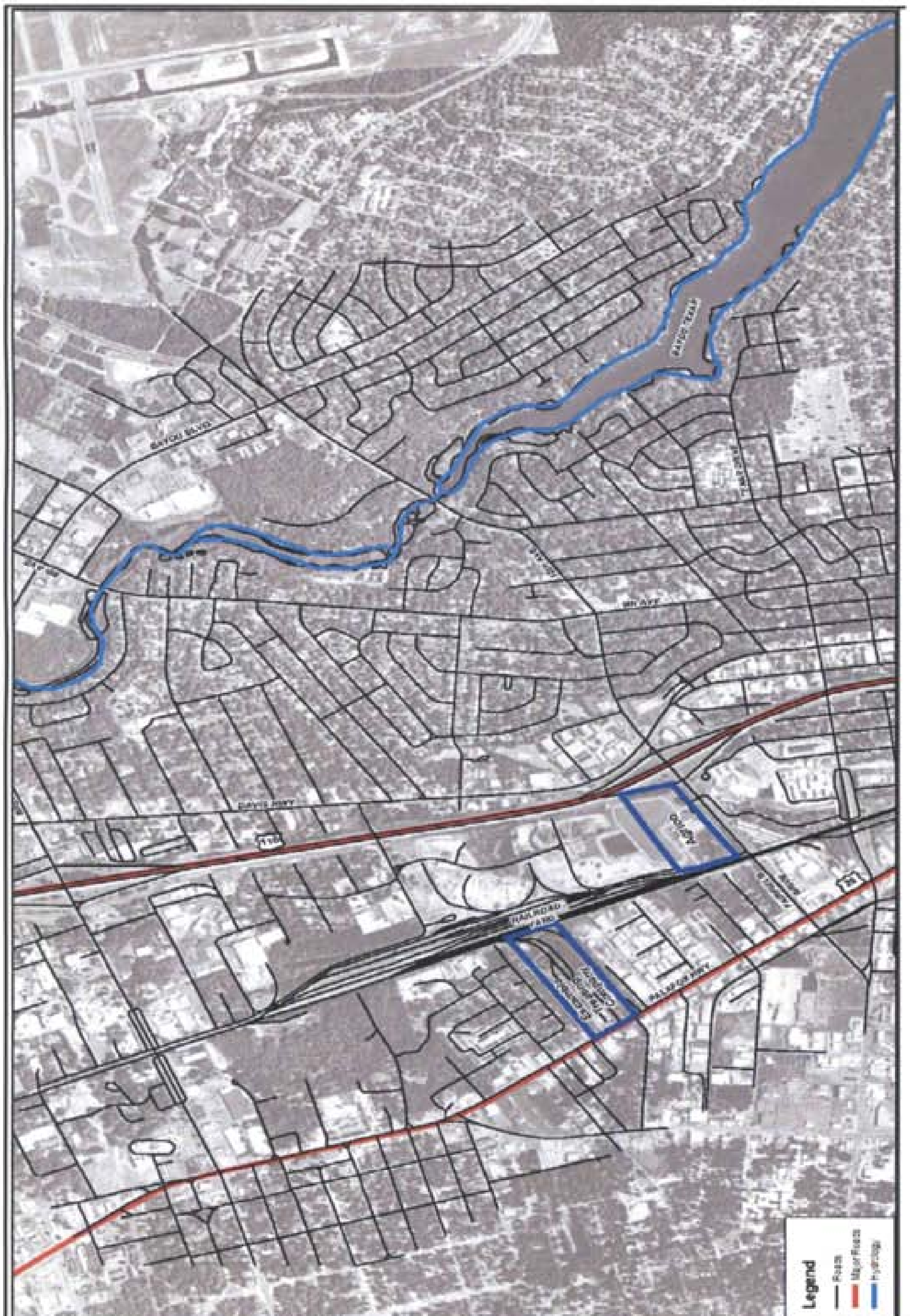
Ground water beneath and downgradient from the Site has been contaminated by releases from the Site. The ground water contamination will be addressed by the remedy presented herein. The prior EPA soil removal action has been effective at reducing or eliminating ongoing impacts to ground water. No drinking water wells are known to be present within the contaminated area of the aquifer. There are no surface water bodies in the immediate vicinity of the Site. Bayou Texar is located 1.5 miles east of the Site. Bayou Texar flows to Pensacola Bay which is 3.5 miles south of the Site.

## 2.2 Site History and Enforcement Activities

### 2.2.1 Operational History

The Site was first developed in 1942 as a manufacturing facility of wood products treated with creosote. Before the start of operations in 1942, the land was used for farming (Weston, 1993). ETC's Pensacola facility was involved in the pressure-treating of wood products, primarily utility poles and foundation pilings. Southern yellow pine was debarked, formed, dried, impregnated with

## Figure 1 Site Location Map



preservatives, and stored at the facility until delivered to customers. From 1944 to approximately 1970, coal-tar creosote was used as the primary wood preservative. PCP dissolved in No. 6 diesel fuel was used as a preservative at the facility starting in 1963, and was the sole preservative in use from 1970 to 1982 (A.T. Kearney, 1990).

Creosote is a mixture of more than 200 organic compounds that is distilled from coal tar at temperatures between 200°C and 400°C. PCP is prepared by the chlorination of phenol in the presence of a catalyst, and is commonly acquired in bulk crystalline form and dissolved in hot diesel fuel because PCP is solid at ambient temperatures.

Before pressure impregnation of preservative into the debarked and "framed," or formed, wood, naturally-occurring moisture and resin were removed from the Southern yellow pine using a steam/vacuum process. In this process, the wood was placed in treatment cylinders and heated using steam from the facility's wood-fired boiler. Condensate formed in the cylinders during the heating cycle was continuously drained to a condenser hot well, then to a primary oil/water separator via a process drain system. At the end of the heating cycle, the cylinders were vented, and a vacuum was applied. Liquids from the wood settled to the bottom of the cylinders. These liquids were pumped to the primary oil/water separator at the conclusion of the vacuum cycle. The vacuum system at the Site was a steam ejector jet attached to an elevated, direct-contact, barometric condenser. Vapors from the treatment cylinders condensed, mixed with the condenser cooling water, and were gravity-fed from the condenser to the condenser hot well, and then to the oil/water separator (A. T. Kearney, 1990).

Following the heating/vacuum cycle, the wood preservative was impregnated into the wood under pressure. After the impregnation cycle, the pressure was reduced in the treatment cylinders, and the wood products were removed from the cylinders on trams. Excess preservative was allowed to drain from the treated products along drip tracks before onsite storage in one of the nine treated-wood storage areas.

Contaminated wastewater and runoff from the former treatment area were the primary wastes managed at the facility. In the early years of operation, all wastewater was sent to an unlined impoundment located in the northeastern part of the Site. This natural earthen unit was used from the mid-1940s through at least the mid-1950s, and thereafter was used as a landfill. After the mid-1950s, process wastewater and contaminated runoff were managed by two separate systems. Process wastewater was initially managed by an oil/water separator to recover treating chemicals and process water for reuse in the wood-treating process. The system consisted of two concrete and treated wood impoundments. The former "hot" and "cold" ponds, each used from 1955 to 1982, and with a holding area of 6,250 cubic feet, operated in series. The "hot" pond received wastewater laden with PCP and creosote before its discharge via shower heads into the "cold" pond. The shower heads cooled the water, volatilizing some of the organic constituents. Water from this unit was discharged to the Pensacola sanitary sewer system or pumped back into the process vacuum line.

The contaminated runoff from the treatment area was directed into a runoff collection and separation system. This system consisted of a concrete collection pad and a series of separation basins, which removed waste treating solutions from the runoff water. Runoff was then pumped via a storm-drain system to an impoundment located in the southern section of the facility. The impoundment, which was constructed of sectionally poured concrete, had a holding capacity of 225,000 gallons. Wastewater in the impoundment, also known as the "swimming pool," was allowed to evaporate, and the remaining contents were discharged to the Pensacola sanitary sewer system (A. T. Kearney, 1990).

### 2.2.2 Regulatory and Enforcement History

The Site has a lengthy regulatory history that begins with the submittal of the Notification of Hazardous Waste Activity Form (CERCLA 103C) to EPA on August 15, 1980. Before this submittal and the promulgation of the Resource Conservation and Recovery Act (RCRA), little available documentation was generated regarding compliance and non-compliance with federal, state, or county rules and regulations (A. T. Kearney, 1990).

As required under the notification provision of RCRA, a Part A Permit Application was submitted by the Escambia Wood Treating Company on November 18, 1980, to the Florida Department of Environmental Regulation (FDER) for a permit to operate a hazardous waste storage facility engaged in the storage of K001 Wood preservative waste. K001 Wood preservative waste is defined as "bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol" under 40 CFR § Part 261.32. Although the Company ceased operation in October 1982, three surface impoundments at the facility that contained K001 sludge and wastewater required permitting and closure.

The Company applied to the State of Florida for a Temporary Operating Permit (TOP) on April 11, 1983. Permit number HT17-68894 was issued on March 2, 1984, with an expiration date of January 1, 1987. The specific provision of the permit required the Company to submit a modified closure plan, ground water monitoring plan, and statistical analysis of ground water samples (A. T. Kearney, 1990). As a result of these requirements, the facility submitted a revised closure plan for the surface impoundments in March 1985.

In May 1985, the Company submitted to the Hazardous Waste Management Section in Tallahassee, Florida, a request for waiver allowing the post-closure care period to continue for a minimum of 5 years, rather than be supplanted by the 30-year, post-closure period required under the RCRA regulations. On May 3, 1985, the waiver was denied and the facility was required to maintain a 30-year, post-closure period of operation (A. T. Kearney, 1990).

On August 20, 1985, a Warning Letter was issued to the Company regarding violation of the RCRA financial requirements. The warning letter was followed by a Notice of Violation (NOV) on September 15, 1985, resulting from the facility's failure to respond to the warning letter. The major violations cited in the NOV dealt with the ground water program and the failure to provide financial assurance (A. T. Kearney, 1990).

During the month of September 1985, in accordance with the TOP, the facility removed sludges from the three surface impoundments and transported them offsite to a hazardous waste facility in

Alabama (A. T. Kearney, 1990). On October 2, 1985, a revised closure plan addressing the 30-year, post-closure requirements under the regulations was submitted to FDER. In addition, the facility was able to obtain a standby letter of credit for closure/post-closure costs as part of the RCRA financial assurance requirements.

In a letter dated November 13, 1985, the facility owners stated that issues in a previous NOV from the FDER had been addressed regarding financial assurance with the exception of the sudden and non-sudden insurance. The applicable insurance policy was canceled July 1, 1985, and the Company had been unable to obtain another policy. On December 14, 1985, the Company obtained liability insurance; however, the policy clearly stated that the general liability insurance coverage excluded pollution events.

On December 31, 1985, Consent Order No 85-0985 between the State of Florida and the Company was signed by both parties to establish a compliance schedule for the Site. This schedule for the installation of additional monitoring wells and the submittal of an acceptable ground water monitoring program was reviewed by the state. The financial assurance issue was handled by the use of a "good-faith effort," which the State considered to be a temporary solution to liability coverage. This required the Company to show evidence, every 90 days, of contacts with known suppliers of pollution liability coverage.

Following the consent order, additional information concerning the closure permit was received from the facility on February 13, 1986; May 29, 1986; and June 24, 1986. On December 19, 1986, the State of Florida issued a notice of intent to issue a permit for closure of the facility. The closure permit application submitted and modified by the facility contained additional permit conditions (closure) established by the state. These conditions addressed ground water monitoring; location, number, and depths of wells; and sampling parameters during closure and post-closure. The conditions were unacceptable to the facility. According to Company personnel, they did not believe that an extensive ground water monitoring program was necessary because 168 cubic yards of K001 sludge was removed from the three impoundments in September 1985.

In February 1987, ETC submitted a petition to request a hearing on FDER's intent to issue a permit. The Company objected to the requirements that additional ground water monitoring wells be installed. The Company claimed that FDER had not sufficiently justified the need for additional wells. Furthermore, Company representatives questioned FDER's authority regarding ground water monitoring at the Site and the proper closure of the surface impoundments. During April 1987, a down gradient facility, Agrico Chemical, notified the state and EPA that its up gradient well was contaminated with PCP. On April 15, 1987, EPA conducted a site visit at Agrico Chemical to sample the up gradient well.

In September 1987, EPA issued a complaint and compliance order regarding the installation of a ground water monitoring system at the facility waste management areas which would fulfill the ground water monitoring requirements of 40 CFR.265.91 (Tobin, 1987). During May 1988, a Preliminary Reassessment was conducted at the Site facility to confirm the findings of the initial preliminary assessment conducted by FDER on July 31, 1984. Reviews of data collected by the EPA Environmental Services Division (ESD) (Sampling Inspection of June 27, 1988), offsite reconnaissance and target survey findings, and reviews of existing EPA and FDER material concluded that the facility should be scheduled for further investigations.

In September 1988, EPA filed a complaint against ETC regarding violations at the Pensacola and other facilities. In April 1989, EPA conducted a compliance evaluation inspection at the Site, and noted several interim status standards violations of 40 CFR § 265.

A preliminary review and visual site inspection were conducted during the RCRA Facility Assessment (RFA) to identify Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) in June of 1990 by EPA (A. T. Kearney, 1990). The RFA was required pursuant to the Hazardous and Solid Waste Amendments (HSWA) of 1984, which expanded EPA's authority under RCRA to require corrective action for releases of hazardous waste or constituents from SWMUs for facilities such as ETC that sought a RCRA permit. The RCRA corrective action process applies to all SWMUs and AOCs that have the potential to release hazardous constituents. The RFA identified 31 SWMUs and 2 AOCs of which 16 SWMUs and 1 AOC were deemed to require further action (A. T. Kearney, 1990).

The Escambia Wood Treating Company filed for bankruptcy and abandoned the Site in 1991. The company defaulted on its environmental liabilities, and the case was referred to the EPA to pursue settlement with the owner. EPA reached a final settlement with the owner, an individual, in 2002.

### 2.2.3 Previous Investigations

The Site has been the subject of numerous previous investigations. These investigations are briefly summarized below:

- 1982 EPA Environmental Services Division (ESD) Investigation

  In November 1982, EPA ESD conducted a RCRA compliance monitoring non-site-specific, Superfund Investigation at the Site. Ground water, soil cores, and waste samples were collected during this investigation. Ground water was collected from two existing supply wells, and no wood preserving or related compounds were detected. Soil core samples collected on site had elevated concentrations of metals and wood preserving related compounds. Samples of wastewaters and sludges had highly elevated concentrations of PCP.

- 1984 Preliminary Assessment

  In July 1984, EPA conducted an onsite inspection and used the results of the 1982 ESD investigation and a 1983 FDER RCRA compliance report to complete a potential hazardous waste-site preliminary assessment. The assessment reported that no damage to offsite property was observed, but that runoff produced at the Site might contaminate nearby storm drains, detention ponds, and other facilities. The assessment concluded that although the extent of contamination was not known, it could extend offsite, and sampling would be necessary to determine if it did (EPA, 1984).

- 1984 Site Inspection

  In August 1984, National Water Well Association Research Facility personnel recorded monitoring well data from the facility's four monitor wells as part of a Site Inspection. The Site Inspection was conducted under contract with EPA.

- 1986 Geohydrological Investigation

  In July 1986, Larry M. Jacobs & Associates, Inc. (LMJA) conducted a geohydrological investigation of the Site for the Escambia Wood Treating Company. The investigation consisted of three 150-foot-deep standard penetration test borings, laboratory tests on selected soil samples, a site visit, and inspection and analysis of samples. Unidentified odors were detected in the soil samples collected near the water table at a depth of 40 feet to 45 feet in one boring. Additional odors were detected from 85 feet to 118 feet below grade in a layer of white, slightly silty, fine sand soils. The FDER reviewed the results of the geohydrologic investigation and indicated that, due to the local geology, any contaminant discharged at the Site could reach the main production zone of the Sand and Gravel Aquifer (180 feet to 280 feet bls), given time, distance, and effect produced by public supply wells down gradient of the Site (Kennedy, 1986).

- 1987 FDER Site Investigation

  In August and September of 1987, FDER conducted an investigation at the Site. The objective of the investigation was to determine if the old creosote pond (SWMU10), located in the northeast corner of the abandoned facility, was a source of ground water contamination. Ground water monitoring and flow data generated in this study indicate that a significant contamination problem existed in the area of the pond and immediately downgradient. The contaminants identified included high concentrations of polynuclear aromatic hydrocarbons (PAHs) and PCP, all of which are associated with the wood treating process and directly associated with the creosote pond contents. These compounds also had been identified in an earlier set of ground water samples taken at the abandoned Agrico Chemical facility, which is located less than a mile to the south (down gradient from the pond). The FDER investigation concluded that to accurately assess the area of ground water that had been impacted by this source, a comprehensive investigation that included multi-level monitoring would be necessary (FDER, 1988).

- 1987 EPA ESD Compliance Sampling Inspection

  A RCRA sampling inspection was conducted at the Site by EPA ESD during the week of December 7, 1987. Samples were collected from five monitoring wells, three waste containers, and three soil sites at the facility. The material in the tanks appeared to be waste sludge. Results from the metals analysis showed that the metals concentrations in the ground water samples and soil samples were generally at or near background levels. A number of organic compounds were detected at very high concentrations in many of the samples. Both volatile and semi-volatile organic compounds associated with wood treating were detected.

- 1988 Preliminary Reassessment

  A preliminary reassessment conducted by NUS Corporation in May 1988 noted that the aquifer of concern beneath the Site is the unconfined Sand-and-Gravel aquifer, and that this system of interbedded, unconsolidated quartz, sand, and gravel supplies most of the agricultural, industrial, municipal, and domestic water needs of this portion of western Florida, including Escambia and Santa Rosa counties. The Preliminary Reassessment concluded that the Site should be considered for further investigation.

- 1990 RCRA Facility Assessment

  A preliminary review and visual site inspection were conducted during the 1990 RFA to identify SWMUs and AOCs. The RFA identified 31 SWMUs and 2 AOCs. Sixteen SWMUs and 1 AOC were deemed to require further action (A.T. Kearney, 1990). The RFA concluded that almost the entire facility should be considered an AOC. The area of greatest concern appeared to be the SWMU 10 area and the entire former treating area. The area of least concern appeared to be the northwest section of the facility which appeared to manage only wood stock awaiting treatment. An additional concern that was identified was the extent of possible creosote contamination in the uppermost aquifer. The RFA report concluded that potential dense non-aqueous phase liquid could have migrated southeastward, based on the structure of the lower confining zone, the Pensacola Clay. At the time of the RFA, none of the existing monitoring wells had been drilled to the lower confining layer, so this could not be tested (A. T. Kearney, 1990).

- 1991 Preliminary Assessment

  The EPA Emergency Response Team (ERT) was activated by the EPA Region 4 On-Scene Coordinator (OSC) to perform a preliminary assessment at the Site in 1991 (Weston, 1991). The preliminary assessment consisted of soil, ground water, sludge, and air sampling, and conducting a bioassessment. The preliminary assessment presented the following conclusions:

  - Soil in SWMU10 was highly contaminated with creosote compounds.
  - Soil in the process area was highly contaminated with PCP, dioxins/furans, and creosote compounds.
  - Ground water appeared to be moving in a southeasterly direction.
  - Creosote compounds, PCP, and VOCs associated with their carriers had leached into the onsite ground water.
  - Sludge in SWMU7 and SWMU17 was highly contaminated and contained PCP, dioxins/furans, chromated copper arsenate (CCA) (SWMU7) and creosote compounds.

- Air sampling indicated that there was no immediate threat to the public through the migration of airborne contaminants.
- No areas of ecological concern existed on the Site that warranted further investigation or influenced removal or remedial decisions.

❑ 1991 Air Monitoring and Air Sampling Investigation

The EPA ERT performed air sampling and monitoring for excavation activities during the removal action at the Site. The monitoring information gathered was used to make field decisions on health and safety concerns and to determine if there was offsite migration of contaminants occurring during the excavation and stockpiling activities (Weston, 1991). The October and November 1991, air sampling events coincided with excavation of the SWMU 10 area, while the December 1991 event was carried out in relation to excavation of the process area. Based on the air monitoring, dust suppression techniques were instituted in October 1991 as a result of readings from Location #2 (located along a path that dump trucks used to move excavated soil to the stockpile).

❑ October 1991 through October 1992 – EPA Soil Removal Action

Removal activities at the Site began on October 14, 1991. Removal activities consisted of the excavation and stockpiling of contaminated material, proper offsite disposal of PCB transformers, proper overpacking and disposal of various containers from the former laboratory building and from around the Site, and separation and proper disposal of asbestos material onsite (related to demolition of onsite buildings). During this removal action, extensive sampling activities were conducted to help define the extent of contamination in the SWMU 10, SWMU 16, and process areas, and as a preliminary means of determining if additional excavation was needed (Weston, 1993).

Test pits were dug in the north pond and process area excavation pits in an attempt to determine the extent of contamination. Immunoassay kit results for PCP and total petroleum hydrocarbons (TPH) indicated that contamination was present in the north pond area at a depth of 50 feet and at a depth of 35 feet in the process area.

Excavation activities were completed in October 1992. An EPA Superfund Removal Update dated March 1994 indicated that the excavations went to a depth of 40 feet where ground water was encountered. Contaminant concentrations remained above action levels (except dioxin levels) and a visible LNAPL was present on top of the water table. According to the Removal Update, the lateral extent of contamination appeared to have been captured within the excavation area. Removal activities did not involve removal or treatment of contaminated ground water. Additional sampling investigations performed in January 2007 addressed the presence of LNAPL material on top of the water table. For conclusions from the sampling investigation see Section 2.2.4 Remedial Investigations/Feasibility Studies.

- January 1992 Well Sampling, Treatability Sampling Volume Estimate Investigation

  The EPA ERT conducted an additional round of monitor well sampling and treatability study sampling. Overall, the levels of several contaminant from two wells associated with SWMU 10 and Process Areas were significantly lower than the levels measured in 1991 (pre-removal action). Excavations and stockpiles onsite were surveyed to estimate the volume of contaminated soil excavated at the ETC Site (Weston, 1992b).

- 1992 Air Sampling Investigation

  The objective of this investigation was to conduct air sampling and monitoring at the Site to characterize residential and onsite airborne concentrations of PCP, dioxins, PAHs, and VOCs during the excavation and stockpiling of PCP and creosote contaminated soils. Data collected were evaluated against community action limits of 59 $\mu g/m^3$ for PCP and 5.5 $pg/m^3$ for dioxin. The results from the sampling indicated that the levels established in the air sampling plan for dioxin, PCP, and/or PAHs were never exceeded. The highest detected levels always were at the station downwind and closest to the work activities.

- 1992 EPA ESD Field Investigation

  In July, 1992, EPA Region 4 ESD conducted a sampling investigation at the ETC Site to acquire additional data for site risk assessment (EPA, 1992). Surface soil samples were collected from two locations onsite and from six residences located adjacent to and north of the site. In addition to analysis for volatile and semi-volatile compounds, dioxin/furan compounds were analyzed and detected in all samples collected. The background sample contained the lowest concentrations of dioxin/furan compounds, and the duplicate samples from the residence adjacent to the Site contained the highest concentrations.

- 1992 Extent of Contamination Study - Phase I

  The objective of this study was to identify the volume of soil to be removed for SWMUs 10 and 16 (based on contaminant concentration and depth) and to characterize the lithology of the material encountered during sampling activities at the Site (Weston, 1992a). The Phase II Contamination Study Report concluded that the two SWMUs were targeted correctly, and that excavation work had succeeded in removing the bulk of contaminated soil. The distribution of contaminant concentrations relative to depth indicated that contaminants had been transported laterally by ground water movement; however, the direction of ground water flow indicated by the contamination profile of some boreholes was not in agreement with previously identified ground water flow directions, warranting further ground water characterization.

- 1994 EPA ESD Field Investigation

  In July, 1994, EPA ESD conducted a sampling investigation to identify the presence and concentrations of any organic constituents in the drinking water supply that might be associated with wastes from the Site. Water samples were collected from three fire hydrants located across the Site, and from two of the city water supply wells that provide water to residents near the Site. EPA concluded that all of the constituents sampled were below EPA's National Primary Drinking Water Regulations and any other health-based standards, with the exception of one detection of tetrachloroethylene (PCE) in City Well #9 (raw water) at a concentration of 6.6 µg/l. EPA's MCL for PCE is 5 µg/l. However, when the well was sampled after treatment (filtering), the PCE concentration was below the detection limit, and EPA concluded that the use of this water supply well should not result in any adverse health effects. PCE is not a chemical associated with the Site.

- December 1994 – The Site was formally listed on the NPL.

- 1998 Feasibility Study (Soil)

  The primary objectives of this FS were to support the identification of remedial goal options (RGOs) for contaminated surface and subsurface soil; to determine the extent of contamination above the RGOs; to develop general response actions (GRAs); to identify, screen, and select remedial technologies and process options applicable to the contamination associated with the Site; and to develop and analyze possible remedial action alternatives for the Site. Risk-based RGOs were calculated for both cancer and non-cancer effects for the contaminants of concern (COCs) attributed to past operations at the Site in soil onsite, as well as offsite in nearby residential areas (Rosewood Terrace/Oak Park/Escambia Arms and Pearl Street/Hermann Avenue neighborhoods). The evaluation of remedial alternatives for soils acting as contaminant sources considered the following COCs: PAHs, collectively considered as benzo(a)pyrene equivalents and dioxins, collectively considered as 2,3,7,8-TCDD toxicity equivalents (TEQ). In addition, the following ground water COCs also were considered: naphthalene, acenaphthene, fluorene, phenanthrene, 2-methylnaphthalene, dibenzofuran, carbazole, and PCP.

- A revised OU1 FS incorporating the results of the additional sampling was issued in June 2005. The OU1 source soils RI included the installation of 24 monitoring wells, which documented the migration of the ground water plume offsite.

- In 2005, EPA issued the final Record of Decision for OU1 (soils). Remedial action began in October 2007 and is scheduled for completion in 2009. The overall cleanup strategy for the OU1 final remedy is to treat principal threat wastes through solidification/stabilization and to permanently isolate surface and subsurface soil contaminated above the selected cleanup levels in an onsite containment system. The major components for the OU1 remedy include the permanent relocation of residents in the Clarinda Triangle neighborhood and the excavation and containment of contaminated soils, with treatment of the most contaminated soils by solidification/stabilization. The containment area is designed to be compatible with the intended future commercial use of the property. Once the contaminated soils are placed, the remedy provides for the operation and maintenance and long-term monitoring of the containment system. Institutional controls will be used to restrict future use of the Site to commercial uses compatible with the remedy. Finally, to ensure the protectiveness of the remedy is maintained, Five-Year Reviews will be conducted.

### 2.2.4 Remedial Investigations/Feasibility Studies

The overall objective of OU2 Remedial Investigation (RI) was to investigate the nature and extent of off-Site ground water contamination associated with the Site. The RI took place in four phases:

- Phase I sample collection was conducted in July and August of 2000 and included sampling existing off-Site wells installed in conjunction with the adjacent Agrico site investigation, collecting surface water and sediment samples from Bayou Texar, and using direct push methods to collect ground water samples and hydrological data via cone penetrameter test (CPT) methods. Phase I sampling activities included the installation of 18 CPT probes advanced to depths of up to 180 feet below land surface (bls) to collect ground water samples and data to define the lithology at the Site. The primary purpose of Phase I was to define the extent of the ground water plume to the east and southeast of the Site.
- Phase II was initiated in July 2001 to refine the definition of the ground water plume and included the installation of 18 new monitoring wells, collection of ground water samples from 43 existing wells, completion of a tidal study, slug testing, and measurement of water levels to determine the ground water gradient.
- Phase III was conducted in early 2004 to determine whether the ground water contamination detected in the first two phases was due to more than one PAH source and to determine whether ground water contamination was impacting Bayou Texar. This phase included the installation of nine new monitoring wells. In addition, water levels were measured in the 9 new wells and 68 existing wells. A residential well survey was conducted to identify supply wells within the ground water plume area.
- Phase IV was conducted in early 2005 to determine whether the ground water plume had migrated east of Bayou Texar. Phase IV included the installation of six new monitoring wells, arranged in 3 two-well clusters on the east side of the Bayou.

Following the RI, in 2003 and 2004, the University of West Florida (UWF) conducted a study of the surface water and sediment quality in Bayou Texar (UWF, 2005). The study used existing data to profile the location and concentrations of contaminants in water and sediment in the Bayou, focusing on the contaminant plumes originating from the ETC and Agrico sites. Phase I of this investigation was conducted from June 2003 to March 2004; Phase II was completed in September 2004. During the two phases of the study, 32 vibracores were collected at depths of up to 5 feet bls. Forty-nine composite sediment samples were collected with a ponar sampler. One-meter deep sediment samples were collected at 15 locations with a sludge sampler. Water samples were collected at those 15 locations and 10 others.

The findings of the UWF study did not definitively indicate whether the ground water plume from the Site was discharging into the Bayou. With the exception of two samples, PAHs were detected only in surface sediments. The two subsurface sediment samples that contained PAHs did not contain naphthalene, as would be expected if the Site plume was discharging into the Bayou. Further, the ratios of PAHs suggested that they came from a variety of sources, including combustion of petroleum and non-petroleum products. Analysis of the sediment samples also failed to detect PCP, a contaminant in the Site ground water plume. Metals detected in the sediment samples were likely contributed by point and non-point sources rather than a ground water plume. In most cases, contaminant levels were higher in the sediments collected from the northern portion of the Bayou up gradient of the exposed ground water intersection from ETC with Bayou Texar.

In January 2007, Black & Veatch conducted an additional investigation, focusing on the areas of highest concentrations of ground water contamination to better characterize the nature and distribution of the ground water contamination in preparation for more in-depth technology evaluations in the Feasibility Study (FS).

At the outset of the FS phase, there were significant data gaps with respect to the nature and distribution of the source plume area at the Site. In the FS, the source plume area was defined as ground water containing the predominant contaminant, naphthalene, at a concentration greater than 7,000 µg/L [i.e., 7 milligrams per liter (mg/L)]. Information collected during the different phases of the RI did not provide resolution of contaminant concentrations in the surficial and lower permeability zones of the Sand and Gravel Aquifer adequate to evaluate source area mass and distribution alternatives with respect to the criteria of effectiveness, implementability, or cost. This uncertainty confounded evaluation of remedial alternatives and resulted in significantly exaggerated cost estimates associated with those alternatives. Additional ground water sample locations east of the Site property were collected to provide additional information on the source area mass and distribution.

This additional ground water sampling was conducted at the Site during January 2007 to better delineate the extent of naphthalene and semi-volatile organic compound (SVOC) contamination in the most highly contaminated portion of the Upper Sand and Gravel Aquifer at the Site. Ground water sampling activities included:

- Collection of ground water samples using direct push technology (DPT) at 4 shallow (60- to 65-feet bls) and 9 intermediate (95 to 105 feet bls) depths.
- Collection of ground water samples from 6 existing monitoring wells, including 3 wells screened in the surficial zone [monitor wells (MW) MW04SH, MW07SH, and MW12S] and 3 wells screened in the low permeability zone (wells MW04IN, MW07IN, MW12IN).
- Analysis of all ground water samples for SVOCs by an EPA Contract Laboratory Program (CLP) laboratory.

All sample analyses were conducted by a CLP laboratory for SVOCs. The most highly contaminated ground water samples ranged in concentration from 15,000 (DPT23I) to 17,000 µg/L naphthalene (MW07N and DPT30I). These samples are located within the source area of the plume in the low permeability zone. Two other samples collected in the low permeability zone, DPT24I and DPT27I, contained naphthalene at concentrations ranging from 360 to 550 µg/L. The ground water sample collected at DPT23S (the shallow sample corresponding to DPT23I) contained 700 µg/L naphthalene. The remaining detected concentrations of naphthalene in ground water were below the ROD cleanup levels.

The RI/FS and additional groundwater investigation performed in January 2007 concluded that there was no visual or quantifiable evidence of LNAPL in the OU2 plume offsite. However, residual LNAPL may be present in the smear zone or ganglia in the OU2 plume onsite. The selected remedy includes in situ oxidation of the source zone and this remedial technology is well proven to remediate residual LNAPL, which may be present at the Site.

## 2.3 Community Participation

There is a high-degree of interest in the Site cleanup within the nearby community, throughout the City of Pensacola and in Escambia County. This is due to a number of factors, including: the location of the Site in a mixed commercial and residential area on a major thoroughfare near downtown; the interim remedial action that resulted in the relocation of over 400 households; and, the existence of active community interest groups. There have been numerous Congressional inquiries related to this project, and two Grand Jury Reports at the local government level. A Technical Assistance Grant is in place with the Clarinda Triangle Association, a local community group. There also has been an investigation by the EPA Ombudsman that resulted in an update of the Community Involvement Plan and increases in direct community contacts. A number of Fact Sheets and Public Availability sessions have been held over the course of the RI/FS.

The announcement of the ETC OU2 Proposed Plan public meeting and the notice of the availability of the Administrative Record were published in the *Pensacola News Journal* newspaper on June 28, 2008. A public comment period was held from June 14 through July 28, 2008. The EPA presented the Proposed Plan to the community at a public meeting on July 2, 2008 at the Pensacola Civic Center with 24 people in attendance. Representatives from EPA, FDEP, and local government received questions and comments from the community concerning the proposed remedy and the remedial alternatives evaluated.

The ETC OU2 Proposed Plan and Feasibility were also made available on the project website, etccleanup.org. The Administrative Record file is available to the public at the West Florida Regional Library at 200 West Gregory Street, Pensacola, Florida and in the information repository maintained at the EPA Region 4 Superfund Record Center. EPA's responses to the comments received during the public comment period are included in the Responsiveness Summary, located in Part 3 of this ROD. The transcript from the public meeting can be found in the Administrative Record and as Appendix A of this ROD.

## 2.4 Scope and Role of Operable Unit

EPA has divided the ETC Site into two OUs. OU1 addresses contaminated soil and waste present onsite, including excavated material from the 1991 removal action stockpiled onsite, and contaminated soil present in offsite areas attributable to the Site. OU2 addresses contaminated ground water present beneath and downgradient of the Site associated with releases from the Site. This decision document presents the final remedy for the ETC Site. This remedial action will eliminate risks to human and ecological receptors from contaminated ground water, is compatible with the planned future reuse of the Site, and completes remedial action at the Site.

## 2.5 Site Characteristics

### 2.5.1 Conceptual Site Model

The conceptual site model for the Site is presented in Figure 2. The shaded portions of the conceptual site model describe the release mechanisms, migration pathways, and potential exposure mechanisms for human receptors related to ground water. Soil contamination is addressed through OU1 actions.

A summary of the conceptual model is presented below:

- Releases from impoundments, spills, waste pits/piles, and contaminated storm water runoff impacted surface and subsurface soil;
- Contaminants leached from soils into ground water;
- Contaminated ground water could potentially impact users of ground water as a potable supply; and
- Contaminated ground water could impact surface water in Bayou Texar in the future, exposing ecological receptors.

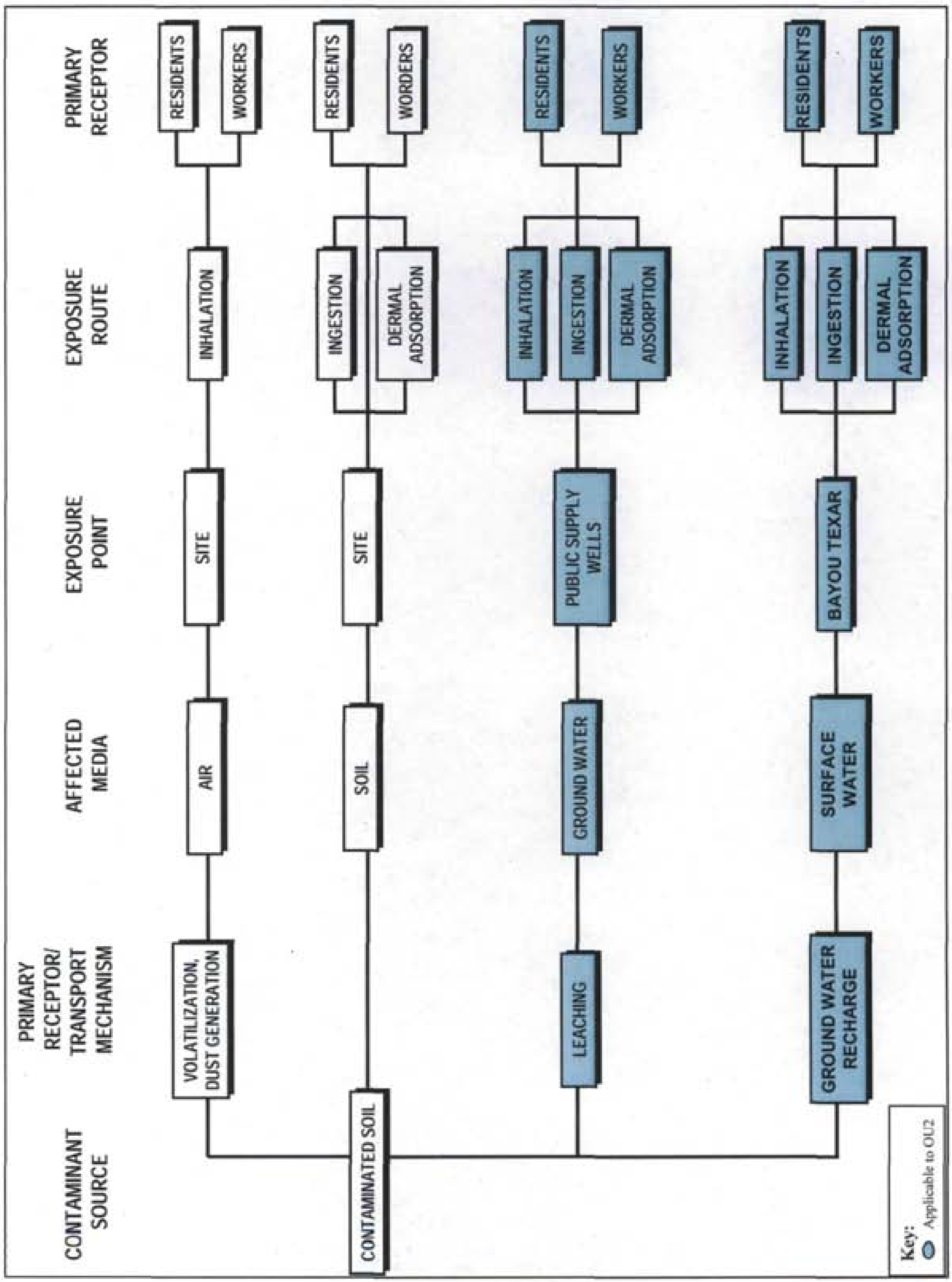
### 2.5.2 Site Overview

ETC operated as a wood treating facility from 1942 to 1982. The 26 acre facility is located in a mixed industrial and residential area of the City of Pensacola, Escambia County, Florida. Facility operations resulted in extensive creosote and PCP contamination in soil and ground water. Soil at the Site also is contaminated with dioxin, which is a common impurity in commercial-grade PCP.

To address the immediate threat posed by contamination at the Site, EPA completed an extensive removal action in 1992. The removal activities were designed to stabilize the Site while EPA evaluated long-term cleanup-solutions for site contamination. EPA excavated approximately 225,000 cubic yards (CY) of contaminated soil and stockpiled these materials, which are still onsite, under a secure cover to prevent direct contact and further migration of contaminants into the ground water. Two large excavated areas, approximately 40 feet deep, remain adjacent to the stockpiled material.

The Site is located in the physiographic division known as the Coastal Plain Province, and the Site is located within the Coastal Lowlands subdivision of this province. The Coastal Lowlands are relatively undissected, nearly level, and lie at or below 100 feet above mean sea level (amsl). A distinctive topographic feature of the Coastal Lowlands is step-like Pleistocene marine terraces. One terrace is located in the downtown area of Pensacola; the Site is located on a higher terrace at an elevation ranging from 85 feet to 92 feet amsl. Two excavations located onsite receive surface water runoff from the covered soil stockpile and from upslope areas. Runoff that does not discharge to the onsite excavations flows with the natural gradient of the land surface to offsite discharge points located along the southern boundary of the Site. Site drainage also is controlled by perimeter ditching which routes runoff to the excavations on site.

## Figure 2. Site Conceptual Model



### 2.5.3 Geology

The Coastal Lowlands are typified by stepped, marine terraces that consist of unconsolidated marine sedimentary deposits of Pleistocene and Holocene age that dip gently toward the coast. Escambia County lies on the north flank of the Gulf Coast geosyncline and the east bank of the Mississippi Embayment. Figure 3 illustrates the general stratigraphic sequence for the Pensacola area. The unconsolidated deposits are generally composed of sand, with varying proportions of silt, clay and gravel. Abrupt facies changes are common, and numerous lenses of clay, sandy clay and gravel characterize the sedimentary deposits that overlie deeper, consolidated limestone rock units.

Surficial deposits at the Site consist of alluvium and terrace deposits of Holocene and Pleistocene age. These deposits consist of undifferentiated silt, sand, and gravel, with some clay (Weston, 1992c). The primary lithology of these surficial deposits is sand.

Underlying the surficial sediments are Pliocene-aged sedimentary deposits that make up the Citronelle Formation. These deposits consist of quartz sand, fine to very coarse in size. The maximum thickness of the Citronelle Formation is estimated to be 115 feet (LMJA, 1986; Weston, 1992b).

Below the Citronelle Formation are the sedimentary deposits of the Alum Bluff Group. The thickness of the Alum Group in the Site area is estimated to be 130 feet (LMJA, 1986). These Miocene-aged deposits consist of fossiliferous sand with lenses of silt, clay, and gravel. The primary lithology of this stratigraphic unit is sand. The Alum Bluff Group contains lenses of coarse-grained sediments (sand and gravel) that typically are highly permeable (Weston, 1992b).

**Figure 3. General Stratigraphy of the Site**

| Series | Stratigraphic and hydrologic units | | | Lithology |
|---|---|---|---|---|
| Holocene and Pleistocene | Alluvium and terrace deposits | | Sand and gravel aquifer | Undifferentiated silt, sand, and gravel, with some clay. Surficial zone of aquifer. |
| Pliocene | Citronelle Formation | | | Sand, very fine to very coarse and poorly sorted. Hardpan layers in upper part. |
| Miocene | Unnamed coarse clastics | Choctawhatchee Formation<br>Alum Bluff Group<br>Shoal River Formation<br>Chipola Formation | | Sand, shell, marl, sand with lenses of silt, clay, and gravel (includes unnamed coarse clastics and Alum Bluff Group). Main producing zone of aquifer. |
| | Pensacola Clay | | Confining Unit | Dark to light gray sandy clay. Is basal confining unit in southern one-half of area. |
| | St. Marks Formation | | Floridan Aquifer system | Limestone and dolomite - top of the Floridan aquifer system. |

MODIFIED FROM USGS GROUNDWATER ATLAS OF THE UNITED STATES
http://capp.water.usgs.gov/gwa/ch_g/jpeg/G021.jpeg

The Pensacola Clay underlies the Alum Group. This unit consists of clay and sandy clay, gray to dark gray in color. The fine grained deposits that make up this unit are of Miocene age and reach a maximum thickness of 370 feet (Weston, 1992b). The base of the Pensacola Clay marks the contact between the unconsolidated (soil) sediments and consolidated (rock) limestone units that constitute the Floridan Aquifer. The Floridan Aquifer is comprised of the Chickasahay and Tampa Formations (upper) and Ocala and Lisbon formations (lower). The consolidated rock units of the upper Floridan Aquifer consist of limestone, grayish white in color, with thin interbeds of gray clay and sand. Fossils are present; their percentage increases with increasing depth. The thickness of the upper Floridan Aquifer is estimated to be 350 feet (Weston, 1992b).

