RECORD OF DECISION

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

NOCATEE HULL CREOSOTE
HULL, DESOTO COUNTY, FLORIDA

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

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SITE NAME AND LOCATION

Nocatee Hull Creosote NPL-Caliber Site
Site-wide Remedy (OU 01)
Hull (DeSoto County), Florida
EPA CERCLIS ID#: FLD980709398

STATEMENT OF BASIS AND PURPOSE

This Decision Document presents the selected remedial action for the Nocatee Hull Creosote Site (the Site), Operable Unit 01 (OU1), Hull (DeSoto County), Florida. The remedy was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, also referred to as Superfund), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for the Site.

This remedial action is taken to protect human health and the environment from the threat posed by soil, groundwater and sediment contamination at the Site. The State of Florida, as represented by the Florida Department of Environmental Protection (FDEP), has been the support agency during the streamlined remedial investigation/focused feasibility study process for the Site. In accordance with 40 CFR §300.430, as the support agency, FDEP has provided input during this process.

ASSESSMENT OF THE SITE

The response action selected in this Record of Decision (ROD) is necessary to protect public health and welfare or the environment from actual or threatened releases of contaminants from this Site. Unacceptable risk associated with this Site is due to the potential ingestion or dermal contact with contaminated soil and sediment as well as potential consumption of groundwater containing contaminants above either federal or State of Florida primary drinking water standards or remediation goals. Ecological risk from exposure to contaminated sediments is also unacceptable based on the Screening Level Ecological Risk Assessment.

DESCRIPTION OF THE SELECTED REMEDY

This action is the first and only CERCLA Operable Unit planned for the Site. This ROD addresses soil, sediment and groundwater contamination resulting from past Site operations and calls for the implementation of response measures which will protect human health and the environment. Investigations have identified significant concentrations of polynuclear aromatic hydrocarbons (PAHs), BTEX (benzene, toluene, ethylbenzene, and xylene) and arsenic as well as elevated levels of other Site contaminants. These contaminants continue to pose an unacceptable threat to public health and the environment. This remedy will achieve substantial risk reduction in an accelerated manner.

The major components of the selected remedy include:

Plant and Peace River Floodplain Areas

- The former plant operations area contains soils, Dense Non-Aqueous Phase Liquid (DNAPL), and groundwater with concentrations greater than cleanup goals that will be contained by a slurry wall and low-permeability capping system to encapsulate Site contamination and minimize rainfall infiltration;
- The bottom of the slurry wall will be keyed into low-permeability clays (10^{-8} to 10^{-10} cm/sec) near the top of the Hawthorn Group;
- The free-product recovery system currently installed as an interim measure will continue to operate until free-flowing DNAPL is no longer recoverable;
- Piezometers will be incorporated into the slurry wall design to allow for hydraulic monitoring both inside and outside of the wall;
- Surface water runoff will be managed by promoting sheet flow of the run-off in a radial pattern;
- Contaminated soils outside of the slurry wall that exceed Chemicals of Concern (COC) cleanup goals will be excavated and consolidated to the slurry wall/cap area. Surface soils with concentrations exceeding direct exposure cleanup goals to a depth of two feet below-land-surface (ft bls) and soils with concentrations exceeding leachability cleanup goals from land surface to the mean-low water table will be excavated and consolidated;
- Clean soil will be placed in excavated areas, as needed, to maintain at least a two-foot depth above remaining soils that exceed direct exposure criteria;
- Sediment "hot spots" exceeding 100 mg/kg total PAHs will be excavated while remaining sediments exceeding sediment cleanup criteria will be monitored until concentrations drop below COC cleanup goals;
- Institutional Controls will be implemented to prohibit residential use on the property, prohibit the extraction of groundwater from the surficial aquifer for drinking or irrigation purposes, and restrict any future excavation in areas where subsurface soils exceed direct exposure cleanup goals to ensure future excavation is properly managed;
- Groundwater outside the slurry wall will be treated by bioremediation via *in-situ* biosparging in select areas, as well as by Monitored Natural Attenuation (MNA);
- Groundwater monitoring will be used to document the progress toward cleanup goals and to verify the integrity of the slurry wall; and
- Performance of the remedy will be evaluated every five years as part of a Five-Year Review required by CERCLA since contamination will remain inside the slurry wall on a permanent basis. Lack of progress in attaining groundwater cleanup goals outside the slurry wall or failure of the permanent containment engineering controls will result in the evaluation of alternatives to correct the issue.

Oak Creek Area

- Soils above the mean-low water table and sediments exceeding ecological cleanup goals will be excavated and transferred to the Plant Area for consolidation with Plant Area soils under the low-permeability cap;
- Backfilling of the creek bed will include installation of a geotextile fabric and riprap within the creek bed area. Other excavated areas will receive clean fill to match the existing grade. Restoration efforts for erosion control will be implemented where excavation and backfilling occur;
- Groundwater treatment will include bioremediation via *in-situ* biosparging, in select areas, and MNA;
- Domestic wells exceeding Primary Drinking Water Standards (PDWS) related to Site COCs or Table 7-20 groundwater cleanup goals will be properly abandoned and replaced with public (County)-supplied water from the recently installed water line; and
- Temporary Institutional Controls will be implemented to prohibit residential use of property with soil contamination exceeding Site COC cleanup goals and to prohibit the extraction of groundwater from the surficial aquifer for drinking or irrigation purposes in areas where groundwater exceeds Site COC cleanup goals. The temporary land use controls would be removed once Site COC cleanup goals have been achieved.