### 2.5.4 Hydrogeology

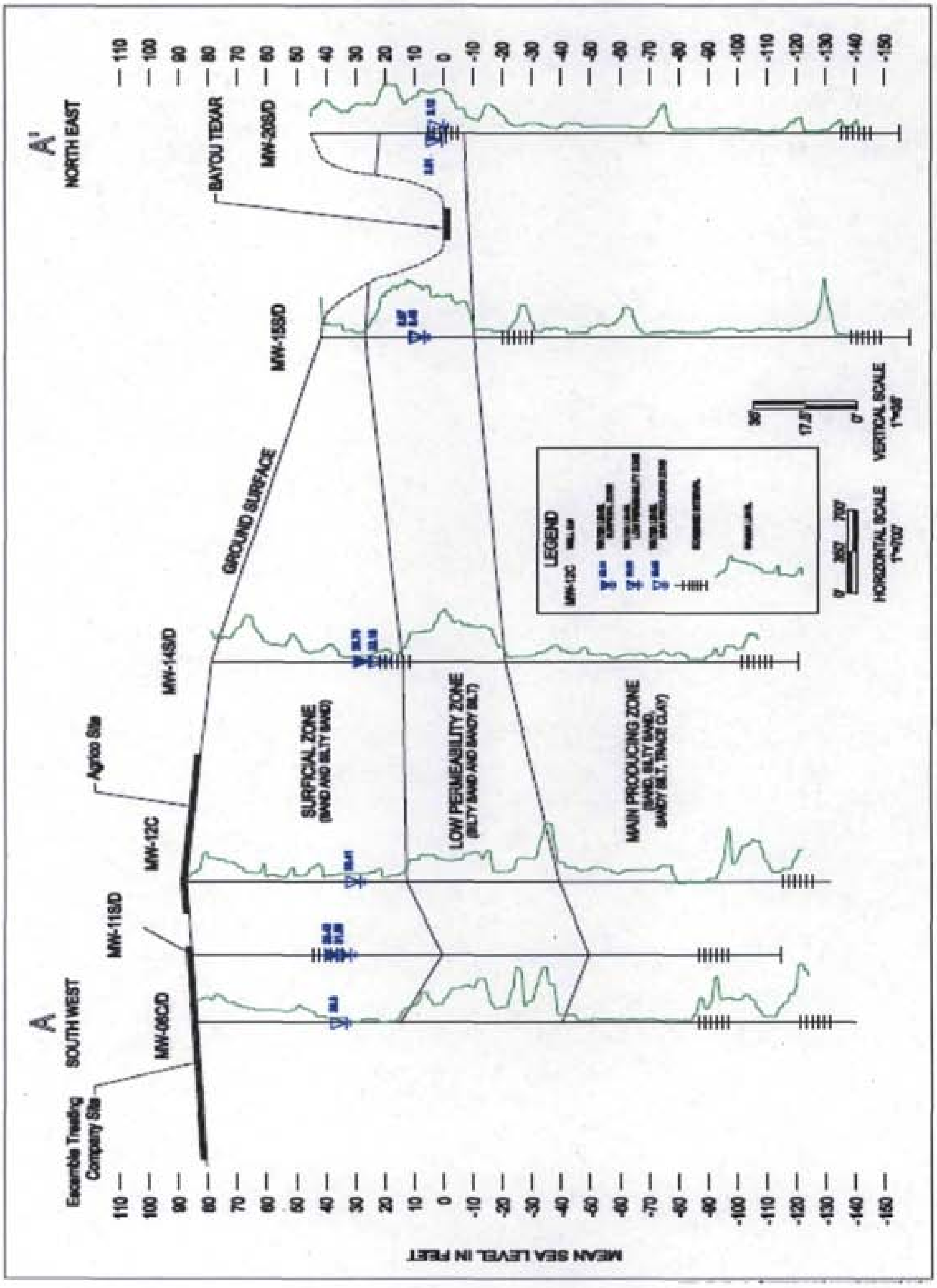
The aquifer system underlying the Site consists of unconsolidated and consolidated sedimentary deposits that make up the surficial soils. The surficial aquifer is unconfined to semiconfined and exists under phreatic or water-table conditions. The surficial aquifer in this area is formally referred to as the Sand and Gravel Aquifer. It consists of surficial soils, the Citronelle Formation and the Alum Bluff Group. The Sand and Gravel Aquifer in the Site area is approximately 200 feet thick at the Site and is a primary source of ground water used to supply potable water to area residents. The water table for this aquifer occurs at a depth of approximately 45 feet bls.

Within the Sand and Gravel Aquifer, three zones of varying hydraulic character have been reported (Kennedy, 1986). The uppermost zone, the surficial zone (SZ) is located at 40 to 60 feet bls. During a previous investigation, the water table within this zone was measured in 12 onsite wells at depths ranging from 42.5 feet to 44.2 feet bls, with associated elevations ranging from 47.1 to 49.6 feet amsl. Based on the water level data collected on that date, ground water flow is to the southeast.

The second zone, the low permeability zone (LPZ), was reported at a depth of 95 feet to 115 feet bls. This zone was identified during the drilling of three deep soil borings that were logged to 150 feet bls (LMJA, 1986). The LPZ underlies the SZ and contains a layer of poorly sorted sands with a higher percentage of silty sand, clayey sand, silt, sandy clay, and clay. The LPZ is characterized by lower porosity and materials, such as silts and clays, with higher capacity to absorb groundwater contaminants.

The top of the deepest zone, the main production zone (MPZ), within the Sand and Gravel Aquifer has been reported as approximately 170 feet to 190 feet bls. This zone is one of the most productive sections of the Sand and Gravel Aquifer and is used by public water supply wells downgradient of the Site that supply potable water to residents in the area. The three zones are not separated by distinct, defined, low permeability strata. As previously indicated, the existence of a clay layer of sufficient competence to prevent continued vertical migration of contaminants at approximately 215 ft bls, suggests that while contamination may migrate deeper than the monitored deep zone, the clay layer may keep it from migrating to the deepest depths of the Sand and Gravel Aquifer. A typical cross-section of the Site hydrostratigraphy is presented in Figure 4.

**Figure 4. Cross-section of the Site Hydrostratigraphy (Parallel to Ground Water Flow Direction)**



## 2.5.5 Nature and Extent of Contamination

This section summarizes the results and presents conclusions from the RI (CDM, 2004) and FS of OU2 (Black & Veatch, 2008).

### 2.5.5.1 Nature and Extent of Ground Water Contamination

The creosote and PCP/diesel fuel wastes that leached into the Site soil and ground water throughout the facility's history are the origin for site-related ground water contamination. The site-related COCs detected in both onsite and offsite monitoring wells reflect the typical constituents of coal tar-based creosote. The primary COC for ground water is naphthalene because it contributes the majority of the risk to potential receptors. Naphthalene is also the most mobile of the site-related contaminants. The extent of naphthalene contamination fully encompasses all site-related ground water contamination. There are a number of known potential sources of groundwater contamination in the area, including the Agrico Superfund Site (a fertilizer manufacturer), a former fertilizer distributor, a second former fertilizer manufacturer (Kaiser Fertilizer), a former landfill/dump, a former scrap metal/battery recycler, a former metal distributor, and drycleaners.

Site-related ground water contamination decreases gradually from the onsite source areas, forming a continuous plume in the three ground water zones (surficial zone [SZ]; low permeability zone [LPZ]; and main producing zone [MPZ]). The distribution of naphthalene contamination in each ground water zone is identified in Figures 5, 6, and 7. Ground water contamination directly site-related does not appear to have influenced definitively surface water, specifically, Bayou Texar, as stated in Section 2.2.4 Remedial Investigations/Feasibility Studies. Several inorganic constituents; aluminum, iron, manganese, nickel, vanadium, and copper, have been identified as potentially site-related. Changes in groundwater chemistry from site-related contamination could lead to concentrations of inorganic constituents above levels of concern. While these inorganic constituents may not be directly site-related, EPA will address this concern during remedial design.

The contaminant plume has been divided into three areas based on concentration to facilitate the development of the most effective treatment for each area.

<u>Source Plume (SP) Area</u>: This area represents high concentration naphthalene contamination bounded by the 7,000 µg/L naphthalene contour in ground water. This area may locally contain residual (un-dissolved) creosote (DNAPL) which would constitute a principal threat waste. This area will require the most aggressive treatment.

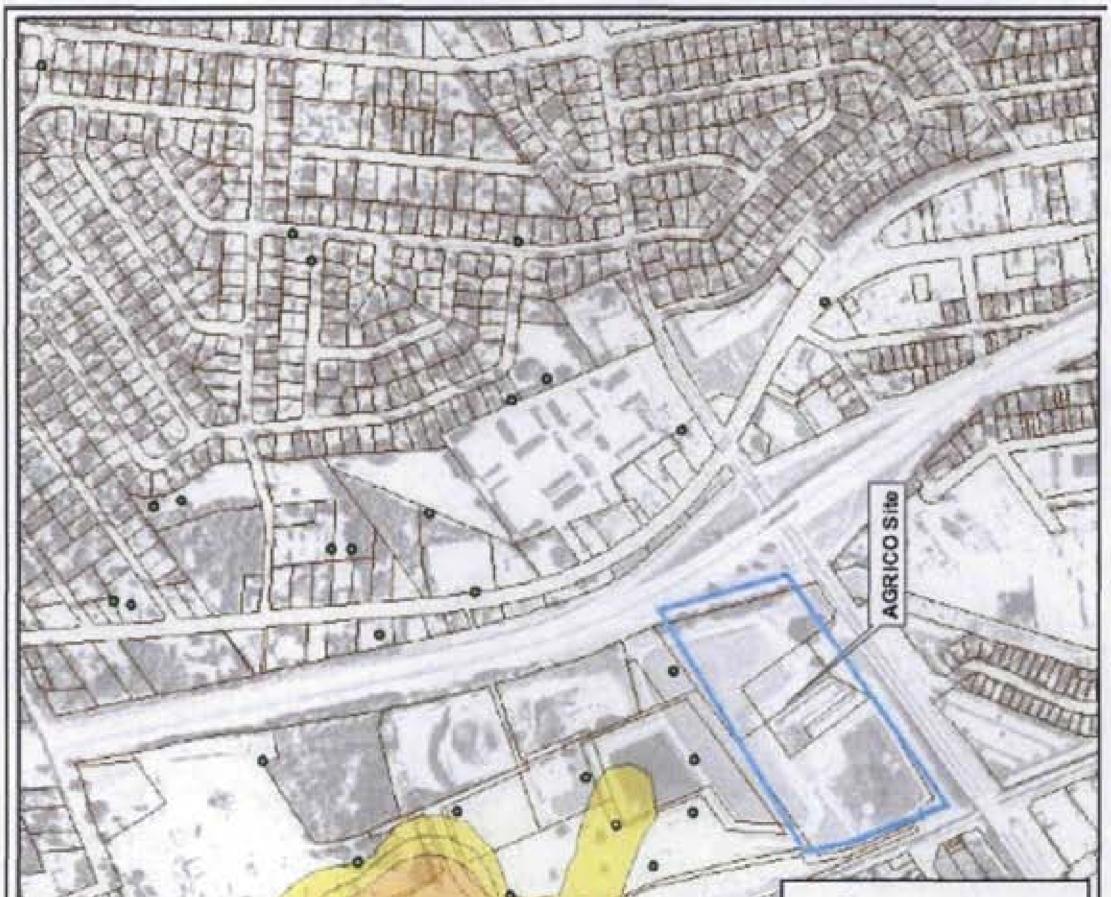
<u>High Concentration Plume (HCP) Area</u>: This portion of the plume represents dissolved naphthalene contamination less than 7,000 µg/L, but above the FDEP Natural Attenuation Default Criterion (NADC) of 140 µg/L. This area would require active treatment to reach acceptable concentrations.

<u>Dilute Plume (DP)</u>: This plume area is defined by lower concentrations of dissolved naphthalene (less than 140 µg/L) that extend downgradient of the SP and HCP. The 140 µg/L boundary value is the FDEP NADC for naphthalene. The FDEP NADC is the level at which natural attenuation is considered technically appropriate. This area would be suitable for less active treatment.

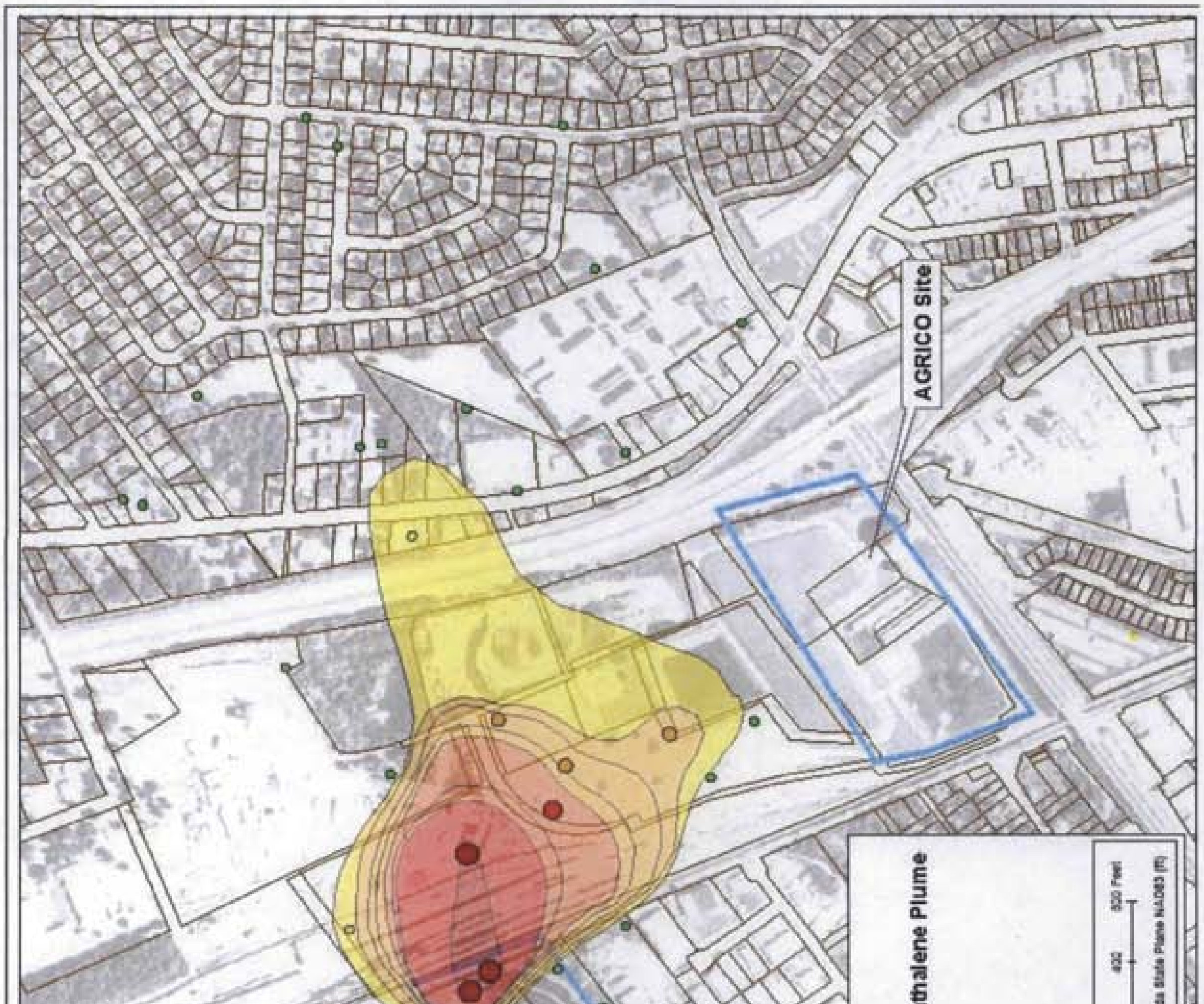
The lines of evidence supporting evidence of natural attenuation occurring at the Site will be performed prior to the implementation of monitored natural attenuation (MNA) at the Site.

Figure 8 illustrates a cross-section of the dissolved naphthalene concentration through the centerline of the dissolved plume from MW04 onsite to MW14 located 2,500 feet downgradient. This illustrates the estimated vertical extent of naphthalene in the SZ, LPZ, and MPZ along this cross-section. The most highly contaminated portion of the dissolved plume is centered just to the east of the Site, under the adjacent CSX rail yard. The higher adsorptive capacity of the LPZ appears to retard migration from this zone and results in higher concentrations of naphthalene in the LPZ.

**Figure 5. Extent of Naphthalene Contamination in the Surficial**



## Figure 6. Extent of Naphthalene Contamination in the Low Permeability Zone



## Figure 7. Extent of Naphthalene Contamination in the Main Producing Zone

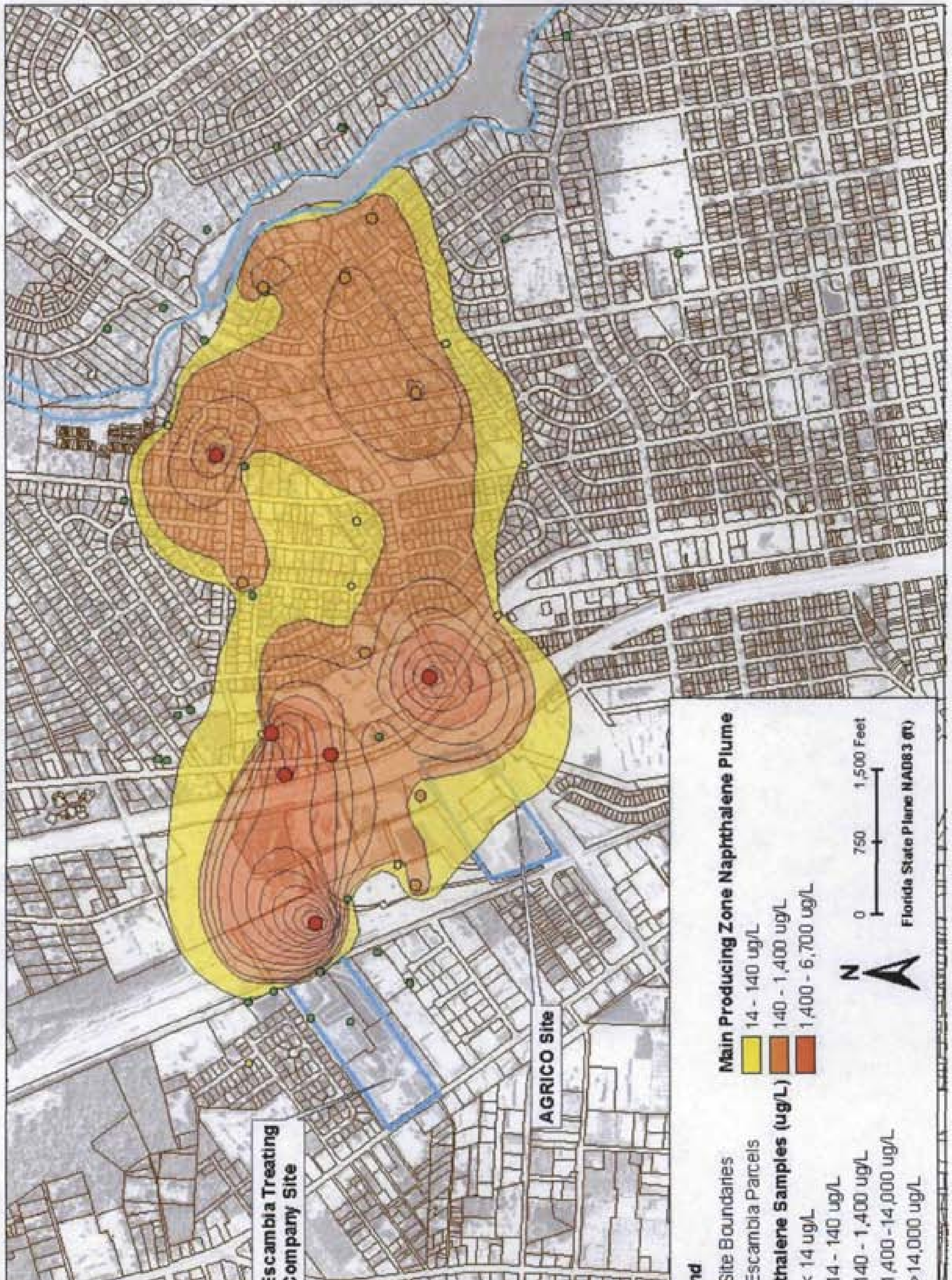
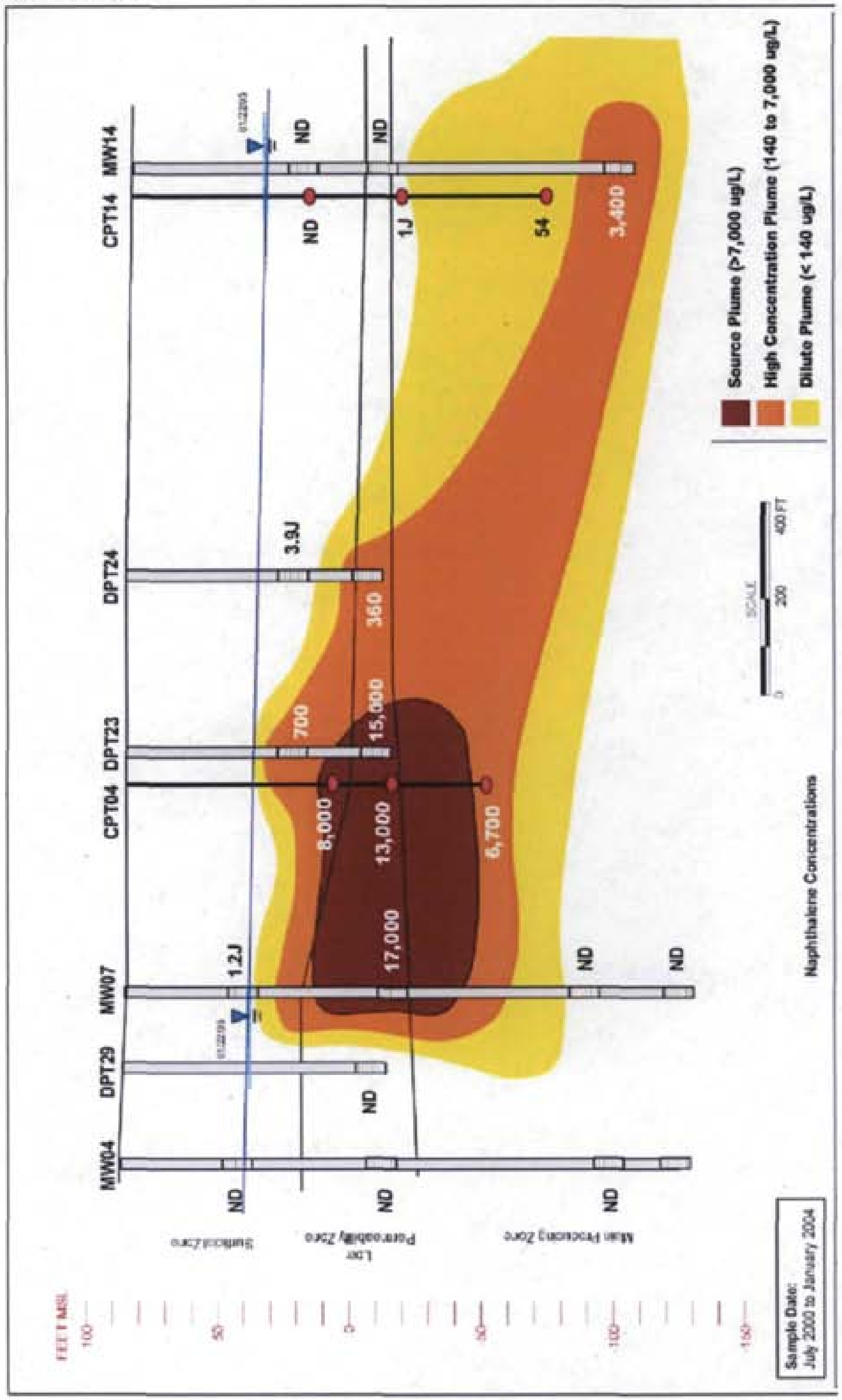


**Figure 8. Cross – Section of Naphthalene Contamination Showing Plume Areas Based on Concentration**



## 2.6 Current and Future Land Use

### 2.6.1 Current Land Use

Historically, land use surrounding the Site has included residential, commercial, and recreational based on observations noted from aerial photographs of the area taken between 1952 and 2004. This land use pattern reflects the current land use. Land use within ½-mile of the Site includes residential, a school, churches, commercial, and light manufacturing.

The former Escambia Wood Treating Company property is currently abandoned, and all structures associated with past operations have been demolished. The most prominent features on the property are the ~225,000 CY contaminated soil stockpile and the corresponding excavation pits. A debris pile consisting primarily of concrete rubble is located on the southeast corner of the property. The Rosewood Terrace/ Oak Park/Escambia Arms neighborhood residents have been permanently relocated, and the former dwellings have been demolished. This area has been fenced to prevent unauthorized access. Ground water beneath the Site is not currently used for supply, but is part of an aquifer that, in other areas, is used for municipal supply.

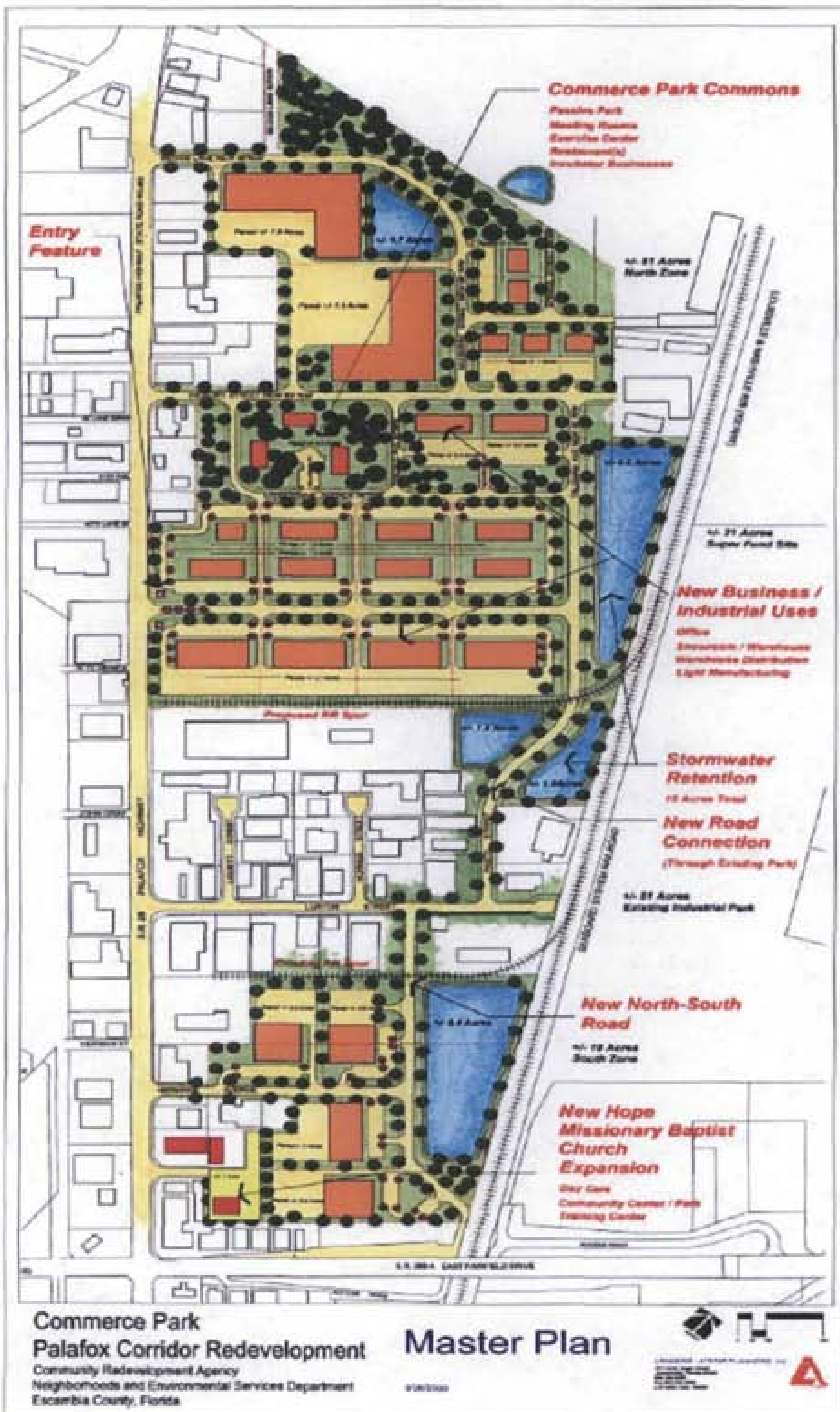
### 2.6.2 Future Land Use

The Escambia Board of County Commissioners designated the Site a Community Redevelopment Area in 1995. EPA Region 4 subsequently awarded a redevelopment grant to Escambia County to develop a reuse plan for the Site. Escambia County, in consultation with area residents and interested stakeholders in the community, produced the Palafox Commerce Park Master Plan to encompass redevelopment of the former Escambia Wood Treating Company property and surrounding impacted properties following relocation of the residents and cleanup of the Site. The plan envisions a mixture of commercial/retail and light manufacturing with 600,000 to 650,000 sq. ft. of new development. Figure 9 presents the conceptual reuse for the ETC Site as presented in the Palafox Commerce Park Master Plan. The expected future land use for the Site is commercial/industrial, and this cleanup decision is based on that use. Ground water use is not expected to change.

## 2.7 Summary of Site Risks

A Baseline Risk Assessment for Human Health (BRA-HH) was completed for OU2 as part of RI/FS. A BRA-HH is an analysis of the potential risks to human health and the environment caused by hazardous substances released from a site in the absence of any additional actions to control or mitigate the releases. This section summarizes the OU2 BRA-HH.

**Figure 9. Planned Future Use of the Site**



### 2.7.1 Summary of Human Health Risk Assessment (HHRA)

The positively identified ground water analytes were screened to exclude analytes that, although present, are not significant in terms of potential human health risks. The screening was conducted in accordance with EPA *Supplemental to Risk Assessment Guidance (RAGS): Region 4 HHRA Bulletins* (EPA, 2000). The chemicals of potential concern (COPCs) from the BRA-HH are shown in Table 1. FDEP has identified additional chemicals to be included as COPCs. These are; 1-methylnaphthalene, phenol, 2,4 dimethylphenol, 3 or 4-methylphenol, 1,2,4 trimethylbenzene, 1,3,5 trimethylbenzene, bis 2-ethylhexyl phthalate, hexachloroethane, 1,2 dichloroethane, dieldrin, chlordane, antimony, vanadium, and benzo(a)pyrene

Following applicable EPA Region 4 guidance, reasonable maximum exposure (RME) concentrations are based on results from wells in the center of the plume (EPA, 2000). This approach uses the most impacted wells as the basis for risk management decisions. Arithmetic average concentrations of the COPCs found in well clusters MW14, AC23, and AC24 were computed. Well clusters AC23 and AC24 are on the Agrico Chemical site located southeast of the Site as indicated on Figure 1 and are clearly impacted by the Agrico contaminants. Where a COPC was not detected at a given location, one-half the sample quantitation limit was used for the calculation. If the average exceeded the maximum detected concentration (possible because of the handling of non-detects), the maximum detected value was used as the RME concentration. The RME concentrations for COPCs detected in the core of the plume are presented in Table 2.

It is noteworthy that dioxin, an important contaminant in the OU1 soils, is not a COPC in ground water. Dioxin is very insoluble in water and is not commonly a ground water contaminant. Among the five ground water samples that were analyzed for dioxin, it was detected only once at 4E-08 µg/L. This is below the State and Federal MCL value for dioxin of 3.0E-05 mg/L. As such, dioxin is not a COPC in ground water. The same can be said for benzo(a)pyrene, another prominent OU1 soil contaminant. Like dioxin, benzo(a)pyrene is very insoluble in water. Benzo(a)pyrene, was not detected in any ground water samples. The majority of the organic COPCs in ground water are the more soluble components of creosote, such as naphthalene.

The primary sources of ground water contamination are releases from wastewater and cooling ponds. Based on the fate and transport of ground water contaminants and the potential for human contact, the potential receptors used for risk assessment were future onsite child residents and future child/adult residents using ground water as a potable water supply. Two kinds of risk were calculated, non-cancer hazards for non-carcinogens, and excess cancer risk for carcinogens. The most sensitive receptor was used for each type of risk. In the case of non-carcinogens, a child resident is the most sensitive receptor, because of a lower body mass relative to the amount of chemical intake. For carcinogens, a resident exposed from childhood through adulthood (child/adult), is the most sensitive receptor because the excess cancer risk for the child (exposure duration of six years) is assumed to be additive to that of an adult (exposure duration of 24 years).

Potentially complete exposure pathways examined were:

- Ingestion of ground water, and
- Inhalation of volatiles released during showering.

## Table 1. Occurrence, Distribution, and Selection of Chemicals of Potential Concern in Ground Water

| Chemical of Potential Concern | Min Conc.[1] (ppb) | Max Conc.[1] (ppb) | Mean Conc. (ppb) | 95% UCL of Mean (ppb) | Background Conc. (ppb) | Screening Toxicity Value (ppb) |
|---|---|---|---|---|---|---|
| 1,1-Biphenyl | 2 | 62 | 6.7 | NC | NA | 30 |
| 2,4-Dinitrotoluene | 4 | 170 | 21 | NC | NA | 7.3 |
| 2,6-Dinitrotoluene | 3 | 35 | 6 | NC | NA | 3.6 |
| 2-Methylnaphthalene | 1 | 1,500 | 84 | NC | NA | 0.6 |
| Acenaphthene | 1 | 540 | 12 | NC | NA | 37 |
| Acenaphthylene | 2 | 20 | 3 | NC | NA | 18.3 |
| Acetone | 85 | 2,000 | 310 | NC | NA | 61 |
| Aluminum | 180 | 140,000 | 20,141 | NC | 49 | 3,650 |
| Benzene | 2 | 7 | 4.7 | NC | NA | 0.4 |
| Carbazole | 1 | 680 | 17.7 | NC | NA | 3.4 |
| Chromium | 1.2 | 130 | 8.1 | NC | 6.5 | 109 |
| Copper | 1.1 | 830 | 7.1 | NC | 270 | 136 |
| Dibenzofuran | 1 | 420 | 18 | NC | NA | 2.4 |
| Fluorene | 2 | 180 | 5 | NC | NA | 24 |
| Iron | 73 | 55,000 | 2,123 | NC | 482 | 1,095 |
| Lead | 2.8 | 49 | 1.2 | NC | 6 | 15 |
| Manganese | 1.4 | 1,300 | 217 | NC | 119 | 88 |
| Naphthalene | 2 | 14,000 | 1,076 | NC | NA | 0.6 |
| Nickel | 2.3 | 94 | 19.5 | NC | 10 | 73 |
| Nitrobenzene | 6 | 6 | 5.3 | NC | NA | 0.3 |
| Pentachlorophenol | 3 | 23 | 9.3 | NC | NA | 0.6 |
| Total Mercury | 0.22 | 2 | 0.11 | NC | 0.09 | 1.1 |
| Total Xylenes | 6 | 510 | 35 | NC | NA | 143 |
| Zinc | 1.6 | 4,200 | 144 | NC | 1240 | 1,095 |

Notes:
Conc. = Concentration
ppb = parts per billion
NA = Not applicable
NC = Not calculated
Note: 1. Minimum/maximum detected concentration in ground water

## Table 2. Summary of Ground Water Chemicals of Potential Concern and Reasonable Maximum Exposure Concentrations Based on Wells at Center of Plume

**Scenario Timeframe: Future**
**Medium: Ground Water**
**Exposure Medium: Ground Water**

| Exposure Point | Chemical of Potential Concern | Concentration Detected[1] | | Units | Frequency of Detection[1] | RME Exposure Point Conc. | Units | Statistical Measure |
|---|---|---|---|---|---|---|---|---|
| | | Min | Max | | | | | |
| Tap/ Shower-head | 1,1-Biphenyl | 2 | 11 | µg/L | 3/3 | 6.7 | µg/L | Mean |
| | 2,4-Dinitrotoluene | 4 | 53 | µg/L | 3/3 | 21 | µg/L | Mean |
| | 2,6-Dinitrotoluene | 3 | 8 | µg/L | 3/3 | 6 | µg/L | Mean |
| | 2-Methylnaphthalene | 1 | 140 | µg/L | 3/3 | 84 | µg/L | Mean |
| | Acenaphthene | 1 | 17 | µg/L | 3/3 | 12 | µg/L | Mean |
| | Acenaphthylene | 2 | 2 | µg/L | 1/3 | 2 | µg/L | Maximum |
| | Acetone | 85 | 920 | µg/L | 3/3 | 310 | µg/L | Mean |
| | Aluminum | 180 | 59,000 | µg/L | 3/3 | 20,141 | µg/L | Mean |
| | Benzene | 2 | 6 | µg/L | 3/3 | 4.7 | µg/L | Mean |
| | Carbazole | 1 | 29 | µg/L | 3/3 | 17.7 | µg/L | Mean |
| | Chromium | 1.2 | 18 | µg/L | 3/3 | 8.1 | µg/L | Mean |
| | Copper | 1.1 | 20 | µg/L | 3/3 | 7.1 | µg/L | Mean |
| | Dibenzofuran | 1 | 28 | µg/L | 3/3 | 18 | µg/L | Mean |
| | Fluorene | 2 | 6 | µg/L | 3/3 | 5 | µg/L | Mean |
| | Iron | 73 | 5,800 | µg/L | 3/3 | 2,123 | µg/L | Mean |
| | Lead | 2.8 | 2.8 | µg/L | 1/3 | 1.2 | µg/L | Mean |
| | Manganese | 1.4 | 340 | µg/L | 3/3 | 217 | µg/L | Mean |
| | Naphthalene | 2 | 2,000 | µg/L | 3/3 | 1,076 | µg/L | Mean |
| | Nickel | 2.3 | 33 | µg/L | 3/3 | 19.5 | µg/L | Mean |
| | Nitrobenzene | 6 | 6 | µg/L | 1/3 | 5.3 | µg/L | Mean |
| | Pentachlorophenol | 3 | 3 | µg/L | 1/3 | 3 | µg/L | Maximum |
| | Total Mercury | 0.22 | 0.22 | µg/L | 1/3 | 0.11 | µg/L | Mean |
| | Total Xylenes | 6 | 71 | µg/L | 3/3 | 35 | µg/L | Mean |
| | Zinc | 1.6 | 420 | µg/L | 3/3 | 144 | µg/L | Mean |

**Key**
µg/L: Micrograms per liter
Mean, using one-half the sample quantitation limit for non-detects
Monitoring well clusters MW14, AC23, and AC24.

Human intakes were calculated for each COPC and receptor using the exposure point concentrations. Estimates of human intake, expressed in terms of mass of chemical per unit body weight per time (mg/kg/day), were calculated differently depending on whether the COPC is a non-carcinogen or a carcinogen. For non-carcinogens, intake was averaged over the duration of exposure and is referred to as the average daily dose (ADD). For carcinogens, intake was averaged over the average lifespan of a person (70 years) and is referred to as the lifetime average daily dose (LADD).

EPA toxicity assessments and the resultant toxicity values were used in the HHRA to determine both carcinogenic and non-carcinogenic risks associated with each COPC and route of exposure. EPA toxicity values used in the HHRA were:

- reference dose (RfD) values for non-carcinogenic effects, and
- cancer slope factors (CSFs) for carcinogenic effects.

To characterize the overall potential for non-carcinogenic effects associated with exposure to multiple chemicals, the EPA uses a Hazard Index (HI) approach. This approach assumes that simultaneous sub-threshold chronic exposures to multiple chemicals that affect the same target organ are additive and could result in an adverse health effect. The HI is calculated as follows:

$$HI = \frac{ADD_1}{RfD_1} + \frac{ADD_2}{RfD_2} + \frac{ADD_i}{RfD_i} \text{ where:}$$

$ADD_i$ = Average Daily Dose for the *ith* toxicant
$RfD_i$ = RfD for the *ith* toxicant

The term $ADD_i/RfD_i$ is referred to as the hazard quotient (HQ).

Calculation of an HI in excess of unity (1) indicates the potential for adverse health effects. An HI greater than one will be generated anytime intake for any of the COCs exceeds its RfD. However, given a sufficient number of chemicals, it is possible to generate an HI greater than one even if none of the individual chemical intakes exceeds its respective RfD.

Carcinogenic risk is expressed as a probability of developing cancer as a result of lifetime exposure. For a given chemical and route of exposure, excess lifetime cancer risk is calculated as follows:

$$\text{Risk} = \text{LADD} \times \text{CSF}$$

These risks are probabilities that are generally expressed in scientific notation (e.g., $1\times10^{-6}$ or 1E-6). An incremental lifetime cancer risk (ILCR) of $1\times10^{-6}$ indicates that, as a plausible upper-bound, an individual has a one-in-one-million chance of developing cancer as a result of Site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at the Site. For exposures to multiple carcinogens, the EPA assumes that the risk associated with multiple exposures is equivalent to the sum of their individual risks.

The total ILCR estimate for a child/adult on-site resident is $8 \times 10^{-5}$. EPA's acceptable target range for carcinogenic risk at Superfund sites is one-in-ten-thousand ($1 \times 10^{-4}$) to one-in-one-million ($1 \times 10^{-6}$). This estimate is within EPA's target range for Superfund sites. The carcinogenic risk characterization is summarized in Table 3.

The future child resident's overall non-cancer hazard is associated with ingestion of ground water and inhalation of vapors evolved from ground water while showering. Non-cancer effects are possible based on an HI of 96. Exposure to naphthalene via ingestion and inhalation of vapors released while showering (HQ equal to 84) accounts for most of the potential non-cancer effects. Other significant contributors to potential non- cancer hazards with HQs shown in parentheses are 2-methylnaphthalene (7), aluminum (1), and nitrobenzene (1). The non-cancer future child's hazard assessment is summarized in Table 4.

The risk assessment was conducted in a manner consistent with the methods used by FDEP to calculate ground water cleanup target levels (GCTLs) (FDEP, 2005). That is, the exposure assumptions and toxicity values that were used were identical to those called out in FDEP's *Technical Report: Development of Cleanup Target Levels (CTLs) for Chapter 62-777.* The difference between the FDEP and EPA Region 4 approaches is in the way Region 4 calculates RGOs. RGOs corresponding to an ILCR of 1E-6 or non-cancer hazard quotient of 1 provide equivalent protectiveness as FDEP's GCTLs. In its calculations, FDEP uses a relative source contribution (RSC) factor of 20 percent. Region 4 does not apply a RSC factor when calculating RGOs. Using a RSC factor of 20 percent has the effect of reducing the GCTL by a factor of 5 compared to an equivalent RGO calculated using the approach endorsed by EPA Region 4.

### 2.7.2 Summary of Ecological Risk Assessment

The major ecological feature of concern near the Site is Bayou Texar. In 2002, a Screening-Level Ecological Risk Assessment (SLERA) was conducted for ground water at the Site. None of the surface water or sediment chemicals retained in the risk assessment were detected in samples collected from Bayou Texar. The contribution of the Site to overall ecological risk in Bayou Texar is minimal since the contaminants present in the Bayou are not related to the Site, and that contamination could be attributed to other sources such as the 68 storm water culverts that feed into the Bayou. Therefore, the Ecological Risk Assessment process was not continued. However, ground water is a potential pathway for contamination to reach Bayou Texar in the future. The ground water remedy will eliminate any future risk of impact to Bayou Texar by eliminating the contaminants in the ground water.

## 2.8 Remedial Action Objectives

Remedial Action Objectives (RAOs) are the desired outcome of a cleanup action. RAOs for the ETC Site OU2 were developed based on the Site data, site-specific risk and fate and transport evaluations, and review of applicable, or relevant and appropriate, requirements (ARARs). The remedy for OU1 (soils) addresses the removal of contaminated surface and subsurface soils which could act as a source for further ground water contamination.

Under the NCP, EPA's goal is to reduce the ILCR to within the range of $1x10^{-4}$ to $1x10^{-6}$ for the expected future land use at the Site. An ILCR of $1x10^{-6}$ is the point of departure for risk management decision making. Similarly, reducing the HI for current and future uses to <1 is also a cleanup level for this site. Additionally, the NCP sets a goal for EPA to restore ground water resources to their beneficial use to the extent practical within a reasonable timeframe. The cleanup levels selected for OU2 are based on an ILCR of < $1x10^{-6}$ for carcinogens. The RAOs developed to address the above issues include the following:

- Prevent further contamination of ground water by aggressive treatment of the source area and principal threat wastes;
- Prevent future human exposure to contaminated ground water by treating the aquifer to meet health – based cleanup standards;
- Eliminate the potential for the future degradation of natural resources (Bayou Texar) from site- related contaminants; and
- Restore ground water to its beneficial use.

## Table 3. Risk Characterization Summary - Carcinogens

**Scenario Timeframe: Future**
**Receptor Population: Resident**
**Receptor Age: Child/Adult**

| Medium | Exp. Medium | Exp. Point | Chemical of Potential Concern | Carcinogenic Risks | | | |
|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total |
| Ground Water | Ground Water | Tap/ Shower-head | 1,1-Biphenyl | NA | NA | NA | NA |
| | | | 2,4-Dinitrotoluene | NA | NA | NA | NA |
| | | | 2,6-Dinitrotoluene | 6E-05 | NA | NA | 6E-05 |
| | | | 2-Methylnaphthalene | NA | NA | NA | NA |
| | | | Acenaphthene | NA | NA | NA | NA |
| | | | Acenaphthylene | NA | NA | NA | NA |
| | | | Acetone | NA | NA | NA | NA |
| | | | Aluminum | NA | NA | NA | NA |
| | | | Benzene | 4E-06 | 2E-06 | NA | 6E-06 |
| | | | Carbazole | 5E-06 | NA | NA | 5E-06 |
| | | | Chromium | NA | NA | NA | NA |
| | | | Copper | NA | NA | NA | NA |
| | | | Dibenzofuran | NA | NA | NA | NA |
| | | | Fluorene | NA | NA | NA | NA |
| | | | Iron | NA | NA | NA | NA |
| | | | Lead | NA | NA | NA | NA |
| | | | Manganese | NA | NA | NA | NA |
| | | | Naphthalene | NA | NA | NA | NA |
| | | | Nickel | NA | NA | NA | NA |
| | | | Nitrobenzene | NA | NA | NA | NA |
| | | | Pentachlorophenol | 5E-06 | NA | NA | 5E-06 |
| | | | Total Mercury | NA | NA | NA | NA |
| | | | Total Xylenes | NA | NA | NA | NA |
| | | | Zinc | NA | NA | NA | NA |
| | | | | | **Ground Water Risk Total =** | | **8E-5** |

Notes:
NA: Not applicable

## Table 4. Risk Characterization Summary - Non-Carcinogens

**Scenario Timeframe: Future**
**Receptor Population: Resident**
**Receptor Age: Child**

| Medium | Exp. Medium | Exp. Point | Chemical of Potential Concern | Non-Carcinogenic Hazards | | | |
|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total |
| Ground Water | Ground Water | Tap/ Shower-head | 1,1-Biphenyl | 0.009 | 0.009 | NA | 0.02 |
| | | | 2,4-Dinitrotoluene | 0.7 | NA | NA | 0.7 |
| | | | 2,6-Dinitrotoluene | 0.4 | NA | NA | 0.4 |
| | | | 2-Methylnaphthalene | 0.3 | 6 | NA | 7 |
| | | | Acenaphthene | 0.01 | 0.01 | NA | 0.03 |
| | | | Acenaphthylene | 0.004 | 0.004 | NA | 0.009 |
| | | | Acetone | 0.2 | NA | NA | 0.2 |
| | | | Aluminum | 1 | NA | NA | 1 |
| | | | Benzene | 0.1 | 0.2 | NA | 0.3 |
| | | | Carbazole | NA | NA | NA | NA |
| | | | Chromium | 0.2 | NA | NA | 0.2 |
| | | | Copper | 0.01 | NA | NA | 0.01 |
| | | | Dibenzofuran | 0.3 | 0.3 | NA | 0.6 |
| | | | Fluorene | 0.008 | 0.008 | NA | 0.02 |
| | | | Iron | 0.5 | NA | NA | 0.5 |
| | | | Lead | NA | NA | NA | NA |
| | | | Manganese | 0.6 | NA | NA | 0.6 |
| | | | Naphthalene | 3 | 80 | NA | 84 |
| | | | Nickel | 0.06 | NA | NA | 0.06 |
| | | | Nitrobenzene | 0.7 | 0.6 | NA | 1 |
| | | | Pentachlorophenol | 0.006 | NA | NA | 0.006 |
| | | | Total Mercury | 0.02 | NA | NA | 0.02 |
| | | | Total Xylenes | 0.001 | NA | NA | 0.001 |
| | | | Zinc | 0.03 | NA | NA | 0.03 |
| | | | **Ground Water HI total** | | | | **96** |
| | | | Total decreased terminal mean body weight males HI | | | | 91 |
| | | | Total kidney, liver HI | | | | 1 |
| | | | Total central nervous system HI | | | | 1 |

Notes:
NA: Not applicable
HI: Hazard index

## 2.8.1 Cleanup Levels

Based on the human health risk-based criteria and analysis of ARARs, the final Site-wide cleanup levels for contaminated ground water at the Escambia Wood Treating Company Superfund Site OU2 are presented on Table 5. As noted above, these cleanup levels were prepared from the analysis described in more detail in the HHRA and from ARARs addressed in Section 2.10.2. Additional COCs are identified for the Source Zone and High Concentration Zone in Table 6. These COCs were developed because the site-related impacts of these COCs are more limited than the Site-wide COCs.

Several inorganic constituents; aluminum, iron, manganese, nickel, vanadium, and copper, have been identified as potentially site-related. Changes in groundwater chemistry from site-related contamination could lead to concentrations of inorganic constituents above levels of concern. While these inorganic constituents may not be directly site-related, EPA will address this concern during remedial design.

EPA's response authority under Section 104(a)(1) of CERCLA is tied to releases or threatened releases of hazardous substances. For the ETC Site, the releases to which EPA has the authority to respond are those releases attributable to ETC. The ETC "Site" extends as far as the extent of contamination attributable to those releases. See 40 CFR §300.400(e). Similarly, the NPL is a list of releases, not a list of sites. Only those releases included on the NPL shall be considered eligible for Fund-financed remedial action. See 40 CFR §300.425(b). At this Site, EPA is authorized to spend Fund money to clean up only those releases attributable to ETC.

**Table 5. Final Site-wide Ground Water Remedial Cleanup Levels for Escambia OU2**

| Contaminant of Concern | Cleanup Level (µg/L) | Basis for Cleanup Level |
|---|---|---|
| 2 - Methylnaphthalene | 10 | HQ = 1 |
| Acenaphthene | 20 | FDEP GCTL |
| Benzene | 1 | FDEP GCTL/Federal MCL |
| Carbazole | 1.8 | FDEP GCTL |
| Dibenzofuran | 28 | FDEP GCTL |
| Naphthalene | 10 | HQ = 1 |
| Nitrobenzene | 3.5 | FDEP GCTL |
| Pentachlorophenol | 1 | Federal MCL and FDEP GCTL/MCL |

Notes:
Mg/L micrograms per liter
FDEP Florida Department of Environmental Proteciton
GCTL Groundwater Cleanup Target Leves
HQ Hazard Quotient
MCL Maximum Contaminant Level
Remedial Levels include applicable criteria specified by Florida Administrative Code (F.A.C.) Chapters 62-777 and 62-550

**Table 6. Final Source and Highly Contaminated Zone Ground Water Remedial Cleanup Levels for Escambia OU2**

| Contaminant of Concern | Cleanup Level (µg/L) | Basis for Cleanup Level |
|---|---|---|
| 1,1 Biphenyl | 0.5 | FDEP GCTL |
| 1 Methylnaphthalene | 28 | FDEP GCTL |
| Benzo(a)pyrene | 0.2 | FDEP GCTL |
| Phenol | 10 | FDEP GCTL |
| 2,4 Dimethylphenol | 140 | FDEP GCTL |
| 3 or 4 Methylphenol | 3.5 | FDEP GCTL |
| 1,2,4 Trimethylbenzene | 10 | FDEP GCTL |
| 1,3,5 Trimethylbenzene | 10 | FDEP GCTL |

Notes:
Mg/L micrograms per liter
FDEP Florida Department of Environmental Protection
GCTL Groundwater Cleanup Target Leves
HQ Hazard Quotient
MCL Maximum Contaminant Level

## 2.9 Description of Alternatives

The alternatives for ground water remediation are described below. The alternatives are grouped by each of the three plume areas: Source Plume (SP), High Concentration Plume (HCP), and Dilute Plume (DP). The alternatives developed for each of the three zones (SZ, LPZ, and MPZ as they appear in the three plume areas) are composed of the technologies that best fit the range of contaminant concentrations within each zone. Alternatives have been developed using various approaches to provide a range of alternatives with respect to the time and methodology required for restoration. One alternative would be chosen for each plume area and all three alternatives would work together to reach the cleanup levels.

### 2.9.1 Detailed Remedial Alternatives Evaluation

#### 2.9.1.1 Source Plume (SP) Alternatives

**Alternative SP – 1: No Action with Monitoring**

***Estimated Capital Cost: $0***
***Estimated O&M Cost: $0***
***Estimated Present Worth Cost for Monitoring (Discount Rate of 7%): $54,300***
***Estimated Implementation Timeframe: Immediate (<1 year)***
***Estimated Time to Achieve RAOs: Undefined***

This alternative would be a required component of the FS, and provides a comparative basis for the other alternatives. Under this alternative, no action would be taken to remedy the contaminated ground water. The Site would remain in its present condition and only monitoring would be performed. Five-Year Reviews would be performed to evaluate the ongoing protectiveness of the remedy. No additional funds would be expended to conduct the reviews, since Five-Year Reviews would be already a component of the OU1 remedy. It is anticipated that each Five-Year Review would consist of a site visit and report preparation.

*Overall Protection of Human Health and the Environment*

Because remedial actions would not be initiated as part of this alternative, it would not provide any increased protection to human health. If no action is taken, contaminants would remain in place.

*Compliance with ARARs*

This alternative would not achieve the RAOs or chemical-specific ARARs established for the contaminated ground water. Action-specific ARARs do not apply to this alternative since further remedial actions would not be conducted.

*Long-Term Effectiveness and Permonence*

The continued exposure of receptors to ground water would be a potential long-term impact of this alternative. The cleanup levels noted in Table 5 for protection of human health would not be met. Because contaminated material would remain onsite under this alternative, a review/reassessment of the conditions at the Site would be performed at 5-year intervals.

*Reduction of Mobility/Toxicity/Volume (M/T/V) Through Treatment*

No reductions in contaminant M/T/V are realized under this alternative.

*Short-Term Effectiveness*

Since no further remedial actions would be implemented at the Site, this alternative would pose no short-term risks to onsite workers.

*Implementability*

This alternative could be implemented immediately (<1 year) because monitoring equipment is readily available and procedures are in place. However, the time to achieve RAOs is too long to quantify (undefined).

*Cost*

There are no capital or annual costs associated with this alternative.

**Alternative SP – 2: Ground Water Recovery, Treatment, and Re-Injection**

***Estimated Capital Cost: $6,637,000***
***Estimated O&M Cost: $923,000***
***Estimated Present Worth Cost (Discount Rate of 7%): $7,560,000***
***Estimated Construction Timeframe: 16 months***
***Estimated Time to Achieve RAOs: Undefined ( Under this scenario, several decades of pump and treat would be necessary to achieve RAOs)***

Alternative SP-2 is a variation of a "pump and treat" ground water remediation scheme commonly applied to ground water contamination sites. The general strategy for this alternative consists of extracting (pumping) contaminated ground water through horizontal recovery wells placed within the SP area and treating the extracted contaminated ground water by an *ex situ* technology train, and re-introducing the treated ground water back into the impacted portion of the SP area through horizontal injection wells. Extraction wells will be installed at a lower level (i.e., deeper in the aquifer) than the injection wells. This arrangement lets gravity assist in the re-injection of treated ground water back into the aquifer, and it minimizes the possible loss of contaminated ground water under the extraction wells placed deeper into the aquifer.

Additional necessary components of this alternative include institutional controls, and periodic inspections and reviews. Restrictive covenants would be placed on the property to restrict the future use of the property to those uses compatible with the treatment system until cleanup levels are attained. State and local agencies would be responsible for the enforcement of these restrictions. Monitoring would be required to assess the effectiveness of the remedial action.

*Overall Protection of Human Health and the Environment*

This alternative would protect the public and the environment from exposure to ground water contamination by physically removing contaminated ground water from the SP area and physically transferring the dissolved contaminants from ground water onto a treatment absorbant (e.g., granular activated carbon). Assuming complete removal of contaminants from ground water, risk from exposure to ground water contaminants is eliminated. No long-term residual risks from ground water in the SP area are anticipated by removing dissolved contaminants. Contaminant migration from the leading edge of the SP zone into downgradient media is expected to be inhibited by this alternative.

If any residual (un-dissolved) contaminant mass exists within the aquifer zone, the "pump and treat" aspect of the SP-2 alternative might not efficiently clean the aquifer in a timely manner. The rate of contaminant desorption from aquifer material into a dissolved form in ground water would determine the total time required for this alternative to achieve remedial objectives. In this case, protection of human health and the environment may not be achieved within a reasonable time frame.

*Compliance with ARARs*

Because this alternative removes contaminant mass from the aquifer, ARARs would be met if remediation activities are sustained long enough for all contaminant mass to be removed from the aquifer ground water.

*Long-Term Effectiveness and Permanence*

Implementing this SP treatment alternative is expected to eliminate the long-term risk associated with the contaminated ground water in the areas treated. The long-term permanence of the removal process depends on the absence of significant mass of un-dissolved (residual) contamination. If substantial amounts of residual contaminants are present in the SP area, the concentrations in ground water could rebound over time as residual solid-bound contaminants leach into fresh ground water. Five-Year Review will be conducted until cleanup levels are met to ensure protection of human health and the environment.

*Reduction of M/T/V Through Treatment*

This alternative meets the statutory preference for treatment as the primary component of the ground water remedial strategy. Physical removal of contaminants in ground water would effectively reduce the mobility, toxicity, and volume (M/T/V) of the contaminants present in the water; however the toxicity is transferred to granular activated carbon and not eliminated through treatment.

Toxicity and volume of creosote-related contaminants in ground water would be reduced only by complete removal. Residual solid-bound contaminants, if present, could cause concentrations in ground water to rebound over time as residual contaminants leach into fresh ground water. Ground water sampling and analysis would be used to monitor this possibility. Mobility is reduced by hydraulic containment during pumping.

*Short-Term Effectiveness*

Community risk associated with this remedial alternative would be low during the installation and sampling of monitoring wells, and the installation and operation of extraction and injection wells. The risk would be greater for workers, but would be minimized by compliance with worker safety requirements and guidelines for hazardous waste site activities. Installation activities would require that workers be trained and certified to perform hazardous waste site activities, and workers would be required to wear, at a minimum, Level D personal protective equipment during removal and well installation.

Environmental impacts resulting from the installation of the monitoring, injection, and extraction wells would include noise pollution. During installation, construction controls would be implemented to minimize contact with contaminated soil and ground water. Any investigation-derived wastes generated during well installation, and spent carbon generated during ground water treatment would be collected and disposed of properly at appropriate facilities.

*Implementability*

The installation of monitoring, extraction, and injection wells, and the setup and startup of the treatment system are established technologies. The monitoring program associated with the treatment system would require monthly management by one individual to oversee the collection of ground water field parameters and samples and by two individuals on a quarterly basis for two years. Long-term O&M activities associated with this alternative would include repair and maintenance of wells, which would be relatively easy to implement. No difficulties are foreseen during the performance of these activities. The significant uncertainty associated with the performance of these activities is the length of time needed for pump and treat to meet cleanup levels as well as the need to gain access to offsite property. If substantial amounts of un-dissolved (solid-bound) contamination are present within this part of the aquifer, it may take many decades of pumping and treating and re-injection to slowly desorb and dissolve contaminants into the ground water phase for treatment.

*Cost*

The direct capital costs for Alternative SP-2 include additional characterization of the SP area and installation of monitoring and horizontal extraction/injection wells; treatability testing for the carbon adsorption; associated equipment, materials, and supplies; permits and licenses; procurement and reporting; and construction oversight. With the addition of indirect costs, the total capital cost is estimated to be 6.6 million dollars.

The O&M costs associated with this alternative ($923,000) include ground water monitoring, operating the extraction/injection well system, and operating the ground water treatment facilities. It is assumed that three Five-Year Review cycles will be performed as part of this ground water remedy. The total present worth of Alternative SP-2 is estimated to be 7.6 million dollars.

### Alternative SP-3a: *In Situ* Enhanced Bioremediation (ISEB) Using Oxygen Amendment and Natural Ground Water Flow

***Estimated Capital Cost: $3,778,000***
***Estimated O&M Cost: $1,303,000***
***Estimated Present Worth Cost (Discount Rate of 7%): $5,081,000***
***Estimated Construction Timeframe: 16 months***
***Estimated Time to Achieve RAOs: 10 years***

Alternative SP-3a is a straightforward in-place aerobic bioremediation scheme. Aerated ground water is created at the up gradient end of the SP area, migrates throughout the SP area by natural, west-to-east ground water flow. The conditions necessary for accelerated growth and metabolism of contaminants by native microbes are created by placing oxygen releasing materials (or injecting gaseous oxygen) into the SP area through wells. Two configurations of wells are used to aerate ground water: a line of vertical wells placed parallel to the rail tracks along the west boundary of the CSX rail yard, and a matrix of horizontal wells placed under the CSX rail yard parallel to the railroad tracks (perpendicular to the direction of ground water flow). The lines of evidence supporting evidence of bioremediation occurring at the Site will be performed prior to the implementation of ISEB at the Site.

<u>Overall Protection of Human Health and the Environment</u>

This alternative would protect the public and the environment from exposure to ground water contamination by biologically degrading the chemicals within the SP area. Residual dissolved contamination at the leading edge of the SP zone could continue to migrate into the HCP zone for a relatively short time until source area contaminants are eliminated. No long-term residual risks from SP ground water are anticipated because biological activity would continue as long as favorable subsurface conditions existed. Since all treatment occurs underground, few short-term hazards or adverse impacts are expected other than typical physical hazards associated with construction-type activities at the remediation staging areas. Remediation progress, subsurface conditions, and long-term protectiveness of the alternative would be monitored over time by ground water sampling and analysis.

<u>Compliance with ARARs</u>

It is anticipated that this alternative will comply with applicable chemical-, location-, and action-specific ARARs. With sufficient treatment time, chemical-specific ARARs for dissolved contaminants can be met. Compliance with chemical-specific ARARs could be delayed if secondary degradation pathways or processes are required to address degradation products or rebounding of contaminant concentrations caused by residual (un-dissolved) contaminants leaching into fresh ground water.

*Long-Term Effectiveness and Permanence*

This SP area treatment alternative is expected to eliminate the long-term risk associated with the contaminated ground water in the areas treated. The long-term adequacy of the bioremediation process proposed in this alternative is dependent on microbial populations throughout the aquifer. Even if significant mass of un-dissolved (residual) contamination exists within the SP area, sustained biological activity over time can mitigate future contamination in ground water leaching from local residual sources. If substantial amounts of residual contaminants are present in the SP area, the time required to degrade this material may be unacceptable for protection of human health and the environment, as well as for resource restoration. The Five-Year Review cycle will be implemented until cleanup levels are met to ensure protection of human health and the environment.

*Reduction of M/T/V Through Treatment*

This alternative meets the statutory preference for treatment as the primary component of the ground water remedial strategy. Biological treatment would effectively reduce the M/T/V of contaminated ground water. If un-dissolved contaminants exist, contaminant concentrations in ground water could rebound over time as material desorbs from aquifer solids and dissolves in fresh ground water. Ground water sampling and analysis would be used to monitor for this possibility; however, biodegradation can provide continuing treatment of un-dissolved (residual) contamination. Because the biological treatment process would occur in the subsurface, no residual waste requiring further treatment or disposal is produced.

*Short-Term Effectiveness*

Community risk associated with this remedial alternative would be low during the installation and sampling of monitoring wells, the installation of injection wells, and the operation of the extraction/injection system. The physical risk would be greater for workers, but would be minimized by compliance with worker safety requirements and guidelines for hazardous waste site activities. Installation activities would require that workers be trained and certified to perform hazardous waste site activities, and workers would be required to wear, at a minimum, Level D personal protective equipment during well installation.

Environmental impacts resulting from the installation of the monitoring, injection, and extraction (if needed) wells would include noise pollution. During installation, construction controls would be implemented to minimize contact with contaminated soil and ground water. Any investigation-derived wastes generated during well installation would be collected and disposed of properly at appropriate facilities.

*Implementability*

The installation of monitoring and injection wells for the *in situ* enhanced bioremediation is relatively simple. Contractors that specialize in this type of well installation involved in this alternative are readily available, as are contractors who specialize in the injection system. Additional remediation at the Site, if required, could be implemented fairly easily. This might simply include installing additional injection wells and adding additional rounds of oxygen-supplying injection.

The greatest concerns are interference with the active CSX rail yard complex just east of the Site and access to the complex. Although most remedial activity would occur below ground under the railroad tracks, access across the tracks for ground surface monitoring of drilling operations will be a logistical challenge. Areas east of the rail yard are generally empty and accessible parcels of land.

The monitoring program associated with the treatment system would require monthly management by one individual to oversee the collection of ground water field parameters and samples and by two individuals on a quarterly basis for two years. Long-term O&M activities associated with this alternative would include repair and maintenance of the monitoring wells, which would be relatively easy to implement. No difficulties are foreseen during the performance of these activities. Current uncertainties for the performance of these activities include the length of time the injection process would need to be conducted for each of the areas to be treated; the number of follow-up treatment rounds required to treat these areas effectively; and the ability to gain access to property offsite. Some of the uncertainty should be removed with the completion of a bench and a pilot-scale treatability study during the remedial design.

*Cost*

The capital costs include both direct and indirect capital costs. The direct capital costs include the additional characterization of the source zone; installation of monitoring and horizontal extraction/injection wells; pilot-scale testing for the ISEB; engineering design, procurement and report; and construction oversight. With the addition of indirect costs, the total capital cost is estimated to be 3.8 million dollars.

The O&M costs associated with this alternative (1.3 million dollars) include ground water monitoring and operation of the injection well system. It is assumed that three Five-Year Review cycles will be performed as part of this ground water remedy. The total present worth of Alternative SP-3a is estimated to be 5.0 million dollars.

### Alternative SP-3b: *In Situ* Enhanced Bioremediation Using Horizontal Extraction and Re-Injection Wells

***Estimated Capital Cost: $8,911,000***
***Estimated O&M Cost: $1,004,000***
***Estimated Present Worth Cost (Discount Rate of 7%): $9,915,000***
***Estimated Construction Timeframe: 16 months***
***Estimated Time to Achieve RAOs: 6 years***

Alternative SP-3b is an in-place aerobic bioremediation scheme implemented through an alternating sequence of horizontal extraction and injection wells installed parallel to the natural ground water flow direction. Aeration occurs by placing oxygen releasing materials (or injecting gaseous oxygen) into horizontal injection wells. The migration of aerated ground water throughout the SP area is facilitated and accelerated by the cycling of ground water between extraction wells and injection wells. The lines of evidence supporting evidence of bioremediation occurring at the Site will be performed prior to the implementation of ISEB at the Site.

*Overall Protection of Human Health and the Environment*

This alternative would protect the public and the environment from exposure to ground water contamination by biologically degrading the chemicals within the SP area in the minimum time feasible. Contaminant migration into downgradient media is expected to be inhibited by this alternative. No long-term residual risks from SP ground water are anticipated because biological activity would continue as long as favorable subsurface conditions existed. Since all treatment occurs underground, few short-term hazards or adverse impacts are expected other than typical physical hazards associated with construction-type activities at the remediation staging areas. Remediation progress, subsurface conditions, and long-term protectiveness of the alternative would be monitored over time by ground water sampling and analysis.

*Compliance with ARARs*

It is anticipated that this alternative will comply with all applicable chemical-, location-, and action-specific ARARs. With sufficient treatment time, chemical-specific ARARs for dissolved contaminants can be met. Compliance with chemical-specific ARARs could be delayed if secondary degradation pathways or processes are required to address degradation products or rebounding of contaminant concentrations caused by residual (un-dissolved) contaminants leaching into fresh ground water.

Location-specific and action-specific ARARs are expected to be met by this alternative.

*Long-Term Effectiveness and Permanence*

Implementing this source zone treatment alternative is expected to eliminate the long-term risk associated with the contaminated ground water in the areas treated. The long-term adequacy of the bioremediation process proposed in this alternative is dependent on the absence of significant mass of un-dissolved (residual) contamination. If substantial amounts of residual contaminants are present in the SP area, the time required to degrade this material would be longer for protection of human health and the environment. Even if dissolved contamination is adequately treated, the concentrations in ground water could rebound over time as residual solid-bound contaminants, if present, leach into fresh ground water. Five-Year Reviews will be conducted until cleanup levels are met to ensure protection of human health and the environment.

*Reduction of M/T/V Through Treatment*

This alternative meets the statutory preference for treatment as the primary component of the ground water remedial strategy. Biological treatment would effectively reduce the M/T/V of contaminated ground water. If un-dissolved contaminants exist, contaminant concentrations in ground water could rebound over time as material desorbs from aquifer solids and dissolves in fresh ground water. Ground water sampling and analysis would be used to monitor for this possibility; however, biodegradation can provide continuing treatment of un-dissolved (residual) contamination. Because the biological treatment process would occur in the subsurface, no residual waste requiring further treatment or disposal is produced.

*Short-Term Effectiveness*

Community risk associated with this remedial alternative would be low during the installation and sampling of monitoring wells, the installation of injection wells, and the operation of the extraction/injection system. The risk would be greater for workers, but would be minimized by compliance with worker safety requirements and guidelines for hazardous waste site activities. Installation activities would require that workers be trained and certified to perform hazardous waste site activities, and workers would be required to wear, at a minimum, Level D personal protective equipment during removal and well installation.

Environmental impacts resulting from the installation of the monitoring, injection, and extraction wells would include noise pollution. During installation, construction controls would be implemented to minimize contact with contaminated soil and ground water. Any investigation-derived wastes generated during well installation would be collected and disposed of properly at appropriate facilities.

*Implementability*

The installation of monitoring and injection wells, and the setup and startup of a temporary injection system, are relatively simple tasks; established procedures are available. Contractors that specialize in the type of well installation are available as are contractors that specialize in the setup and startup of the proposed ISEB.

The greatest concern is interference with the active CSX rail yard complex just east of the Site as well as access to the complex. Although most remedial activity would occur below ground underneath the railroad tracks, access across the tracks for monitoring of drilling operations will be a logistical challenge. Areas east of the rail yard are generally empty and accessible parcels of land.

The monitoring program associated with the treatment system would require monthly management by one individual to oversee the collection of ground water field parameters and samples and by two individuals on a quarterly basis for two years. Long-term O&M activities associated with this alternative would include repair and maintenance of the monitoring wells, which would be relatively easy to implement. No difficulties are foreseen during the performance of these activities. Current uncertainties associated with this alternative include the length of time the injection process would need to be conducted for each of the areas to be treated and the number of follow-up treatments necessary to fully remediate impacted areas effectively. Some of the uncertainty should be removed with the completion of a bench and a pilot-scale treatability study during the remedial design.

Under this alternative, cleanup levels and ARARs could be met in approximately 6 years from the onset of construction activities. The *in situ* biological remediation alternative could be constructed and initiated in approximately 16 months. Parts of the tasks could be performed concurrently. For example, a bench study could be conducted concurrently with the development of the planning documents, and construction activities for the treatment system could occur concurrently. It is estimated that the time from the notice to proceed to limited startup would be approximately 16 months.

*Cost*

The direct capital costs for Alternative SP-3b (8.9 million dollars) include additional characterization of the source zone; installation of monitoring and horizontal extraction/injection wells; treatability testing for the ISEB; engineering design, procurement, and report; and construction oversight.

The O&M costs associated with this alternative (1.0 million dollars) include ground water monitoring, and operation of the injection well system. It is assumed that a Five-Year Review will be performed as part of this ground water remedy. The total present worth of Alternative SP-3b is estimated to be 9.9 million dollars

**Alternative SP-4: *In Situ* Chemical Oxidation (ISCO) and *In Situ* Enhanced Bioremediation (ISEB) Using Vertical and Horizontal Wells**

***Estimated Capital Cost: $6,712,000***
***Estimated O&M Cost: $2,141,000***
***Estimated Present Worth Cost (Discount Rate of 7%): $8,862,000***
***Estimated Construction Timeframe: 10 months***
***Estimated Time to Achieve RAOs: 1 year***

Alternative SP-4 expands on the design of Alternative SP-3a. The in-place aerobic bioremediation scheme (ISEB) would be supplemented by ISCO technology applied to ground water containing the highest naphthalene concentrations. Efficiency of aeration, oxidation, and distribution of treated ground water is increased by installing vertical extraction wells located downgradient of the SP area and operating them to return extracted water back to the head of the horizontal injection wells.

The subsurface conditions necessary for accelerated growth and metabolism of the contaminants by native microbes are created by placing oxygen releasing materials (or injecting gaseous oxygen) into the SP area through wells. Two configurations of wells perpendicular to the direction of ground water flow are used to aerate ground water: a line of vertical wells parallel to the rail tracks along the west boundary of the CSX rail yard, and a matrix of horizontal wells placed under the CSX rail yard. The aerated ground water, created at the up gradient end of the SP area, migrates throughout the SP by natural, west-to-east ground water flow. The lines of evidence supporting evidence of bioremediation occurring at the Site will be performed prior to the implementation of ISEB at the Site.

*Overall Protection of Human Health and the Environment*

This alternative would protect the public and the environment from exposure to ground water contamination by rapidly degrading the highest concentration of contaminants with chemical treatment, and more extensively and persistently degrading the contaminants within the SP area with biological treatment. Minimal long-term residual risks from SP ground water are anticipated because biological activity would continue as long as favorable subsurface conditions existed. Since all treatment occurs underground, few short-term hazards or adverse impacts are expected other than typical physical hazards associated with construction-type activities at the remediation staging areas. Remediation progress, subsurface conditions, and long-term protectiveness of the alternative would be monitored over time by ground water sampling and analysis.

*Compliance with ARARs*

It is anticipated that this alternative will comply with all applicable chemical-, location-, and action-specific ARARs. With sufficient treatment time, chemical-specific ARARs for dissolved contaminants can be met. Compliance with chemical-specific ARARs could be delayed if secondary degradation pathways or processes are required to address degradation products or rebounding of contaminant concentrations caused by residual (un-dissolved) contaminants leaching into fresh ground water.

Location-specific ARARS are expected to be met by this alternative. Action-specific ARARs will be re-evaluated as remedial design considerations are addressed.

*Long-Term Effectiveness and Permanence*

Implementing this SP area treatment alternative is expected to eliminate the long-term risk associated with the contaminated ground water in the areas treated. The degree to which contaminants are degraded by chemical treatment is directly related to many conditions, including:

- How well the chemical oxidant is introduced to the subsurface and how well it gets distributed throughout the impacted aquifer material.
- How completely and how long the chemical oxidant and contaminant (dissolved or residual) contact each other.
- How accurately the dosing calculations and pre-treatment studies account for non-contaminant oxidant demand in the subsurface.

ISCO should completely or largely address the problem associated with any solid-bound residual contamination. Even if dissolved contamination is adequately treated, the concentrations in ground water could rebound over time as residual contaminants leach into fresh ground water. Five-Year Reviews will be conducted until cleanup levels are met to ensure protection of human health and the environment.

*Reduction of M/T/V Through Treatment*

This alternative meets the statutory preference for treatment as the primary component of the ground water remedial strategy. The combination of chemical and biological treatment of contaminated ground water would effectively reduce the M/T/V of the contamination. ISCO should completely or largely address the problem associated with any solid-bound residual contamination. Un-dissolved (residual) contamination would be addressed in whole or in part by the ISCO component of this alternative. Ground water sampling and analysis would be used to monitor for potential rebound of contaminant concentrations in ground water. Because the treatment process would occur in the subsurface, any residual waste produced would not require further treatment or disposal.

*Short-Term Effectiveness*

Community risk associated with this remedial alternative would be low during the installation and sampling of monitoring wells, the installation of injection wells, and the operation of the extraction/injection system. The physical risk would be greater for workers, but would be minimized by compliance with worker safety requirements and guidelines for hazardous waste site activities. Installation activities would require that workers be trained and certified to perform hazardous waste site activities, and workers would be required to wear, at a minimum, Level D personal protective equipment during removal and well installation.

Environmental impacts resulting from the installation of the monitoring, injection, and extraction wells would include noise pollution. During installation, construction controls would be implemented to minimize contact with contaminated soil and ground water. Any investigation-derived wastes generated during well installation would be collected and disposed of properly at appropriate facilities.

*Implementability*

The installation of monitoring and injection wells and the setup and startup of an injection system are relatively simple, and established procedures are in use. Contractors that specialize in this type of well installation are available, as are contractors that specialize in the setup and startup of the proposed chemical oxidation injection system.

The greatest concerns are interference with the active CSX rail yard complex just east of the Site as well as access to the complex. Although most remedial activity would occur below ground under the railroad tracks, access across the tracks for monitoring of drilling operations will be a logistical challenge. Areas east of the rail yard are generally empty and accessible parcels of land.

The monitoring program associated with the treatment system would require monthly management by one individual to oversee the collection of ground water field parameters and samples and by two individuals on a quarterly basis for two years. Long-term O&M activities associated with this alternative would include repair and maintenance of the monitoring wells, which would be relatively easy to implement. No difficulties are foreseen during the performance of these activities. Current uncertainties for the performance of these activities include the length of time the injection process would need to be conducted for each of the areas to be treated and the number of return rounds of treatment that would be necessary to treat these areas effectively. Some of the uncertainty should be removed with the completion of a bench and a pilot-scale treatability study during the RD stage.

Under this alternative, RAOs and ARARs for this Site would be met in approximately one year, and enhanced bioremediation alternative could be constructed and initiated in approximately one year. Parts of the tasks could be performed concurrently. For example, a bench study could be conducted concurrently with the development of the planning documents. It is estimated that the time from the notice to proceed to limited startup would be approximately 10 months.

*Cost*

The capital costs for the ISCO/ISEB alternative (6.7 million dollars) include installation of the injection and additional monitoring wells, piping assemblies and piping necessary to feed injection wells from the temporary injection treatment system, and associated piping and other appurtenances.

The O&M costs associated with implementing alternative SP-4 (2.1 million dollars) include ground water monitoring, offsite disposal of the investigation-derived wastes, and maintenance of the monitoring wells. The total present worth of Alternative SP-4 is estimated to be 8.9 million dollars.

### Alternative SP-5: *In Situ* Chemical Oxidation Using Horizontal Extraction Wells and Re-Injection Wells

***Estimated Capital Cost: $42,231,000***
***Estimated O&M Cost: $8,835,000***
***Estimated Present Worth Cost (Discount Rate of 7%): $51,065,000***
***Estimated Construction Timeframe: 10 months***
***Estimated Time to Achieve RAOs: 1 year***

Alternative SP-5 is similar to Alternative SP-3b in its overall design and intent. The difference is that Alternative SP-5 achieves contaminant degradation with ISCO technology implemented through an alternating sequence of horizontal extraction and injection wells emplaced parallel to the natural ground water flow direction. Using ISCO in the source zone will transform contaminants into benign end products more rapidly than treatment by enhanced bioremediation alone. ISCO involves the injection of an oxidant such as permanganate, hydrogen peroxide, ozone, persulfate or a combination thereof. This alternative may require multiple phases of injections to fully treat the contamination and would eliminate human exposure to the ground water contamination.

*Overall Protection of Human Health and the Environment*

Complete protection of human health and the environment from exposure to ground water contamination is conditioned on complete contact between chemical oxidant and subsurface contaminants. The degree to which contaminants are degraded by chemical treatment is directly related to many conditions, including:

- How well the chemical oxidant is introduced to the subsurface and how well it gets distributed throughout the impacted aquifer material.
- How completely and how long the chemical oxidant and contaminant (dissolved or residual) contact each other.
- How accurately the dosing calculations and pre-treatment studies account for non-contaminant oxidant demand in the subsurface.

Residual dissolved contamination at the leading edge of the plume zone could continue to migrate into downgradient plume zones for a relatively short time until up gradient contaminants are eliminated. Since all treatment occurs underground, few short-term hazards or adverse impacts are expected other than typical physical hazards associated with construction-type activities at the remediation staging areas. Remediation progress, subsurface conditions, and long-term protectiveness of the alternative would be monitored over time by ground water sampling and analysis.

*Compliance with ARARs*

It is anticipated that this alternative will comply with all applicable chemical-, location-, and action-specific ARARs. With sufficient treatment time, chemical-specific ARARs for dissolved contaminants can be met. Compliance with chemical-specific ARARs could be delayed if secondary degradation pathways or processes are required to address degradation products or rebounding of contaminant concentrations caused by residual (un-dissolved) contaminants leaching into fresh ground water.

Location-specific ARARS are expected to be met by this alternative. Action-specific ARARs would be re-evaluated as remedial design considerations are addressed.

*Long-Term Effectiveness and Permanence*

The long-term adequacy of the chemical oxidation process proposed in this alternative is dependent on the absence of significant mass of un-dissolved (residual) contamination. Also, the degree to which contaminants are degraded by chemical treatment is directly related to how well the chemical oxidant is introduced to the subsurface, how well it gets distributed throughout the impacted aquifer material, and how completely and how long the chemical oxidant and contaminant (dissolved or residual) contact each other.

Dissolved contamination at the leading edge of the plume zone could continue to migrate into downgradient plume zones for a relatively short time until up gradient contaminants are eliminated. Even if dissolved contamination is adequately treated; the concentrations in ground water could rebound over time as residual solid-bound contaminants leach into fresh ground water. Five-Year Reviews will be conducted until cleanup levels are met to ensure protection of human health and the environment.

*Reduction of M/T/V Through Treatment*

This alternative meets the statutory preference for treatment as the primary component of the ground water remedial strategy. However, chemical treatment of contaminated ground water by itself may or may not completely reduce the M/T/V of the contamination. As stated previously, the degree to which contaminants are degraded by chemical treatment is directly related to how well the chemical oxidant is introduced to the subsurface, how well it gets distributed throughout the impacted aquifer material, and how completely and how long the chemical oxidant and contaminant (dissolved or residual) contact each other. Ground water sampling and analysis would be used to monitor for potential rebound of contaminant concentrations in ground water. Because the treatment process would occur in the subsurface, any residual waste produced would not require further treatment or disposal.

*Short-Term Effectiveness*

Community risk associated with this remedial alternative would be low during the installation and sampling of monitoring wells, the installation of injection wells, and the operation of the extraction/injection system. The risk would be greater for workers, but would be minimized by compliance with worker safety requirements and guidelines for hazardous waste site activities. Installation activities would require that workers be trained and certified to perform hazardous waste site activities, and workers would be required to wear, at a minimum, Level D personal protective equipment during well installation.

Environmental impacts resulting from the installation of the monitoring, injection, and extraction wells would include noise pollution. During installation, construction controls would be implemented to minimize contact with contaminated soil and ground water. Any investigation-derived wastes generated during well installation would be collected and disposed of properly at appropriate facilities.

*Implementability*

The installation of monitoring and injection wells, and the setup and startup of the injection well system, are relatively simple and established technologies. Contractors that specialize in this type of well installation are available, as are contractors that specialize in the setup and startup of the chemical oxidant injection system.

The greatest concerns are interference with the active CSX rail yard complex just east of the Site. Although most remedial activity would occur below ground under the railroad tracks, access across the tracks for ground surface monitoring of drilling operations will be a logistical challenge. Areas east of the rail yard are generally empty and accessible parcels of land.

The monitoring program associated with the treatment system would require monthly management by one individual to oversee the collection of ground water field parameters and samples and by two individuals on a quarterly basis for two years. O&M activities associated with this alternative would include repair and maintenance of the monitoring wells, which would be relatively easy to implement. No difficulties are foreseen during the performance of these activities. Current uncertainties for the performance of these activities include the length of time the injection process would need to be conducted for each of the areas to be treated and the number of return rounds of treatment that would be necessary to treat these areas effectively. Some of the uncertainty should be removed with the completion of a bench- and a pilot-scale treatability study during the RD stage.

Under this alternative, it is uncertain how long it would take to meet RAOs and ARARs for this Site. Under optimal conditions, they could be met in approximately one year; if chemical oxidation is unsuccessful in remediating all sources of contamination in the SP area, it may take several rounds of re-application or several decades of natural attenuation to achieve RAOs and ARARs. Parts of the tasks could be performed concurrently. For example, a bench study could be conducted concurrently with the development of the planning documents. It is estimated that the time from the notice to proceed to limited startup would be approximately 10 months.

*Cost*

The capital costs for the chemical treatment-only alternative (42.2 million dollars) include installation of the injection and additional monitoring wells, piping assemblies and piping necessary to feed injection wells from the chemical injection system, and associated piping and other appurtenances. Although this remedy is similar to SP-3b, the capital costs are substantially higher due to the costs of using chemical oxidation as a single technology.

The O&M costs associated with implementing SP-4 (8.8 million dollars) include ground water monitoring, offsite disposal of the investigation-derived wastes, and maintenance of the monitoring wells. The total present worth of Alternative SP-4 is estimated to be 51.0 million dollars.

2.9.1.2 High Concentration Plume (HCP) Alternatives

**Alternative HCP-1: No Action with Monitoring**

***Estimated Capital Cost: $0***
***Estimated O&M Cost: $0***
***Estimated Present Worth Cost for Monitoring (Discount Rate of 7%): $54,300***
***Estimated Construction Timeframe: Immediate (< 1 year)***
***Estimated Time to Achieve RAOs: Undefined***

This alternative is a required component of the FS, and provides a comparative basis for the other alternatives. Under this alternative, no action would be taken to remedy the contaminated plume areas, so that Alternative HCP-1 is only considered with alternatives SP-1 and DP-1. The Site would remain in its present condition and only monitoring would be performed. Five-Year Reviews would be performed to evaluate the ongoing protectiveness of the remedy. No additional funds would be expended to conduct the reviews, since Five-Year Reviews are already a component of the OU1 remedy. It is anticipated that each Five-Year Review would consist of a site visit and report preparation.

*Overall Protection of Human Health and the Environment*

Because remedial actions would not be initiated as part of this alternative, it would not provide any increased protection to human health. If no action is taken, contaminants would remain.

*Compliance with ARARs*

This alternative does not achieve the RAOs or chemical-specific ARARs established for the contaminated ground water. Action-specific ARARs do not apply to this alternative since further remedial actions will not be conducted.

*Long-Term Effectiveness and Permanence*

The cleanup levels noted in Table 5 for protection of human health would not be met. Because contaminated material remains onsite under this alternative, a review/reassessment of the conditions at the Site would be performed at 5-year intervals to ensure that the remedy does not become a greater risk to human health and the environment.