Site-wide

- Monitoring of groundwater for aluminum and iron will be required throughout the Site remediation process to track remediation impacts on these elevated concentrations of Florida GCTL contaminants; and
- Groundwater concentrations of aluminum and iron will be re-evaluated after Site COC cleanup goals have been achieved to determine if they pose an unacceptable health threat.

Principal threat waste at this Site includes free-phase DNAPL and the elevated creosote contaminated soils in the saturated and unsaturated zones of the former creosote wood treating plant that continue to serve as source material causing adverse groundwater impacts. The inorganic contaminant, arsenic, was detected above remediation goals in soil in several areas of the plant, borrow pit and Control Measures Area. It is not included as principal threat waste because it is sporadic in occurrence and frequently does not have a corresponding exceedance of groundwater criteria in the immediate vicinity of the soil exceedance. Principal threat waste, exceeding remediation goals, located outside the slurry wall area will be excavated and consolidated within the slurry wall area and under the low-permeability cap. Previous sample data suggest the waste is non-hazardous for Resource Conservation and Recovery Act (RCRA) classification purposes. Excavated waste will be tested to determine its categorization (RCRA hazardous or non-hazardous) for waste management purposes. Any soils categorized as RCRA hazardous waste will be disposed at a permitted disposal facility pursuant to RCRA requirements (40 CFR Part 268). Any remaining principal threat waste located below excavation limits and outside the slurry wall area will be treated in-situ using the biosparging technology identified for groundwater remediation.

Monitored Natural Attenuation (MNA) will be used in pocketed groundwater areas outside the direct influence of the *in-situ* biosparging to address organic and inorganic ground-water contamination that remains at, or below, the State of Florida Chapter 62-777, Florida Administrative Code (FAC), Natural Attenuation Default Criteria but exceed remediation goals.

The selected remedy will provide protection of human health and the environment by eliminating, reducing, or controlling risk at the Site through removal, treatment, engineering controls and the use of temporary and permanent institutional controls such as land and/or groundwater use restrictions on the Site until remediation goals are met.

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, and is cost-effective. The soil containment component of the remedy does not satisfy the preference for treatment that reduces toxicity or volume as a principal element but it does address mobility on a long-term basis and allows for expedited remediation of contaminated groundwater outside of the containment area. The recovery and off-site disposal of free-product creosote (DNAPL) will continue to stabilize the remaining contamination inside the containment area (slurry wall/cap system). While not anticipated, should the excavated soils and sediments that will be consolidated inside the containment area categorize as RCRA hazardous waste, treatment before off-site land disposal per 40 CFR Part 268 would be met, thus meeting the preference for treatment of principal threat waste. The remaining components of this remedy satisfy the preference for treatment that reduces toxicity, mobility, or volume as a principal element. Therefore, it is determined that this remedy utilizes a permanent solution and alternative treatment technology to the maximum extent practicable.

Institutional Controls (ICs) and Five-Year Reviews will be used to ensure the Site remains protective. This remedy, when fully completed, will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure at the Plant and Peace River Floodplain Areas. A statutory Five-Year Review will be conducted for the Site within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment. Long-term ICs and additional statutory Five-Year Reviews will be required at the Plant and Peace River Floodplain Areas after remediation goals have been achieved.

DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this Record of Decision. Additional information can be found in the Administrative Record for this Site.

- Chemicals of concern and their respective concentrations, Tables 7-1 and 7-22.
- Baseline risk represented by chemicals of concern, Section 7.1.
- Remediation goals established for chemicals of concern and the basis for those levels, Section 7.1.5 and Table 7-20 (Human Health) and Section 7.2 (Ecological).
- How source materials constituting principal threats are addressed, Section 11.0.

- Current and reasonably anticipated future land use assumptions and potential future beneficial uses of groundwater, Section 6.0.
- Potential land use that will be available at the Site as a result of the selected remedy, Section 12.4.
- 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, Section 12.3.
- Key factors that led to the selection of the remedy, Section 12.1.

AUTHORIZING SIGNATURE

Franklin E. Hill
Director
Superfund Division

6-15-09
Date

DECISION SUMMARY

PART 2: DECISION SUMMARY

1.0 SITE NAME, LOCATION, AND DESCRIPTION

Site Name: Nocatee Hull Creosote
Location: Hull (DeSoto County), Florida
EPA Identification Number: FLD980709398
Lead Agency: EPA
Support Agency: Florida Department of Environmental Protection

The Nocatee Hull Creosote Site is located approximately eight miles south of Arcadia, Florida and about one mile west of US Hwy 17 on Hull Avenue, also referred to as Hull Road, in Hull, Florida. The Site is located in Section 6, Township 39 South, Range 24 East, DeSoto County, Florida. The coordinates of the plant property are approximately 27° 07' 05" North latitude and 81° 56' 43" West longitude. The Site consists of three separate areas. The 38-acre former creosote wood treating "Plant Area" extends in a north-south direction parallel to the west side of Hull Avenue. The area of actual treatment operations is shown on **Figure 1-3**. Site contaminants have also impacted a portion of the adjacent 35-acre "Peace River Floodplain Area" (which includes the borrow pit, braided stream and floodplain) to the west, as well as a portion of the 45-acre rural residential "Oak Creek Area" on the east side of Hull Avenue, as shown on **Figure 1-2**.

The Plant Area consists of upland field vegetated with grasses and some trees and is defined as the original area where wood treating operations took place. CSX Transportation (CSXT) owns the plant property and has more recently acquired ownership of the additional parcels impacted by Site contaminants.

The borrow pit, approximately 2.7 acres in size, is a topographically well-defined low area just west of the former creosote wood treating operations area and contains seasonally wet organic-rich soils. The borrow pit was created during the early part of facility operations and received drainage from the former operations area via a storm drain and buried drainage pipe. Storm water from the borrow pit is channeled at its north end and flows into the braided stream. Surface water flow is seen only immediately following a storm event or after extended periods of heavy rainfall.

The braided stream and Peace River floodplain extend westward from the borrow pit to the Peace River. This lowland hardwood river swamp area is about 35 feet above mean sea level (amsl) at the borrow pit, and slopes down to approximately 10 to 15 feet amsl adjacent to the Peace River. The braided stream contains multiple drainage channels flowing through a bald cypress swamp. These multiple channels join to form a stream that flows into the Peace River.

The Oak Creek Area is situated east of Hull Avenue, and slopes to the east from approximately 40 feet amsl at Hull Avenue to its eastern boundary approximately 20 feet amsl at Oak Creek as shown on **Figure 1-4**. Oak Creek Road is an unpaved private road that runs approximately ½ mile in a southerly direction beginning at Hull Avenue. The Oak Creek Floodplain Area pertains to the land east of Oak Creek Road. Land parcels in the Oak Creek Area and Oak Creek Floodplain Area are owned by private parties or CSXT. Some of the acreage CSXT owns was purchased to control properties where remediation actions were anticipated or to provide additional space to stage the work. Additional acreage was included in some of the purchases at the request of the seller.

Vegetation in the Oak Creek Area consists of mixed trees and shrubs. Land use is rural residential along Hull Avenue and Oak Creek Road near the Site. There were very few residences along Hull Avenue during treatment plant operational years. Oak Creek Road does not appear in aerial photographs in 1972 but is present in 1978 with a few homes visible. Residences in the area have private wells and septic tanks.

In August 2004, Hurricane Charlie (a Category 4 hurricane) passed directly over the Site causing widespread damage. Numerous private homes were destroyed. Although Hurricane Charlie caused significant wind damage to tall vegetation in the cypress swamp and surrounding areas, this wetland remained densely vegetated, continued to provide substantial ecological habitat for a variety of terrestrial and aquatic species and recovered rapidly.

Land use surrounding the Site consists of citrus groves to the north, east and south and hardwood river swamp to the west. Zoning in the area generally and particularly on the west side of Hull Avenue is currently Agricultural 10. The property on the east side of Hull Avenue (Oak Creek Area) is currently zoned Residential Multi-Family Mixed District. A significant portion of land (632 acres), less than one-half mile to the northeast of the Site, has recently been rezoned from Rural Agricultural to Industrial Heavy suggesting future commercial growth in the immediate area.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The creosote wood treating plant operated from 1913 until 1952 performing treatment of railroad ties using coal tar creosote. Untreated wood was brought into the yard on railcars, cut to the proper size and stored for conditioning and treatment. The untreated wood was placed on small wood treating carts that were moved into a retort (closed cylinder) to be conditioned by removing natural moisture content and increasing permeability. The wood was then impregnated with creosote by filling the cylinder with heated liquid creosote while under pressure. The treatment cylinder was reported to be approximately 100 feet long and six feet in diameter. The ties remained in the cylinder while excess creosote and water were pumped out. Creosote was recycled for later use. Once the creosote was evacuated from the cylinder, the treated wood was moved to the drip track area prior to being loaded onto rail cars for shipment to users (Gannett, 2002). Details of the Plant Area layout are shown in **Figure 1-3**.

Plant drainage was routed to the adjacent borrow pit to the west. The borrow pit discharged to the braided stream which flowed into the Peace River floodplain and on to the Peace River. Current investigations suggest the most heavily contaminated soils in the production area and the borrow pit were removed in the past during the removal of the buildings, track, tanks, treatment cylinders and other hardware associated with the treatment facility. The Plant Area now consists of upland field vegetated with grasses and some trees.

Enforcement History
Florida Department of Environmental Regulation (predecessor to FDEP) began investigations of the Site in 1986 when private drinking water wells in the Oak Creek Area showed chemical contamination. Initial response measures included fencing and conducting periodic sampling of nearby private wells. In 1999, FDEP requested that EPA initiate Superfund investigations of the Site. In 1999, EPA signed an Administrative Order on Consent with CSXT. Since that time, EPA, in consultation with FDEP, has overseen efforts to delineate the nature and extent of contamination performed by the Potentially Responsible Party (PRP) and their support contractor.