*Reduction of Mobility/Toxicity/Volume (M/T/V) Through Treatment*

No reductions in contaminant M/T/V are realized under this alternative.

*Short-Term Effectiveness*

Since no further remedial actions would be implemented at the Site, this alternative would pose no short-term risks to onsite workers. It is assumed that Level D personal protection would be used when conducting site visits for Five-Year Reviews.

*Implementability*

This alternative could be implemented immediately (<1 year) because monitoring equipment is readily available and procedures are in place. However, the time to achieve RAOs is too long to quantify (undefined).

*Cost*

There are no capital or annual costs associated with this alternative.

**Alternative HCP-2: *In Situ* Chemical Oxidation and *In Situ* Enhanced Bioremediation**

***Estimated Capital Cost: $10,931,000***
***Estimated O&M Cost: $1,093,000***
***Estimated Present Worth Cost (Discount Rate of 7%): $12,024,000***
***Estimated Construction Timeframe: 10 months***
***Estimated Time to Achieve RAOs: 3 years***

Alternative HCP-2 (which corresponds to alternative SP-4) uses two separate technologies to address different portions of the HCP plume at the Site. ISCO technology would be used for ground water in the HCP containing concentrations of naphthalene between 2,000 and 7,000 µg/L. For portions of the HCP area having naphthalene concentrations less than 2,000 µg/L, ISEB would be employed. The use of ISCO likely would contribute to creating aerobic conditions in, and downgradient of, the ground water zones in which it is applied.

The method of ISCO application in the deeper and more widely distributed portions of the contaminant plume (those containing 7,000 to 140 µg/L) is different than the method used in the SP areas. The proposed well systems are designed to distribute both oxygen-releasing materials and chemical oxidants throughout the target HCP areas. Remedial progress would be monitored through monitoring wells placed downgradient of the existing wells and the injections well points.

*Overall Protection of Human Health and the Environment*

Alternative HCP-2 would protect the public and the environment from the risks posed by contaminants in the HCP area by aggressively treating the more highly contaminated ground water and providing a long term and flexible approach to the plume areas with lower concentrations of contaminants. This alternative would also address migrating contamination through the continued biodegradation of contaminants as they move downgradient with the ground water. Residual dissolved contamination at the leading edge of the plume zone could continue to migrate into downgradient plume zones for a relatively short time until up gradient contaminants are eliminated. Once remediation is complete, no long-term residual risks would be expected from the remediated areas. An extra measure of protection against long-term residual risks is provided by the bioremediation, which could continue to address any contamination that may remain.

*Compliance with ARARs*

With sufficient treatment time, chemical-specific ARARs for dissolved contaminants can be met. Compliance with chemical-specific ARARs could be delayed if secondary degradation pathways or processes are required to address degradation products or rebounding of contaminant concentrations caused by residual (un-dissolved) contaminants leaching into fresh ground water. Under this alternative, RAOs and ARARs for this Site would be met in approximately 3 years, and enhanced bioremediation alternative could be constructed and initiated in approximately one year.

Location-specific ARARS are expected to be met by this alternative. Action-specific ARARs will be re-evaluated as remedial design considerations are addressed.

*Long-Term Effectiveness and Permanence*

Alternative HCP-2 uses two compatible technologies that act to provide an effective treatment for ground water in the HCP area. The ISCO should very quickly address a large amount of dissolved contaminant mass, while the enhanced bioremediation provides for long-acting biological activity that would enhance the long-term performance of Alternative HCP-2. The long-term protection of human health in Alternative HCP-2 is comparable to that of Alternative SP-4.

*Reduction of M/T/V Through Treatment*

This alternative meets the statutory preference for treatment as a principal element. Both ISCO and enhanced bioremediation transform the COCs into benign products, thus reducing the M/T/V. Once the remedial action for this alternative is complete, no long-term residual risks would be expected from the remediated areas, as bioremediation is expected to completely address dissolved naphthalene as it migrates through areas of aerobic conditions.

*Short-Term Effectiveness*

Community risk associated with Alternative HCP-2 would be low during the remedial activities. The physical risk would be greater for workers performing the remedial action, but would be minimized by compliance with worker safety requirements and guidelines for hazardous waste site activities. Well installation activities would require that workers be trained and certified to perform hazardous waste site activities, and workers would be required to wear, at a minimum, Level D personal protective equipment when there is potential for exposure to ground water.

Environmental impacts resulting from the drilling and construction activities include noise pollution. During the remedial action, construction controls would be implemented to minimize contact with contaminated soil and ground water. Any investigation-derived wastes generated during construction activities would be collected and disposed of properly at appropriate facilities.

*Implementability*

The installation of monitoring and injection wells for the *in situ* chemical oxidation and enhanced bioremediation is relatively simple, and established procedures are in use. Areas east of the rail yard are generally empty and accessible parcels of land; however access to these areas would have to be obtained. Contractors that specialize in this type of well installation proposed are available, as are contractors that specialize in the injection system.

Under this alternative, RAOs and ARARs for this Site would be met in approximately 3 years. Additional remediation at the Site, if required, could be implemented fairly easily. This might simply include the installation of additional injection wells and adding additional rounds of oxygen-supplying injection. Parts of the tasks could be performed concurrently. For example, a bench study could be conducted concurrently with the development of the planning documents. It is estimated that the time from the notice to proceed to limited startup would be approximately 10 months.

*Cost*

The capital costs estimated for Alternative HCP-2 (10.9 million dollars) include monitoring, injection, and extraction well installations; additional plume delineation sampling; bench-scale bioremediation testing; bench- and pilot- scale ISCO testing; associated equipment, materials, and supplies; engineering design, procurement, and reporting; and construction oversight.

The O&M costs associated with this alternative (1.1 million dollars) include quarterly monitoring for the first two years and semi-annual monitoring for the following four years. The Five-Year Reviews cycle would be implemented for this alternative. The total present worth of Alternative HCP-2 is estimated to be 12.0 million dollars.

**Alternative HCP-3: *In Situ* Enhanced Bioremediation**

***Estimated Capital Cost: $5,408,000***
***Estimated O&M Cost: $1,093,000***
***Estimated Present Worth Cost (Discount Rate of 7%): $6,501,000***
***Estimated Construction Timeframe: 16 months***
***Estimated Time to Achieve RAOs: 6 years***

Alternative HCP-3 relies on *in situ* biodegradation. Subsurface conditions are enhanced to allow native microbes to effectively metabolize creosote-based contaminants. Enhancing conditions consists of injecting oxygen-releasing material through a series of vertical injection wells strategically placed throughout the HCP area. This *in situ* remedial technology is compatible with the ISEB application in Alternatives SP-4 or SP-5. Native bacteria already present in the sand and gravel aquifer likely will degrade creosote-related contaminants after an acclimation period under newly-formed aerobic conditions. The lines of evidence supporting evidence of bioremediation occurring at the Site will be performed prior to the implementation of ISEB at the Site.

*Overall Protection of Human Health and the Environment*

Alternative HCP-3 would protect the public and the environment from the risks posed by contaminants in the HCP area by effectively treating the contaminated ground water while providing a long-acting and flexible approach to the zones with lower concentrations of contaminants. This alternative would also address migrating contamination, through the continued biodegradation of contaminants as they move downgradient with the ground water. Residual dissolved contamination at the leading edge of the plume zone could continue to migrate into downgradient plume zones for a relatively short time until up gradient contaminants are eliminated. Once remediation is complete, no long-term residual risks would be expected from the remediated areas.

*Compliance with ARARs*

It is anticipated that this alternative will comply with all applicable chemical-, location-, and action-specific ARARs. With sufficient treatment time, chemical-specific ARARs for dissolved contaminants can be met. Compliance with chemical-specific ARARs could be delayed if secondary degradation pathways or processes are required to address degradation products or rebounding of contaminant concentrations. Under this alternative, cleanup levels and ARARs could be met in approximately 6 years from the onset of construction activities. The *in situ* biological remediation alternative could be constructed and initiated in approximately 16 months.
Location-specific ARARS likely would be met by this alternative. Action-specific ARARs will be re-evaluated as remedial design considerations are addressed.

*Long-Term Effectiveness and Permanence*

Alternative HCP-3 uses effective, natural processes that act to transform contaminants in impacted ground water into benign products. The alternative, by creating and maintaining aerobic conditions in the aquifer, will utilize the ability of native microbes within the subsurface to permanently transform organic contaminants into products such as carbon dioxide. This alternative provides for long-acting biological activity that would enhance the long-term performance of Alternative HCP-3.

Although the amount of time required for the attainment of RAOs for the HCP area is longer under Alternative HCP-2, the adaptability and ongoing treatment afforded by this alternative provides at least the same level of protection in the long term. Institutional controls prohibiting the extraction of ground water would be implemented to reduce the risk of exposure to ground water while remediation is occurring.

<u>*Reduction of M/T/V Through Treatment*</u>

This alternative meets the statutory preference for treatment as a principal element. The enhanced bioremediation treatment transforms the COCs into benign products, thus reducing the M/T/V. Once the remedial action for this alternative is complete, no long-term residual risks would be expected from the remediated areas, as biological transformations would continue to mitigate dissolved naphthalene even after the oxygen supply is no longer maintained.

<u>*Short-Term Effectiveness*</u>

Community risk associated with Alternative HCP-3 would be low during the remedial activities. The physical risk would be greater for workers performing the remedial action, but would be minimized by compliance with worker safety requirements and guidelines for hazardous waste site activities. Well installation activities would require that workers be trained and certified to perform hazardous waste site activities, and workers would be required to wear, at a minimum, Level D personal protective equipment when there is potential for exposure to ground water.

Environmental impacts resulting from the drilling and construction activities include noise pollution. During the remedial action, construction controls would be implemented to minimize contact with contaminated soil and ground water. Any investigation-derived wastes generated during construction activities would be collected and disposed of properly at appropriate facilities.

<u>*Implementability*</u>

The installation of monitoring and injection wells for the *in situ* enhanced bioremediation is relatively simple. Areas east of the rail yard are generally empty and accessible parcels of land; however access would have to be obtained. Contractors that specialize in this type of well installation involved in this alternative are readily available as are contractors that specialize in the injection system. Additional remediation at the Site, if required, would be implemented fairly easily. This might simply include the installation of additional injection wells and adding additional rounds of oxygen-supplying injection.

Parts of the tasks could be performed concurrently. For example, a bench study could be conducted concurrently with the development of the planning documents, and construction activities for the treatment system could occur concurrently. Under this alternative, RAOs and ARARs for this Site would be met in approximately 6 years. It is estimated that the time from the notice to proceed to limited startup would be approximately 16 months.

*Cost*

The capital costs for this alternative (5.4 million dollars) include monitoring and injection well installation; bench-scale bioremediation testing; associated equipment, materials, and supplies; engineering design, procurement, and reporting; and construction oversight. The corresponding O&M costs (1.1 million dollars) include quarterly monitoring for the first two years and semi-annual monitoring for the following four years. It is expected that a Five-Year Review will be completed for this alternative. The total present worth cost of Alternative HCP-3 is estimated to be 6.5 million dollars.

**Alternative HCP-4: *In Situ* Enhanced Bioremediation with Ground Water Recovery, Treatment, and Re-Injection**

***Estimated Capital Cost: $5,109,000***
***Estimated O&M Cost: $2,673,000***
***Estimated Present Worth Cost (Discount Rate of 7%): $7,782,000***
***Estimated Construction Timeframe: 16 months***
***Estimated Time to Achieve RAOs: 6 years***

Alternative HCP-4 consists of two separate remedial components: an enhanced aerobic bioremediation treatment component for most areas within the HCP area, and hydraulic containment of the plume at the eastern extent to control further migration of contaminated ground water toward Bayou Texar. This *in situ* technology uses the bioremediation approach described in Alternative HCP-3; introduction of an oxygen-supplying material to the aquifer will create aerobic conditions favorable to the growth and propagation of microbial populations. The lines of evidence supporting evidence of bioremediation occurring at the Site will be performed prior to the implementation of ISEB at the Site.

*Overall Protection of Human Health and the Environment*

Alternative HCP-4 would protect the public and the environment from the risks posed by contaminants in the HCP area by effectively treating the contaminated ground water while providing a long-acting and flexible approach to the zones with lower concentrations of contaminants. This alternative would also address migrating contamination through the ground water recovery, treatment, and injection as well as continued biodegradation of contaminants as they move down gradient with the ground water. Once remediation is complete, no long-term residual risks would be expected from the remediated areas. An extra measure of protection against long-term residual risks is provided by the bioremediation, which could continue to address any residual organic contamination that may exist.

*Compliance with ARARs*

It is anticipated that this alternative will comply with all applicable chemical-, location-, and action-specific ARARs. With sufficient treatment time, chemical-specific ARARs for dissolved contaminants can be met. Compliance with chemical-specific ARARs could be delayed if secondary degradation pathways or processes are required to address degradation products. The ground water recovery treatment and injection system would ensure the protection of the Bayou Texar. Under this alternative, cleanup levels and ARARs could be met in approximately 6 years from the onset of construction activities. The *in situ* biological remediation alternative could be constructed and initiated in approximately 16 months.

Location-specific ARARS likely would be met by this alternative. Action-specific ARARs will be evaluated more completely as remedial design considerations are addressed.

*Long-Term Effectiveness and Permanence*

Alternative HCP-4 uses well-understood and effective biological processes that can transform contaminants in impacted ground water into benign products. The effectiveness of the alternative depends on the ability to create and maintain favorable conditions for native microbes within the subsurface to grow, propagate, and metabolize organic contaminants. This alternative provides for long-acting biological activity that would enhance the long-term performance of this alternative.

Although the amount of time required for the attainment of RAOs for the source zones is longer under Alternative HCP-4 than HCP-2, the adaptability and ongoing treatment afforded by this alternative provides the same level or a higher level of protection in the long term ground water recovery treatment and injection system. Institutional controls prohibiting the extraction of ground water would be implemented to reduce the risk of exposure to ground water while remediation is occurring.

*Reduction of M/T/V Through Ground Water Recovery Treatment and Injection System*

This alternative meets the statutory preference for treatment as a principal element. The enhanced bioremediation treatment transforms the COCs into benign products, thus reducing the M/T/V. Once the remedial action for this alternative is complete, no long-term residual risks would be expected from the remediated areas, as biological transformations would continue to mitigate dissolved creosote-associated contaminants even after the oxygen supply is no longer maintained.

*Short-Term Effectiveness*

Community risk associated with Alternative HCP-4 would be low during the remedial activities. The physical risk would be greater for workers performing the remedial action, but would be minimized by compliance with worker safety requirements and guidelines for hazardous waste site activities. Well installation activities would require that workers be trained and certified to perform hazardous waste site activities, and workers would be required to wear, at a minimum, Level D personal protective equipment when there is potential for exposure to ground water.

Environmental impacts resulting from the drilling and construction activities include noise pollution. During the remedial action, construction controls would be implemented to minimize contact with contaminated soil and ground water. Any investigation-derived wastes generated during construction activities would be collected and disposed of properly at appropriate facilities.

*Implementability*

The installation of monitoring and injection wells for the *in situ* enhanced bioremediation is relatively simple. No interference with the active CSX rail yard complex just east of the Site is expected. Areas east of the rail yard are generally empty and accessible parcels of land; however access would have to be obtained. Contractors that specialize in this type of well installation involved in this alternative are readily available as are contractors that specialize in the injection system. Additional remediation at the Site, if required, would be implemented fairly easily. This might simply include the installation of additional injection wells and adding additional rounds of oxygen-supplying injection.

Parts of the tasks could be performed concurrently. For example, a bench study could be conducted concurrently with the development of the planning documents, and construction activities for the treatment system could occur concurrently. Under this alternative, RAOs and ARARs for this Site would be met in approximately 6 years. It is estimated that the time from the notice to proceed to limited startup would be approximately 16 months.

*Cost*

The capital costs for this alternative (5.1 million dollars) include monitoring and injection well installation; bench-scale bioremediation testing; associated equipment, materials, and supplies; engineering design, procurement, and reporting; and construction oversight.

The corresponding O&M of the ground water recovery treatment and injection system costs (2.7 million dollars) include quarterly monitoring for the first two years and semi-annual monitoring for the following four years. The Five-Year Review cycle will be implemented for this alternative. The total present worth cost of Alternative HCP-4 is estimated to be 7.8 million dollars.

2.9.1.3 Dilute Plume (DP) Alternatives

**Alternative DP-1: No Action with Monitoring**

***Estimated Capital Cost: $0***
***Estimated O&M Cost: $0***
***Estimated Present Worth Cost for Monitoring (Discount Rate of 7%): $54,300***
***Estimated Construction Timeframe: Immediate (< 1 year)***
***Estimated Time to Achieve RAOs: Undefined***

This alternative is a required component of the FS, and provides a comparative basis for the other alternatives. Under this alternative, no action would be taken to remedy the contaminated plume areas, so that Alternative DP-1 is only considered with alternatives SP-1 and HCP-1. The Site would remain in its present condition and only monitoring would be performed. Five-Year Reviews would be performed to evaluate the ongoing protectiveness of the remedy. No additional funds would be expended to conduct the reviews, since Five-Year Reviews are already a component of the OU1 remedy. It is anticipated that each Five-Year Review would consist of a site visit and report preparation.

*Overall Protection of Human Health and the Environment*

Because remedial actions would not be initiated as part of this alternative, it would not provide any increased protection to human health. If no action is taken, contaminants would remain in place.

*Compliance with ARARs*

This alternative does not achieve the RAOs or chemical-specific ARARs established for the contaminated ground water. Action-specific ARARs do not apply to this alternative since further remedial actions will not be conducted.

*Long-Term Effectiveness and Permanence*

The continued exposure of receptors to ground water is a potential long-term impact of this alternative. The cleanup levels noted in Table 5 for protection of human health would not be met. Because contaminated material remains onsite under this alternative, a review/reassessment of the conditions at the Site would be performed at 5-year intervals to ensure that the remedy does not become a greater risk to human health and the environment.

*Reduction of Mobility/Toxicity/Volume (M/T/V) Through Treatment*

No reductions in contaminant M/T/V are realized under this alternative.

*Short-Term Effectiveness*

Since no further remedial actions would be implemented at the Site, this alternative would pose no short-term risks to onsite workers. It is assumed that Level D personal protection would be used when conducting site visits for Five-Year Reviews.

*Implementability*

This alternative could be implemented immediately (<1 year) because monitoring equipment is readily available and procedures are in place. However, the time to achieve RAOs is too long to quantify (undefined).

*Cost*

There are no capital or annual costs associated with this alternative.

**Alternative DP-2: Monitored Natural Attenuation (MNA)**

***Estimated Capital Cost: $0***
***Estimated O&M Cost: $757,000***
***Estimated Present Worth Cost (Discount Rate of 7%): $757,000***
***Estimated Construction Timeframe: Immediate (< 1 year)***
***Estimated Time to Achieve RAOs: 20 to 30 years***

Alternative DP-2 would rely on MNA processes to address low contamination concentration aquifer zones. The activities associated with this alternative are monitoring for MNA parameters and reporting of ground water quality within the DP area. The lines of evidence supporting evidence of natural attenuation occurring at the Site will be performed prior to the implementation of monitored natural attenuation (MNA) at the Site.

*Overall Protection of Human Health and the Environment*

Alternative DP-2 would protect the public and the environment from the risks posed by low concentrations of contaminants in the DP area by natural diffusion, adsorption, dispersion, biodegradation, and other attenuation processes. It is uncertain how long this alternative would take to achieve RAOs and ARARs. Dissolved contamination at the leading edge of the plume zone could continue to migrate into downgradient zones until up gradient contaminants are eliminated. Once remediation is complete, no long-term residual risks would be expected from the remediated areas. An extra measure of protection against long-term residual risks could be provided by biodegradation, which could continue to address any residual organic contamination that may exist.

Since the DP alternatives would be selected in combination with SP/HCP alternatives, all of which include an element of enhanced bioremediation and/or oxidation, biodegradation in the DP zone would be expected under natural ground water flow conditions.

*Compliance with ARARs*

It is anticipated that this alternative will comply with all applicable chemical-, location-, and action-specific ARARs. With sufficient treatment time, chemical-specific ARARs for dissolved contaminants can be met. Location-specific and action-specific ARARS are expected to be met by this alternative.

*Long-Term Effectiveness and Permanence*

Alternative DP-2 relies on natural processes that degrade contaminants to reduce the risk associated with exposure to those contaminants. This alternative provides for long-acting, biological activity that would enhance the long-term performance of Alternative DP-2. Institutional controls prohibiting the extraction of ground water would be implemented to reduce the risk of exposure to ground water while remediation is occurring.

*Reduction of M/T/V Through Treatment*

This alternative meets the statutory preference for treatment as a principal element; albeit as a passive treatment approach. The natural attenuation processes include the biodegradation of contaminants by native microbes.

*Short-Term Effectiveness*

Community risk and risk to remediation workers associated with Alternative DP-2 would be low during the remedial activities. Environmental impacts resulting from construction-type remedial activities are not an issue in this alternative. Any investigation-derived wastes generated during sampling and analysis activities would be collected and disposed of properly at appropriate facilities.

*Implementability*

Implementing the technical components of the MNA alternative is very simple and straightforward. This alternative could be implemented immediately (<1 year) because monitoring equipment is readily available and procedures are in place. Since the source area and high concentration plume remedies will expedite this portion of the remedy, and cleanup levels could be achieved in 20 to 30 years.

*Cost*

The MNA alternative carries negligible capital costs. The corresponding O&M costs for this alternative (0.8 million dollars) include quarterly monitoring for the first two years and semi-annual monitoring for subsequent years; potentially for a total of 20 to 30 years. The Five-Year Review cycle would be implemented for this alternative. The total present worth of Alternative DP-2 is estimated to be 0.8 million dollars.

**Alternative DP-3: *In Situ* Enhanced Bioremediation**

***Estimated Capital Cost: $2,215,000***
***Estimated O&M Cost: $377,000***
***Estimated Present Worth Cost (Discount Rate of 7%): $2,592,000***
***Estimated Construction Timeframe: 16 months***
***Estimated Time to Achieve RAOs: 6 years***

Alternative DP-3 is the application of *in situ* enhanced bioremediation to the entire dilute zone. This alternative utilizes the same technology and approach of the in situ enhanced bioremediation portion of Alternative HCP-3, with ISEB at different depths within the sand and gravel aquifer to address the dilute ground water. It is estimated that one round of injections would be needed to adequately supply the aerobic conditions that would remedy the dilute zone for effective remediation. The lines of evidence supporting evidence of bioremediation occurring at the Site will be performed prior to the implementation of ISEB at the Site.

*Overall Protection of Human Health and the Environment*

Alternative DP-3 would protect the public and the environment from the risks posed by contaminants in the dilute zones by effectively treating the contaminated ground water while providing a long-acting remedial approach. This alternative would also work to address migrating contamination from up gradient areas of the plume, through the continued biodegradation of contaminants as they move downgradient with the ground water.

Residual dissolved contamination at the leading edge of the plume zone could continue to migrate into downgradient plume zones for a relatively short time until up gradient contaminants are eliminated. Once remediation is complete, no long-term residual risks would be expected from the remediated areas. An extra measure of protection against long-term residual risks is provided by the bioremediation, which could continue to address any residual organic contamination that may exist.

*Compliance with ARARs*

It is anticipated that this alternative will comply with all applicable chemical-, location-, and action-specific ARARs. With sufficient treatment time, chemical-specific ARARs for dissolved contaminants can be met.

Location-specific ARARS are expected to be met by this alternative. Action-specific ARARs will be evaluated more completely as remedial design considerations are addressed.

*Long-Term Effectiveness and Permanence*

Alternative DP-3 uses effective, natural processes that act to transform contaminants in impacted ground water into benign products. The alternative, by creating aerobic conditions in the aquifer, will utilize the ability of native microbes within the subsurface to permanently transform organic contaminants into products such as carbon dioxide. This alternative provides for long-acting biological activity that would enhance the long-term performance of Alternative DP-3. Institutional controls prohibiting the extraction of ground water would be implemented to reduce the risk of exposure to ground water while remediation is occurring.

*Reduction of M/T/V Through Treatment*

This alternative meets the statutory preference for treatment as a principal element. The enhanced bioremediation treatment transforms the COCs into benign products, thus reducing the M/T/V. Once the remedial action for this alternative is complete, no long-term residual risks would be expected from the remediated areas, as biological transformations would continue to destroy dissolved naphthalene even after the oxygen supply is no longer maintained.

*Short-Term Effectiveness*

Community risk associated with Alternative DP-3 would be low during the remedial activities. The physical risk would be slightly higher for workers performing the remedial action, but would be minimized by compliance with worker safety requirements and guidelines for hazardous waste site activities. Well installation activities would require that workers be trained and certified to perform hazardous waste site activities, and workers would be required to wear, at a minimum, Level D personal protective equipment when there is potential for exposure to ground water.

Environmental impacts resulting from the drilling and construction activities include noise pollution. During the remedial action, construction controls would be implemented to minimize contact with contaminated soil and ground water. Any investigation-derived wastes generated during construction activities would be collected and disposed of properly at appropriate facilities.

*Implementability*

The installation of monitoring and injection wells for the ISEB is relatively simple. Contractors that specialize in this type of well installation involved in this alternative are readily available as are contractors that specialize in the injection system. Additional remediation at the Site, if required, could be implemented fairly easily. This might simply include the installation of additional injection wells and adding additional rounds of oxygen-supplying injection.

Under this alternative, cleanup levels and ARARs could be met in approximately 6 years from the onset of construction activities. The *in situ* biological remediation alternative could be constructed and initiated in approximately 16 months. Parts of the tasks could be performed concurrently. For example, a bench study could be conducted concurrently with the development of the planning documents, and construction activities for the treatment system could occur concurrently. It is estimated that the time from the notice to proceed to limited startup would be approximately 16 months.

*Cost*

The capital costs for this alternative (2.2 million dollars) include: monitoring and injection well installation; bench-scale bioremediation testing (which could be incorporated in the source and/or highly impacted zone bioremediation alternatives); associated equipment, materials, and supplies; permits and licenses; engineering design, procurement, and reporting; and construction oversight. The corresponding O&M costs for this alternative (0.4 million dollars) include quarterly monitoring for the first two years and semi-annual monitoring for the following year. The Five-Year Review cycle would be implemented for this alternative. The total present worth of Alternative DP-3 is estimated to be 2.6 million dollars.

2.9.2 Common Elements and Distinguishing Features of the Alternatives

Common elements of the alternatives are the installation of horizontal injection/extraction wells beneath the CSX Transportation Rail Yard to address SP and the use of the ORC for ISEB which without oxidation would be equivalent to an overall net increase in the oxygen concentration within the aquifer. With the exception of the No Action alternatives (SP-1, HCP-1, and DP-1), all alternatives address ground water contaminated above the remedial cleanup levels in Table 5, and meet the threshold criteria of protection of human health and the environment and the attainment of ARARs.

All remedial SP, HCP, and DP alternatives that incorporate active remediation (SP-2, SP-3a, SP-3b, SP-4, SP-5, HCP-2, HCP-3, HCP-4, and DP-3) would address contaminated ground water at the Site. These active remediation alternatives also reduce or eliminate the M/T/V of the contaminants. These alternatives involve reasonably well-established technologies that can be readily implemented. All active remediation alternatives meet the statutory preference for treatment to reduce the M/T/V of contamination. The short-term impacts and the duration of these impacts are similar.

## 2.10 Comparative Analysis of Alternatives

The thirteen remedial alternatives have been examined with respect to the evaluation requirements in the NCP, CERCLA, and the factors described in *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA, 1988). The nine evaluation criteria are:

Threshold Criteria

- Overall protection of human health and the environment; and
- Compliance with ARARs.

Balancing Criteria

- Short-term effectiveness;
- Long-term effectiveness and permanence;
- Reduction of mobility, toxicity, or volume through treatment;

- Implementability; and
- Cost.

Modifying Criteria

- State acceptance; and
- Community acceptance.

A comparative analysis of the ground water alternatives based on the threshold and balancing evaluation criteria is presented below. The objective of this section is to compare and contrast the alternatives to support selection of the ETC OU2 remedy. The alternatives compared include:

Source Plume (SP) Alternatives

1. Alternative SP – 1: No Action with Monitoring;
2. Alternative SP – 2: Ground Water Recovery, Treatment, and Re-Injection
3. Alternative SP – 3a: In Situ Enhanced Bioremediation Using Oxygen Amendment and Natural Ground Water Flow
4. Alternative SP – 3b: In Situ Enhanced Bioremediation Using Horizontal Extraction and Re-Injection Wells
5. Alternative SP – 4: In Situ Chemical Oxidation and In Situ Enhanced Bioremediation Using Vertical and Horizontal Wells
6. Alternative SP – 5: In Situ Chemical Oxidation Using Horizontal Extraction and Re-Injection Wells

High Concentration Plume (HCP) Alternatives

1. Alternative HCP – 1: No Action with Monitoring;
2. Alternative HCP – 2: *In Situ* Chemical Oxidation and *In Situ* Enhanced Bioremediation
3. Alternative HCP – 3: *In Situ* Enhanced Bioremediation
4. Alternative HCP – 4: *In Situ* Enhanced Bioremediation with Ground Water Recovery, Treatment, and Re-Injection

Dilute Plume (DP) Alternatives

1. Alternative DP – 1: No Action with Monitoring;
2. Alternative DP – 2: Monitored Natural Attenuation
3. Alternative DP – 3: *In Situ* Enhanced Bioremediation

Table 7 presents a summary of each remedial alternative along with qualitative ranking scores for each evaluation criterion. Each alternative's performance against the criteria (except for present worth) was ranked on a scale of 0 to 5, with 0 indicating that none of the criterion's requirements were met and 5 indicating all of the requirements were met. The ranking scores, combined with the present worth costs, provide the basis for comparison among alternatives. With the exception of short-term effectiveness, all alternatives are ranked higher than no-action alternatives, SP-1, HCP-1, and DP-1, across all the criteria.

### 2.10.1 Overall Protection of Human Health and the Environment

The highest ranked alternatives are those that combine chemical oxidation and bioremediation (SP-4, and HCP-2). These offer the benefits of both aggressive treatment through ISCO and the long-term, on-going treatment provided by *in situ* biodegradation. Other active remedial alternatives were ranked next highest and the No Action alternatives were ranked lowest.

### 2.10.2 Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA and NCP §300.430(f)(1)(ii)(B) require that remedial actions at Superfund sites attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations, which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA Section 121(d)(4).

Applicable requirements are those cleanup levels, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal or State environmental laws or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a Superfund site. Only those State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable. Relevant and appropriate requirements are those cleanup levels, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal or State environmental laws or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a Superfund site, address problems or situations sufficiently similar to those encountered at the Superfund site that their use is well suited to the particular site. Only those State standards that are identified in a timely manner and are more stringent than Federal requirements may be relevant and appropriate. Compliance with ARARs addresses whether a remedy will meet all of the ARARs of other Federal and State environmental statutes or provides a basis for invoking waiver.

Each remedial alternative is evaluated for its compliance with ARARs as defined in CERCLA Section 121(f). The following items must be considered during the evaluation:

- Compliance with chemical-specific ARARs (i.e., maximum contaminant levels [MCLs]). This consideration includes whether chemical-specific ARARs can be met and whether a waiver may be appropriate if they cannot be met.
- Compliance with location-specific ARARs (i.e., protection of historic sites, regulations regarding activities near wetlands/floodplains). This consideration includes whether location-specific ARARs can be met or waived.
- Compliance with action-specific ARARs (i.e., RCRA treatment technology standards). This consideration includes whether action-specific ARARs can be met or waived.

## Table 7. Comparative Evaluation of Remedial Alternatives for Escambia OU2

| Remedial Alternative | Relative Numeric Ranking of Success at Satisfying Threshold and Balancing Criteria[1] | | | | | | | | | | | | | Overall Score [2] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Threshold Criteria (TC) | | | | | Balancing Criteria (BC) | | | | | | | | |
| | Overall Protection | | Compliance with ARARs | | | Long-Term Effectiveness | Reduction of T/M/V | | | Short-Term Effectiveness | Implementation | | Cost Estimate | |
| | Human Health | Environmental | Chemical-Specific | Location-Specific | Action-Specific | | Toxicity | Mobility | Volume | | Technical Issues | Time for Results | | |
| **Source Plume (SP) Area** | | | | | | | | | | | | | | |
| SP-1 | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 5 | 5 | 0 | 5 | 3.75 |
| SP-2 | 1 | 1 | 5 | 1 | 0 | 2 | 5 | 5 | 5 | 0 | 0 | 1 | 3 | 4.20 |
| SP-3a | 2 | 2 | 2 | 4 | 3 | 1 | 2 | 2 | 2 | 4 | 3 | 2 | 4 | 6.50 |
| SP-3b | 2 | 2 | 3 | 2 | 1 | 1 | 2 | 2 | 2 | 4 | 1 | 3 | 1 | 4.00 |
| SP-4 | 3 | 3 | 4 | 3 | 4 | 5 | 3 | 3 | 3 | 2 | 4 | 5 | 2 | 11.48 |
| SP-5 | 4 | 4 | 1 | 2 | 2 | 4 | 4 | 4 | 4 | 2 | 2 | 3 | 0 | 7.48 |
| **High Concentration Plume (HCP) Area** | | | | | | | | | | | | | | |
| HCP-1 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 3 | 2.25 |
| HCP-2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 1 | 0 | 1 | 0 | 5.04 |
| HCP-3 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 3 | 2 | 2 | 3 | 2 | 6.67 |
| HCP-4 | 1 | 1 | 2 | 1 | 1 | 1 | 3 | 2 | 1 | 0 | 0 | 2 | 1 | 2.50 |
| **Dilute Plume (DP) Area** | | | | | | | | | | | | | | |
| DP-1 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 2 | 1.50 |
| DP-2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 3.38 |
| DP-3 | 2 | 2 | 2 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 2 | 0 | 2.25 |

**Notes:**[1] The results of the comparative analysis are summarized by assigning to each Alternative a numeric rank value corresponding to the relative success at satisfying the conditions of the threshold and balancing criteria. A high relative numeric rank value indicates that the Alternative is successful at satisfying the conditions of the criteria, a relative numeric rank value of 0 indicates the Alternative is the least successful of the alternatives at satisfying the criterion. Criteria with the same relative numeric rank were judged to be equally successful at satisfying the criteria.

[2] Overall score is calculated by multiplying the sum of the Threshold Criteria numeric ranks ( $\sum$TC) and the ratio of the sum of Balancing Criteria Ranks ($\sum$BC=max). See text for details.

**Overall Score** = $\sum TC * F(BC)$ or Overall Score = $\sum TC * (\sum BC / \sum BC\text{-max})$

Chemical-specific, action-specific, and location-specific ARARs are identified in Tables 7, 8, and 9.

The No Action alternatives (SP-1, HCP-1, and DP-1) do not achieve RAOs or comply with chemical-specific ARARs. Contamination in ground water would remain a health risk to humans and the potential for a future impact to Bayou Texar remains. Because no actions would occur under these alternatives, the risk of human or environmental exposure would remain, but action-specific and location-specific ARARs would be met by default.

Except for any contaminant mass that exists until cleanup levels are met, no temporary (short-term) non-compliance with ARARs is expected in any of the other alternatives. All alternatives incorporating active remediation would comply with all location- and action-specific ARARs and would be designed to comply with all chemical-specific ARARs (Table 7).

### 2.10.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time. All alternatives, except the No Action Alternatives, provide long-term protection because they allow for unlimited use/unlimited exposure within a reasonable timeframe. Long-term effectiveness is evaluated based on the following three factors:

- Magnitude of the risk remaining from untreated waste or treatment residuals at the end of the remedial activities;
- Adequacy of controls used to manage the treatment residuals or untreated wastes that remain at the Site; and
- Reliability of the controls to provide protection from the treatment residuals or untreated wastes.

In the No Action Alternatives, SP-1, HCP-1, and DP-1, long-term risk of exposure to contaminated ground water would remain. Alternatives with an ISCO component (e.g., SP-4, SP-5 and HCP-2) would reach RAOs and ARARs sooner, and the bioremediation components of those alternatives would continue to provide effectiveness and permanence to remedial results over the long-term. Alternatives without an ISCO component (e.g., SP-2, SP-3a, SP-3b, HCP-3, HCP-4, DP-2 and DP-3) are expected to provide long-term effectiveness and permanence for protection against exposure and risk; however, achieving those levels using options relying only on bioremediation may require more time (Table 7). All of the alternatives would necessitate Five-Year Reviews of remedy protectiveness since unrestricted use/unlimited exposure criteria would not be met within 5 years. Adequate and reliable controls can be readily established for all of the alternatives.

## Table 8. Chemical-Specific ARARs, Criteria, and Guidance for Escambia OU2

| Requirement | Citation | Status | Synopsis | Evaluation/Action To Be Taken |
|---|---|---|---|---|
| **Chemical Specific ARARs** | | | | |
| Florida Groundwater Classes, Standards, and Exemptions | Florida Administrative Code (FAC) Chapter 62.520 | Applicable | This rule designates the groundwater of the State into five classes and establishes minimum "free from" criteria. This rule also specifies that Classes I and II must meet the primary and secondary drinking water standards listed in Chapter 62-550. | This rule was used to classify groundwater and establish cleanup levels for groundwater. Groundwater at this Site is considered a potential source of drinking water (Class II). |
| Florida Drinking Water Standards, Monitoring, and Reporting | Chapter 62-550.310, FAC | Relevant and Appropriat e | This rule provides primary drinking water quality standards and maximum contaminant levels (MCLs) for public water supply systems. | Cleanup levels for contaminants of concern in groundwater are based on Florida MCLs listed in this report. |
| Florida Contaminant Cleanup Target Levels Rule | Chapter 62-777.170(1)(a), FAC | Relevant and Appropriat e | Establishes cleanup target levels for site rehabilitation pursuant to FAC Chapters 62-785, 62-730, 62-780, 62-770, 62-782, and 62-713. | CTLs for groundwater provided in Table 1 of this rule were used to establish cleanup levels. |
| Risk-based Cleanup Levels | Chapter 62-780.650(1)(d) | Relevant and Appropriat e | In establishing this alternative site-specific CTLs for groundwater or soil the following factors shall be considered: $10^{-6}$ and HI = 1 | $10^{-6}$ and/or HI = 1 considered in developing risk base cleanup level. |

**Table 9. Action-Specific ARARs, Criteria, and Guidance for Escambia OU2**

| Requirement | Citation | Status | Synopsis | Evaluation/Action To Be Taken |
|---|---|---|---|---|
| **ACTION SPECIFIC ARARs** | | | | |
| Florida Groundwater Classification | Chapter 62-520, FAC | Applicable | State classification system to establish groundwater usage categories for aquifers as part of a groundwater protection strategy. The surficial aquifer beneath the site carries a state classification of G-1. This classification means that the surficial aquifer is a sole-source aquifer that is an irreplaceable groundwater resource and warrants a high degree of protection. | |
| Florida Underground Injection Control Regulations | Chapter 62-528.600 through 528.645, FAC | Applicable | Establishes standards and criteria for construction, operation, monitoring, plugging, and abandonment for Class V wells | Regulations pertaining to Class V Group 4 injection wells associated with aquifer remediation projects will be followed. |
| Florida Groundwater Permitting and Monitoring Requirements | Chapter 62-522.300 and 522.300(2)(e), FAC | Applicable | Establishes permitting and monitoring requirements for installations discharging to groundwater to prevent contaminants from causing a violation of water quality standards and criteria of the receiving groundwater. | A zone of discharge is allowed for primary standards for groundwater for closed-loop reinjection systems and for the prime constituents of the reagents used to remediate the contaminants. |

**Table 9. Action-Specific ARARs, Criteria, and Guidance for Escambia OU2**

| Requirement | Citation | Status | Synopsis | Evaluation/Action To Be Taken |
|---|---|---|---|---|
| Florida Water Well Permitting and Construction Requirements | Chapter 62-532.500, FAC | Applicable | Establishes minimum standards for the location, construction, repair, and abandonment of water wells. | The requirements for permitting for the construction, repair and abandonment of monitoring, extraction, and injection wells will be met. |
| Florida Hazardous Waste – Requirements for Remedial Action | Chapter 62-730.225(3), FAC | Applicable | Requires warning signs at sites suspected or confirmed to be contaminated with hazardous waste. | This requirement will be met. |
| Florida Natural Attenuation with Monitoring Regulation | Chapter 62-780.690(8)(a) through (c), FAC | Relevant and Appropriate | Specifies minimum number of wells and sampling frequency for conducting groundwater monitoring as part of a natural attenuation remedy. | The requirements associated with implementation of groundwater monitoring will be met. |
| Florida Active Remediation Regulation for Groundwater in-Situ Systems(s) | Chapter 62-780.700(12)(g), FAC | Relevant and Appropriate | Specifies that operations parameters for in-situ system(s) should include measurements of biological, chemical, or physical indicators that will verify the radius of influence at representative monitoring locations, weekly for the first month, monthly for the next 2 months, quarterly for the first 2 years, and semi-annually thereafter. | In-situ groundwater remediation will meet the relevant requirements of this rule.* |

**Table 9. Action-Specific ARARs, Criteria, and Guidance for Escambia OU2**

| Requirement | Citation | Status | Synopsis | Evaluation/Action To Be Taken |
|---|---|---|---|---|
| Florida Active Remediation Regulation for Groundwater Bioremediation System(s) | Chapter 62-780.750(4)(a) through (c), FAC | Relevant and Appropriat e | Specifies that operational parameters for bioremediation system(s) should include measurements of dissolved oxygen at representative monitoring locations; rates of biological, chemical, or nutrient enhancement additions; weekly for the first month, monthly for the next 2 months, quarterly for the first 2 years, and semi-annually thereafter. | Groundwater remediation will meet relevant requirements of this rule.* |
| Florida Post Active Remediation Monitoring Regulation | Chapter 62-780.750(4)(a) through (c), FAC | Relevant and Appropriat e | Specifies minimum number of wells and sampling frequency for conducting groundwater monitoring as part of post active remediation monitoring. | Post active remediation monitoring will meet the relevant requirements of this rule.* |

*The designated number of wells, sampling time frames/frequency, and specific parameters for analyses will be provided in a Monitoring Plan that is included in a post-ROD document (e.g. Remedial Design or Remedial Action Work Plan) which is approved by the EPA and FDEP.

### 2.10.4 Reduction of Mobility, Toxicity, or Volume through Treatment

Reduction of M/T/V refers to the performance of the treatment technologies. This criterion addresses the statutory preference for selecting a remedial action that permanently and significantly reduces the M/T/V of the COCs. The ability of a remedial alternative to reduce the M/T/V of the COCs is evaluated based on the following five factors:

- The treatment processes, the remedies employed and the materials they treat;
- The amount (mass or volume) of hazardous materials that will be destroyed or treated by the remedial alternative, including how the principal threat(s) will be addressed;
- The degree of expected reduction in the M/T/V of COCs, measured as a percentage of reduction or order of magnitude;
- The degree to which the treatment is irreversible; and
- The type and quantity of treatment residuals that would remain following the treatment.

Alternatives SP-1, HCP-1, and DP-1 provide no mechanisms to determine if reduction of M/T/V is occurring. Moreover, there is minimal basis for asserting an ongoing reduction in M/T/V under these no action alternatives. Alternatives SP-2, SP-3a, SP-3b, SP-4, SP-5, HCP-2, HCP-3, HCP-4, and DP-3 provide the most active removal remediation options and the most effective reduction of M/T/V of ground water contaminants. The alternatives that include ISCO provide aggressive treatment of DNAPL which is suspected to be present and would constitute a principal threat. All other alternatives would meet the statutory preference for treatment as a principal element for remediation, and would provide reduction in contaminant volume over time (Table 7), however SP-2 employs passive treatment through natural attenuation processes. Reduction of mobility for alternatives without an ISCO treatment component (SP-3b, HCP-3, and DP-3) would be accomplished solely through contaminant bioremediation while ground water is flowing.

### 2.10.5 Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during remedial action. The short-term effectiveness of a remedial alternative is evaluated with respect to its effect on human health and the environment during its implementation. Short-term effectiveness is evaluated based on the following four factors:

- Protection of the community during the remedial action. This addresses any risk that results from the implementation of the remedial action (i.e., dust from an excavation) that may affect human health;
- Protection of workers during the remedial action. This addresses threats that may affect workers and the effectiveness and reliability of protective measures that may be taken;
- Environmental impacts. This addresses the potential adverse environmental impact from the implementation of the remedial alternative and evaluates how the impact could be mitigated, prevented, or reduced; and

- The amount of time required until the RAOs are achieved. This includes an estimate of the time required to achieve RAOs for the entire Site or for individual elements associated with specific site areas or threats.

Alternatives SP-1, HCP-1, and DP-1 provide no active mechanisms for remediation. Therefore, these alternatives do not provide any effectiveness at reducing risk and exposure to contaminated media. The risk to community and the environment would remain the same.

Alternatives with an *ex situ* component (e.g., SP-2, SP-3b and HCP-4) have a higher exposure risk to the community and to remedial workers during remediation than *in situ* alternatives. They were ranked lower than alternatives that use strictly subsurface/*in situ* technologies (e.g., SP-3a, SP-4, HCP-2, HCP-3, DP-2, and DP-3). The *in situ* alternatives that can rapidly degrade contaminants through chemical oxidation (e.g., SP-4, SP-5, and HCP-2) were ranked the highest for this evaluation criterion.

### 2.10.6 Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, access, administrative feasibility, and coordination with other governmental entities are also considered. The implementability of a given remedial alternative is evaluated based on the following factors:

<u>Technical Feasibility</u>

- Construction and operation. This consideration relates to the technical difficulties and unknown aspects associated with a given technology;
- Reliability of a technology. This consideration focuses on the ability of a technology to meet specified process efficiencies and performance goals, including whether technical problems may lead to schedule delays;
- Ease of undertaking additional remedial actions. This consideration includes a discussion of what, if any, future remedial actions may need to occur and how difficult it would be to implement them; and
- Monitoring considerations. This consideration addresses the ability to monitor the effectiveness of the remedial actions and includes an evaluation of the risks of exposure if monitoring is determined to be insufficient to detect a system failure.

<u>Administrative Feasibility</u>

- Both the ability and time required to coordinate with other offices and regulatory agencies (i.e., obtaining permits for offsite activities or rights-of-way for construction activities).
- Availability of services and materials/supplies;
- Availability of adequate offsite treatment, storage capacity and disposal services;
- Availability of necessary equipment, specialists and provisions to ensure any necessary resources;
- Timing of the availability of each technology; and

- Availability of services and materials, and the potential for obtaining competitive bids, especially for innovative technologies.

All of the alternatives are proven technologies and relatively straightforward to implement. However, access to areas needed for technological implementation may prove difficult due to the inability to physically access the areas needed and/or be granted access by the affected property owners.

2.10.7 Cost

For each remedial alternative, a minus 30 to plus 50 percent cost estimate has been developed. Cost estimates for each remedial alternative are based on conceptual engineering and design and are expressed in 2008 dollars. The cost estimate for each remedial alternative consists of the following three general categories:

Capital Costs. These costs include the expenditures that are required for construction of the remedial alternative (direct costs) and non-construction/overhead costs (indirect costs). Capital costs are exclusive of the costs required to operate and maintain the remedial alternative throughout its use. Direct costs include the labor, equipment and supply costs, including contractor markups for overhead and profit, associated with activities such as mobilization, monitoring, site work, installation of treatment systems, and disposal costs. Indirect costs include items required to support the construction activities, but are not directly associated with a specific item.

Present Worth O&M Costs. These costs include the post-construction cost items required to ensure or verify the continued effectiveness of the remedial alternative. O&M costs typically include long-term power and material costs (i.e., operational cost of a water treatment facility), equipment replacement/repair costs, and long-term monitoring costs (i.e., labor and laboratory costs), including contractor markups for overhead and profit. Present worth analysis is based on a 7% discount rate over a period of 30 years.

Total Present Worth Costs. This is the sum of the total construction costs and present worth O&M costs and forms the basis for comparison of the various remedial alternatives. Based on the comparative analysis provided in Table 10, Alternatives SP-3a, HCP-3, and DP-2 are the least expensive viable alternatives for the SP, HCP, and DP areas, respectively.

## 2.11 Principal Threat Wastes

The NCP establishes an expectation that EPA will address the principal threats posed by a site through treatment wherever practicable (NCP §300.430(a)(1)(iii)(A)). Identifying principal threat waste combines concepts of both hazard and risk. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile, which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. A portion of the contaminated soil in the onsite stockpile is considered to be "principal threat waste" because the COCs are found at concentrations that pose a significant risk to human receptors and include the more mobile contaminants. Soil that constitutes a principal threat is being addressed under the remedial action for OU1.

In groundwater, naphthalene occurs at concentrations that indicate the likely presence of dense non-aqueous phase liquids (DNAPL). Naphthalene has been found in the source area at more than 50% of the pure phase solubility of naphthalene. DNAPL would act as source material for ongoing groundwater contamination and is considered a principal threat waste.

**Table 10. Comparison of Remedial Alternative Costs for Escambia OU2**

| Remedial Alternative | Capital Cost | Present Worth O&M Cost | Total Present Worth Cost |
|---|---|---|---|
| **Source Plume (SP) Areas** | | | |
| SP – 1 No Action | - | $54,000 | $54,000 |
| SP – 2 Ground Water Recovery, Treatment, and Re – Injection | $6.6 million | $0.9 million | $7.6 million |
| SP – 3a *In Situ* Enhanced Bioremediation Using Oxygen Amendment and Natural Ground Water Flow | $3.8 million | $1.3 million | $5.0 million |
| SP – 3b *In Situ* Enhanced Bioremediation Using Horizontal Extraction and Re – Injection Wells | $8.9 million | $1.0 million | $9.9 million |
| SP – 4 *In Situ* Chemical Oxidation and *In Situ* Enhanced Bioremediation Using Vertical and Horizontal Wells | $6.7 million | $2.1 million | $8.9 million |
| SP – 5 *In Situ* Chemical Oxidation Using Horizontal Extraction and Re – Injection Wells | $42.2 million | $8.8 million | $51.1 million |
| **High Concentration Plume (HCP) Areas** | | | |
| HCP – 1 No Action | - | $54,000 | $54,000 |
| HCP – 2 *In Situ* Chemical Oxidation and *In Situ* Enhanced Bioremediation | $10.9 million | $1.1 million | $12.0 million |
| HCP – 3 *In Situ* Enhanced Bioremediation | $5.4 million | $1.1 million | $6.5 million |
| HCP – 4 *In Situ* Enhanced Bioremediation with Ground Water, Recovery, and Re – Injection | $5.1 million | $2.7 million | $7.8 million |
| **Dilute Plume (DP) Areas** | | | |
| DP – 1 No Action | - | $54,000 | $54,000 |
| DP – 2 Monitored Natural Attenuation | - | $0.8 million | $0.8 million |
| DP – 3 *In Situ* Enhanced Bioremediation | $2.2 million | $0.4 million | $2.6 million |

## 2.12 Selected Remedy

### 2.12.1 Rationale for the Selected Remedy

The remedy selected for ETC OU2 addresses contamination of ground water impacted by releases from the Escambia Treating Company Superfund Site. This action represents the final remedy selected for the Site, and is compatible with the intended future use of the Site. This action also is compatible with and complementary to the action for OU1.

The selected remedy is aggressive treatment of areas that act as a source for continued contamination of the aquifer, using ISCO to destroy contaminants in the source and high concentration areas. Treatment of the source and high concentration areas will continue using ISEB, which encourages the decomposition of contaminants by enhancing natural biological activity. Areas with lower levels of contamination also will be treated using ISEB. Once the source areas have been addressed, the levels of contamination moving from the Site will decrease, enabling natural processes already taking place to fully remediate the contamination. The selected alternatives will attain the most stringent risk-based cleanup levels and eventually no site-related contamination will remain.

EPA, in collaboration with FDEP, will evaluate inorganic constituents in groundwater, including iron, for human health risk and determine if these are site-related contaminants during the Remedial Design. Additionally, EPA will evaluate the inclusion of Bayou Texar within the monitoring network for the selected remedy to address concerns about site-related impacts to the bayou.

The modifying criteria of state and community acceptance have been incorporated into the selected remedy. The State of Florida, as represented by the FDEP, has been the support agency during the RI/FS process for the Site. In accordance with 40 CFR §300.430, as the support agency, FDEP has provided input during the process. The community has participated in review of the Proposed Plan, and, based on the comments received, supports the selected remedy.

### 2.12.2 Description of the Selected Remedy

The selected remedy is the combination of alternatives SP-4, HCP-3, and DP-2. The selected remedy combines ISCO and ISEB in the SP (SP-4) areas, ISEB in the HCP areas (HCP-3), and MNA for DP areas (DP-2). This remedy uses strategically placed vertical and horizontal injection wells to aggressively remediate contaminants in the source and high concentration areas and provides active remediation at lower concentration areas. Because the contaminant plume is located under industrial and residential land-use areas of a sizeable metropolitan area, the level of intrusiveness for the remedial alternatives was considered. *In situ* treatment options, therefore, were the most favored remedial options. In addition, selection of a single remedial technology was not appropriate due to the heterogeneous lithology and subsurface conditions at this Site.

The major components of the selected remedy include:

- Installation of vertical and horizontal injection and extraction wells;
- ISCO and ISEB using vertical and horizontal wells in source plume areas (SP-4);

- ISEB in high concentration plume areas (HCP-3);
- MNA in dilute plume areas (DP-2);
- Operation & Maintenance;
- Institutional controls; and
- Five-Year Reviews.

2.12.2.1 *In situ* Chemical Oxidation (ISCO) and *In Situ* Enhanced Bioremediation (ISEB) Using Vertical and Horizontal Wells of Source Plume Areas (SP-4)

Alternative SP-4 combines two technologies to address the ground water contamination. ISCO technology will be applied to ground water containing the highest contaminant concentrations supplemented by in-place aerobic bioremediation scheme (ISEB). A line of vertical wells installed parallel to the rail tracks along the west boundary of the CSX rail yard will be used as injection points for a chemical oxidant (Figure 10). *In situ* oxidation will address the most highly contaminated ground water and any residual (un-dissolved) contaminants present in the source plume (SP) zone. Successful installation and operation of vertical wells along the western edge of the CSX rail yard and the horizontal wells requires access to the area adjacent to the SP footprint. A key objective of this component is to address principal threat waste aggressively and create aquifer conditions suitable for ISEB.

Growth and metabolism of native microbes is enhanced by aeration of SP zone ground water through a series of horizontal wells placed under the CSX rail yard parallel to the rail tracks and perpendicular to the direction of ground water flow (Figure 10). The aerated ground water, created at the up gradient end of the SP area, migrates throughout the SP by natural, west-to-east ground water flow. Efficiency of the system is increased by installing vertical extraction wells down gradient of the SP area and returning extracted water back to the injection wells.

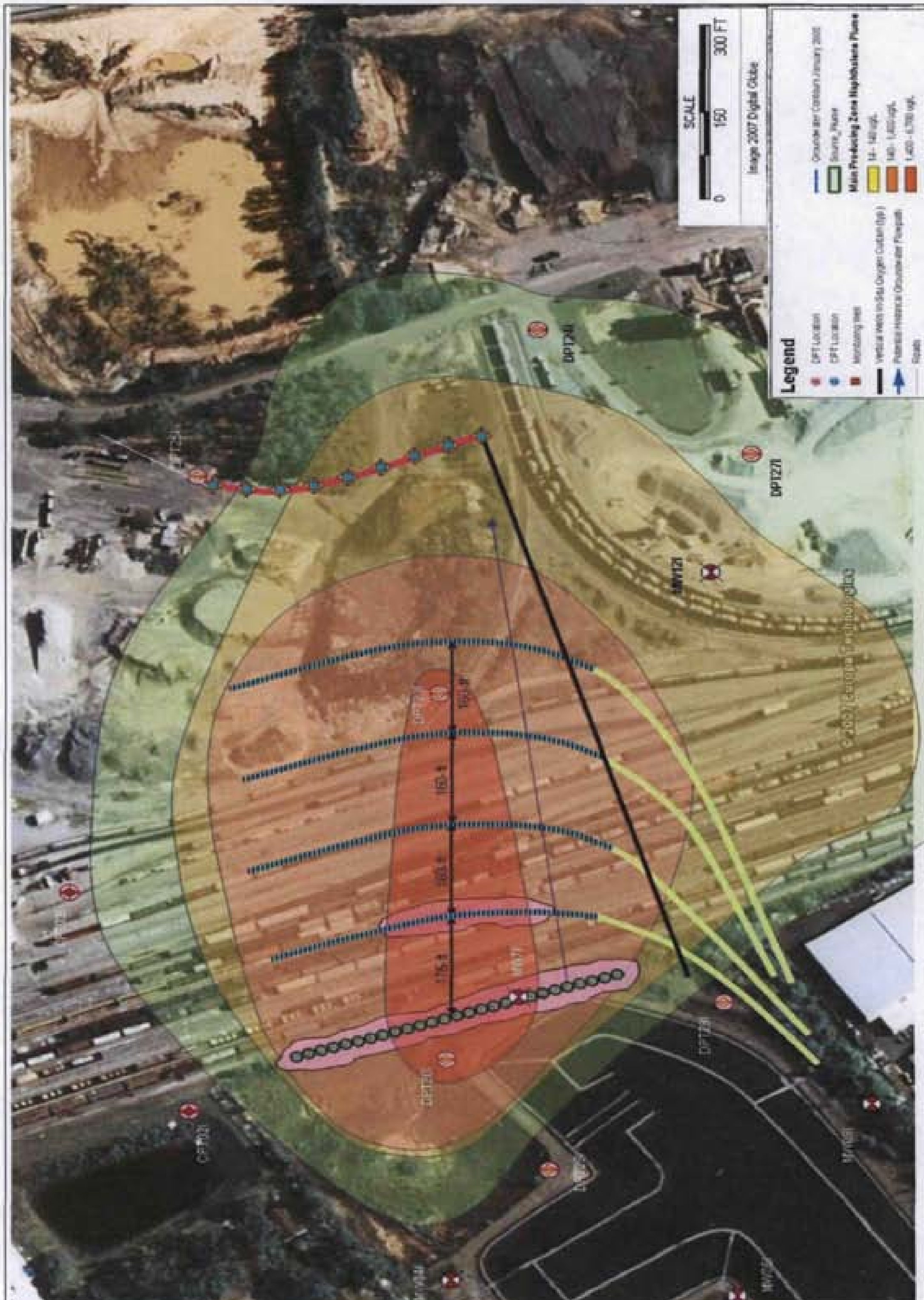
2.12.2.2 *In situ* Enhanced Bioremediation (ISEB) of High Concentration Plume Areas (HCP-3)

Alternative HCP-3 relies on ISEB and consists of injecting of a bioremediation amendment through a series of vertical injection wells strategically placed throughout the HCP area (Figure 11). Native microbes already present in the sand and gravel aquifer, after an acclimation period under newly-formed aerobic conditions, will degrade the dissolved contaminants. This approach complements the ISCO and ISEB in the SP area.

2.12.2.3 Monitored Natural Attenuation of Dilute Plume Areas (DP-2)

Alternative DP-2 relies on natural attenuation processes to address the DP area, defined as the area of the plume with contamination below the FDEP Natural Attenuation Default Criteria. The activities associated with this alternative are monitoring and reporting of monitored natural attenuation parameters within the dilute contaminant concentration zone.

**Figure 10. Physical Layout of Remedial Alternative SP - 4**



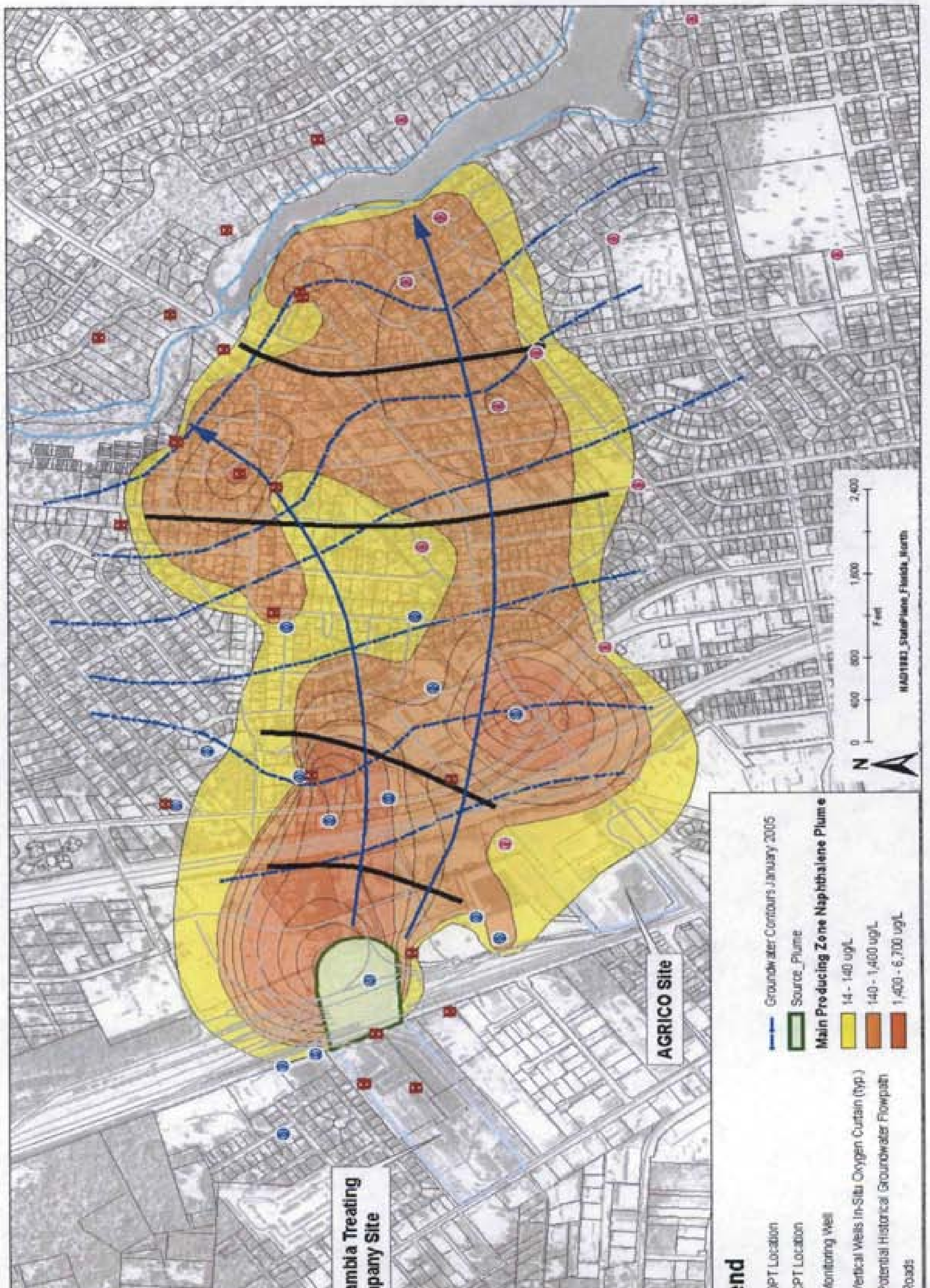
### 2.12.2.4 Operation & Maintenance

Operation and maintenance (O&M) requirements for maintaining the selected remedy to ensure long term protectiveness will be developed during remedial design. A final O&M Plan will be developed as part of the post-construction report. The basic O&M requirements are periodic repair and maintenance of the monitoring wells. The monitoring program associated with the remedy would require monthly management by one individual to oversee the collection of ground water parameters. In addition, ground water sampling will be conducted on a routine basis until cleanup levels are met. The monitoring program will be designed to track the concentrations of COCs and of important chemical parameters used to evaluate the remedy. The implementation of the monitoring program will be determined in remedial design to address the Source Zone and High Concentration Zone COCs, identified in Table 6 and inorganic constituents that are not directly site-related.

### 2.12.2.5 Institutional Controls

Institutional controls are in place to ensure protectiveness in the short-term. These include a local ordinance requiring connection to public water supply and inclusion of the area in an existing FAC 62-524 delineated area. In the long-term, ICs are not needed for groundwater because cleanup levels will allow for unlimited use and unrestricted exposure. One of the goals of the OU1 (soil) remedy is the protection of groundwater and additional ICs are part of the OU1 ROD to to physically protect the containment cell.

**Figure 11. Physical Layout of Remedial Alternative HCP-3**



2.12.2.6 Five-Year Reviews

A statutory review of the ongoing protectiveness of the remedy will be performed by EPA no less often than every five years after initiation of the remedial action. This review is a public process, and will be conducted to ensure that the onsite remedy selected for this Site remains protective of human health and the environment.

2.12.3 Summary of Estimated Remedy Costs

The estimated present worth (7% discount rate) capital costs for remedy construction is approximately $12.1 million and is summarized in Table 11. The present worth cost estimate for 30 years of O&M is approximately $4.0 million and is presented in Table 12. Additional changes in the cost estimate are likely to occur as new information and data are collected during the engineering design of the remedial alternatives. Major changes, if they occur, may be documented in the form of a memorandum in the Administrative Record file, an ESD, or a ROD Amendment. This is an order of magnitude cost estimate that is expected to be within a margin of plus 50 percent to minus 30 percent of the actual project costs.

2.12.4 Expected Outcomes of the Selected Remedy

The implementation of the selected remedy will result in the achievement of the most stringent risk-based cleanup levels such that eventually no Site-related ground water contamination will remain. The selected remedy is compatible with the remedial approach used at the nearby Agrico site. Coordination with the Agrico site during the ETC OU2 remedial design will ensure compatibility. The selected remedy has among the lowest short-term impacts to the community, and achieves RAOs quickly.

2.12.4.1 Expected Land and Ground Water Use

During remedy construction, engineering and administrative controls will be used to protect the public from environmental exposure or safety hazards associated with the cleanup activities. Following remedy construction of OU1, the planned reuse of the Site is commercial. Expected ground water use will continue to be not used for supply, but part of an aquifer that is used for municipal supply. The ongoing evaluation and current remedy for OU2 will require ongoing access to the Site by EPA. This access is not expected to appreciably interfere with commercial reuse of the Site and/or ground water use and is being factored into reuse planning by the community.

**Table 11. Estimated Remedy Capital Costs for Escambia OU2**

| Alternative SP – 4 *In Situ* Chemical Oxidation and *In Situ* Enhanced Bioremediation Using Vertical and Horizontal Wells | Quantity | Units | Unit Cost | Present Worth |
|---|---|---|---|---|
| Design Basis Tests | 1 | LS | | $140,700 |
| Drilling Costs | 1 | LS | | $2,818,440 |
| Recirculation/Treatment System Costs | 1 | LS | | $334,000 |
| Gas Infusion Equipment Costs | 1 | LS | | $312,500 |
| Oxidation Equipment Capital Costs | 1 | LS | | $150,000 |
| Oxidation System Operation Costs | 4 | Year | $80,000/Year | $480,000 |
| Cost for ISCO Materials-Year 1 | 795,600 | lb | $1.24/lb | $986,544 |
| Cost for ISCO Materials-Years 2 - 6 | 1 | LS | | $986,544 |
| Pilot-Scale Study | | | included | |
| Proposed Monitoring Wells | 12 | Each | $10,500/each | $126,000 |
| Subtotal-Capital Costs | | | $6,334,728 | |
| Project Management | 1 | LS | | $316,736 |
| Project Plans | 1 | LS | | $63,347 |
| Permits/Licenses | 1 | LS | | $6,335 |
| Total Capital Costs (SP-4) | | | $6,721,146 | |
| Alternative HCP-3 *In Situ* Enhanced Bioremediation | Quantity | Units | Unit Cost | Present Worth |
| Oxygen-Supplying Injection: LPZ | 1 | LS | | $650,650 |
| Oxygen-Supplying Injection: MPZ | 1 | LS | | $2,253,250 |
| Ground Water Horizontal Well Re-circulating System | 1 | LS | | $1,603,800 |
| Total Capital Costs (HCP-3) | | | $5,407,700 | |
| Alternative DP-2 Monitored Natural Attenuation | | | | |
| Total Capital Costs (DP-2) | | | $0 | |
| TOTAL CAPITAL COSTS (SP-4, HCP-3, and DP-2) | | | | $12,128,846 |

**Table 12. Estimated Remedy Present Value O&M Costs for Escambia OU2**

| **Alternative SP – 4 *In Situ* Chemical Oxidation and *In Situ* Enhanced Bioremediation Using Vertical and Horizontal Wells** | **Quantity** | **Units** | **Unit Cost** | **Present Worth** |
|---|---|---|---|---|
| **Annual O&M Costs** | **15** | **Year** | **$90,000/Year** | **$874,102.41** |
| **Contingency (20% of Capital Costs)** | **1** | **LS** | **-** | **$1,266,946** |
| **Present Value of O&M Costs + Contingency** | | | | **$2,141,048** |
| **Alternative HCP – 3 *In Situ* Enhanced Bioremediation** | **Quantity** | **Units** | **Unit Cost** | **Present Worth** |
| **Oxygen – Supplying Injection: LPZ** | **15** | **Year** | **$60,000/Year** | **$546,475** |
| **Oxygen – Supplying Injection: MPZ** | **15** | **Year** | **$60,000/Year** | **$546,475** |
| **Present Value of O&M Costs** | | | | **$1,092,950** |
| **Alternative DP-2 MNA** | **Quantity** | **Units** | **Unit Cost** | **Present Worth** |
| **Present Value of O&M Costs** | **30** | **Year** | | **$757,420** |
| **TOTAL PRESENT VALUE of O&M COSTS (SP – 4, HCP – 3, and DP – 2)** | | | | **$3,991,418** |

2.12.4.2 Final Cleanup Levels

The cleanup levels noted in Table 5 were derived from analysis described in more detail in the HHRA and meet the current federal regulatory drinking water standards or maximum contaminant levels (MCLs) and current FDEP Ground Water Contaminant Levels (GCTLs). The cleanup levels also consider site-specific cleanup levels based on reaching concentrations of contaminants corresponding to a site-specific Hazard Quotient (HQ) of less than 1 and a site-specific cumulative excess lifetime cancer risk more protective than $1 \times 10^{-6}$, or one in one million. The final remedial cleanup levels for concentrations of COCs in ground water are included in Table 5.

## 2.13 Statutory Determinations

Based on information currently available, EPA as the lead agency believes the selected remedy meets the threshold criteria and provides the best balance of benefits with respect to the balancing and modifying criteria. EPA expects the selected remedy to satisfy the following statutory requirements of CERCLA 121(b): (1) be protective of human health and the environment; (2) comply with ARARs (or justify a waiver); (3) be cost-effective; and (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies, and satisfy the preference for treatment as a principal element to the extent practicable.

2.13.1 Protection of Human Health and the Environment

The selected remedy for OU2 satisfies the statutory requirement for protection of human health and the environment through aggressive ground water treatment of source areas, high concentration areas, and more dilute contaminated areas *in situ* with few short-term hazards or adverse impacts and minimal long-term residual risks. The engineering principles and technology for the selected remedy are well-established and are expected to be reliable over the long-term. Site conditions are mostly conducive to construction of the treatment system, and the remedy is compatible with the expected future use of the Site.

### 2.13.2 Compliance with ARARs

Implementation of the selected remedy will comply with all federal and state chemical-specific, action-specific, and location-specific ARARs.

Chemical-specific requirements include those laws and regulations governing the release of materials possessing certain chemical or physical characteristics, or containing specified chemical compounds. Chemical-specific requirements set health or risk based concentration limits or ranges in various environmental media for specific hazardous substances, contaminants, and pollutants. State requirements to attain risk-based cleanup levels for carcinogens of $1 \times 10^{-6}$ and a hazard index of 1 or less for non-carcinogens will be met by the selected remedy. Table 8 presents the chemical-specific ARARs, to-be-considered (TBCs) guidance, and criteria for the Selected Remedy.

Action-specific requirements are technology-based, or establish performance, design, or other similar action-specific controls or regulations for the activities related to the management of hazardous substances or pollutants. Action-specific requirements are triggered by the remedial action selected to accomplish the cleanup. A summary of the requirements to be met through the implementation of the selected remedy is provided in Table 9.

Location-specific requirements are design requirements or activity restrictions based on the geographic or physical position of the site and its surrounding area. Location-specific requirements set restrictions on the types of remedial activities that can be performed based on site-specific characteristics or location. No location-specific requirements for ETC OU2 were identified.

### 2.13.3 Cost Effectiveness

EPA has determined that the selected remedy is cost-effective and that the overall protectiveness of the remedy is proportional to the overall cost of the remedy. The cost-effectiveness of the remedy was assessed by comparing the overall effectiveness of the remedy (i.e., long-term effectiveness and permanence; reduction in M/T/V; short-term effectiveness) with the other alternatives considered. More than one remedial alternative may be considered cost-effective, but CERCLA does not mandate that the most cost-effective or least expensive remedy be selected.

### 2.13.4 Permanent and Alternative Treatment solutions

The selected remedy uses permanent solutions and alternative treatment technologies to the maximum extent practicable. The selected remedy will provide long-term effectiveness and permanence. The remedy will require specific additional institutional and administrative controls over the short-term to remain effective, but these controls can be removed when cleanup levels are attained. The remedy can be reliably considered permanent.

2.13.5 Preference for Treatment as a Principal Element

In addition to the four statutory mandates previously discussed, the NCP includes a preference for treatment for the selected remedy in addressing the principal threat at the Site. The selected remedy meets the preference for treatment as a principal element. The selected remedy is primarily based on active treatment to address the M/T/V of the contaminated ground water.

2.13.6 Five-Year Review Requirement

CERCLA Section 121 and 40 CFR Part 300 require a review of remedial actions at least every five years if the remedial action results in hazardous substances, pollutants, or contaminants remaining in place above levels that allow for unlimited use and unrestricted exposure. Since the selected remedy is based on onsite treatment of ground water for the duration approximately six years and MNA monitoring for up to 20 to 30 years, a statutory review of the remedial action is required within 5 years of the beginning of remedial construction.

## 2.14 Documentation of Significant Changes

Pursuant to CERCLA 117(b) and NCP 300.430(f)(3)(ii), the ROD must document any significant changes made to the Preferred Alternative discussed in the Proposed Plan. There have been no significant changes to the Preferred Alternative discussed in the Proposed Plan.

## 2.15 References

A.T. Kearney. 1990. Draft RCRA Facility Assessment Report, Escambia Treating Company, Pensacola, Florida.

Black & Veatch, 2008. Feasibility Study Report for Operable Unit 2 (Groundwater) at the Escambia Wood Treating Site. Black & Veatch Special Projects Corp.; Alpharetta, Georgia. April, 2008.

EPA, 1984. Potential Hazardous Waste Site, Preliminary Assessment - Escambia Treating Company, Pensacola, Florida.

EPA, 1988. Guidance for Conducting Remedial Investigations and Feasibiltiy Studies Under CERCLA, Interim Final. EPA/540/G-89/004.

EPA, 1992. U.S. Environmental Protection Agency, Sampling Investigation for Escambia Treating Company, Pensacola, Florida, 1992.

EPA, 2000. Supplemental to Risk Assessment (RAGS): Region 4 HHRA Bulletin.

FDEP, 2004. Florida Department of Protection, Institutional Controls, Procedures and Guidance, 1994.

FDEP, 2005. *Technical Report: Development of Cleanup Target Levels (CLTs) for Chapter 62-777*, prepared for the Division of Waste Management, FDEP, by the Center for Environmental and Human Toxicology, University of Florida, Gainesville, February.

FDER, 1988. Creosote Pond Field Investigation Report.

Kennedy, Michael, FDER. 1986. Interoffice Memo dated October 13, 1986 to William Kellenberger, Comments on RCRA Groundwater Monitoring Plan and Report of Geohydrological Investigation.

LMJA (Larry M. Jacobs & Associates). 1986. Report of Geohydrological Investigation for the Escambia Treating Company Pensacola Plant Site.

Tobin, Patrick, EPA. 1987. Letter dated September 28, 1987 to Charles Soule, Transmittal of Complaint and Compliance Order.

UWF, 2005. University of West Florida, *Profiles of Selected Pollutants in Bayou, Texar*, prepared by UWF, Pensacola, FL, May 10, 2005.

USBC, 2005. U.S. Bureau of Census, eirv.census.gov.

Weston (Roy F. Weston, Inc.). 1991. Preliminary Assessment Escambia Treating Company Site, Pensacola, Florida.

Weston (Roy F. Weston, Inc.). 1992a. Preliminary Report - Well Sampling, Treatability Sampling and Volume Estimate. Escambia Treating Company Site, Pensacola, Florida.

Weston (Roy F. Weston, Inc.). 1992b. Preliminary Report. Soil Sampling and Lithologic Characterization - Escambia Treating Company Site, Pensacola, Florida.

Weston (Roy F. Weston, Inc.). 1993. Removal Activities Summary Report, Escambia Treating Company Site, Pensacola, Florida.

# PART 3: RESPONSIVENESS SUMMARY

## 3.1 Overview and Summary

This Responsiveness Summary documents public comments and EPA responses to comments on the proposed plan for remediation of Operable Unit 2 (Ground water) at the Escambia Treating Company Site in Pensacola, Escambia County, Florida. EPA published the Public Notice for the Proposed Plan and Public Meeting in the *Pensacola News Journal* on June 28, 2008. EPA mailed a meeting notice and a Proposed Plan fact sheet to individuals and groups on the ETC site mailing list at this same time. EPA Region 4 held a public comment period from June 14 through July 15, 2008. EPA held a public meeting on July 2, 2008 to present the elements of the proposed remedy and receive oral public comments.

A verbatim transcript of the July 2, 2008 public meeting is provided in Appendix A. Appendix B contains comments transcribed verbatim from electronic and first class mail from community members and community groups, including: Citizens Against Toxic Exposure (CATE), the Clarinda Triangle Association (CTA), the Center for Environmental Diagnostics and Bioremediation, University of West Florida State, Pensacola, the League of Women Voters, and the Gulf Coast Environmental Defense.

**3.2 Public Comments Received and EPA Responses**

3.2.1 Comments from Frances Dunham Expressed at the Public Meeting
Ms. Dunham's comments were a summary of CATE's comments. EPA's responses are included in Section 3.3.1.

3.2.2 Comments from Allan Peterson Expressed at the Public Meeting

EPA groundwater plan based on misinformation, lack of information, and wishful thinking
For at least 21 years, EPA has known that Escambia Treating Company is contaminating the aquifer.

In 1987, pentachlorophenol from ETC was discovered in the groundwater under the Agrico Chemical Superfund Site. In fact, the threat to groundwater was the reason EPA excavated the pile of toxic waste we know as "Mt. Dioxin" in 1991-93.

During those 21 years, EPA has allowed the underground plume of contaminants to spread into clean groundwater under homes, schools and businesses. Finally, in 2008 EPA has announced it has a plan to clean up what is now an enormous plume of woodtreating chemicals.

Unfortunately, after all this time, EPA still doesn't know enough about the plume to treat it effectively. Here's what EPA should - but doesn't - know:

**EPA doesn't know the southern boundary of the plume.**
Southeast of ETC, between Palafox and 12th Avenue, EPA has found that the plume curves south but has not collected groundwater samples far enough south to find a clean boundary.

**Response 1 – Based on the data collected, there is sufficient delineation to support the risk assessment, feasibility study, and to evaluate remedial alternatives. It is often impossible to definitively characterize the nature and extent of contamination at a site. Rather than delay the cleanup, EPA has decided to move forward with the ROD. The remedy will include intensive monitoring of contaminants and data will constantly be reviewed for additional data needs. EPA will add wells to the monitoring network as needed to adequately carry out and document the cleanup. Further, the remedial design will assess the need for additional characterization. If it is deemed necessary, further investigations will be undertaken.**

**EPA doesn't know the eastern boundary of the plume.**
ETC contamination has spread to Bayou Texar, 1.5 miles to the east southeast. It extends all along the shore of the bayou from the 12th Avenue bridge south to 34th Street. But there, according to EPA, it just disappears.

**Response 2 – EPA is concerned about potential impacts to Bayou Texar and has studied the interface between the groundwater and surface water in Bayou Texar. The data, as discussed in the ROD, indicate that no site-related contamination is impacting Bayou Texar. EPA's selected remedy eliminates any potential future impact to Bayou Texar.**

EPA is relying on a UWF study to say that the contaminants do not discharge into Bayou Texar; however, the UWF study was inconclusive on that point. It speculated that the PAHs in the bayou came from a "variety of sources, including combustion of petroleum and non-petroleum products." ETC's history of facility fires, the presence of creosote as well as diesel fuel, and the use of Naphthalene in the plant's lab are consistent with varying ratios of PAHs - as have been found in the ETC surface soils.

**Response 3 – EPA is concerned about potential impacts to Bayou Texar. One of the objectives of the cleanup is to protect Bayou Texar. (Refer to section 2.8 of the ROD) EPA has evaluated data collected by both the EPA and by UWF. There is no conclusive evidence that the contaminants in the plume are impacting Bayou Texar. The UWF study confirms EPA's conclusion. Regardless, the selected remedy will eliminate groundwater contamination that could impact Bayou Texar in the future.**

Likewise, EPA is assuming the plume doesn't flow under the shallow bayou to the east side.

**Response 4 – EPA was concerned about the possibility that the plume flowed under the Bayou, investigated the possibility, and concluded that site-related contamination does not extend beyond or into Bayou Texar.**

**EPA doesn't know whether anyone is drinking from the plume or being exposed to ETC contaminated water, seafood, or produce.**
EPA has never delivered on its promise to conduct a door-to door survey to warn families living over the plume against drinking from private wells or irrigating produce gardens. Not every

private well is registered with the Northwest Florida Water Management District. And there has been no official warning about Bayou Texar recreation or seafood.

**Response 5 – A number of factsheets have been distributed in the area because of the ETC site and the nearby Agrico Superfund Site. Private well surveys have been conducted and no private wells have been found in the plume area. If anyone is aware of a private well in the plume area, they should notify the FDEP and the EPA.**

**In addition, the entire area between the ETC Site and Bayou Texar is in a FAC 62-524 delineated area, which is a designation by the State restricting the construction of new groundwater wells in the area. This area is a FAC 62-524 delineated area due to contamination from many sites, including the ETC Site. The Northwest Florida Water Management District permits well construction and can answer questions about the delineated area program. http://www.nwfwmd.state.fl.us/**
**Many of the other sources of contamination have been investigated by the FDEP and FDEP can be contacted for more information.**

**There is no need for a warning on the consumption of seafood or produce because of the ETC.**

If the plume is flowing under Bayou Texar, it may have affected or be approaching the ECUA Hagler public supply well. EPA doesn't know this, either.

**EPA has found no evidence of contamination moving under Bayou Texar to the east – See Response 4.**
**The ECUA Hagler water supply well is east of Bayou Texar. The ECUA Hagler water supply well is not downgradient of the ETC plume, that is, the groundwater in the ETC plume does not flow toward the ECUA Hagler well.**

**EPA doesn't know the concentration and locations of dioxins in the Plume.**
Dioxins are measured separately as several related compounds. In order to assess the total toxicity of these compounds present in the plume, each compound's concentration must be weighted by its level of toxicity, so that apples can be added to apples.

When EPA sampled the ETC groundwater, it was not expecting to find dioxins, and only a few samples were analyzed for these compounds. In some cases, dioxins were present at high concentrations. In other cases, the detection limits for the dioxins analysis were so crude that it couldn't say. In a 2006 report EPA concluded that dioxins exceeded the governing standard at 23 locations, including 5 wells on the east side of Bayou Texar. "Non detect" does not mean "zero": for instance, if the detection limit for a toxic contaminant is 10 parts per million, it is customary to record a non-detect as 5 ppm, since the level could be 9 ppm or any lesser amount. Noting the 23 widely spaced locations in question, EPA was asked to resample all the wells for dioxins, using more precise measurements; this was not done, and the UWF report on Bayou Texar included no analysis for dioxins. Basically, EPA has decided to ignore the dioxins.

**Response 7 – EPA has not and is not ignoring dioxins. EPA has collected many samples for dioxins in groundwater. None of the calculated toxic equivalents (TEQs) exceed the MCL of 0.03 nanograms per liter (ng/L). The highest TEQ, 0.00014 ng/L, was detected in a sample from MW23I.**

**The 2006 report referenced by commenter is titled "Technical Memorandum for the Remedial Alternatives for Groundwater at the Escambia Wood Treating Site". This report contains an error that has created understandable confusion with regard to dioxins in groundwater. The comparison of analytical data to state and federal standards (MCLs) was not based on consistent units of measurements. The units for the state and federal standards for dioxin were reported in micrograms per liter (µg/L) while the dioxin results were reported in nanograms per liter (ng/L). (1 µg/L equals 1,000 ng/L). As a result, the analytical results appeared to be 1000x greater than they actually are. Consequently, it appeared that there were numerous exceedances of the state and federal dioxin standards when in fact there were none. The 2006 report will be reissued with corrections and the updated version placed in the information repository.**

**One source for the data referenced in the 2006 report is the "Preliminary Data Summary Report, Phase III Investigation (Groundwater Results), Remedial Investigation/Feasibility Study for the Escambia Treating Company Site, Operable Unit 2" dated July 14, 2004. This document is available in the information repository and contains the proper units in discussion of the dioxin results in section 4.2.1 Dioxins/Furans.**

**Response 21 below explains how dioxin was determined not to be a Chemical of Concern in ground water.**

**EPA doesn't know whether contaminants in the plume have been degrading.**
EPA's plan proposes to treat the most toxic parts of the plume by accelerating a process it assumes has been going on for years: the degradation of the plume by microbes naturally present in soil and groundwater. There is no evidence of this. Natural attenuation is EPA's choice for the rest of the plume; that's bureaucrat for doing nothing at all, in the hope that the unproven degradation will do the trick.

**Response 8 – The commenter misunderstands EPA's selected remedy. The approach selects the technology based on the level of contamination. The most contaminated part of the plume will be treated with In situ Chemical Oxidation, which is an aggressive treatment that destroys contaminants through a chemical reaction. The other parts of the plume will be addressed by Enhanced Biodegradation or Monitored Natural Attenuation. For more detail, refer to the ROD and the Feasibility Study.**

**EPA doesn't know whether the selected remedies will work.**
EPA proposes oxygenating the most polluted groundwater to activate the microbes already there. No treatability studies have been carried out to prove this will reduce even the ETC groundwater contaminants EPA recognizes. It will not treat the dioxins and the non aqueous phase liquids (NAPLs), which are difficult to clean up and may continue to leach more contamination.