After initiating a Streamlined Remedial Investigation (SRI), an area of creosote contamination was identified in the Oak Creek Area. Due to the residential nature of the area, the PRP fenced the contaminated area, identified as the Control Measures Area (CMA), and implemented several other interim measures to contain the CMA contamination. Upon completion of the SRI in 2002, which included a Human Health Risk Assessment (HHRA) and a Screening Level Ecological Risk Assessment (SLERA) through Step 3b, the PRP initiated a Focused Feasibility Study (FFS) which evaluated alternatives for cleaning up the contamination. Steps 4 through Step 8 of the SLERA were also completed during the FFS process. During the FFS time frame, the State of Florida created the Florida Risk Based Corrective Action (RBCA) program which addresses the cleanup of certain types of contaminated sites such as Nocatee Hull Creosote. After passage of Florida RBCA, the PRP indicated a desire to satisfy both the federal Superfund cleanup criteria and the Florida RBCA cleanup criteria in one response action.

During the FFS, additional information was gathered in the form of Supplemental Assessment Reports (ARCADIS, 2005b and 2006), an Ecological Constraints Review (Breedlove, 2007), a Geotechnical Investigation Report (ARCADIS, 2008b) and an Interim Free Product Recovery System Installation and Startup Report (ARCADIS, 2008a). These reports provide additional information necessary to support various options under consideration in the alternatives being considered in the FFS.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

EPA has been working with the community since the start of the Streamlined Remedial Investigation and has made efforts to insure that interested parties have been kept informed and been given an opportunity to provide input on activities performed at the Site.

A Community Relations Plan was developed for the Site to document the plan for community participation during the investigation process. At the initiation of the Superfund SRI process, a public meeting was held at the Site, in August 1999, to explain EPA Superfund involvement and process and solicit concerns from the community. At the meeting residents expressed concern over the possible contamination of their drinking water wells and health issues from possible past exposure to contamination from the Site. Based on these concerns, the Agency for Toxic Substances and Disease Registry (ATSDR), working through the Florida Department of Health (FDOH), performed a Public Health Assessment for the Site which was finalized in June 2002. The report classified the Nocatee Hull Creosote Site as "no apparent" public health hazard. It found that the most frequent occurrences and highest levels of contamination were in on-site soil and groundwater. Since no one is living on the Site, it is unlikely that anyone is currently exposed to the on-site contaminants. The report indicated no awareness of any current exposures to off-site contamination (ATSDR, 2002).

A Site mailing list was developed from attendance at the initial public meeting and has been appended as additional contacts were identified. The periodic mailing of Fact Sheets to update the community has occurred during the Superfund activities. Damage to the area caused by Hurricane Charlie in August 2004 resulted in some residents moving from the area and the use of Federal Emergency Management Agency temporary trailers for many remaining residents until they could rebuild.

The Proposed Plan for the Nocatee Hull Creosote Site was mailed on August 27, 2008. This document was made available to the public as part of the Site Administrative Record located in the EPA Region 4 Docket Room and at the information repository, located at DeSoto County Library in Arcadia, Florida. The Notice of Availability of these documents and the date and location of the Proposed Plan Public Meeting was published in the DeSoto Sun on September 3, 2008. A public comment period was held from August 28, 2008 to September 26, 2008. The public comment period was extended two times at the request of a representative of residents living near the Site. The public comment period closed on November 26, 2008.

A public meeting for the Site was held on September 11, 2008 at the Mount Olive CME Church in Hull, Florida. EPA representatives presented an overview of the Proposed Plan and answered questions about the Site and the remedial alternatives under consideration. A transcript of the public meeting, a part of the Administrative Record for the Nocatee Hull Creosote Site, can be reviewed at the information repository at the DeSoto County Library and at the Region 4 EPA Record Center in Atlanta, Georgia. In addition, a Responsiveness Summary that provides EPA comments on questions raised by the public at the public meeting and through written comments is included as Part 3 of this Record of Decision (ROD).

The Administrative Record is available for review during normal business hours at the following locations:

DeSoto County Library 125 N. Hillsborough Avenue Arcadia, FL 34266 863-993-4851	U.S. EPA – Region 4 Superfund Records Center 61 Forsyth St., SW Atlanta, GA 30303 800-435-9234, ext. 2-8463

4.0 SCOPE AND ROLE OF OPERABLE UNITS

This ROD is for the first and only CERCLA Operable Unit planned for the Site. It includes the final remedial action for addressing the Chemicals of Concern (COCs) in contaminated soil, contaminated sediments and contaminated groundwater at the Site. As such, the ROD addresses all impacts to all media and represents the final site-wide cleanup approach. Through this ROD for the Nocatee Hull Creosote Site, EPA Superfund will address all contaminated media at the Site.

5.0 SITE CHARACTERISTICS

5.1 Conceptual Site Model

A conceptual site model (CSM) incorporates information on the potential chemical sources, release mechanisms, affected media, potential exposure pathways, and known receptors to identify potential and completed exposure pathways. Exposure Pathways selected for evaluation from the CSMs for the HHRA and SLERA (Gannett, 2002 and ARCADIS, 2005a) for the Site are presented in **Table 7-2**. Site contamination occurred as a result of spillage of creosote around the plant operations area, in drainage sumps and the borrow pit. Drainage from the borrow pit carried creosote contamination through the braided stream to the Peace River Floodplain. Creosote contamination in the Control Measures Area (CMA) of the Oak Creek Area, east of Hull Avenue, either followed surficial drainage features under Hull Avenue and then to the CMA or the material was dumped there. Site contamination was also transferred by groundwater migration via natural horizontal hydraulic gradients westward toward the Peace River and eastward toward Oak Creek.