**Response 9 – The commenter misunderstands EPA's selected remedy. Refer to Response 8. EPA is confident that the proposed remedy will work based on a substantial database that covers the application of this remedy for PAH sites. There are 15 previous CERCLA remedies that have used bioremediation for naphthalene treatment (Use of Bioremediation at Superfund Sites, September, 2001). Three of these remedies have been ex situ, five of these have been in situ bioventing sites, and seven have been in situ groundwater/soil treatments. A bench scale biodegradation treatability study is being considered as part of the Remedial Design to provide a more detailed and site-specific design basis. This bench scale testing would also include enumeration of the indigenous PAH-degrading bacteria through quantitative polymerase chain reaction (PCR) testing. As noted in Responses 7 and 21, dioxins are not chemicals of concern (COCs) in ground water.**

**Bioremediation will not be used to directly treat creosote DNAPL because it would not be effective. There is no visual or quantifiable evidence of NAPL in the off-site OU2 plume. The RI/FS concludes that if NAPL is present it is likely to be a residual smear zone or ganglia. However, the potential for residual NAPL has been included in the overall design strategy. For example, the most favorable remedy includes in situ oxidation along the ETC property boundary. This remedial technology is proven to remediate naphthalene based PAHs and should be effective against residual NAPL at this site. If large amounts of NAPL are discovered, the remedial approach will be adjusted accordingly, but the overall approach of using the best technology based on the level of contamination will remain.**

The staging area for the remediation is arbitrarily limited to the CSX railroad yard, even though much of the plume, including dioxins and NAPLs, are in distant parts of the plume. The method EPA intends to use will cause the contaminants to move vertically and horizontally. EPA should include a quarterly schedule of monitoring for all the contaminants found in the plume to track fate and transport.

**Response 10 – The treatment area is based on where contamination has been found and needs to be treated. EPA will conduct treatment wherever needed to address site-related contamination. There are many criteria that can apply to the selection of remediation process staging locations. They include technical issues (proximity to the contamination; appropriate subsurface geology to facilitate achieving remedial goals; etc.) and other issues such as access to properties; minimizing impact to the local population; and interference with existing infrastructure and utilities. All of these criteria were taken into account when preparing the remediation strategy. The strategy presented in the Feasibility Study report is be both flexible and dynamic, and allows adjustments to be made as new information becomes available.**

**With respect to dioxins, see Responses 7 and 21. With respect to NAPLs, they have not been detected in the downgradient portions of the OU2 plume. The selected remedy will be designed to minimize the influence of horizontal movement of contaminants. Regular monitoring will be carried out to track remedial effectiveness and the fate and transport of COCs.**

**EPA doesn't know how much soil it excavated in the original 1991-93 big dig.**
Maybe it's because ETC has had 5 regional project managers since 1994, but this is unprofessional. The agency has known, forgotten, remembered, and re-forgotten the volume of the poisoned ETC soil that became "Mt. Dioxin." It is 255,000 cubic yards, not 225,000 cubic yards, and that's not an insignificant difference. Many entire Superfund sites are no more than 30,000 cubic yards.
Please, go back to the 1993 Action Memo and to the 2006 Record of Decision, and let's get this corrected for good. It's 255K; this should be an easy answer.

**Response 11 – The volumes cited in the Action Memo and in the 2006 ROD are estimates. As part of the OU1 Remedial Action, a survey was conducted and the volume of the stockpile was calculated as slightly more than 224,000 cubic yards. The EPA concedes that the estimates, which were calculated using different techniques, are different. The EPA believes this difference is irrelevant since all the soil in the stockpile is being excavated and placed in a secure containment cell onsite.**

3.2.3 Questions from Keith Wilkins Expressed at the Public Meeting
*Note: The following questions are summarized from Keith Wilkins's questions posed at the public meeting. EPA's responses made at the public meeting have been edited in this Responsiveness Summary. Verbatim transcript of Mr. Wilkins's questions and EPA's responses may be found in the meeting transcript, Appendix A.*

Will there be active remediation if natural attenuation monitoring shows that cleanup goals are not reached?

**Response 12 – Yes. If the cleanup goals established in the ROD are not achieved after a period of monitored natural attenuation, EPA will revisit the remedy and evaluate alternative cleanup options.**

Will the detailed responses to the questions posed tonight go into the written record and be distributed to the public?

**Response 13 – This responsiveness summary is the formal response to questions posed at the public meeting as well as written comments received during the comment period. The responsiveness summary is included in the ROD that will be available in the Administrative Record and Information Repository.**

3.2.4 Comments from Oliver Semmes
The article appeared on an editorial page dedicated to criticisms of our government. This is useful when balanced and accurate.
Reading the article raised in my mind the question, "Why blame EPA?" Have local governments stated a position on the problem? Have they conducted, or contracted for, tests to establish the level of risk and possible remedies? Have all local responsibilities been exercised?

If the answers to those questions are "yes", then the question arises as to why local governments have not elevated the issue through U.S. congressmen from Florida?

There is much to be said for letting environmental stewardship start at the local level…and stepping up to the mark with our own resources before begging.

**Response 14 – The EPA has and will continue to work with local and state government and elected officials.**

3.2.5 Comments from ConocoPhillips, Inc. and the Williams Companies

December 7, 2007

Mr. David Keefer,
RPM U.S. EPA, Region 4
Atlanta Federal Center
61 Forsyth Street SW
Atlanta, GA 30303-8960

RE: Agrico Site PRP's Review Comment Response to
Escambia Treating Company Site Draft FS
Pensacola, Florida

Mr. Keefer:

ConocoPhillips, Inc. and the Williams Companies appreciate the opportunity to review the Draft Feasibility Study (FS) for the Escambia Treating Company (ETC) site dated October 2007. ConocoPhillips and Williams, on behalf of Agrico Chemical Company, as Potentially Responsible Parties for the Agrico site, have concerns about geochemical and hydraulic changes that could occur with the proposed remediation at the ETC site. The proposed remedies for the ETC site could potentially adversely impact the Agrico constituents of concern (COCs), resulting in lateral and/or vertical expansion of Agrico's plume. The purpose of this letter is to summarize these concerns and present recommendations for your consideration.

Background

The Agrico site was placed on the National Priorities List in 1989. In 1994, the U.S. EPA issued its last Record of Decision. Soil remediation at the site was completed over 10 years ago and groundwater monitoring is ongoing. The U.S. EPA has concluded that the remedy is effective, as indicated in the last two, 5-year EPA reviews of the site. Because the Agrico remediation plan is well defined and working as designed, we are concerned that the proposed remediation for sites to the north and south of the Agrico site will negatively impact the current remediation at the Agrico site. Agrico's well delineated plume could be jeopardized and adversely influenced by the proposed activities at the ETC site.

ETC Remediation

Nearly all of the northern portion of the Agrico plume is potentially affected by planned remedial activities for the ETC site whose plume is known to intrude into the Agrico plume area. Based on the review of a portion of the draft FS provided by EPA, ConocoPhillips, Williams and their consultant, URS Corporation, believe there is a high potential for the activities associated with the proposed ETC preferred remedial alternatives to affect hydraulic head conditions, pH, geochemistry, and DO, in groundwater in the vicinity of the Agrico site. These changes have the potential to be reflected within the Agrico monitoring network as changes in Agrico COC concentrations and as changes in the areal extent of impacts.

Because of the potential for unknown and possibly complicating effects on the Agrico groundwater plume and geochemistry, it is suggested that the hydrodynamic and geochemical effects of the proposed remedial alternative be evaluated and well understood by EPA's contractor as part of the remedial design phase. Bench scale and/or pilot testing of the selected remediation alternative should be completed first. The preferred alternative should not be considered for full-scale implementation if significant increases in COC concentrations and/or areal extents of Agrico COCs are observed during bench-scale/pilot testing.

**Response 15 – EPA is aware of Agrico's concerns regarding the possibility that the remedy for OU2 will negatively impact the remedy for Agrico. Potential adverse impacts include increased dissolved oxygen (DO) levels, changes in pH, and addition of a chemical oxidant to the High Concentration Plume area. The following general recommendations for minimizing adverse impacts will be considered:**

1. **Include radium, arsenic, and fluoride in any proposed bench scale testing for oxygen infusion or chemical oxidation.**
2. **Conduct bench scale and/or field scale oxygenation tests to determine the aquifer's consumptive capacity for oxygen (chemical oxygen demand and biological oxygen demand) to better define the estimated impact from oxygen delivery.**
3. **Establish a sentry monitoring zone using existing wells to monitor the change in Agrico COCs following ISCO and oxygen addition for the ETC remedy.**
4. **Remediation of the HCP near CPT19-D should be phased in slowly and monitored under a detailed monitoring plan.**

The following recommended action items regarding the ETC remediation are suggested:

1. Provide key technical findings from bench or pilot tests conducted as part of the remedial alternative selection and/or pre-design process, for ConocoPhillips and Williams review.
2. Because of the proximity of the Agrico plume, for any ETC remedial plan, develop a protective monitoring plan for the Agrico area that will include monitoring for significant changes in concentrations of pH, ORP, DO, and Agrico COCs (arsenic, lead, fluoride, sulfate, nitrate, chloride, radium 226 and radium 228) as a result of the ETC remediation.

3. Establish a monitoring network that will detect hydraulic head changes between aquifer zones that could affect the Agrico area.
4. Provide the results of the quarterly or semi-annual monitoring to Agrico PRPs. If groundwater quality or hydraulic head data indicate that ETC remediation adversely impacts Agrico's plume, ETC remediation should be stopped and re-evaluated.

**Response 16 – As noted in Response 15, EPA is aware of potential negative impacts on the Agrico remedy. As the design progresses, EPA will provide results of bench- or pilot-scale tests to Agrico. Further, the monitoring network and sampling program will be appropriately designed to satisfy Agrico's concerns cited above.**

3.2.6 Comments from CSX Transportation

28 July 2008

By Electronic and First Class Mail

Mr. Erik Spalvins
Remedial Project Manager
USEPA, Region 4, Superfund Remedial Branch
61 Forsyth Street, SW
Atlanta, GA 30303

RE: June 2008 Proposed Plan Comments - Escambia Treating Company Superfund Site
Operable Unit 2 - Groundwater
Pensacola, FL

Dear Mr. Spalvins:

CSX Transportation, Inc. (CSXT) owns and operates a railroad switching yard, the Goulding Yard, on property adjacent to the Escambia Treating Company Superfund Site (the ETC Site). CSXT and its consultants have reviewed the Proposed Plan for the ETC Site. CSXT submits these comments on the Proposed Plan with the expectation and understanding that EPA will address two primary concerns about the potential effects of the remedies EPA proposes: (1) the health and safety of our workers at the Goulding Yard and (2) railroad operations.

The Goulding Yard is located immediately adjacent to and along the east-northeast property line of the ETC Site. CSXT also owns land on the east side of the Goulding Yard that is leased by others. The Goulding Yard is also hydrogeologically downgradient of the ETC Site.

The Proposed Plan confirms that Site-related constituents have migrated in groundwater from the ETC Site to and under the Goulding Yard. All three of the contaminated plumes--the Source Plume, the High Concentration Plume, and the Dilute Plume-- discussed and illustrated in the Proposed Plan underlay a substantial portion of CSXT's property. According to the Proposed Plan, "the most highly contaminated portion of the dissolved plume is centered just to the east of the Site, under the adjacent CSX Rail Yard." *Id.* At 6.

The proposed active remedy for the Source Plume appears to be focused on the portion of the plume located beneath the CSXT property. EPA proposes the implementation of In-Situ Chemical Oxidation and In-Situ Enhanced Bioremediation Using Vertical and Horizontal Wells. Although not sufficiently detailed in the Proposed Plan, the feasibility study for the ETC Site indicates that this remedial alternative will require the installation of both horizontal and vertical wells along or under CSXT property. Aeration of the Source Plume would be accomplished with the installation and operation of "a matrix of horizontal wells placed under the CSX Rail Yard parallel to the rail tracks . . . ." Also, "a line of vertical wells installed parallel to the rail tracks along the west boundary of the CSX Rail Yard will be used as injection points for chemical oxidant (Figure 3-3)." *Feasibility Study Report for Operable Unit 2 (Groundwater)/Revision 1/Escambia Wood Treating Site* (Black & Veatch April 2008), at 3-13. In short, this system entails the installation and operation of numerous wells, subsurface drains, pumps and piping systems near or in an active rail yard.

CSXT's concerns about the safety and health of its workers must be considered under the short-term risk analysis required by the National Contingency Plan. See 30 C.F.R. § 300.430(e)(9)(iii)(E)(1). Neither the Proposed Plan nor the Feasibility Study sufficiently addresses the short-term risks to CSXT's workers.

The subsurface drains associated with Alternative SP-4 would be designed to deliver oxidizing reagents associated with the ISCO process. Neither the Proposed Plan nor the Feasibility Study indicates which reagent would be used for the ISCO process, but it is well documented that use of certain oxidizers poses more risk than others. Off-gassing is a common "side effect" with some of these oxidizers; off-gassing could lead to worker exposure. Workers at the Goulding Yard transverse the yard as part of normal railroad operations, and there are buildings and repair buildings on the CSXT Property. Neither the Feasibility Study (§ 4.1.5.5) nor the Proposed Plan assesses or even mentions the potential short-term risk to rail yard workers. The Feasibility Study merely makes this unsupported statement: "Community risk associated with this remedial alternative would be low during the installation and sampling of monitoring wells, the installation of injection wells, and the operation of the extraction/injection system." *Id.* at § 4.1.5.5. Has any assessment been done of, for example, the potential risk of vapor intrusion into structures on top of the treatment zone? In some instances the gasses produced from an ISCO process would be high in oxygen content. The rail yard has maintenance facilities where acetylene torches are commonly used for repairs to locomotives and rail cars. Has this risk been evaluated?

**Response 17 – Vapor intrusion is a significant (and growing) concern in the implementation of remedial technologies. Development of the restoration approach for the ETC Site took this concern into account and the selected remedy should have an insignificant impact on aboveground vapor concentrations. The introduction of oxygen into the underlying aquifer is not proposed at rates that will stimulate *in situ* physical air stripping of the COCs. Instead, the purpose of the horizontal well injection system is to increase dissolved oxygen levels in ground water. Hence, it is unlikely that vapor intrusion**

**will be significantly enhanced by the proposed remedy. This assumption will be tested as part of the operational monitoring by monitoring the ground surface volatile emissions as part of the proposed operational monitoring plan. The COCs themselves, deemed as semi-volatiles, would only be physically stripped at air-to-water ratios (approaching 400) much greater than will be applied in the proposed remedy. Thus, the COCs themselves are not considered a significant vapor intrusion threat. Of note, the presence of the CSX rail yard is expected to present a high background value for volatile aromatics that will make low level vapor intrusion more difficult to detect. The remedy will be incapable of producing levels of volatiles that could be at ignitable concentrations for acetylene torches or other sources of ignition. The HCP-3 remedy will be situated closer to residences and businesses and will require a more robust monitoring approach to provide assurances that vapor intrusion is not going to be an issue above those portions of the contaminant plume.**

**The products of the proposed *in situ* chemical oxidation treatment walls (with permanganate as the oxidant) will not produce oxygen or volatile vapors when reacting with naphthalene. End products for the reaction will include carbon dioxide ($CO_2$), water, manganese dioxide solids ($MnO_2$), and potential intermediates of the PAHs. The chemical equation for the reaction is:**

$$16KMnO_4 + C_{10}H_8 + 16H^+ \rightarrow 16MnO_2(s) + 10CO_2(g) + 16K^+ + 12H_2O$$

**Where: $KMnO_4$ = potassium permanganate**
**$C_{10}H_8$ = naphthalene**
**$16H^+$ = hydrogen ion**
**$MnO_2(s)$ = manganese dioxide (solid)**
**$CO_2(g)$ = carbon dioxide (gas)**
**$K^+$ = potassium ion**
**$H_2O$ = water**

**Thus, carbon dioxide is the principal off-gas produced in the reaction. In all, the probability of vapor intrusion or hazardous vapor production is low and will be monitored as a precaution.**

CSXT's concerns about potential interference with its railroad operations must be addressed under the implementability analysis required by the NCP. See 40 C.F.R. § 300.430(e)(9)(iii)(F). The NCP requires assessment of the ease or difficulty of implementation considering, among other things, technical feasibility. More specifically, the technical difficulties, the ease of undertaking additional remedial actions, and the ability to monitor the effectiveness of the remedy must be assessed.
Neither the Proposed Plan nor the Feasibility Study sufficiently assesses the implementability of alternatives SP-4 and HCP-3. The discussion in the Feasibility Study of implementability of SP-4 is limited to this:

> The effort required to implement this alternative primarily involves the placement, installation, and operation of horizontal oxygen infusion wells, vertical chemical

oxidation wells up-gradient (i.e., immediately west of the railroad yard), groundwater recovery wells downgradient, and associated pumps and piping for groundwater transfer. Adequate space exists on adjacent sites to introduce the horizontal wells into the ground. A mandatory 5YRR cycle and a minimal groundwater monitoring program using existing monitoring wells would be implemented to determine the progress and impact that SP-4 is having on the Site.

FS, § 3.5.5.2, page 3-37. The Proposed Plan concludes simply: "All of the alternatives are proven technologies and relatively straightforward to implement." *Id.* at 15. There has apparently been no analysis or consideration of the technical feasibility of constructing and operating the ISCO system at an operating rail yard.

**Response 18 – Remedies SP-4 and HCP-3 will not require equipment storage or staging on CSX property, nor will the system operation have any influence on CSXT's operations. The only potential impact on CSXT operations could come during horizontal well drilling when a surveyor might need to periodically cross the tracks to monitor the progress of the underground horizontal well drilling. Actual horizontal well drilling is anticipated to take place at depths of approximately 70 feet and 105 feet below land surface. Any persons requiring access to the Goulding Yard will receive appropriate, CSX-provided, safety training. The FS tables 3-3 and 3-4 don't point out clearly enough that there are no remedy elements on CSX property (abovegrade) nor is there any vertical drilling through the railyard for any of the alternatives. These tables could be revised to more clearly make the point that no impacts to CSXT operations are expected from any of the remedies for this Site.**

Similarly, the implementation of Alternative HCP-3 for the High Concentration Plume will require the installation and operation of injection wells on CSXT rail property. The Feasibility Study says no more than this in the discussion of the implementability of this alternative: "Adequate space exists on adjacent sites to introduce the wells into the ground (Figure 3-5)." FS, § 3.5.9.2.

**Response 19 – For that property east of the CSXT tracks belonging to CSXT, face-to-face discussions with CSXT should be initiated to negotiate access to that property for remedy implementation. Alternatively, the lines of injection wells may need to be reconfigured.**

In short, EPA has not allayed CSXT's concerns about the logistics of implementation and operation of the proposed remedy and the potential effects on railroad operations. Moreover, the plan indicates the active remediation of the Source Plume will only take two years. During this time period railroad operations could be significantly impacted if the remediation program is not properly designed and implemented, in a manner that avoids interference with railroad operations and ensures the integrity and safety of the rail yard. What assurances does CSXT have that the remedy can be implemented without disruptions to its operations? What is the contingency in the event that the remedial goals, with are not achieved within the two year timeframe? Neither the Feasibility Study nor the Proposed Plan answers these questions.

**Response 20 – As stated in Response 18, the proposed remedy will not impose undue burdens on CSX operations as the remedy will not require equipment storage or staging on CSX property. If the remedy takes longer to implement than is estimated at this time, EPA will evaluate its options then. A key factor in such deliberations will be to avoid disruptions of CSX operations.**

We understand that CSXT's comments will be considered and addressed in EPA's responsiveness summary. See 40 C.F.R. § 300.430(f)(3)(i)(F). We assume that CSXT's concerns will also be considered and addressed in remedial design.

CSXT looks forward to working with EPA and its contractors during the design, construction and operation of the selected remedial action. Please contact me if you need any additional information.

Respectfully submitted,

Keith A. Brinker
Manager Environmental Remediation

### 3.3 Comments Received from Organizations and EPA Responses

#### 3.3.1 Citizens Against Toxic Exposure (CATE)

To: Erik Spalvins/R4/USEPA/US@EPA
From: Frances Dunham <francesdunham@mchsi.com>
Date: 07/06/2008 11:34PM
cc: Francine Ishmael <fishmael@cate.gccoxmail.com>
Subject: CATE comments on Escambia Treating Company OU-2 Proposed Plan

Erik,

It was good to meet you, and thank you for the detailed presentation. We appreciate your suggestion that Citizens Against Toxic Exposure (CATE) comment early on the Escambia Treating Company OU-2 Proposed Plan in order to receive a more thorough response. Our comments are pasted in below.

Also, I have attached CATE's comments on the 2006 Remedial Alternatives Technical Memo; page 3 is EPA's Napathalene plume map on which we have noted locations where dioxin concentrations were elevated.

Thank you,

Frances Dunham
Citizens Against Toxic Exposure

Subra Company
P. O. Box 9813
New Iberia, LA 70562

Date: July 1, 2008

To: Frances Dunham
Citizens Against Toxic Exposure

From: Wilma Subra

Subject: Comments on the Proposed Plan and Feasibility Study for the Escambia Treating Company Superfund Site - Operable Unit - 2, Ground Water

**Ground Water Contaminants**

The ground water plumes resulting from contamination from the ETC site contain a host of Volatile Organic Chemicals, Semi-Volatile Organic Chemicals, Heavy Metals, PAHs, Pesticides and Dioxins. These chemicals are present in the ground water in the three aquifer zones above the regulatory standards. Naphthalene has been selected as the best indicator of the contamination extents in the dissolved plumes. Thus Naphthalene has been identified to be monitored in the ground water in order to determine the extent of contamination and effectiveness of the remedial activities. The focus on Naphthalene and the limiting of chemicals of concern to nine PAHs, Trichloroethene, 2,4-Dinitrotoluene and Pentachlorophenol are inadequate and inappropriate. EPA should focus on all of the chemicals (VOCs, SVOCs, Heavy Metals, Pesticides, and Dioxins detected in the ground water plumes in excess of regulatory standards.

**Response 21 – The cleanup action for the ETC Site is limited to Site-related compounds. There are number of constituents present in the ground water in the area and some are from other sources. Most of the constituents, although present, do not pose an unacceptable risk. The selection of COCs is summarized in the ROD.**

**Special note about dioxin: As discussed above, dioxin failed to exceed the screening threshold in the risk assessment and was therefore not considered a COPC. Subsequently, additional ground water samples were collected and analyzed for dioxin. As noted in Response 7, the reporting of this data is a source of understandable confusion in that the units for the state and federal standards were reported in µg/L while the dioxin results were reported in ng/L. (1 µg/L equals 1,000 ng/L). Thus it appeared that there were numerous exceedances of the state and federal standards when in fact there were none.**

The monitoring of ground water contaminants to track contamination concentrations in the three contamination plume zones is planned to include VOCs, SVOCs, Metals (FS p 3-16). The lack of monitoring requirements for the Pesticides and Dioxins is not acceptable.

**Response 22 –See Response 21.**

Dioxins have been detected in the contaminated ground water plumes in excess of acceptable levels (Technical Memorandum for the Remedial Alternatives for ETC OU-2) in the surficial zone, low permeability zone and main production zone (FS p 1-18). EPA failed to consider the Dioxins contaminating the ground water plumes in the proposed alternatives. EPA also failed to determine the effectiveness of the various remedial alternatives in reducing the concentrations of Dioxins in the ground water plumes.

**Response 23 – See Response 21 and Response 7.**

**EPA must evaluate the proposed remedies with regard to their effectiveness in reducing the concentrations of Dioxins in the ground water plumes.**
EPA must include Dioxins and the Pesticides in the monitoring program to determine the changes in concentration of VOCs, SVOCs, Heavy Metals, Pesticides and Dioxins. This information is critically important to track the impacts and effectiveness or lack of effectiveness of the remedies as they are implemented.

A focus limited to the "chemicals of concern" list is not adequate to trace the remedial activities impacts or failures to reduce the concentrations of chemicals in the ground water plumes. All of the chemicals detected in excess of regulatory requirements must be monitored and evaluated on a regular basis. The frequency of monitoring must be monthly to quarterly depending on drought conditions in the ETC site area and plume extent.

**Response 24 – See Response 21 and Response 7.**
**The EPA only has authority to address site-related compounds. The monitoring program will be of sufficient scope, frequency, and duration to evaluate the progress of the remedial action in dealing with site-related contaminants.**

**Non-Aqueous Phase Liquids (NAPL)**
The Feasibility Study states that the highest concentrations of Naphthalene detected in the groundwater could indicate the presence of Non-Aqueous Phase Liquids (NAPL). The possible presence of NAPL will be assessed during the Remedial Design and/or Remedial Action phase. The delay in assessing the presence of, locations of and extent of NAPL associated with the ETC site should be initiated prior to the design phase in order to provide the necessary information required for the design phase. The restriction of remedial activity areas to the CSX Rail Yard could prohibit appropriate remedies needed to address NAPL. Thus the locations of NAPL must be determined before the design phase is implemented in order to determine if additional surface areas will be required in order to implement the selected remedial activities. The importance of appropriately and timely addressing the NAPL is associated with the ability of the NAPLs to continue to serve as a source of continuous contamination of the ground water. The continuation

of contamination of the ground water could require the ground water remedial activities to be required for extensive periods of time. Addressing the source areas of NAPL is critical to remediation of the ground water resources.

**Response 25 –The high concentrations of naphthalene in parts of the plume indicate that it is likely that NAPL is present, but NAPL has not been found in the plume. The selected remedy includes technologies that are effective at remediating residual product as well as high concentrations of dissolved-phase contamination. As a point of clarification, the "design phase" includes elements such as pre-design investigations and treatability studies. These tasks are in addition to the preparation of plans and specifications traditionally associated with remedial design.**

**Lack of Performance of Treatability Studies**

The proposed alternatives involve the use of In-Situ Chemical Oxidation and In-Situ Enhanced Bioremediation. These two methods of remediation have not been determined to be effective in degrading the chemicals in the contaminated ground water plumes. The Feasibility Study and Proposed Plan focus on remediation of Naphthalene. However, the effectiveness of In-Situ Chemical Oxidation and Enhanced Bioremediation has not been demonstrated to be effective in degrading the Naphthalene. In addition to Naphthalene, a host of VOCs, SVOCs, Heavy Metals, Pesticides and Dioxins are present in the ground water plumes above regulatory standards. The effectiveness of the In-Situ Chemical Oxidation and Enhanced Bioremediation have not been determined for these other chemicals nor for Naphthalene. Treatability studies must be performed for all the chemicals detected in the ground water in excess of regulatory levels for the two treatment technologies prior to initiation of the design phase.

**Response 26 – Dioxins are not COCs for the ETC Site (See Responses 5 and 21). The technologies selected have been effective at many other sites with this kind of contamination and are well-proven. Treatability studies are not needed to select the remedy, though a treatability study is underway to refine the design.**

**In laboratory studies, the ISCO results are exceptional with greater than 99% removal of naphthalene obtainable after 24 hours treatment. Likewise, the enhanced bioremediation results also show greater than 95% reduction (*Bioremediation of BTEX, Naphthalene, and Phenanthrene in Aquifer Material using Mixed Oxygen/Nitrate Electron Acceptor Conditions*, EPA, October 1997). The key to successful remediation of these compounds is the design of the *in situ* components. Achieving direct contact with the oxidation phase, and producing a robust dissolved oxygen front with the bioremediation remedy, are the most important factors to the overall effectiveness of the remedies.**

**As stated in Response 9, a bench-scale treatability study is being considered for the enhanced bioremediation component of the remedy during the design phase. This test would be used to optimize the *in situ* bioremediation design. The ISCO component is being tested this year with bench-scale testing of the *in situ* natural oxidant demand (NOD) and a field push-pull injection test that will allow better quantification of the permanganate dosing rate and injection hydraulics.**

**Lack of Adequate Information on Residential Water Wells**

On page 9 of the EPA ETC Proposed Plan for OU-2, Ground Water, the risk assessment concludes that no excess health risk are associated with the current use scenario of contaminated ground water. EPA states it is not aware of any in-use private water supply wells within the ETC contamination plume. This information is based on a 2004 well survey and other information. This information is not adequate on which to base the risk assessment. EPA was supposed to perform an up to date well survey in all the residential areas over the contaminated plumes. The most recent residential well survey that was to survey all areas above the plumes has either not been performed or not been made publicly available. Such a survey must be conducted, must be made available to all well owners or renters over the contaminated plumes and must be used to determine the potential human heath exposures due to dermal contact, inhalation and/or ingestion of contaminated ground water from residential wells and consumption of garden products irrigated with contaminated groundwater. The exposure of residents who continue to use private water wells that produce contaminated water is an unacceptable risk. The human health exposure must be considered and remedial activities included in the Feasibility Study and Remedial Action Plan to address the human health exposures.

**Response 27 – See Response 5.**

**Undefined Extents of Ground Water Contaminated Plumes**

On page 1-23 of the Feasibility Study, the text states that the lateral and vertical extent of the dissolved plume lacks interior resolution. This lack of resolution will require additional sampling to delineate the plumes.

The information contained in the Feasibility Study demonstrates that the extent of the ground water plumes has not been defined along the southern and eastern boundaries. The extent of the plumes on the southern and eastern boundaries must be further defined.

**Response 28 –See Response 1.**

The ground water plume in the main production zone ends at Bayou Texar. The EPA failed to define the pathway of the plume, under Bayou Texar and/or into Bayou Texar. Clear determination of the plume into, under and on the eastern side of Bayou Texar, must be established. The risk to human health and ecological receptors as a result of the movement of the ground water plume in the area of Bayou Texar are critical to define and monitor. In addition, as the remedial activities are implemented, monitoring of the plume adjacent to, under or into Bayou Texar must be an integral part of the remedial action plan. Changes in the contaminated plumes are critical to trace throughout the remedial phase.

**Response 29 – See Responses 1, 4, and 25.**

**Preferred Alternatives**

The Feasibility Study and Proposed Plan list the preferred alternatives as SP-4 (In-Situ Chemical

Oxidation and In-Situ Enhanced Bioremediation) for the Source Plume, HCP-3 (In-Situ Enhanced Bioremediation) for the High Concentration Plume, and DP-2 (Monitored Natural Attenuation) for the Dilute Plume. The draft Feasibility Study issues by Black and Veatch for review by the EPA, FDEP, and ETC Technical Assistant listed SP-4 (In-Situ Chemical Oxidation and In-Situ Enhanced Bioremediation) for the Source Plume, HCP-2 (In-Situ Chemical Oxidation and In-Situ Enhanced Bioremediation) for the High Concentration Plume and DP-2 (Monitored Natural Attenuation) for the Dilute Plume. The preferred alternative for the High Concentration Plume should be changed to the HCP-2, In-Situ Chemical Oxidation and In-Situ Bioremediation as was proposed in the draft Feasibility Study. The HCP-2 alternative will be more effective and result in a shorter time period for the remedial activities (4 years versus 7 years). The contaminated ground water plumes have been a problem for a long period of time and the remedial alternatives should be selected to quickly and effectively remedy the contaminated ground water plumes.

**Response 30 – Remedy HCP-2 (*In Situ* Chemical Oxidation and *In Situ* Bioremediation) is essentially the same as remedial alternative HCP-3 (*In Situ* Enhanced Bioremediation) except that a 1,600-foot ISCO treatment wall was included between the first and second bioremediation treatment wall (see Figure 3-4 in the FS). The ISCO barrier would provide an aggressive contaminant reduction zone in the earlier portion of the HCP and should increase the flexibility and overall effectiveness of the HCP remedy. However, the area of the HCP actually directly treated by the ISCO wall is less than 5% of the total area of the HCP zone and the incremental cost is approximately $6 million more (100% higher). Consequently, this remedy did not provide a sufficient enhancement to justify the increased cost. Viewed another way, the HCP-3 remedy could be roughly doubled in effort for the same cost as the ISCO curtain element of HCP-2. The overriding problem is that the plume is too large in areal extent to cost-effectively remediate with ISCO. See also Response 42.**

**Remedial Alternatives Limited by Restricting Area to be Used for Well Construction**
The remedial alternatives were limited by consideration of locating wells and surface units for remedial activities only on the property of the CSX Rail Yard, not in the residential area. The remedial alternatives were further limited by considerations of well locations within the rail yard property that would not significantly disrupt the rail yard operations. Such limitations could negatively impede the implementation of the remedial actions and could restrict appropriate actions that would be necessary to address the NAPL which is scheduled to be further defined during the remedial design and/or remedial action phase. Such restrictions on well locations and surface facility units are not acceptable when such restrictions could hamper necessary remedial activities.

**Response 31 – The ISCO and recirculation injection wells are proposed to be located along the ETC property west of the CSX site. The only spatial limitation applied to the proposed Source Area remedy elements was to not have aboveground elements or equipment within the CSX rail yard. This was chosen to reduce cost, minimize disruption to CSX's operation, and to avoid the complex operational and health and safety requirements for operating within the footprint of a rail yard. For example, CSX requires a flagman be**

**present whenever a non-CSX employee is working along the tracks. The option of trying to connect vertical wells through underground utility drilling was considered but was rejected due to cost and complexity. The restriction imposed by this limitation is not considered a substantial impediment to the effective remediation of the Site. The proposed use of horizontal wells will suffice to create the oxygenated zones necessary for the oxygenation treatment walls.**

**For the HCP-3 remedy, the horizontal well locations were selected to coincide with north-south running streets so as to stay within right-of-ways and avoid private residences. The connecting well vaults will consequently have a minimal impact on surrounding residences and businesses.**

3.3.2 Comments from Clarinda Triangle Association

July 23, 2008

Mr. Erik Spalvins
Remedial Project Manager
Escambia Treating Company Superfund Site Superfund Remedial Branch
U.S. EPA
Atlanta Federal Center
61 Forsyth Street SW
Atlanta, GA 30303

Re: Comments on Draft Feasibility Study, Operable Unit 2 (Ground Water), Escambia Treating Company Superfund Site, Pensacola, Florida

Dear Mr. Spalvins,

The Clarinda Triangle Association (CTA) is pleased to forward the attached comments from our Technical Advisor in connection with the subject document. In general, the Technical Advisor found the draft Feasibility Study to be well done and to substantially meet the goals for the ground water cleanup that have been voiced by CTA and the greater Pensacola community. There are, however, specific items where it is believed the document can be improved and the remedy strengthened. Please review the Technical Advisor's comments carefully.

We look forward to continuing the positive relationship that has been established between EPA and CTA, and we appreciate the opportunity to participate in the public comment process for the Operable Unit 2 cleanup.

Very Truly Yours,

Katherine Wade
CTA President

KW:pd

Enclosures

cc: L'Tonya Spencer, Community Involvement Coordinator, U.S. EPA
Mary Gutierrez, Partnership for Community Progress
Peter Dohms, P.G., CTA Technical Advisor
CTA Board of Directors

MEMORANDUM

TO: Katherine Wade, Clarinda Triangle Association

FROM: Peter H. Dohms, P.G., CTA Technical Advisor

DATE: July 22, 2008

SUBJECT: Comments on Feasibility Study Report for Operable Unit 2 (Ground Water), Escambia Treating Company Superfund Site, Escambia County, Florida

INTRODUCTION

In accordance with the Statement of Work incorporated in the assignment given to Gallet & Associates as the Technical Advisor to the Clarinda Triangle Association (CTA), this document is a review and commentary for the Feasibility Study Report for Operable Unit 2 (Ground Water) at the Escambia Treating Company (ETC) Superfund site in Pensacola, Florida. This document is organized in the following fashion:

- The first section contains a general discussion of the document, and contains a "wish list" of goals for the OU2 cleanup, as developed by the CTA;
- The second (main) section lists specific comments.

GENERAL DISCUSSION

For as long as the EPA has been seeking input from the citizens of Pensacola on the topic of ground water contamination at and down gradient from the Site, the EPA has been hearing requests for an aggressive program of ground water remediation and aquifer restoration. There is an incredible volume of contaminated aquifer in OU2; the plume is over 11/2 miles in length, almost 3/4 miles in width, and reaches to depths in excess of 200 feet below land surface in places. These dimensions, coupled with the elevated contaminant concentrations found in the Source Plume area, have contributed to the anxiety in the community that the ground water cleanup needs to be aggressive, comprehensive and effective. As an overall statement, which is intended to set the context of the specific comments that follow in a later section, it is clear that this Feasibility Study Report substantially meets the requirements that have been so vigorously voiced by the community.

Aside from the obvious goal of a remedy that is protective of human health and the environment, CTA also endorses the following goals for the remedial action:

- A remedy that will achieve aquifer restoration in as short a time as possible;
- A remedy that applies proven technology;
- A remedy that does not generate large volumes of "secondary" waste needing its own disposal or treatment;
- A remedy that employs a technology that allows for continuing or repeated treatment of the aquifer until cleanup goals are met;
- Aggressive monitoring of the contaminant plume during cleanup;
- No disturbance of the Agrico remedy; and,
- Frequent reports to CTA and the community on progress that is occurring.

SPECIFIC COMMENTS

The following comments are generally arranged from "front to back" in the Feasibility Study report (FS). In those cases where a discrepancy is noted between information provided in two places in the FS, the comment is linked to the first location, with a cross-reference to the second.

Section 1:

1. In the table on page 1-14, the values for "effective porosity" provided (0.28, 0.35 and 0.30 for the SZ, LPZ and MPZ, respectively) are in some disagreement with the values for "effective porosity" provided in Table 2-6 (0.28, 0.25 and 0.30, respectively). A typographic error for one of the two LPZ porosities is suspected.

**Response 32 – The value on page 1-14 for the effective porosity of the LPZ is incorrect; it should be 0.25 (as presented in Table 2-6).**

2. In the text on page 1-14, it is stated, "...both upward and downward gradients were measured in the wells on both sides of the Bayou." In the next paragraph it is stated, "Water level changes in response to pumping of municipal supply wells located in the vicinity of the Site were found to exert a much greater influence on water levels observed in the monitoring wells." It is necessary to considerably expand the discussion of these topics. For instance, Figure 1-7 makes it plain that the ground water flow in the Main Producing Zone continues in an easterly direction beneath (and apparently not influenced by) Bayou Texar. The community has significant concerns related to the position of the distal portions of the contaminant plume, and whether pumping of the ECUA public supply wells on Royce Street and Summit Boulevard might be drawing the plume towards those wells. Pumping the Summit well would tend to draw contaminants across the Bayou, although pumping at Royce Street would tend to pull contaminants to the north, along the west bank of Carpenter's Creek. Please provide an enlarged discussion of the topic, including proposed guidelines for plume migration monitoring during aquifer restoration.

**Response 33 – EPA appreciates the community's concern regarding the location of the**

**ECUA supply wells with respect to the distal portions of the plume. As noted in Responses 1, 4, and 25, additional investigations may be undertaken as part of the remedial design. Prior to initiating these investigations, EPA will prepare detailed plans that will include the objectives of the investigations and the rationale for well placements.**

3. The last sentence of Section 1.2.5.3.2 (page 1-18) reads, "*Trace ubiquitous levels of dioxin were also detected in several SZ, LPZ and MPZ monitoring wells, however, the concentrations did not exceed MCLs or GCTLs*." (emphasis added). The sensitivity of Pensacola residents to the topic of dioxin in ground water is well known, and the topic is judged to possess sufficient volatility that an expanded discussion of the occurrence and detected concentrations of dioxin in ground water is necessary. A comprehensive discussion of why dioxin was not listed as a COC is also necessary (i.e., was dioxin detected at a significant fraction of those thresholds, or were the detections two or more orders-of-magnitude below those thresholds?).

**Response 34 – See Responses 7 and 21.**

4. Section 1.3.3 (High Concentration Plume Area Contamination) makes reference to Figure 1-10 (showing HCP distribution in the MPZ) on page 1-25. Reference to Figure 1-10 suggests that there is a key location in the MPZ testing where no data points are present to define the HPZ boundary. This area is between off-site monitor wells AC-02D and AC-03D, lying southwest from CPD-19D (a one-time test). Given the elevated naphthalene concentration in CPD-19D in comparison with all surrounding sample locations, an additional well in this area could yield results that would make a significant change in the plume geometry of this vicinity. A suitable location for a cluster well (screened in the SZ, LPZ and MPZ) would be near the northeast corner of the Brown-Barge Middle School property (i.e., "across the street" from the Agrico Superfund site).

**Response 35 – If additional investigations are planned as part of the remedial design, EPA and its engineer will first identify the data gaps that remain and will seek to resolve them in a timely and efficient manner. A well cluster as described in this comment may be considered; however, the final decision will be a collaborative effort between EPA and its engineer.**

5. Following up on that previous comment, in Section 1.4 (Additional Design Basis Assumptions and Strategy for the Feasibility Study), add a sentence to item #9 (page 1.28) to read as follows: "One candidate location for such additional sampling would be to add a 3-well cluster near the northeast corner of the Brown-Barge Middle School site, near the intersection of 1-110 and Fairfield Drive."

**Response 36 – See Response 35.**

Section 2:

6. In Section 2.1.4 (ARARs Applicable to Off-Site Clean-up Activities), on page 2-5 it is stated, "The surficial aquifer beneath the site carries a state classification of G-1

designating it as an irreplaceable groundwater resource that warrants a high degree of protection." I have been unable to confirm that any area of the Sand & Gravel Aquifer of Escambia is classified G-I (Note: G-II aquifers are designated for drinking water supply).

**Response 37 – The commenter is correct. The Sand & Gravel Aquifer is classified G-II, not G-I.**

7. On page 2-10, within Section 2.2.3 (Delineation of Areas and Volumes of Contaminated Media), it is stated, "Site-related contamination has not been found in groundwater samples collected from the eastern side of Bayou Texar; thus, it is assumed that the bayou marks the eastern-most extent of groundwater contamination at the site." The sensitivity of the citizens of Pensacola to the issue of contamination migrating eastward beneath and beyond Bayou Texar was already noted (see Comment 2 above). The quoted sentence should be modified (or footnoted) with the phrase, "...at this time," in recognition that monitoring in the wells east of Bayou Texar needs to continue for the entire period of time the remedy is underway.

**Response 38 – See Responses 1 and 4.**

Section 3:

8. In the discussion of Alternative HCP-3 (Section 3.3.8.1, page 3-22) it is stated, "Install six (6) sets of vertical injection wells screened within the HCP area,...". Elsewhere it is stated that this array is illustrated on Figure 3-6, but 3-6 only shows four sets of vertical injection wells.

**Response 39 – Unfortunately, Figure 3-6 incorrectly shows these as vertical wells in the legend. Actually, they were envisioned as horizontal wells (2-3 individual wells making up the largest band shown on Figure 3-6). These wells would have three stacked sets of wells per location. Vertical wells are possible, but they are not optimal since they may be far too disruptive to the community. Additional cost estimates and more detailed screening may provide sufficient information to decide if horizontal wells or vertical would be best for this remedy. A model would benefit the evaluation of well configuration and type. The text of the FS document could be amended to make sure that it is consistent with the intent of Figure 3-6.**

9. The "Implementability" discussion of Alternative HCP-3 (Section 3.5.9.2, page 3-43) incorrectly references Figure 3-5 (Figure 3-6 actually depicts the Alternative HCP-3 layout), but that is an aside from the point of this comment. On Figure 3-6, one of the "oxygen infusion well" arrays is shown extending in a generally northeast line from a point near the north end of the 1-110 / Fairfield Drive interchange (second array from the left). Knowledge of this area of Pensacola indicates that installing an injection well array along this alignment will be challenging, owing to the extent and nature of the existing infrastructure, commercial development, and residential neighborhoods. On the other hand, the two "easterly" injection well arrays shown on Figure 3-6 (aligned along Avenue and 12th Avenue) promise somewhat less complexity (aside from the City cooperation

needed to secure permits for the installation along busy arterial rights-of-way). Note that these logistical complexities also attach to Alternative HCP-2, albeit in a fashion specific to the details of that Alternative.

**Response 40 – EPA appreciates your input and will take it into consideration as the remedial design progresses.**

Section 4:

10. In the "Implementability" discussion of (preferred) Source Plume Alternative SP-4 (Section 4.1.5.6, page 4-16); it is made clear that much of the Source Plume cleanup will be occurring in horizontal wells to be installed beneath the CSX Railroad Yard. Early consultation with CSX Railroad is recommended to ensure they cannot or will not veto this element of the proposed remedy.

**Response 41 – EPA agrees with this comment. Discussions with CSX are ongoing.**

11. In Section 4.2.10.2 (Summary of Comparative Analysis, High Concentration Plume Area), it is stated on page 4-49, "Considering all criteria, addressing HCP area groundwater contaminants by in-situ enhanced bioremediation is the most favorable and suitable approach. For the HCP area, HCP-3 ranks above HCP-2 and HCP-4." This conclusion, however, does not appear to be supported by earlier text discussions, and there appear to be one or more errors in Table 4-2 that would, if corrected, in all likelihood show that HCP-2 should be the "preferred alternative."

Examples of the specific items in the text that support the conclusion that there are errors in Table 4-2 include the following:

- Sections 4.1.7 and 4.1.8 provide the analyses of Alternatives HCP-2 and HCP-3, respectively. In subsection 4.1.7.6 ("Implementability" for HCP-2) it is stated, "Under this alternative, RGOs and ARARs for the Site would be met in approximately 3 years." In subsection 4.1.8.6 ("Implementability" for HCP-3) it is stated, "Under this alternative, RGOs and ARARs for this Site would be met in approximately 6 years." Alternative HCP-2 therefore clearly has a distinct advantage over HCP-3 in terms of "Time for Results" (a column in Table 4-2). Yet, in Table 4-2, Alternative 4-3 is ranked ahead of Alternative HCP-2 in "Time for Results." The correct "Time for Results" rankings in Table 4-2 should be:
  - HCP-1 – 0 points;
  - HCP-2 – 3 points;
  - HCP-3 – 2 points;
  - HCP-4 – 2 points. (note: HCP-3 & HCP-4 both listed as "6 years")
- Sections 4.1.7 and 4.1.8 provide the analyses of Alternatives HCP-2 and HCP-3, respectively. The two subsections describing the "Short-Term Effectiveness" of Alternatives HCP-2 and HCP-3 (subsections 4.1.7.5 and 4.1.8.5, respectively) are identically worded. That would imply that the two Alternatives should have identical scores in Table 4-2 (as per Footnote 1 of Table 4-2). Yet, in Table 4-2,

Alternative HCP-2 is given a score of 1 point and Alternative HCP-3 is given a score of 2 points. The correct "Short-Term Effectiveness" rankings in Table 4-2 should be:

- HCP-1 – 3 points;
- HCP-2 – 1 point;
- HCP-3 – 1 point;
- HCP-4 – 0 points.

- When these two corrections are made in Table 4-2, then it appears that the numeric scores of the two Alternatives will change so that Alternative HCP-2 will be seen to be the clearly superior alternative.

**Response 42 – The scoring is intended to be a qualitative comparison and is considered, but not the sole factor in EPA choosing the selected remedy. The scoring was revised in the ROD to be consistent with the discussion. The financial analysis of these two remedies revealed a preference for HCP-3 in terms of cost for the amount of environmental benefit realized. It was judged that spending less to achieve the same remedial goals for only a slightly longer remediation period was the most prudent choice for this portion of the contaminant plume.**

Section 5:

12. For the Conclusions section (Section 5.0, page 5-2), in the event that the foregoing-noted errors in Table 4-2 are corrected, it might be necessary to rank Alternative HCP-2 above Alternatives HCP-3 and HCP-4.

**Response 43 – Given the justification presented in Response 42, the conclusions section will not need to be revised.**

Tables:

13. In Table 2-5 (Remedial Action Objectives, General Response Actions, and Remedial Technology Types), in the column headed "Remedial Action Alternatives," in the paragraph titled, "For Human Health," correct the "lifetime cancer risk" from 1 E-04 to 1 E-06 to conform to the text.

**Response 44 – As the commenter noted, the lifetime cancer risk level was incorrectly presented in Table 2-5.**

Figures:

14. No comments other than as described in previous comments.

CONCLUSIONS & RECOMMENDATIONS

The ground water remedy options that are proposed in the Feasibility Study were examined and were found to substantially conform to the goals and objectives for the ground water cleanup that have been expressed by the citizens of Pensacola. The EPA and its engineering contractor are to be commended for this draft Feasibility Study.

With that said, there are a number of specific recommendations that are provided below in a spirit of further improving upon the fine foundation that is provided by this document:

(a) Please expand upon the discussion in Section 1.2.5.2 (page 1-14) on the topics of contaminants being drawn towards the two major municipal supply water wells (Summit Boulevard and Royce Street), as described in Comment 2 above.

**Response 45 – See Response 33.**

(b) Please expand upon the discussion in Section 1.2.5.2 (page 1-14) on the topic of the potential for potential migration of the plume in the Main Producing Zone beneath and to the east of Bayou Texar.

**Response 46– See Response 33.**

(c) Please expand upon the discussion of dioxin in Section 1.2.5.3.2 (page 1-18), focusing on, (1) comparing detected dioxin concentrations with MCLs and GCTLs, and (2) why dioxin way not listed as a COC.

**Response 47 – See Responses 7 and 21.**

(d) There is every chance that a 3-well cluster (SZ, LPZ, MPZ) that would be situated between off-site wells AC-02D and AC-03D, and southwest of CPD-19D (near the NE corner of the Brown-Barge School site) would allow redefinition of the HPZ plume in that area, possibly resulting in a significant reduction of the estimated plume volume needing treatment. A well cluster in this area would also help alleviate concerns that contaminants are migrating southward through this apparent gap.

**Response 48 – See Response 1.**

(e) It is necessary to re-visit the "scoring" of Alternatives HCP-2 and HCP-3 in Table 4-2 in light of two possible errors that are described in Comment 11 above. If the suspected errors in scoring are confirmed, then there is every likelihood that Alternative HCP-2 will be found to be the preferred alternative.

**Response 49 – See Response 42.**

(f) A number of the elements of a ground water monitoring program during the ground water program have been described in the text (i.e., "quarterly monitoring for the first five years," "testing to include the constituents of concern"), but many other elements of the ground water monitoring program are not described. One of the goals for the facility cleanup that was expressed at the beginning of this document was, "aggressive monitoring of the plume during cleanup." It is recommended that there be additional definition of what the ground water monitoring program will look like during OU2 cleanup. Please provide that description, including (but not limited to) the following elements:

- A listing of wells to be monitored [be sure to include MW-20D, MW-24D, MW-25D, MW-26D and MW-27D; all east of Bayou Texar and/or Carpenter's Creek. Also, include key wells along the north plume boundary (MW-13D, MW-15D and MW-16D) and south plume boundary (AC-03D, AC-20D, and AC-28D). It might also be necessary to install new wells at key locations along the plume centerline where data points are limited to one-time temporary sampling installations (e.g., CPT-12D, CPT-19D)].
- A discussion of monitor well installation, and assurance that new wells will be installed in accordance with the EPA Handbook of Suggested Practices for the Design & Installation of Ground-Water Monitoring Wells.
- A listing of field parameters that will be included in the monitoring (turbidity and Redox potential, coupled with testing for "total" and "dissolved" concentrations of certain metals can be used to distinguish detections of certain metals that are artifacts of well construction).
- A discussion of the QA/QC procedures to be followed during field sampling, sample transportation, and lab analysis.

**Response 50 – EPA will take your suggestions into consideration as EPA and its design engineer develop the ground water monitoring program. Suffice it to say that monitoring well installation and QA/QC procedures will conform to the latest EPA guidance.**

The Clarinda Triangle Association is grateful for the opportunity to review and comment upon the proposed Feasibility Study for Escambia Treating Company OU2 (Ground Water).

Peter H. Dohms, P.G.
Florida License #208
July 22, 2008

3.3.3 Comments from Center for Environmental Diagnostics and Bioremediation, University of West Florida State, Pensacola

To: Erik Spalvins/R4/USEPA/US@EPA
From: "Carl Mohrherr" <cmohrherr@uwf.edu>
Date: 07/09/2008 03:50PM
Subject: My concerns over the preferred remedy for ETC OU2.

Erik Spalvins:

We spoke during your presentations at the Pensacola Chamber of Commerce and at the Pensacola Civic Center on July 2, 2008. I am with the Center for Environmental Diagnostics and Bioremediation, University of West Florida State, Pensacola. 32514. 850-857-6010. Below was mailed to you and L'Tonya Spencer. Below are my concerns over the preferred remedy for ETC OU2.

Sincerely,

Carl J. Mohrherr

Concerns on the preferred alternative proposed in the "U.S. ENVIRONMENTAL PROTECTION AGENCY SUPERFUND PROPOSED PLAN FACT SHEET ESCAMBIA WOOD TREATING COMPANY SUPERFUND SITE OPERABLE UNIT 2 – GROUND WATER, June 2008

In the early 1990's the USEPA excavated approximately 250,000 cubic yards of material from the Escambia Treating Site. The USEPA initiated an extensive soil removal action at the ETC Site in 1991, and completed the action in 1992. The excavated soils were stock piled on site under a tarp leaving a large hole in the ground. The removal action was a hasty and poorly thought out decision that led to larger and more impacting environmental situation. The thinking at the time was that the stockpiled soils would be cleaned up by novel remediation strategies. Later it appeared that the novel remediation strategies were not viable and the stockpile as of July 2008 is awaiting action that will put it back into the hole that it was excavated from. This history is recounted to emphasize that what ever action is taken for OU2 must not make the environmental impact worse than what it already is.
I realize that at this point the USEPA has only provided the rationale for EPA's preferred alternative. But prior to completion of the Record of Decision I have some concerns that should be addressed relative to the proposed In-situ Chemical Oxidation (ISCO) that is part of the preferred alternative for the ETC OU2 Proposed Plan-Groundwater (2008).

The source area under the CSX railroad switch yard consists of residues derived from wood treating wastes. These wastes appear to include diverse PAHs (Polycyclic Aromatic Hydrocarbon) and possibly dioxins/furans. Metals may also be present. Most of the COCs (Contaminants of Concern) and other wastes present in the source area are relatively insoluble in the groundwater. Some of the lighter molecular weight (LMW) PAHs such as the naphthalenes and acenaphthene are able to leach into the groundwater due to their relatively higher solubility in water. Currently it appears that only these LMW PAH congeners are present in environmentally significant concentrations and extent in the ground water plume that is approaching Bayou Texar. Currently there appears to be either no impact on Bayou Texar or a limited impact that has not been detected by the analyses conducted. An increase in the solubility of the organic COCs could result in increased transport and impact on Bayou Texar and perhaps on the more distant drinking water wells. The major concern is that the solubility of the other PAH components will be enhanced by the Preferred Alternative.

"EPA's Preferred Alternative is aggressive treatment of areas that act as a source for continued contamination of the aquifer. This involves using an aggressive treatment, in-situ chemical oxidation, to destroy contaminants in the source and high concentration areas. Treatment of the source and high concentration areas will continue using in-situ enhanced bioremediation."(ETC

OU2 Proposed Plan-Groundwater, 2008)

I am concerned with the potential of In-situ Chemical Oxidation (ISCO) to transform PAHs and other COCs to more soluble structures resulting in increased concentrations of other pollutants that are currently not present in significant quantities in the groundwater plume. The findings from an article by Brown et al. (2002) cited the following conclusion that supports this concern: "While PAHs are most likely not completely mineralized by permanganate oxidation reactions, their structure is altered by polar functional groups providing vast improvements in aqueous solubility and availability for natural biotic mineralization. " The same concerns of increased solubility may also exist if other oxidizing agents are used instead of permanganate.

A concern is that the monitoring of the ISCO process will be conducted without using appropriate chemical analyses that are sufficient to detect any polar structures and other degradation products derived from PAHs that may enter the groundwater. Prompt detection will allow adjustments and other fine tuning of the remediation system to be made to prevent over loading downstream biotic degradation and possibly resulting in transport of dioxins/furans. It is to be expected that EPA methods 8270C and 8260B as commonly employed will not detect all of the likely degradation products. For example 8270 normally detects only 18 specific PAHs. My concern is that the strategy for analyte detection be designed to detect all degradation products originating from ISCO that can exert direct and/or indirect environmental impacts.

An additional concern is that dioxins/furans may be present in the source area. Site dioxins/furans are reported to consist primarily of OCDD (octachlorodibenzodioxins) that may be partially dechlorinated by ISCO resulting in transformations that may be toxic. This coupled with the fact that the "aggressive remediation" may release a large slug of products derived from parent PAHs that could transport dioxin/furan congeners away from the source area. Alternative HCP-3 that relies solely on in-situ biodegradation processes may not be sufficient to prevent the migration of a large "slug" of ISCO derived products from spreading through the aquifer.

Below is a table showing dioxin/furan concentrations from ETC site monitoring wells. This establishes that there are dioxins/furans in low concentrations in the groundwater in some locations of the site. These sites are distant from Bayou Texar and the hydrophobic nature of OCDD normally prevents it from being readily transported by groundwater over long distances. It is important that further efforts to remediate the groundwater do not increase dioxin/furan concentrations in groundwater. The indicated wells are located either near the plume source or in other areas that are near the OU1 site. Currently there is no evidence that dioxins/furans are migrating great distances or will likely impact Bayou Texar under current conditions. Precise planning and monitoring of the ISCO process will be needed to verify that the above concern does not happen.

Table showing low concentrations of dioxins/furans in ETC OU2 groundwater

| Monitoring Well | Dioxin Conc. |
|---|---|
| CPT12D | 0.001 ng/l |
| ETC-MW-01SH | 0.00028 TEQ ng/l |
| ETC-MW-04-DP | 0.00037 TEQ ng/l |

| | |
|---|---|
| ETC-MW-04-C | 0.0002 TEQ ng/l |
| ETC-MW-06SH | 0.0049J TEQ ng/l |
| ETC-MW-09S | 0.00087 TEQ ng/l |
| ETC-MW-10IN | 0.00034 TEQ ng/l |

What is suggested is that a complete chemical flow chart of what is expected to occur from the ISCO process for the ETC site be prepared by a biochemist with established competence with ISCO and that the appropriate chemical analyses be selected that will detect and quantitate all of the expected analytes. Protocols to implement appropriate Standard Operating Procedures should also be designed to reduce risk of impact from degraded PAHs and dioxins/furans to better insure success of the remediation.

Reference.

Brown, G.S., L.L. Barton, and B.M. Thomson (2002. Permanganate oxidation of sorbed polycyclic aromatic hydrocarbons. Waste Management, 23, 737–740)

**Response 51 – The intermediates of the oxidation of PAHs in general and naphthalene specifically are currently being researched in academic institutions. For example, an excellent thesis was prepared in 2004 by Stephen Forsey at the University of Waterloo: "In situ Chemical Oxidation of Creosote/Coal Tar Residuals: Experimental and Numerical Investigation." This thesis supports earlier work that shows that naphthalene can be successfully degraded by oxidation. This research concluded that the partial oxidation of compounds such as methylnaphthalenes would produce both naphthalic acids as well as ring oxidation products. In addition, it was concluded that ketones as well as carboxylic acids are potential oxidation products that may form in the oxidation of creosote/coal tars by permanganate ion. G.S. Brown's paper (cited in the comment) lists potential oxidation products as aromatic diols (glycols) and short chain alkanes. Finally, the book *Principles and Practices of In Situ Chemical Oxidation using Permanganate* by Siegrist et al. indicates that permanganate produces different products under acidic and basic conditions and can cleave one of the aromatic rings of naphthalene (in acidic solutions) to produce phthalic acid.**

**Standard EPA analytical methods may not detect all of the potential intermediates that could be produced. More in depth literature research may be required to investigate this issue. If needed, specific analytical testing could be conducted from a bench-scale treatability test (hence in a more controlled environment) to identify if any intermediates are contaminants of concern, and what permanence these compounds may have both in the presence of excess oxidant and in the absence. This level of effort is ideally done at the university level. Field sampling should be restricted to a known parameter list for effective monitoring and reduced costs.**

**As noted in Responses 7 and 21, dioxins and furans are not COCs in ground water; however, performance monitoring of the remedies can be employed to look for the creation and/or transport of dioxins and furans. As with PAHs, the investigation of potential oxidative intermediates is beyond the scope of the CERCLA design process and would best**

**be determined at the university level through a more thorough examination of existing academic reports or through analytical testing for dioxins/furans in bench scale testing.**

3.3.4 Questions from League of Women Voters Expressed at Public Meeting

*Note: The following questions are summarized from Ms. Deborah Nelson's questions posed at the public meeting. EPA's responses made at the public meeting have been edited in this Responsiveness Summary. Verbatim transcript of her comments and EPA's responses may be found in the meeting transcript, Appendix A.*

We were concerned that you would come up with or formulate a process without doing a treatability study first.

**Response 52 – EPA will be conducting field-scale treatability studies (an Oxidant Feed System Test [Push-Pull Test] and an Oxygen Infusion Test) to evaluate the effectiveness of different components of the remedy. The purpose of these tests will be to evaluate the ISCO process option at the pilot scale and to examine the vertical and lateral distribution of dissolved oxygen from the proposed horizontal wells as a design basis for the full-scale design.**

We were concerned about their effectiveness in treating the naphthalene and the other chemicals that you identified as critical. We were concerned about the possibility that perhaps it won't work.

**Response 53 – Appendix B in the feasibility study has a discussion about a variety of different technologies, including the one that was chosen. See also Responses 26 and 52.**

Secondly, we were concerned that EPA's remediation processes won't be capable of degrading NAPLs.

**Response 54 – As noted in Response 9, the technologies that were chosen are capable of addressing NAPLs. To date, none has been detected. Additional investigations may be undertaken to confirm this finding. If NAPL is found, the remedial approach will be adjusted accordingly.**

Thirdly, EPA has never answered the dioxin questions brought up by your own groundwater sampling results and estimates based on results. Mainly, dioxin exceeded acceptable levels in 23 plume area locations including five wells that are on the east side of Bayou Texar. We think that EPA should have followed up with a definitive analysis of plume area dioxin findings, but your agency has never done so. Instead, EPA has decided to omit dioxin from its designated contaminant of concern list and then selected remediation processes that will not remove dioxin. And that's a concern we have.

**Response 55 – See Responses 7 and 21.**

Four, EPA has assumed that the plume extends to Bayou Texar but neither enters the bayou or flows under it to the east. We think EPA should have delineated the southern and eastern boundaries of the plume and (inaudible) the public's contact with any part of the plume, but the agency has failed to do so. EPA is relying on the University of West Florida study of Bayou Texar to state that the plume has not affected the bayou. That study is inconclusive and does not conclude that the plume has not polluted the bayou sediments.

Emerald Coast Utilities Authority's Hagler drinking water supply well is located east of the bayou, and we think that's vulnerable to the plume as well. Without an investigation to define the eastern edge of the plume, nobody knows whether this well has been affected or is in danger of contamination. That is a major concern as well.

**Response 56 – See Responses 1, 4, and 25.**

It appears that EPA has arbitrarily chosen to limit the remediation process to what can be staged on the CSX Railroad properties

**Response 57 – Although the figures in the report(s) may appear to limit the remediation process to what can be staged on the CSX Railroad properties, this is not EPA's intention. There are many criteria that can apply to the selection of remediation process staging locations. They include technical issues (proximity to the contamination; appropriate subsurface geology to facilitate achieving remedial goals; etc.) and socio-political issues (access to properties; minimizing impact to the local population; interference with existing infrastructure and utilities; etc.). All of these criteria were taken into account when preparing the remediation strategy. For instance, the most highly contaminated groundwater zones are beneath the CSX property; this led to the placement of remediation process equipment at those locations. The strategy as presented in the Feasibility Study report also is intended to be both flexible and dynamic, which will allow adjustments to be made as new information becomes available that suggests moving some remediation processes to a new location.**

EPA is assuming that the plume has already been degrading and that by simply encouraging the ongoing action of naturally existing microorganism -- this is in the largest reaching part of the plume -- that's going to be enough to reduce the toxicity. In other words, no treatment on the big -- the widest section.

**Response 58 – The remedial approach is to use the technology most appropriate to the level of contamination. MNA is only appropriate when the upgradient sources are addressed. Once the ongoing contamination from the source and high concentration areas is stopped, MNA will be effective. It is anticipated that the active remedial activities will enhance the ongoing natural attenuation processes as ground water flows from the zones of active treatment into other zones. Should contaminant levels fail to reach the cleanup levels in a reasonable timeframe, EPA will reevaluate the situation and take the necessary corrective measures.**

EPA is assuming that designated contaminants of concern are going to remain stationary while they are degrading during the remediation process, but the remediation processes are going to move the plume vertically and horizontally.

**Response 59 – EPA recognizes that the ground water system is dynamic. That is, it is influenced by natural hydraulic gradients and the contaminants will therefore not remain stationary. To the extent possible, EPA plans to impose artificial gradients on the aquifer to limit contaminant migration. This will be accomplished through a series of strategically placed extraction and injection wells to recirculate the ground water from inside the chemical oxidation area. A network of monitoring wells will assess the effectiveness of this plan. EPA anticipates that injections of gaseous oxygen, instead of water saturated with oxygen, will avoid displacing the ground water. This will thereby avoid pushing contaminated groundwater out of the way with the water that is being injected into the system to treat it.**

3.3.5 Comments from Gulf Coast Environmental Defense

Gulf Coast Environmental Defense has always worked to protect and improve the local environment, especially its water resources. We have taken a strong interest in the Escambia Treating Company Superfund site, and we have participated in all public meetings and comment opportunities to advocate for the most effective cleanup achievable.

GCED is concerned about EPA's inadequate delineation of the ETC plume of contamination, which has grown to immensity during the 20 years EPA has left it to spread into the aquifer. Surely, in 2008, analysis of the plume should be complete. Yet we find several troubling deficiencies.

In addition, it is disappointing to note that EPA's planned remedy rests on certain unproven assumptions that may impair its success.

These are the most critically weak points in the EPA plan:

The eastern boundary of the plume is unknown, despite the critical questions this raises.

**Response 60 – See Response 1**

Does it discharge in Bayou Texar? If so, what is happening to swimmers, water skiers and fishermen?

**Response 61 – There is no evidence that the contaminant plume is discharging into Bayou Texar. Based on available data, there is no risk to swimmers, water skiers or fishermen.**

Does it flow under the bayou to the east side? If so, is it in or near the ECUA Hagler well?

**Response 62 – See Response 4.**

The southern boundary is also unknown between Palafox and 12th Avenue.

**Response 63 – See Response 1.**

Are any local residents using contaminated well water?

**Response 64 – To the best of EPA's knowledge, no residents are using contaminated well water. See also Response 5.**

Does the plume contain Non-Aqueous Phase Liquids, and if so, where? Will the chosen remedy remove them?

**Response 65 – See Response 9.**

Since EPA has found Dioxins at elevated levels during each phase of sampling and at 23 locations, how can EPA be ignoring them in the Proposed Plan? Why has EPA decided to focus on only 9 of the toxic chemicals it has found in the plume and ignore all the many others?

**Response 66 – See Responses 7 and 21.**

Will the remedies that EPA is proposing actually work? Why is EPA delaying treatability studies until after it chooses a remedy?

**Response 67 – Based on case studies at sites similar to Escambia, EPA is confident that the remedies will work. That said, EPA will be conducting field-scale treatability studies to test its assumptions. Note that treatability studies are typically conducted during the remedial design phase, as is proposed for this site.**

We also want to point out EPA's peculiar mistake in stating the volume of soil originally stockpiled at ETC as 225,000 cubic yards. The correct number is 255,000.

**Response 68 – See Response 11.**

3.3.5 Comments from PNJ Editorial Board

More than words needed from EPA

Cleanup effort must be proven before we can believe.
We hope officials from the Environmental Protection Agency were listening — really listening — to citizen comments last week on the proposed groundwater cleanup of the Escambia Wood Treating Co. Superfund site.

What they heard was deep skepticism about EPA promises and questions about whether EPA's performance will match its rhetoric.

For instance, questions were raised about the validity of one of the proposed cleanup methods, which is to inject oxygen into the ground to nourish microbes that can consume a variety of contaminants.

The problem: EPA has presented no evidence that such microbes are, in fact, actually present and working now. If they are not, injecting oxygen to stimulate their growth doesn't help.

Area residents also want the EPA to delineate definitive southern and eastern borders for the underground plume of contaminants now spreading through the groundwater.

It's hard to formulate a cleanup plan, and judge its success, if you don't have a specific idea of where the contaminants are.

There is hope that the proposed $16 million cleanup will make a significant improvement to the problem. But as one participant said at least week's public meeting, residents are "not hopeful about the EPA returning if it isn't done right the first time."

The long, drawn-out Superfund process, and a site cleanup plan that left many people here unsatisfied, has created a lot of doubt that EPA is really committed to an adequate cleanup.

It is up to the agency to do the work in a way that restores public confidence.

In large part that will come from being transparent and offering the kind of hard data that goes beyond rhetoric. It is one thing to say a cleanup will work; it is another to document that it is working.

We agree with one thing EPA officials said last week: It is time to get going on this cleanup. The Superfund site is a huge scar on the community, even if much of it is hidden underground.
We look forward to the day when the site is deemed clean enough for reuse, and the groundwater is as clean as technology can currently make it.

But it will take more than words.

**Response 69 – EPA carefully listened to citizens' concerns voiced at the public meeting. The sentiments expressed in this editorial were raised by citizens at the meeting and in written correspondence provided to EPA during the public comment period. This responsiveness summary provides EPA's formal responses to those concerns.**

**The Superfund process is deliberative and can take a long time. Superfund sites are among the most complex waste sites and the solutions are costly and challenging. As such, it can be an understandable source of frustration for the affected communities. EPA is committed to a successful cleanup.**

**The ongoing remedial action at OU1 is testament to EPA's commitment. EPA is equally committed to restoring the ground water so that it can again be considered a safe drinking**

**water resource. As we proceed through the remedial design and remedial action, EPA pledges to maintain open lines of communication with the community. Periodic fact sheets will be issued and public meetings will be held if deemed necessary. Going forward, EPA's goals are twofold: first, to implement the remedy specified in the ROD; and secondly, make the process as transparent and understandable as it can be.**

## APPENDIX A

## Public Meeting Transcript

U.S. ENVIRONMENTAL PROTECTION AGENCY
PROPOSED PLAN MEETING
ESCAMBIA WOOD TREATING COMPANY SUPERFUND SITE
OPERABLE UNIT 2

**PUBLIC MEETING**

Transcript of the U.S. Environmental Protection Agency Proposed Plan Meeting commencing at 6:30 p.m., on the 2nd day of July, 2008, at the Pensacola Civic Center, 201 East Gregory Street, Pensacola, Florida, before C. Jeanine Black, Court Reporter and Notary Public at Large, in and for the State of Florida.

**ANCHOR COURT REPORTING**

229 South Baylen Street
Pensacola, Florida 32501
(850)432-2511
FAX (850)432-2302

6856 Caroline Street
Milton, Florida 32571
(850)626-6207
FAX (850)626-4589

**APPEARANCES**

EPA REMEDIAL PROJECT MANAGER:

ERIC SPALVINS
Atlanta Federal Center
61 Forsyth Street SW
Atlanta, Georgia 30303

EPA COMMUNITY INVOLVEMENT COORDINATOR:

L'TONYA SPENCER
Atlanta Federal Center
61 Forsyth Street SW
Atlanta, Georgia 30303

EPA BRANCH MANAGER:

CAROL MONELL
Atlanta Federal Center
61 Forsyth Street SW
Atlanta, Georgia 30303

EPA LEGAL COUNSEL:

LISA ELLIS, ESQUIRE
Atlanta Federal Center
61 Forsyth Street SW
Atlanta, Georgia 30303

## INDEX OF PROCEEDINGS



## INDEX OF EXHIBITS

MS. SPENCER: Good evening, everybody. My name is L'Tonya Spencer. I'm the community involvement coordinator for the Escambia Wood Treating Company site. Tonight we are here to talk about a proposed plan for Operable Unit 2 which is the groundwater cleanup.

First, I'm going to introduce our EPA personnel and staff that's here. After that, Eric is going to give his presentation on Operable Unit 2. After Eric finishes his presentation, we will have a presentation or a statement by the Women League Voters. Did I say that correctly? League of Women Voters. She's going to make a statement.

If you have any questions during Eric's presentation, I have a comment card because we want him to be able to get through the presentation. So if you have any questions during the presentation, if you would raise your hand or if you want comment cards now. I'll take your questions on the cards when Eric finishes the presentation and after the statement from the League of Women Voters. I'll get that right before tonight is over.

First, we have Eric Spalvins who is the

remedial project manager for the site. We have Carol Monell, our branch chief; and we have our attorney, Lisa Ellis, here; and we also have some representatives from the Florida Department of Environmental Protection. With that, Eric is going to start.

MR. SPALVINS: L'Tonya, can you help me with this real quick?

(Whereupon, a discussion ensued off the record.)

MR. SPALVINS: Is that good? Can everybody see? Great. Thank you all for coming. My name is Eric Spalvins. As L'Tonya said, I'm the remedial project manager for the Escambia Treating Company. I recently inherited this site from David Kiefer. So I've been on the site for about almost a year, I think, or nine months. So I thank you all for being here.

We are here tonight to present the proposed cleanup plan for the groundwater for Escambia Treating Company. Now, this is the plan -- the proposed plan is EPA's way of saying this is the remedy that we think is the best choice. This is not the selection that we have made. We will make the selection with the issuance of a remedy

Record of Decision, ROD. So we look forward to getting community comments. If you have any questions or require any clarification, then I'll be happy to answer those. And after we have ended our public comment period which ends July 28th, we'll issue the ROD; and as part of the ROD, we'll have a written responsiveness decision --

MS. MONELL: Response to comments.

MR. SPALVINS: Response to comments?

MS. MONELL: Response to summary.

MR. SPALVINS: -- response to summary. That will be a written response to the comments we receive during the public commentary.

So just to tell you a little bit about where we are in the Superfund process right now, we have moved past the remedial investigation for the site. I'll go into details about that later. We have completed the feasibility study which is where we look at options. We are currently here at the issuance of the proposed plan, and remedy selection will occur during the Record of Decision. Once the cleanup decision has been made, then we'll move into remedial design. Once the design is complete, we'll move into remedial action. Once our remedial action is complete, we'll be in operation maintenance.

This is the location of the site. This is downtown Pensacola. Bayou Texar is here; the site is over here (indicating). And I want to go ahead and go over -- we have been working on the groundwater remedy for a little while here. We have -- David and EPA has been involved with the community groups, different community groups, the Clarinda Triangle Association, the Chamber of Commence, Bay Area Regional Planning Commission -- no, Bay Area Resource Council, West Florida Planning Commission, and presented some of the early iterations, some of the early information on feasibility study and groundwater contamination and how we are hoping to address it.

We have issued fact sheets. We do have a project website which contains the proposed plan and the feasibility study in PDF. That's www.etccleanup.org. We also have updates there of the ongoing soil cleanup. We also had recently an event with community members, local- and state-elected officials and also Senator Nelson at the site in June.

To go a little bit over the operational history at Escambia Treating Company, this was a wood treater that operated from about 1942 to 1970. Well, from 1942 to 1982. From '42 to '70, creosote was the primary preservative used. Then from 1970 to 1982, Pentachlorophenol was used as well.

The primary source of the contamination to the groundwater were the wastewater ponds and surface impoundments that were used to manage the wastewater at that site. There also was a lot of soil contamination that acted as a source for groundwater contamination as rainwater filtered through the contaminated soil.

This is a historical photograph of the wood treating facility (indicating). I do want to kind of just point out a couple of things. This little corner over here (indicating) was a pond that was used I think from the '40s into the '60s as a wastewater pond. Then later it was filled in and used as a landfill. That's one of the main areas where they did removal action. That's also one of the main source areas for groundwater contamination.

The Escambia Treating Company has been

divided into two operable units. This is a way for EPA to separate parts of the cleanup so that we can accelerate one part or address one part of the cleanup before we are ready to do the whole thing. So sometimes we use this to expedite cleanups.

In this case, we started on Operable Unit 1 first which was the contaminated soil, and the current cleanup deals with the contaminated soil and the existing soil stockpile that was removed in the removal action. Operable Unit 2 is the groundwater, which is contaminated groundwater on-site and offsite. That's what we are talking about tonight.

In terms of groundwater investigations, they started back about 1982. As early as 1982, there have been a number of studies conducted by the State, conducted by EPA, different parts of the EPA; but as far as the Superfund part of this investigation, the remedial investigation for the whole site began in 1994 when the site was listed on the National Priorities List. That's when it became a Superfund site.

As part of this, 55 groundwater samples were collected. Then in '98, as a part of that investigation, we decided that we should split the site into the two operable units which meant that an RI for Operable Unit 2, the groundwater, just focusing on the groundwater, was started in 2000 and had four phases that occurred until 2005.

Also, not involved -- a study that EPA did not conduct, but looked at the site, was a study by the University of West Florida that looked at the effects on Bayou Texar. That study looked at the effects of other sources of pollution including the Agrico Superfund site which is nearby; and it involved poor water, which poor water is the water in the sediment of the surface water body.

So you have surface water; you have groundwater. And then as groundwater moves into surface water or as surface water moves into groundwater, it is poor water. So they sampled poor water and the sediment in Bayou Texar. We'll get into that a little more later.

EPA conducted an additional characterization of the highest areas of contamination as part of the feasibility study in 2007. This was to refine some work that had been done on the feasibility study up to that point that needed a little more information to give us better knowledge of exactly what we were looking at in the source area.

This is a cross section of the groundwater (indicating). It will take a second to explain this, so bear with me. We have the Escambia site over here, and then Bayou Texar is over here (indicating). The scale is exaggerated a little bit on the vertical axis so we can kind of see some details.

The site contamination -- this is the groundwater contamination that came from the wastewater pond, like I said earlier. So an underlying wastewater pond is receiving wastewater from the wood treater. The liquid parts of that mix that they use, it just goes down. It just pours straight down into the groundwater. It doesn't move very quickly, but it moves down into the groundwater as pure product.

Then there is also, up here, soils that were contaminated (indicating). And as rainwater fell on those soils, it infiltrated through the contaminated soil and became contaminated groundwater when it entered here (indicating).

What we see -- the way the contamination moved once it entered the groundwater -- so the water table starts here (indicating). The removal action that happened in '90 for soils excavated a lot of this material down to the water table. The contamination then has moved down into the aquifer, and there's a layer of the aquifer around here that is a little bit lower permeability, which means that the water contaminants move more slowly through it. It has a different -- it's made up of different types of soils and aquifer material. So the worst contamination -- the contaminants as it moved through here, they slowed down. They adhered and absorbed to that layer in the soil more than they did this upper part of the groundwater. And then the worst of the contamination continued to move down into this lower part of the aquifer we call the main producing zone. Once the contaminants got into here -- the water is moving through here at a much higher rate than this middle area. So that's why we have this long plume of groundwater contamination.

So what we see is then this area here, where we have the highest contamination, is acting as a continuous source for groundwater contamination to the lower part of the aquifer. It's being picked up in the regional flow which moves it toward Bayou Texar.

As it moves closer to Bayou Texar, the contamination starts to move up. We see it a little shallower over here, but we haven't found any of the contaminants that are in this plume in Bayou Texar or in the sediment or in the poor water.

So we think that what is happening is Bayou Texar is acting as a groundwater divide which, if you visualize it, the groundwater, especially the surface water, is moving towards Bayou Texar, and Bayou Texar flows to the ocean. So as it comes to Bayou Texar, the water is moving towards Bayou Texar, and than out towards the ocean. The same thing is happening in the lower aquifers, but the gradient is not pushing the water all the way up to the surface water.

So we think that what is happening is the contaminant plume is moving across and starting to come up; but before it comes out of Bayou Texar, it moves down, and the natural processes that are consuming this contamination are making the -- lowering the concentrations. So that's why we see lower concentrations down here than we do closer in to the source area (indicating).

This is a look at -- a more detailed look at what we are calling the source area. So the site would be here (indicating). This is where the worst of the contamination has come to rest. This is an overhead view of the extent of contamination in all layers of the aquifer. This shows just how far the contamination is above the drinking water standard.

As you can see, it does come to Bayou Texar, but this is below the level of Bayou Texar. We have groundwater wells on the other side of Bayou Texar. We haven't found any of our contaminants on the other side of Bayou Texar. So we are convinced that Bayou Texar is acting as what we call a groundwater divide. So the groundwater on this side of it flows to Bayou Texar, and the groundwater on this side of Bayou Texar flows to Bayou Texar as well.

This is the Agrico site that I mentioned earlier. And this is a 3-D representation of what we are talking about, another way to look at it. So we have the same image that we have rotated a little bit; and then we have this surficial, shallow contamination that we mentioned.

Then this is an area of -- this part of the area is what we are calling the source area. This darkest area is the level of the highest concentration of naphthalene. Then we have, below that, this main producing zone of the aquifer. You can see by this little current out here that what we think is the contamination is coming down, and then it's moving and coming up toward Bayou Texar (indicating).

The question is how bad is it, and what do we do about it. The way that the Superfund program works is we conduct risk assessment. We have guidance on how to do this consistently so that we look at all the sites across the nation the same way. Part of that is the human health risk assessment. The good news is there's no excess risk associated with the current use of the groundwater. This is because everyone in the area is on city water, publicly supplied water. So in the absence of a drinking water well in the plume, there's no exposure route to any people, which is good.

It is possible, however, that future residents at some point in the future may put in a well, and then there is a potential for risk in the future. So that's one of the reasons that we are recommending an action be taken.

Another motivation for the action is to restore the groundwater to beneficial use, which is part of our mission. When we find contamination in groundwater, our policy is to clean it up.

We also have conducted an ecological risk assessment. This looked mainly at Bayou Texar, and we looked at the groundwater-to-surface-water or sediment pathway. And the way it works is you take a look at what could be a problem. This pathway to Bayou Texar was considered a potential threat.

So we looked at it, and we have looked at the contaminants in the plume and what could be getting there. We have six contaminants that we retain for consideration. None of those were detected in the Bayou Texar water or in the sediment. So we feel good that Bayou Texar is not currently being impacted by this site.

However, the cleanup for groundwater, cleaning this up to drinking water standards and returning the aquifer to beneficial use will eliminate any potential threat to Bayou Texar because the contamination will be gone. So we feel good about this.

So the next step in the process is to come up with a remedial action objective. This is what we want to accomplish with the remedial action. We have three of those:

Prevent further contamination of groundwater by aggressive treatment of the source area. This will -- this fits in with the soil remedy which is removing contaminated soils that could be a threat to groundwater. This will remove source areas in the aquifer to groundwater.

Prevent future exposure to contaminated groundwater by treating the aquifer to meet health-based cleanup standards. And this takes care of the potential human health risk for a future human receptor.

And the third remedial action objective is to eliminate any future potential degradation of natural resources, which is Bayou Texar. And while we don't see any current impacts, if we achieve our other goals, this goal will follow.

These are our cleanup goals for groundwater. We have a list of contaminants, the cleanup goal, and then the reason why we are getting the cleanup goal. The message here is we are using the State's cleanup goals for a lot of these, which is part of our program. If the State has a cleanup goal for groundwater that is more conservative than ours, then we evaluate it, and, in this case, we decided to use the state cleanup target levels.

We also have two that are -- the reason that we have the particular numbers here, HQ of one is, in a risk assessment, we look at a site-specific evaluation of contaminants in the exposed pathways. In this case, the hazard quotient, which is the comparison of the health based -- a health standard for a contaminant, that number worked out to be lower than the state or the federal level. So we used that --

selected that site-specific risk number for two of these contaminants.

Overall remedial strategy, the goal is to restore the aquifer to beneficial reuse and obtain our cleanup levels throughout the plume. The way we are going to achieve this is we are going to tailor the technology and the approach to the level of contamination in different parts of the plume. So we have designated -- this is conceptually -- we are thinking about this as a source plume which has greater than 7,000 micrograms per liter of naphthalene. That will receive an aggressive treatment.

A highly impacted plume area which is a dissolved area of the plume -- a plume where the dissolved concentrations are 140 micrograms per liter to 7,000 micrograms per liter, that will receive an active treatment, which we'll talk about later. And then the dilute plume is levels between the drinking water standard which is 14 micrograms per liter and 140 micrograms per liter which is the State's natural attenuation default criteria. That is the concentration at which the State of Florida has said that it is appropriate to consider natural attenuation. That will receive active monitoring of the natural attenuation. So we will be actively monitoring this to make sure we see the degradation the way we want.

If, in that monitoring, we find that the contamination is not breaking down through the monitoring -- naturally, as we would like, then we will have the opportunity to fix that problem, to go in and take additional action. So we are not just going to be walking away. We are not saying, well, let Mother Nature take care of it. We are going to make sure Mother Nature is taking care of it by watching it very closely.

So, to go back to this slide which shows the cross section of the plume, the very closest area to the site, this is an approximation of the area where we will be using the most intense, aggressive treatment; and then this other area is an area where we will be looking at the other less aggressive treatment. And the yellow area is the area where we are already at the appropriate level for natural attenuation.

Let me get some water.

So let's look at the evaluation of remedial alternatives. Part of the feasibility study -- the way it works is we start with a large list of options. And, I mean, like more than 20. If you look at the feasibility study, you will find tables in there where we are looking at a lot of options, and we have a screening process that details, you know, is this option even remotely feasible for this situation. And so we have kind of screened it down -- we whittled this down to a shorter list that we do a more in-depth comparison on.

We have nine criteria to evaluate these options that are a more detailed analysis. We have two threshold criteria. Any of the options we look at have to meet the threshold criteria. If they don't meet the threshold, then they are out of consideration. That is, overall protection of human health and the environment. So it must be protected. Compliance with applicable or relevant and appropriate requirements, or ARARs, which is a fancy way of saying that if there are other cleanup levels that we need to meet, such as if the State has a cleanup level or there is a site-specific cleanup level or if there is a requirement from another law or regulation that we need to consider, the cleanup alternative has to meet these requirements.

Once we have selected the options that meet the first two, then we look at balancing criteria, one of them being long-term effectiveness. Is it going to be effective in the long term.

Another is reduction of contaminant mobility, toxicity and volume. Is it going to reduce the mobility, so that the contaminant can't move? Is it going to make the contaminant less toxic, or is it going to reduce the volume? Is it going to destroy the contamination, or is it going to take care of the contaminants?

The short-term effectiveness includes things like on the short term, are people going to be protected? How long will it take for people to be protected? For this situation, we don't have any immediate exposure pathway, so we -- it's protected in the short term, but short-term effectiveness also considers things like during the implementation of the remedy, are there opportunities for people to get hurt? Like are you moving a lot of material? Are you going to be shipping a lot of stuff? Is there a potential for the activity to produce hazardous conditions? So that's another factor there.

Implementability is the technology, something you can implement easily. Cost, we look at, relative, you know, to the other alternatives, how much does this cost? Then we have the two modifying criteria which is we want to make sure we have considered the State's comfort with the remedy and also the community's acceptance of the remedy.

Now, to look at specifically our site here or the groundwater, Escambia, for the source plume which is the most contaminated area, the first thing we have to look at and we are required to look at by law, even though it doesn't meet the criteria of being protected, is no action with monitor. That's if we walk away and kept an eye on it, but didn't take any active treatment. We have an estimated net present cost, which is just a way to even -- net present cost is a way to even the playing field. So if you are spending $10 a day over 10 years versus a hundred dollars a day, how do you compare that? Net present cost does that because they take different timeframes.

The second option was groundwater recovery treatment and reinjection which is pump and treat. You remove the groundwater that's contaminated. You treat it to remove the contamination, and then you inject it back into the ground. This option is in situ enhanced by remediation with oxygen amendment and natural groundwater flow. These are going to run together, so I'll try to keep them separate.

But enhanced bioremediation with oxygen amendment is adding the oxygen to the aquifer either through adding oxygen directly or adding a compound that releases oxygen. That encourages the microbes to break down the contamination. Natural groundwater flow means that we are just going to inject it into the source plume, and we would let the natural flow carry it down.

This next option is similar. It involves bioremediation with oxygen amendment, and instead of letting the groundwater just carry it, we have horizontal wells through the plume to extract and reinject. That's a recirculation. So we are maintaining a zone in the groundwater. When you extract and inject it, it lets you move the -- it gets better contact with other parts of the aquifer, and you have better distribution of your -- anything you are adding.