5.2 Site and Regional Setting

5.2.1 Topography and Hydrology

The Nocatee Hull Creosote Site Study Area is located adjacent to the Peace River Valley, as shown on **Figure 1-1**. The Study Area lies between the Peace River Valley and the Oak Creek Valley. Elevation is approximately 41 feet amsl in the former creosote wood treating plant area, and slopes down to approximately 15 feet amsl in the Peace River floodplain area and approximately 28 feet amsl in the forested area adjacent to Oak Creek.

Surface topography of the former creosote wood treating plant reflects a relatively flat 25-acre area adjacent to Hull Avenue sloping quickly down at the western edge of the borrow pit. The borrow pit is an area that has been excavated from the north, forming a depression in the sandy upland that slopes down towards the south. The southern edge of the borrow pit reflects an approximately ten foot drop from the sandy upland. The persistence of standing water and wet soils in the borrow pit due to its depressed elevation has led to an increase in the organic content of the soils.

As surface topography slopes down to the west, it quickly levels out into a bald cypress swamp area, where inflowing drainage water is retained and results in high-organic content hydric soils. This area has been termed the braided stream. One single channel flow exits the braided stream in the northwest corner carrying drainage water to the Peace River floodplain and then to the Peace River. **Figure 1-4** shows a map of the area with surface elevation contour lines.

Precipitation in the Study Area will partially be absorbed by initial abstraction such as depression storage and vegetation interception. Some of the precipitation will directly infiltrate into the ground. The remaining precipitation will form sheet flows and exit the area as stormwater runoff. Precipitation falling on the main former creosote wood treating plant area will run off either into the borrow pit to the west or the ditch adjacent to the former railroad right-of-way to the east. The borrow pit forms a large depression storage area which drains through a channel on the west side and directs stormwater to the braided stream complex and ultimately to the Peace River via the unnamed Peace River tributary. On the east side of Hull Avenue, a culvert pipe under Hull Avenue carries stormwater detained in the ditch adjacent to the former railroad right-of-way down into the forested area west of Oak Creek. Stormwater collecting in this lowland forested area partially sheet flows and partially infiltrates and then discharges into a man-made ditch carrying stormwater under Oak Creek Road and ultimately to Oak Creek. (Gannett, 2002)

5.2.2 Site Climate
The climate of DeSoto County is characterized as humid-subtropical. The average winter temperature is 62 degrees Fahrenheit (°F), with an average daily minimum temperature of 49°F. The average summer temperature is 81°F, with an average daily maximum temperature of 92°F. The area typically receives an annual average of 53 to 54 inches of precipitation. (ARCADIS, 2008c).

5.2.3 Site Geology
In conjunction with the soil sampling and monitoring well installation activities, continuous lithologic data was collected from boreholes installed at the Study Area since 2005 to further characterize the geology (ARCADIS, 2005b and 2006). The physical characteristics and a description of the soil samples were detailed on soil boring logs using the Unified Soil Classification System (USCS). Near the land surface, the formation is comprised of clean, medium- to fine-grained sands at a depth of 12 to 15 feet below land surface (ft bls). The silt and clay content increases with depth, clean sands giving way to silty and then clayey sand/sandy clay units from approximately 35 to 52 ft bls. An approximately 3-foot thick layer of dense green clay exists across the western, northern and eastern portions of the Study Area, the top of which is observed as shallow as 37 ft bls and as deep as 56 ft bls.

Monitoring well drilling logs indicate the Study Area is underlain by approximately 15 feet of light-brown to white surficial soils and undifferentiated Plio-Pleistocene sands and approximately 23 feet of fine silty sands and clayey sands representative of the Upper Miocene Peace River Formation. These surficial clastic marine deposits are underlain at depth by water-bearing units of limestone.

The depth to the upper confining unit of the Hawthorn Group at the Study Area varies, ranging from approximately 38 to 59 ft bls. The upper confining unit of the Hawthorn Group consists of reworked materials, predominantly fine-grained sands, cemented with calcium carbonate. Beneath these reworked materials are alternating layers of soft to hard clay, sandy clays, hard-weathered limestone, and cemented calcareous sand that is approximately 68 ft thick. At approximately 132 ft bls, a water-bearing zone was encountered, consisting of a layer of unconsolidated limestone fragments intermixed with shell fragments, soft sands, and phosphatic grains that extended to approximately 139 ft bls. Water beneath the confining unit (Hawthorn Group) is under confined or artesian conditions.

Geologic cross sections A – A' and B – B' are presented in **Figures 5-1** and **5-2**. The cross sections show the sandy upland of the former creosote wood treating plant area with land sloping down on both the east and west sides. The land surface has a slight slope from SMW-29 in the north to MW-6 to the south. The cross section shows the upper lithostratigraphic layer comprising the vadose zone and shallow groundwater, and a lower lithostratigraphic layer containing intermediate groundwater. The groundwater elevation profile closely follows surface topography in the east-west direction, as shown in cross section A – A'. The groundwater plateau across the former creosote wood treating plant area is shown in cross section B – B'.