This next one is in-situ chemical oxidation and enhanced bioremediation using oxygen with vertical and horizontal wells. The bioremediation and oxygen is the same as the others, pretty much. Vertical and horizontal wells is a little different. We have some vertical wells. We also have some horizontal wells.

The thing that makes this really different is the in-situ chemical oxidation. That is a very -- a relatively -- it's a more intense treatment than bioremediation. You inject chemicals that oxidize the contaminants, in fact, any organic matter in the aquifer. You select a compound. It could be ozone; it could be oxygen; it could be sulfate; and you add it. Once it gets into the groundwater, it starts oxidizing things. I don't know if -- I can't think of a good analogy, but maybe OxiClean or something like that is the way to think about it.

Then the last one is in-situ chemical oxidation using horizontal wells for extraction/reinjection, and this one is only using chemical oxidation. So step four involves chemical oxidation to address some of the contamination, and then transitions the system into using the enhanced bioremediation and using the enhanced bioremediation to reach a much lower level of contamination.

The fifth option is using chemical oxidation to try to oxidize everything that's in the plume all the way down to methyl, so there's no contaminants left.

We have the relative costs here. You know, seven million, five million, 9.9, 8.8; and then this last one is 51 million dollars. It's quite a bit more expensive because it requires a lot more chemicals to do the -- to have enough chemicals to completely oxidize everything in the plume.

The next part of the plume that we are looking at is the high concentration plume area. Similarly, we have no actual monitoring which is required that we look at that. So we carry this over. And then similar to the previous slide, we have in-situ chemical oxidation and enhanced bioremediation. We also have an option which is enhanced bioremediation solely.

And then we have -- the last one is bioremediation with groundwater recovery, treatment and recirculation. So that's adding the oxygen and then also pumping out the water, treating it and then putting it back in. So it's just another -- it's another more involved step. And the cost comparison, it's -- you know, the chemical oxidation is more expensive.

The high concentration plume area is larger than the source plume area. So it takes more. The enhanced bio is 6.5, and the bio -- enhanced bioremediation with pump and treat is 7.7 million.

The last part of the plume is the dilute plume. We have these three options that carried over: No action again; long-term natural attenuation which, as I discussed earlier, is where we keep an eye on everything chemically and biologically that's happening in the plume, make sure we are seeing contaminants decrease.

Then the last option is the in-situ

enhanced bioremediation which is similar to what we talked about before.

We see the costs. No action is the same as the other costs for no action, 54,000; monitoring natural attenuation is about 800,000; and the enhanced bioremediation is 2.5 million.

The remedy the EPA thinks is the best remedy, which we would like your comment on, is the combination of these three: SP-4 which is the chemical oxidation with enhanced bioremediation in the source area; and then in the high concentration area, enhanced bioremediation; and in the dilute plume area, monitor and natural attenuation. We have the net present cost for all these, and the total of all this is about $16 million.

Now, we have -- in the feasibility study, we have a much more detailed analysis of these alternatives, and we have scoring of the alternatives. I'll tell you that the scores which balance several criteria and present a weighted average, the highest scoring alternative for each part of the plume is here. So SP-4 was the highest scoring alternative for all the source plume alternatives. Same with

HCP-3, high concentration plume three, and DP-2. So looking at all of the criteria, these were the high scoring, and that's why we are recommending this and appreciate your comments on it.

To go a little bit more in-depth of what we are talking about, this is kind of a conceptual layout. These lines may not correspond with the information you have. That's -- just for the sake of presentation, it's simplified.

We have the source plume area. This is the high concentration area, and this is the dilute plume area. So we are talking about putting in -- and I'll show this in more detail. This is the chemical oxidation zone. These are the vertical wells. These are horizontal wells which will be used for both the chemical oxidation part of this remedy and the enhanced biodegradation part of the remedy. We have a line of groundwater recovery wells here which will help make the entire process more effective by recirculating some of that water. And this is the SP-4 component.

Then this is HCP -- the HCP-3 part of the remedy, proposed remedy. These are wells (indicating). We haven't made a determination of the best way to build these yet, but the idea is either vertical -- a series of vertical wells or a horizontal well that will deliver this oxygen to the aquifer, increasing the level of oxygen in the aquifer and allowing microbes to then consume the contamination.

So the way it will work is the source area will be treated. Once the source area has -- the levels have been decreased to where they are appropriate for the enhanced bioremediation, then it will be switched to enhanced bioremediation. All of this then will be under enhanced bioremediation.

Once that plume has been destroyed to the level that monitored natural attenuation is appropriate, then the entire plume will be left to monitored natural attenuation. We will be leaving all these wells in place so that if we have a problem or if we decide we want to speed it up a little bit, we can always continue to add oxygen. The wells are built in such a way they can be used as monitoring wells; they can be used as injection wells; they can be used as pumping wells. So we have a lot of flexibility with the way these are built.

Then, hopefully, we think, about 20 to 30 years -- it's hard to make estimates on this kind of thing because, remember, right now, we still have this source area that's contributing these contaminants to the whole plume. And until that source area is gone, it's hard to really estimate the capacity of all these microbes in this aquifer to consume and attenuate contamination.

We know it's working because we see lower levels of contamination here. And natural attenuation is several different processes occurring in the plume. And we see that it's working already because we have it working, but once the source area has been addressed, then we will be able to do a much better estimate of how long it will take for natural attenuation to completely resolve the plume, and eventually we won't have one anymore.

So that's a conceptual layout of what we are talking about. This is a little more focused in on the aggressive treatment zone where we would be treating the source area. So what we are seeing is, this is our property;

these are the railroad tracks at the CSX Rail Yard (indicating). On the ETC property, there would be a series of vertical wells which would be used to inject chemical oxidants. Some of these horizontal wells can also be used to inject chemical oxidants. We can use these to extract groundwater which will help pull the chemical oxidants forward. We can use them in a variety of ways.

The horizontal wells are here because we can't move the rail yard. This is a way for us to get under the rail yard and address the contamination in an area where it's most contaminated.

Then the last component of this is this -- these groundwater recovery wells over here (indicating) which we would use to pump groundwater back up here to the top, add more chemicals or more oxygen, and then we can create a recirculation pattern here.

From a side view, this is kind of what it would look like. These little circles represent the horizontal wells. So visualize these coming out of the screen towards you. Each of these -- we have them staggered at different depths.

They are placed horizontally. We can operate, like I said, pump on some of them and pull on some of them so that we can address -- get the best distribution of the chemicals.

Right now we are preparing to do a treatability study for the groundwater. I have the work plan in my desk. We haven't approved it yet, but we should work through all the details with the State very soon. Hopefully, we'll be doing this in a few months when we start the treatability study.

The purpose of it is to inform the remedial design of the remedy. We'll look at the aquifer chemistry, get a better understanding of that. We'll get a better idea of the aquifer hydrology. We'll be installing some wells that will be able to take samples out to learn about the chemistry of the aquifer material. The hydrology, we'll be doing pump tests in the aquifer with horizontal wells to determine how far apart they need to be spaced, how we can operate them in pumping or pumping in or out mode. We'll also look at oxidant effectiveness which will enable us to select the best oxidant or a combination of oxidants for the chemical oxidation.

This is designed to support the remedial action because the infrastructure that we are putting in place for the treatability study will remain in place for the remedial action, and we'll use it. I'll show you what it kind of looks like. We'll have three wells. I think there are two here and one here that are horizontal (indicating). Then we have some wells here that we'll use to monitor what happens when we pump water in and out of these things (indicating). And we'll also be putting in a test boring well up here.

The treatability study is -- it helps inform the design of the remedy. It's not part of the remedy selection process. So this is going to help feed information into the remedial design.

And this is kind of a depiction of what the horizontal drill rig does. It's an interesting technology. The drill rig is able to go down at an angle, and then the well is able to be turned and maneuvered underground. I think it's going to be quite interesting. This just shows, you know, under the railroad tracks, we'll be getting to it. Then this is a picture of one of those rigs (indicating). I think I have seen things like this on the side of the road. This is kind of a -- this is an area where they have used this before to go under a railroad track. This is the treatment system, and then this dotted line is supposed to represent how, you know, the well dives under the railroad tracks (indicating). I'm not sure where that site is. But our engineers are familiar with that, and they are using what they learned there in designing this one.

Let's see. So I think that wraps up everything that I prepared. If you have any questions, please, Tonya has these cards. Hopefully, we'll be able to address those.

I'll remind everybody, the ETC cleanup website has got a lot of good information on it with regards to the proposed plan and the treatability studies as well.

(Whereupon, Mr. Spalvins was provided the question cards.)

MR. SPALVINS: This is a question about Agrico.

MS. SPENCER: DNT.

UNIDENTIFIED SPEAKER: Dinitrotoluene.

MR. SPALVINS: Okay. Got you. The dinitrotoluene source is from Agrico. It should be the responsibility of the PRT of Agrico to clean up the dinitrotoluene.

THE REPORTER: I'm sorry. Can you repeat that?

MR. SPALVINS: Sure. It's dinitrotoluene. And the question is: The dinitrotoluene source was from Agrico. It should be the responsibility of the PRT of Agrico to clean up the DNT. Can you explain further.

Dinitrotoluene, or DNT, was retained as one of our contaminants of concern. And we have it -- we will be looking at it and making sure we address it. The Agrico plume is separate from our plume. It's -- I don't think I have -- I don't have a drawing of it, but it's further south of our plume and has a different path. It's a little shallower. But the remedy that we are proposing should address it as an organic chemical. It will be oxidized just like anything else, any of our contaminants that are in the plume.

MS. SPENCER: There's a statement from the

League of Women Voters.

MR. SPALVINS: I know -- it looks like I have -- it just says common groundwater planning, Allan Peterson.

MS. SPENCER: The women's league was supposed to go first.

MR. SPALVINS: Oh, I'm sorry. I'm sorry. Please go ahead.

MS. NELSON: I'm Deborah Nelson. I'm with the League of Women Voters. We did have several areas of concern that we just wanted to share with you this evening. Number one, I think that you have already touched on this a little bit, but we were concerned that you had -- that EPA had selected the remediation process without conducting the treatability studies first.

You said that's going to be happening in conjunction with the process, or that's going to be correcting for whatever doesn't work?

MR. SPALVINS: Okay. I think I understand your question. The feasibility (sic) study is the process where we look at the alternatives for the cleanup. And as part of the feasibility study --

MS. NELSON: I'm sorry. The treatability

study.

MR. SPALVINS:  Okay.  Then go ahead and give me the question again.

MS. NELSON:  We were concerned that you would come up with or formulate a process without doing a treatability study first and ensure --

MR. SPALVINS:  Okay.  Well, the treatability study is being done not to determine if it will work.  We are confident that all the -- we are confident that these options will work.  The treatability study is to inform the design of the remedy.  So the determination of whether or not an alternative would work is done in the feasibility study.  And implementability is one of the balancing criteria.  That is, will it work; how easy is it to implement.

So we have taken into consideration implementability.  And in looking at the feasibility study, then you have questions about the rankings or the discussion in there about the implementability of the remedy, then we -- then let us know, and we can address that concern.

But the treatability study is not conducted to determine -- to answer the question will this work. The treatability study is conducted to say, okay, how big does the pipe need to be; how long does the well need to be; those kind of questions. So it's the specifications of the design.

MS. NELSON: Okay.

MR. SPALVINS: That's what we are looking for. Those are the answers we are looking for with the treatability study.

MS. NELSON: We were concerned about the actual remediation processes that y'all had selected.

THE REPORTER: I'm sorry, ma'am. I can't hear you.

MS. NELSON: We were concerned about their effectiveness in treating the naphthalene and the other chemicals that you identified as critical. We were concerned about the possibility that perhaps it won't work.

MR. SPALVINS: Okay. We can -- we'll address that. The feasibility study in one of the appendices has a discussion about a variety of different technologies. It's in the back of the feasibility study. I know that it's on the website, and so I encourage anybody who has questions about that to look in the appendices because there's some discussion there; and if you still have those concerns, we can respond to that. We'll pull out the information that was required, and we'll provide -- hopefully address that concern.

MS. NELSON: Okay. Secondly, we were concerned that EPA's remediation processes won't be capable of degrading nonaqueous liquids and APL contaminations. The concern is that they will continue to leach contaminants because they will continue to be down there.

MR. SPALVINS: That's one of our concerns is DNAPLs, which is a dense, nonaqueous phase liquid, and that is -- these are creosote compounds, for everyone else. They are non -- they are not water soluble. They have a very low solubility in water. So it's kind of like oil and water, is kind of the way to think about it. What happens is, in the soil, if DNAPL is present, you have little globules of these chemicals, and they don't dissolve in the water to flush them out. They just stay there. A little bit will become dissolved and continue to contaminate the aquifer over a long period of time because it is a source that can continue to leach out. That is one of our concerns as well. And we will -- one of the reasons that chemical oxidation is attractive is that it will -- it should be able to address that, but we can address that concern in more detail as well.

MS. NELSON: Okay. Thirdly, EPA has never answered the dioxin questions brought up by your own groundwater sampling results and estimates based on results. Mainly, dioxin exceeded acceptable levels in 23 plume area locations including five wells that are on the east side of Bayou Texar.

We think that EPA should have followed up with a definitive analysis of plume area dioxin findings, but your agency has never done so. Instead, EPA has decided to omit dioxin from its designated contaminant of concern list and then selected remediation processes that will not remove dioxin. And that's a concern we have.

MR. SPALVINS: Well, that concern, I think, deserves a detailed answer, so I won't get into it very much right now except to say that our risk assessment looked at a variety of chemicals; and based on our risk assessment process, dioxin was not carried forward as a contaminant of concern.

Dioxin is a relatively low solubility compound that doesn't travel very much in groundwater. So we will provide more detailed comments as soon as we can.

MS. NELSON: Thank you. Four, EPA has assumed that the plume extends to Bayou Texar but neither enters the bayou or flows under it to the east. We think EPA should have delineated the southern and eastern boundaries of the plume and (inaudible) the public's contact with any part of the plume, but the agency has failed to do so.

EPA is relying on the University of West Florida study of Bayou Texar to state that the plume has not affected the bayou. That study is inconclusive and does not conclude that the plume has not polluted the bayou sediments.

Emerald Coast Utilities Authority's Hagler drinking water supply well is located east of the bayou, and we think that's vulnerable to the plume as well. Without an investigation to define the eastern edge of the plume, nobody knows whether this well has been affected or is in danger of contamination. That is a major concern as well.

MR. SPALVINS: We'll address that in detail. We do have groundwater wells on the opposite side, and we do not detect contaminants in those wells so --

MS. NELSON: Including dioxin?

MR. SPALVINS: I'm not that familiar with it. However, if the dioxin was traveling with the naphthalene, then we would have to have it at all points along the plume, and it didn't make it through risk assessment. We'll address dioxin separately.

MS. NELSON: Okay. It appears that EPA has arbitrarily chosen to limit the remediation process to what can be staged on the CSX Railroad properties rather than using whatever was (inaudible) adjacent properties.

MR. SPALVINS: Well, as we saw, we have plans for our water wells that are in the neighborhood that would be either constructed on rights-of-way or would go underneath the homes to a significant depth so as not to interfere with any utilities or anything. That would address the contamination further away from the railroad. That's the area with the most intensive treatment because that's where the worst contamination is.

MS. NELSON: EPA is assuming that the plume has already been degrading and that simply encouraging the ongoing action of naturally existing microorganisms is going to --

THE REPORTER: Ma'am, I am so sorry. Can you speak up a little bit?

MS. NELSON: Certainly. EPA is assuming that the plume has already been degrading and that by simply encouraging the ongoing action of naturally existing microorganism -- this is in the largest reaching part of the plume -- that's going to be enough to reduce the toxicity.

In other words, no treatment on the big -- the widest section.

MR. SPALVINS: We will be using -- we are proposing natural attenuation, and it will be monitored natural attenuation. So we will be keeping track of whether and how well it works. And if it does not work, then we will know, and we will be able to take corrective measures.

MS. NELSON: Then this is our last comment.

EPA is assuming that designated contaminants of concern are going to remain stationary while they are degrading during the remediation process, but the remediation processes are going to move the plume vertically and horizontally.

MR. SPALVINS: That's one of the reasons that we are proposing this system where we can pump on some wells and pull on some wells, pump in and pull out. We are proposing a series of wells to recirculate the groundwater from inside the chemical oxidation area, and we have a network of monitoring wells. We will be able to measure if we are seeing, you know, contaminants mobilize.

It's certainly a concern when you do this kind of thing, but we think with the -- we should be able to establish hydrology pull which means we can impose on the aquifer, you know, pumping here and pumping there, to keep things from moving around.

The other thing, something I didn't mention about the enhanced bioremediation is, one of the options we looked at was injecting the oxygen. The way that works is you don't -- you can either inject water that's saturated with oxygen, or you can inject straight gaseous oxygen. The advantage of doing that is this well that goes across the plume, you can send a little tube down there and you infuse oxygen and you don't displace groundwater. You just increase the oxygen level of the groundwater. That's an advantage because then you are not pushing contaminated groundwater out of the way with the water you are pumping into it to treat it. That's something I forgot earlier.

MS. NELSON: Thank you.

MR. SPALVINS: Sure.

MR. WILKINS: Keith Wilkins, Escambia County.

THE REPORTER: I'm sorry. What is your name again?

MR. WILKINS: Keith Wilkins.

Eric, for the diluted portion of the (inaudible) conducting natural attenuation monitoring, are you looking for a continual downward trend toward the 14 parts per billion in that to reach below that level, so that if it levels off above that, is that going to mean there will be some type of active remediation applied.

MR. SPALVINS: That's right. If the natural attenuation proceeds -- doesn't get all the way to 14, the drinking water standard, then we would have to take a look at it and see if that remedy is going to achieve our goal. Our goal is to reach drinking water levels and our risk base cleanup levels. If we don't reach that with monitored natural attenuation, we have to go back and revisit the remedy and see what we can do to make that happen.

MR. WILKINS: One other question. With the detailed responses to some of those questions, will that go into the written record and be distributed to the public and also on your mailing list?

MR. SPALVINS: Yes.

MR. WILKINS: Thank you.

MR. SPALVINS: I think that Frances wanted to make a statement.

MS. DUNHAM: I appreciate you making this presentation. We still have some questions. I'm Frances Dunham. I'm speaking on behalf of Citizens Against Toxic Exposure.

I realize you are new to this site. There is one thing that's started happening again.

It's an old mistake, but I would appreciate it if this could be corrected in the documents that you have now and on your website. The stockpile, the original excavation that took place in '91-'93 was actually 255,000 cubic yards, not 225,000. And although that's just a reversal of a couple of the numbers, that's 30,000 cubic yards. That's a very significant amount. You know, I don't for a moment think this is your fault, but, you know, it would be nice to have that nailed down.

MR. SPALVINS: I'll look into that. I suspect -- and I could be wrong. I suspect that the volume they estimated when they did the removal is the first number, but then we had our contractor survey the stockpile. I think that maybe just over time the soils have settled. And as a result of maybe just six inches of settlement, it appears that it's a smaller volume. It might be part of your discrepancy, but I'll find out and let you know exactly why that discrepancy exists.

MS. DUNHAM: That's the number that was used in the design phase meeting; it was used in the Record of Decision in 2006; and it certainly was in the Action Memo, you know, in '93. I can't speak to settling, but it has been used; and then every now and then, they go back. That's a pretty big change.

MR. SPALVINS: I'll let you know if that's a clerical error or if there's another reason for that.

MS. DUNHAM: It sounds clerical to me; but, anyway, EPA has proposed at least partly a remedy that will be somewhat active. We are just a little bit concerned -- in fact, we are very concerned about the things that we don't yet know about the plume.

This remedy is focused only on nine of the chemicals out of the vast number -- I'm not sure even how many there ended up being -- found at elevated levels on the site, volatile organic chemicals, semi-volatiles, heavy metals, PAHs, pesticides, and dioxins. All of these were above regulatory standards in all three groundwater zones. So we are very concerned that this remedy that you proposed here will not be effective on all those chemicals.

We don't know exactly, given the fact that these were all above elevated levels, the regulatory standards, why only these few were chosen. We are especially concerned about dioxin, like the last commentator. I realize that dioxin would not normally move into groundwater. It doesn't like to do that. It prefers to cling to organic particles in the soil; but, of course, we also know there's a lot of naphthalene in this plume. And in the presence of naphthalene, groundwater can move dioxin away.

In fact, the 2006 technical memo on remedial alternatives showed 23 locations within the plume where dioxins were above the elevated levels. That -- we just can't wish that away. It's a very serious problem because of its extremely toxic effects to humans and to the environment.

So CATE has asked in the past and we asked in our 2006 comments on that same document, which is part of the repository, that you go back and sample all those locations again, really, all the locations for dioxins with a better detection limit. There were -- fairly crude methods were used, and we recognize that needs to be done again.

But if it's there, it really can't be ignored. I'm afraid that it is not being considered in this plan. There's no reason to think that this chemical oxidation bioremediation will really work on it.

We have previously commented, the EPA has never established whether any households are using private wells contaminated by the Escambia Treating Company plume. Without that information, EPA cannot claim there is no potential health exposure due to dermal contact, inhalation or ingestion of contaminated groundwater from those residential wells and the consumption of garden products irrigated with contaminated groundwater.

EPA did at one point, a few years ago, promise to do that. I think since that time, it has relied on the Northwest Florida Water Management District which may or may not even know. It hasn't always been in effect. There are old wells. These are old neighborhoods we are talking about. The plume is in a historically developed area. There may well have been wells put in use decades ago before the water management existed or has any record of it.

We feel also that the notification people within the Agrico community received -- what was that? 1998, I believe -- doesn't really cover this problem. For one thing, although the plumes overlap, they aren't entirely in the same locations. So there are other areas that will be contaminated by this plume. It's just the responsible thing to protect these residents from using these wells. I don't think they have received any direct warning. What we would like to see is a door-to-door survey.

We are also concerned the EPA has never defined eastern or southern boundaries in the plume. Eastern plume boundaries especially are important with respect to human health. If the plume enters Bayou Texar, there may be threats to recreational users, swimmers, waterskiers and others, or to seafood consumers. That could be very troubling.

If the plume goes under Bayou Texar, which seems also very likely and even more likely, and, of course, the plume could be doing both, there may be a threat to the Hagler well on the east side of Bayou Texar. And, of course, I don't need to tell you that an ECUA well being affected by these contaminants would certainly be a tragedy for this community.

We are also concerned that there's an arbitrary limitation of the facilities that will be put into place to the CSX Railroad yard. I appreciate you not wanting to disrupt railroad operations, but this plume is a huge one. And it's, especially in part, very, very toxic. It's been here for 21 years now, that we know of, and, certainly, it's been there longer than that; but it was discovered under Agrico in 1987.

At this point, we really need to know it's done right. I understand there's an intention to revisit it; but I have seen too often with a Superfund site, you get these five-year reviews and the assumption is that all is well. We'll see a little thing in the paper, five-year review, everything is great. I'm not very hopeful about EPA returning to do a cleanup if the first time fails. So I do think this is important that we get it right.

Like the League, I'm also very concerned about the nonaqueous phase liquids, how they may be moving around, and they may continue to create contamination by leaching out into the rest of the groundwater. I am not optimistic that these methods will be able to treat them, but, at any rate, these are reasons that I think we need treatability studies, pilot and bench tests to show that this treatment would work on them.

In fact, the treatment methods that you are proposing is assuming that microbes already in the aquifer are doing their work right now. We haven't really seen any evidence of that. We certainly see 21 years or probably more years than that of dilution that's spreading out. But are the microbes working on it? Is it being degraded by that, or is it just simply expanding and so any given portion of it is a little less concentrated? We don't know which is. If you are relying on those microbes which may not be effective on this plume, considering all the contaminants you are not taking into account, that could be -- that's potentially to invite failure.

Also, although we would recommend that you go back and do much more careful delineation, and sampling, especially for dioxins and the other issues that I have raised, if you are intending to go ahead with this, we would at least suggest that you add in-situ chemical oxidation to the enhanced bioremediation for the high concentration plume as well as for the source plume because, for one thing, that will cut three years off the process. That means three years of not spreading and not potentially endangering people.

Thank you for the opportunity to make comments. CATE will be submitting written comments for the record. Thanks.

(Whereupon, Exhibit 1 was identified to be marked and attached to the transcript.)

MR. SPALVINS: Thank you for your comments. EPA shares a lot of the concerns that you have mentioned. There are many of them. So I don't know that I can respond to them effectively right now, but I look forward to talking to you about it later.

MS. DUNHAM: Okay. Good.

MR. PETERSON: My name is Allan Peterson. My comments on the groundwater proposal echo some that have been mentioned already; but they are serious concerns, and they deserve to be reiterated.

For at least 21 years, EPA has known that Escambia Treating Company was contaminating the aquifer. In 1987 pentachlorophenol from ETC was discovered in the groundwater under the Agrico site. The threat to groundwater, in fact, was the reason the EPA excavated the pile of toxic waste that we now know as Mt. Dioxin. That was 1991 to '93.

During those 21 years, EPA has allowed the underground plume of contaminants to spread to clean groundwater under homes, schools and businesses. Finally, in 2008, EPA announced it has a plan to clean up what is now an enormous plume of wood treating chemicals. Unfortunately, EPA still I think does not know enough about the plume to treat it effectively.

I have a couple of things here about what EPA should know, but doesn't know. It doesn't know the southern boundary of the plume, as has been mentioned. Southeast of ETC between Palafox and 12th Avenue, EPA has found that the plume curves south, but has not collected groundwater samples far enough to find a definitive end.

EPA doesn't know the eastern boundary of the plume. Contamination has spread to Bayou Texar a mile and a half to the east/southeast. It extends along the shore of Bayou Texar from the 12th Avenue bridge, south to 34th Street; but there, according to EPA, it magically stops.

EPA is relying on the UWF study to say that the contaminants could not discharge into Bayou Texar. However, the UWF study was inconclusive on that point. It speculated that the PAHs, polycyclic aromatic hydrocarbons, in the bayou came from, quote, a variety of sources including combustion of petroleum and non-petroleum products, unquote. ETC's history of facility fires and the presence of creosote as well as diesel fuel and the use of naphthalene in the plant's labs are consistent with varying ratios of PAH's as have been found in the ETC surface soils. Likewise, EPA is assuming the plume does not flow under the shallow bayou to the east side.

EPA doesn't know whether anyone is drinking from the plume, being exposed to ETC-contaminated water, seafood or produce.

EPA never delivered on its promise to conduct a door-to-door survey to warn families living over the plume against drinking water from private wells or irrigating produce gardens and, as mentioned, not every private well is registered with Northwest Florida Water Management District, and there's been no official warning about Bayou Texar recreation or seafood. If the plume is flowing under Bayou Texar, it may have affected or is approaching the ECUA Hagler public water supply. EPA doesn't know that either.

EPA doesn't know the concentration and locations of dioxins. This is an important issue. Dioxins are measured separately, just as you mentioned, as several related compounds. In order to address the total toxicities of these compounds present in the plume, each compound's concentration must be weighted by its level of toxicity. So apples can be added to apples.

When EPA sampled ETC groundwater, it was not expecting to find dioxins. Only a few samples were analyzed for those compounds. In some cases, dioxins were present at high concentrations. In other cases, the detection limits for the dioxins analysis were so crude that they couldn't say.

In a 2006 report, EPA concluded that dioxins exceeded the government standard at 23 locations, including five wells on the east side of Bayou Texar. It should be noted that non-detect does not mean zero. For instance, if the detection limit for a toxic contaminant is 10 parts per million, it's customary to record a non-detect as five parts per million, since the level could be nine or any lesser amount.

Noting the 23 widely spaced locations in question, EPA was asked to resample all the wells for dioxins using more precise measurements. This was not done, and the UWF report on Bayou Texar included no analysis for dioxins. Basically, EPA decided to ignore dioxins.

EPA also doesn't know whether the contaminants in the plume have been degrading. EPA's plan proposes to treat the most toxic part of the plume by accelerating a process it assumes has been going on for years, that of the degradation of the plume by microbes naturally present in the soil and groundwater. There's no evidence of this.

Natural attenuation is EPA's choice for the rest of the plume. That's bureaucratic for doing nothing at all in hopes that the unproven degradation will do the trick.

EPA doesn't know whether the selected remedies will work, as has been mentioned. EPA proposes oxygenating the most polluted groundwater to activate the microbes already there. No treatability studies have been carried out to prove this will reduce even the ETC groundwater contaminants the EPA recognizes. It will not treat the dioxins in the nonaqueous phase liquids, the NAPLs, which are difficult to clean up and may continue to leach more contamination.

The staging area for the remediation is arbitrarily limited to CSX Railroad yard, even though much of the plume, including the dioxins and NAPLs, are at the distant parts of the plume. The method EPA intends to use will cause the contaminants to move vertically and horizontally. EPA should include a quarterly scheduled monitoring for all the contaminants found in the plume to track fate and transport.

EPA doesn't seem to know how much soil it excavated in the original 1991 to '93 big dig. Maybe it's because ETC has had five regional project managers since 1994, but this is unprofessional. The agency has known; it has forgotten; it has remembered and re-forgotten the volume of the poisoned ETC soil that became Mt. Dioxin. And I reiterate again, it's 255,000 cubic yards, not 225,000 cubic yards. That's an important factor because many Superfund sites -- 30,000 is as big as they are.

So, please, I urge you to go back to the 1993 Action Memo and to the 2006 Record of Decision and let's get this corrected once and for all. It's 225K, and this should be an easy answer.

Thank you for letting me make these observations.

MR. SPALVINS: Thank you. Anybody else have any questions?

UNIDENTIFIED SPEAKER: It's a very basic question.

MS. SPENCER: State your name.

MR. COSSON: My name is Derek Cosson.

THE REPORTER: I'm sorry. Can you spell

that?

MR. COSSON: C-o-s-s-o-n. Just a quick question. Micrograms per liter, how many micrograms is a liter?

MR. SPALVINS: How many micrograms is a liter?

MR. COSSON: I just want a scale.

MR. SPALVINS: Sure. Microgram is -- I might have to get my pencil out to figure this out. It has been a long time. But a microgram is a unit of mass. A liter is a unit of volume. Now, a liter is -- correct me if I'm wrong, but a thousand grams. Okay. So that's the way we determine what a gram is. It's equal to -- a thousand grams is equal to a liter. So, if you have a thousand grams, that's a million milligrams.

MR. COSSON: Yeah.

MR. SPALVINS: And that is one billion micrograms. So one microgram per liter is one microgram per one billion micrograms of water, one part per billion. Okay.

MR. COSSON: Thanks.

UNIDENTIFIED SPEAKER: Will your PowerPoint be on the website? Will you post those?

MR. SPALVINS: Sure. Yes, ma'am.

MS. GODWIN: I am Eleanor Godwin. I am a member of the Clarinda Triangle Association Board. We really appreciate this opportunity to be able to share information and ask questions. Unfortunately, our technical advisor was not able to be here tonight, but he is in the process of reviewing your alternatives and will present his thoughts and comments to you.

But, again, we appreciate your efforts to move forward to the Record of Decision on this project.

MR. SPALVINS: Yes, ma'am.

MS. SISSKIN: My name is Enid Sisskin. I represent the Gulf Coast Environmental Defense. We have been involved in commenting on every aspect of this, and our organization has been concerned with the resources of the area and particularly its waters.

We have similar concerns to the ones presented before. I have them in writing so I don't have to go through them again; but, the delineation, the chemicals chosen, even the amounts listed on the website, the boundaries; and so, rather than you having to type it all over, I'll just give it to you because they are reiterating a lot of the same points made.

MR. SPALVINS: Okay. Thank you. Would it be helpful for you to have a written version of the comments?

THE REPORTER: Yes. Sure. I will attach those as exhibits.

MR. SPALVINS: Whatever you think is appropriate.

(Whereupon, Exhibit 2 was identified to be marked and attached to the transcript.)

MR. SPALVINS: Any other comments? Okay. Thank you all very much. The public comment period is open until July 28th. It was originally the 15th. We extended it a little bit because we had issues and a little delay. So we have extended the comment period.

Again, I encourage you to go to the website, if you would like more information. Also, contact me, Eric Spalvins. My contact information is on the proposed plan. We have printed versions of that out here, if you need my contact information or L'Tonya's.

Yes, ma'am.

UNIDENTIFIED SPEAKER: I believe L'Tonya

said if people have written comments that they aren't submitting, they can be sent by mail or by e-mail.

MR. SPALVINS: That's right.

UNIDENTIFIED SPEAKER: That's to either one of you?

MR. SPALVINS: Yes. If you want, you can give a written version to the reporter so she can make sure that she got everything right from your comments that were spoken.

(Whereupon, Exhibit 3 was identified to be marked and attached to the transcript.)

(Whereupon, the meeting was concluded at 8:15 p.m.)

**CERTIFICATE OF REPORTER**

STATE OF FLORIDA )
COUNTY OF ESCAMBIA )

I, C. Jeanine Black, Court Reporter and Notary Public, certify that I was authorized to and did stenographically report the foregoing proceedings; and that the transcript is a true record of said proceedings.

I further certify that I am not a relative, employee, attorney, or counsel of any of the parties, nor am I a relative or employee of any of the parties' attorneys or counsel connected with the action, nor am I financially interested in this action.

______________________________
C. JEANINE BLACK,
Court Reporter, Notary Public
State of Florida

EXHIBIT
1
7-2-08

Subj: **oral comments from July 2 EPA meeting**
Date: 7/4/2008 4:20:21 P.M. Central Daylight Time
From: apeterson71@mchsi.com
To: paintedrobinhood@aol.com

Jeanine,

I attended EPA's meeting concerning their Proposed Plan for the contaminated groundwater from Escambia Treating Company Superfund Site. Thanks for offering us the opportunity to email our comments to you.

Frances Dunham
Citizens Against Toxic Exposure (CATE)

Citizens Against Toxic Exposure (CATE) will be submitting written comments, written by our technical advisor Wilma Subra, on EPA's Proposed Plan for Operable Unit 2. In my brief oral remarks this evening I summarize the concerns CATE has about EPA's plan:

EPA has proposed three remediation methods for the plume of contamination from ETC. For the plume area with the highest levels of Napthlene, EPA would use In-Situ Chemical Oxidation and In-Situ Enhanced Bioremediation; for the mid-range levels, In-Situ Enhanced Bioremediation; for the lower levels, Natural Attenuation.

EPA's evaluation of remedies is based on just nine of the toxic chemicals in the ETC plume and focuses on Napthalene contamination specifically - rather than all the Volatile Organic Chemicals, Semi-Volatile Organic Chemicals, Heavy Metals, PAHs, Pesticides and Dioxins present above regulatory standards in the groundwater in the three aquifer zones.

Dioxins are a real problem that cannot be wished away. In all 3 sampling phases, EPA has found Dioxins in excess of acceptable levels at 23 locations in the plume; yet neither Dioxins nor Pesticides is considered in remedy selection. Dioxins might normally adhere to soil particles rather than moving into the groundwater, but in the presence of Napthalene, Dioxins can move into groundwater, as apparently they have here. After the 2006 Remedial Alternatives Technical Memo cited the high levels of Dioxins in groundwater, CATE asked EPA to follow up with additional sampling of all wells for all ETC contaminants. EPA has not done so, and now EPA proposes remedies that ignore Dioxins.

Non-Aqueous Phase Liquids (NAPLs) are likely to be present in the plume. NAPLs are challenging to treat and can continue to contaminate the aquifer. Selecting remedies before assessing the presence (or locations) of NAPLs is to invite failure.

All the chemicals found in the plume above the regulatory standards must be considered in remedy selection and in regular (at least quarterly) monitoring.

EPA has never established whether any households are using private wells contaminated by the ETC plume. Without that information, EPA cannot claim there are no potential human heath exposures due to dermal contact, inhalation and/or ingestion of contaminated groundwater from residential wells and consumption of garden products irrigated with contaminated groundwater. CATE has repeatedly asked EPA to notify every household over the ETC plume about the health risks associated with the plume. Not every private well is registered with the Northwest Florida Water Management District - some predate the district or may have been sited without a permit - so relying on their records is not satisfactory. Besides the passage of many years during which residents may have moved, the Agrico notifications are not sufficient due to the differing plume locations.

EPA has never defined the eastern or southern boundaries of the plume. The eastern plume is especially important with respect to human health. If the plume enters Bayou Texar, there may be threats to recreational users and seafood consumers; if the plume goes under Bayou Texar, there may be threats to a public drinking water supply well. The University of West Florida report was inconclusive.

The staging area for the work is arbitrarily limited to the CSX railroad yard, and the installations will be further limited to avoid rail yard operations. These restrictions stand to impede access to the plume and work against the effectiveness of the remediation. This plume is too large and too contaminated with toxic chemicals for treatment to be limited in this way.

EPA's chosen methods of remediation have not been determined to be effective in degrading the chemicals in the contaminated groundwater plumes - not even Naphthalene, much less the host of VOCs, SVOCs, Heavy Metals, Pesticides and Dioxins present in the groundwater plumes above regulatory standards. Selecting remedies before treatability studies to assess their effectiveness is to invite failure.

Although we recommend that EPA revisit the plan to make the improvements listed above, if EPA declines to do so, we want to add that a more effective and timely remedy for the mid-range levels would be In-Situ Chemical Oxidation combined with In-Situ Enhanced Bioremediation.

=

EXHIBIT
2
7-2-08

Gulf Coast Environmental Defense Statement
Enid Sisskin, PhD
July 2, 2008

Gulf Coast Environmental Defense has always worked to protect and improve the local environment, especially its water resources. We have taken a strong interest in the Escambia Treating Company Superfund site, and we have participated in all public meetings and comment opportunities to advocate for the most effective cleanup achievable.

GCED is concerned about EPA's inadequate delineation of the ETC plume of contamination, which has grown to immensity during the 20 years EPA has left it to spread into the aquifer. Surely, in 2008, analysis of the plume should be complete. Yet we find several troubling deficiencies.

In addition, it is disappointing to note that EPA's planned remedy rests on certain unproven assumptions that may impair its success.

These are the most critically weak points in the EPA plan:

The eastern boundary of the plume is unknown, despite the critical questions this raises.

> Does it discharge in Bayou Texar? If so, what is happening to swimmers, waterskiiers and fishermen?
>
> Does it flow under the bayou to the east side? If so, is it in or near the ECUA Hagler well?

The southern boundary is also unknown between Palafox and 12th Avenue.

Are any local residents using contaminated well water?

Does the plume contain Non-Aqueous Phase Liquids, and if so, where?
Will the chosen remedy remove them?

Since EPA has found Dioxins at elevated levels during each phase of sampling and at 23 locations, how can EPA be ignoring them in the Proposed Plan? Why has EPA decided to focus on only 9 of the toxic chemicals it has found in the plume and ignore all the many others?

Will the remedies that EPA is proposing actually work? Why is EPA delaying treatability studies until after it chooses a remedy?

We also want to point out EPA's peculiar mistake in stating the volume of soil originally stockpiled at ETC as 225,000 cubic yards. The correct number is 255,000.

EXHIBIT
3
7-2-08

## EPA groundwater plan based on misinformation, lack of information, and wishful thinking

For at least 21 years, EPA has known that Escambia Treating Company is contaminating the aquifer. In 1987, pentachlorophenol from ETC was discovered in the groundwater under the Agrico Chemical Superfund Site. In fact, the threat to groundwater was the reason EPA excavated the pile of toxic waste we know as "Mt. Dioxin" in 1991-93.

During those 21 years, EPA has allowed the underground plume of contaminants to spread into clean groundwater under homes, schools and businesses. Finally, in 2008 EPA has announced it has a plan to clean up what is now an enormous plume of woodtreating chemicals.

Unfortunately, after all this time, EPA still doesn't know enough about the plume to treat it effectively. Here's what EPA should - but doesn't - know:

**EPA doesn't know the southern boundary of the plume.**
Southeast of ETC, between Palafox and 12th Avenue, EPA has found that the plume curves south but has not collected groundwater samples far enough south to find a clean boundary.

**EPA doesn't know the eastern boundary of the plume.**
ETC contamination has spread to Bayou Texar, 1.5 miles to the east southeast. It extends all along the shore of the bayou from the 12th Avenue bridge south to 34th Street. But there, according to EPA, it just disappears.

EPA is relying on a UWF study to say that the contaminants do not discharge into Bayou Texar; however, the UWF study was inconclusive on that point. It speculated that the PAHs in the bayou came from a "variety of sources, including combustion of petroleum and non-petroleum products." ETC's history of facility fires, the presence of creosote as well as diesel fuel, and the use of Naphthalene in the plant's lab are consistent with varying ratios of PAHs - as have been found in the ETC surface soils.

Likewise, EPA is assuming the plume doesn't flow under the shallow bayou to the east side.

**EPA doesn't know whether anyone is drinking from the plume or being exposed to ETC contaminated water, seafood, or produce.**
EPA has never delivered on its promise to conduct a door-to door survey to warn families living over the plume against drinking from private wells or irrigating produce gardens. Not every private well is registered with the Northwest Florida Water Management District. And there has been no official
warning about Bayou Texar recreation or seafood.

If the plume is flowing under Bayou Texar, it may have affected or be approaching the ECUA Hagler public supply well. EPA doesn't know this, either.

**EPA doesn't know the concentration and locations of dioxins in the plume.**
Dioxins are measured separately as several related compounds. In order to assess the total toxicity of these compounds present in the plume, each compound's concentration must be weighted by its level of toxicity, so that apples can be added to apples.

When EPA sampled the ETC groundwater, it was not expecting to find dioxins, and only a few samples were analyzed for these compounds. In some cases, dioxins were present at high concentrations. In other cases, the detection limits for the dioxins analysis were so crude that it couldn't say. In a 2006 report EPA concluded that dioxins exceeded the governing standard at 23 locations, including 5 wells on the east side of Bayou Texar. "Non detect" does not mean "zero": for instance, if the detection limit for a toxic contaminant is 10 parts per million, it is customary to record a non-detect as 5 ppm, since the level could be 9 ppm or any lesser amount. Noting the 23 widely spaced locations in question, EPA was asked to resample all the wells for dioxins, using more precise measurements; this was not done, and the UWF report on Bayou Texar included no analysis for dioxins. Basically, EPA has decided to ignore the dioxins.

**EPA doesn't know whether contaminants in the plume have been degrading.**

EPA's plan proposes to treat the most toxic parts of the plume by accelerating a process it assumes has been going on for years: the degradation of the plume by microbes naturally present in soil and groundwater. There is no evidence of this.

Natural attenuation is EPA's choice for the rest of the plume; that's bureaucrat for doing nothing at all, in the hope that the unproven degradation will do the trick.

**EPA doesn't know whether the selected remedies will work.**

EPA proposes oxygenating the most polluted groundwater to activate the microbes already there. No treatability studies have been carried out to prove this will reduce even the ETC groundwater contaminants EPA recognizes. It will not treat the dioxins and the non aqueous phase liquids (NAPLs), which are difficult to clean up and may continue to leach more contamination.

The staging area for the remediation is arbitrarily limited to the CSX railroad yard, even though much of the plume, including dioxins and NAPLs, are in distant parts of the plume. The method EPA intends to use will cause the contaminants to move vertically and horizontally. EPA should include a quarterly schedule of monitoring for all the contaminants found in the plume to track fate and transport.

**EPA doesn't know how much soil it excavated in the original 1991-93 big dig.**

Maybe it's because ETC has had 5 regional project managers since 1994, but this is unprofessional. The agency has known, forgotten, remembered, and re-forgotten the volume of the poisoned ETC soil that became "Mt. Dioxin." It is 255,000 cubic yards, not 225,000 cubic yards, and that's not an insignificant difference. Many entire Superfund sites are no more than 30,000 cubic yards.

Please, go back to the 1993 Action Memo and to the 2006 Record of Decision, and let's get this corrected for good. It's 255K; this should be an easy answer.