5.2.4 Site Hydrogeology

Groundwater elevation data indicates that the groundwater flow direction is historically consistent across the shallow, intermediate and deep zones of the surficial aquifer with an approximate northeast-southwest groundwater divide located within the former plant area. West of the groundwater divide groundwater flows toward the Peace River and east of the divide groundwater flows toward Oak Creek as shown in **Figures 5-3, 5-4 and 5-5**. In the area near the groundwater divide the gradient is fairly flat and increases to the east of Hull Avenue and west of the borrow pit. The groundwater flow velocity in the shallow more permeable sands was calculated to be approximately 75 feet per year (ft/yr). Groundwater flow velocity in the intermediate zone of the surficial aquifer was calculated to be approximately 15 ft/yr. Physical characteristics of the deep zone of the surficial aquifer suggest it would have a slower groundwater flow velocity than the intermediate zone. The water table at the Plant Area ranges from 0 - 7 ft bls across the Site. The water table in the Oak Creek Area ranges from 0 – 3 ft bls. (ARCADIS, 2008c)

The surficial groundwater aquifer located above the Hawthorn Group was divided into shallow (0 – 15 ft bls), intermediate (15-38 ft bls) and deep (38 – 60 ft bls) zones for the Superfund investigation.

5.2.5 Surface Water Hydrology

Precipitation in the Study Area will partially be absorbed by initial abstraction such as depression storage and vegetation interception. Some of the precipitation will directly infiltrate into the ground. The remaining precipitation will form sheet flows and exit the area as stormwater runoff. Precipitation falling on the main former creosote wood treating plant area will run off either into the borrow pit to the west or to the ditch adjacent to the former railroad right-of-way to the east. The borrow pit forms a large depression storage area which drains through a channel on the northwest corner and directs stormwater to the braided stream complex and ultimately to the Peace River via the unnamed Peace River tributary. On the east side of Hull Avenue, a culvert pipe under Hull Avenue carries stormwater detained in the ditch adjacent to the former railroad right-of-way down into the forested area west of Oak Creek Road. Stormwater collecting in this lowland forested area partially sheet flows and partially infiltrates and then discharges into a man-made ditch carrying stormwater under Oak Creek Road and ultimately to Oak Creek.

5.2.6 Wildlife/Natural Resources

Three soil types are found on or adjacent to the Nocatee Hull Creosote Site. Soils in the central part of the Study Area are characterized as nearly level, poorly drained soils that are sandy throughout. Soils in the sloping floodplain areas are characterized as nearly level to gentle sloping, somewhat poorly drained and moderately well drained soils that are sandy throughout.

Finally, the soil type represented in the seasonally wet area west of Hull Avenue is deep, very poorly-drained, sandy soils.

Terrestrial, wetland and aquatic/potentially aquatic habitats were identified in the Study Area. Terrestrial habitats located west of Hull Avenue included upland mowed fields with scattered trees and shrubby areas, and an area of floodplain forest on-site along the Peace River.

Wetland areas west of Hull Avenue included an area of shrubby to immature forested wetland located in the borrow pit, and a large forested wetland located between the borrow pit and the Peace River, dominated by mature bald cypress trees. East of Hull Avenue, floodplain wetlands were found along Oak Creek and an area of mixed upland and forested wetland occurred between Hull Avenue and Oak Creek Road.

Perennial aquatic habitat areas were limited to the Peace River and to Oak Creek. These water bodies contain flowing water year-round. Two streams west of Hull Avenue, called the Peace River tributary and the unnamed tributary, appear to be seasonally flooded.

5.3 Media Contamination

The nature and extent of soil, groundwater, sediment and surface water in the Plant and Peace River Floodplain and the Oak Creek Areas are presented separately. The analytical data is screened against the RGOs developed in the HHRA, the RGOs developed in the SLERA and the Florida Cleanup Target Levels (CTLs) (FDEP, 2005).

5.3.1 Plant and Peace River Floodplain Area

The data collected in the Plant Area and the Peace River Floodplain Area were screened against commercial exposure values (HHRA and Florida SCTLs) and against ecological screening values developed in the SLERA.

5.3.1.1 Soil Contamination

Surface Soil

Analytical data from surface soil samples collected at the Study Area from 0 to 2 ft bls since 1999 were used to evaluate the nature and extent of contamination at the Site. The screening of the organic (volatile organic compounds (VOCs) and PAHs) constituent data from these samples to the RGOs developed in the HHRA indicate concentrations in two areas within the Plant and Peace River Floodplain Areas that exceed the RGOs: one in the former plant operations area and one in the borrow pit. Screening the same data set against Florida commercial direct exposure SCTL criteria, a larger area is identified that is inclusive of the area identified by the RGO screening. No RGO was developed in the HHRA for direct exposure to inorganic constituents (heavy metals), specifically arsenic, but screening against SCTLs shows one area, in the former plant operations area, that exceeds the SCTL for arsenic.

Three discrete areas within the Plant and Peace River Floodplain Areas (one in the former plant operations area, one along the southern rim of the borrow pit and one in and adjacent to the northern side of the borrow pit) exceeded ecological soil exposure criteria. These areas are all contained within the areas identified by RGO and SCTL screening for commercial direct exposure criteria.

Three areas were identified, two in the borrow pit and in the former plant operations area, with organic concentrations in excess of leachability SCTLs. The groundwater data in these areas did not exceed the Florida GCTLs for these organic contaminants. One soil sample in the Peace River Floodplain Area exceeded the Florida leachability SCTL.

Arsenic was the only inorganic constituent identified from the screening of the data to have a potential to leach to groundwater. Two surface soil samples (CP-SS-01 and CP-SS-03) in the Plant Area exceeded soil leachability criteria for arsenic (Gannett, 2003c). Groundwater data in the vicinity of these soil samples (SMW-26 and SMW-49) did not exceed Florida GCTLs. Many surface soil sample locations can be seen on **Figure 5-6**. Groundwater monitoring well locations are shown on **Figures 5-8, 5-9** and **5-10**.

Subsurface Soil

Subsurface soil was screened to the Florida leachability SCTLs or site-specific leachability criteria. Three soil borings exceeded a leachability screening criteria. Data from two of the locations (CP-SS-16 and CP-SS-23, both from 1 to 3 feet bls interval), reported arsenic concentrations exceeding the site-specific leachability criteria. Data from the subsurface soil collected at DMW-106 (5 feet bls) had organic constituent concentrations above leachability SCTLs. Many subsurface soil sample locations can be seen on **Figure 5-7**.

5.3.1.2 Groundwater Contamination

The surficial aquifer was divided into three zones based on the depth of the monitoring wells. In the shallow zone, no concentrations in excess of the RGOs were detected. Four areas were noted in excess of a Florida GCTL: three in the vicinity of the former plant operations area and one in the borrow pit. Arsenic concentrations above standards were detected at MW-6 and SMW-57.

In the intermediate zone, one area within the former plant operations area in the vicinity of IMW-11 and IMW-39 has concentrations greater than the RGOs. The area identified with groundwater concentrations in excess of a Florida GCTL extends from the former plant operations area west across the borrow pit to MW-66 and IMW-37.

In the deep zone, there are no concentrations in excess of the RGOs. One area extending from the northern end of the borrow pit to the former plant operations area had contaminant concentrations exceeding a Florida GCTL. An estimated concentration of cadmium above its respective Florida GCTL was reported at DMW-106; however, cadmium was also detected in the associated method blank. Cadmium was resampled in several monitoring wells whose data was affected by the method blank on July 17, 2008. The analytical data for cadmium was below Florida GCTLs (ARCADIS, 2008d) and therefore it is eliminated as a contaminant of concern.

Aluminum and iron were detected above secondary drinking water standards in each of the three zones of the surficial aquifer. However, aluminum and iron were detected above secondary drinking water standards in areas where no Site related organic compounds were detected. Since these standards are secondary criteria not based on health effects, they will be monitored to determine what effects the implemented remedy has on their final concentrations after remediation of the Site organic contamination is complete.

5.3.1.3 Sediment Contamination

The SLERA completed for the Site determined that 10 mg/kg of total PAHs could remain in sediment, and potential ecological receptors would be protected (ARCADIS, 2007). Three areas in the braided stream and Peace River floodplain had sediment concentrations in excess of the ecological screening value and affect a total of 1.1 acres. Many sediment sample locations are shown on **Figure 5-11**.

5.3.1.4 Dense Non-Aqueous Phase Liquid (DNAPL)

During the installation of additional monitoring wells in 2005, free-phase DNAPL was measured in the bottom of two wells (DMW-100 and DMW-106). Based on this finding, monitoring wells TMW-1, TMW-2 and TMW-3 were installed to bound the extent of this DNAPL (source) area to the south, west and east respectively. Monitoring well DMW-104 bounds this area to the north. Free-phase DNAPL was also detected in monitoring well DMW-114 during its installation adjacent to Hull Avenue. Although a small amount of free product was removed from DMW-114 after installation, no additional free product has been detected since April 2006. Additional assessment in this area demonstrated that the occurrence of free product was localized.

In 2008, five additional recovery wells were installed within the original DNAPL source area (DWM-100 and DMW-106). These recovery wells (RW-1 through RW-5) are equipped with automatic sensors and dedicated submersible pumps to remove any accumulated DNAPL to a storage drum for later disposal (ARCADIS, 2008a). A couple of these DNAPL wells initially recovered small amounts of DNAPL which is recorded on a monthly basis. No additional DNAPL has been recovered in recent months.

5.3.2 Oak Creek Area

The data collected in the Oak Creek Area were screened against residential exposure values (HHRA and Florida SCTLs) and against ecological screening values developed in the Screening Level Ecological Risk Assessment (SLERA).

5.3.2.1 Soil Contamination

Surface Soil

Analytical data from surface soil samples collected at the Study Area from 0 to 2 ft bls since 1999 were used to evaluate the nature and extent of contamination at the Site. The screening of the organic (volatile organic compounds (VOCs) and PAHs) constituent data from these samples to the RGOs developed in the HHRA indicate concentrations in one area that exceed the RGOs. Screening the same data set against Florida residential direct exposure SCTL criteria, two areas are identified. No RGO was developed in the HHRA for direct exposure to inorganic constituents (heavy metals), specifically arsenic, but screening against SCTLs shows one area, within the Control Measures Area (CMA), that exceeds the SCTL for arsenic.

Two discrete areas within the CMA exceeded ecological soil exposure criteria.

Two areas were identified, within the CMA, with organic concentrations in excess of leachability SCTLs. The groundwater data in one of these areas (ES-SS-03) did not exceed the Florida GCTLs for these organic contaminants.

Arsenic was the only inorganic constituent identified from the screening of the data to have a potential to leach to groundwater. One area in the CMA exceeded soil leachability criteria for arsenic.

Subsurface Soil

Subsurface soil samples collected in the Oak Creek Area were screened to the RGOs, soil leachability values, and ecological screening values. There were only two sample locations (ES-SS-10 and ES-SS-14) with constituent concentrations in excess of these criteria.

5.3.2.2 Groundwater Contamination

As with the Plant and Peace River Floodplain Areas, groundwater within the Oak Creek Area was evaluated by dividing the surficial aquifer into three separate zones based on the depths of monitoring wells: shallow, intermediate and deep. Groundwater data for the surficial aquifer were screened to both the RGOs developed in the HHRA as well as the Florida GCTLs from Chapter 62-777.

In the shallow zone, no COCs were detected in concentrations in excess of the RGOs. Five areas were noted in excess of the Florida GCTLs although one of these is an extension of an area previously identified with the Plant area. For the other four, three are located along the east side of Oak Creek Road in the vicinity of the CMA and the other is located between Hull Avenue and Oak Creek. These four areas are identified as separate areas because differences in COCs detected in each of the wells suggest that these COCs were not from a common source. Arsenic and lead are the only metals with concentrations exceeding GCTLs in the Oak Creek Area shallow zone. There was only one sample for lead that exceeded the GCTL and it was an estimated value. Estimated concentrations for cadmium above its respective Florida GCTL/ MCL were reported at SMW-61, IMW-62, TMW-2 and DMW-106; however, cadmium was reported in the method blank at 0.00551 mg/L for this sample batch. The Florida GCTL/MCL for cadmium is 0.005 mg/L. The four monitoring wells whose samples were in the laboratory batch that had the cadmium method blank detection were resampled on July 17, 2008. The analytical results for cadmium were below the Florida GCTL/MCL and therefore it is eliminated as a contaminant of concern.

In the intermediate zone, one area in the vicinity of monitoring well IMW-33, located adjacent to Hull Avenue, was identified with COC concentrations exceeding the RGOs. That same area with the inclusion of monitoring well IMW-35 was identified with COC concentrations exceeding a Florida GCTL. Two additional areas exceeded Florida GCTLs. One area is located in the CMA and the other in the vicinity of potable well PW-04. Arsenic concentrations exceeding GCTLs in the Oak Creek Area were used to delineate intermediate groundwater contamination. Cadmium related to the method blank was also an issue in this area.

In the deep zone, groundwater samples collected from DMW-103 indicate no COC concentrations exceeding intermediate zone RGOs or GCTLs. An area of deep zone groundwater containing concentrations greater than GCTLs extends from Hull Avenue east to DMW-103, located in the CMA. There are no metals exceeding GCTLs in the Oak Creek Area deep zone groundwater.

Aluminum and iron were detected above secondary drinking water standards in each of the three zones of the surficial aquifer. However, aluminum and iron were detected above secondary drinking water standards in areas where no Site related organic compounds were detected. Since these standards are secondary criteria not based on health effects, they will be monitored to determine what effects the implemented remedy has on their final concentrations after remediation of the Site organic contamination is complete.

Residential Wells

Potable well sampling was initiated in 1986 after a citizen complaint about an oily sheen and odor in tap water was received by Florida Department of Environmental Regulation. Seven potable drinking water wells have been sampled quarterly or annually as part of the SRI. Two of those wells have had exceedances of the Florida MCL for benzene and have had carbon filters installed (in 1999 and 2004) and maintained by the Florida Department of Environmental Protection. Post filter sampling has confirmed the carbon filters effectively remove the contamination.

5.3.2.3 Sediment Contamination

The total areal extent of sediments in the CMA and Oak Creek exceeding the ecological screening value for total PAHs is estimated to be approximately 0.7 acres.

6.0 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The Plant Area itself was historically industrial; however, there have not been any industrial operations since the 1950s. The Plant Area and Peace River Floodplain Area to the west of Hull Avenue, owned by CSTX, are vacant and fenced. CSXT intends to restrict use of the property following remedial action to commercial or industrial uses consistent with the future operations and maintenance plan for the Site, the DeSoto County zoning ordinance and recent land use changes in Hull trending toward commercial and industrial use.

The land bordering the Study Area west of Hull Avenue to the north and south is currently active citrus groves and to the west is hardwood river swamp. The land to the east of the residential Oak Creek Area is also active citrus groves. The land in the Oak Creek Area on the east side of Hull Avenue is sparsely populated residential or vacant. All of the property in the Oak Creek Area needed for remedy implementation has been purchased by CSXT. Land owned by CSXT is shown on **Figure 1-5**.

Zoning in the area generally and particularly on the west side of Hull Avenue is currently Agricultural 10 (A-10). The A-10 zoning designation allows agricultural, pastoral, non-phosphate mining and low-density residential development (DeSoto County Zoning Code § 2304). One single-family dwelling per parcel is allowed. Also allowed are agricultural uses, wildlife management areas, wholesale plant nurseries, golf courses, cemeteries and hunting cabins. Other uses could be allowed with a special use permit, including community transmitting and receiving facilities, firing ranges, kennels, places of worship and recreational facilities such as golf.

The property on the east side of Hull Avenue is currently zoned Residential Multi-Family Mixed District (RMF-M). Pre-manufactured homes and other residential dwellings are permitted in an RMF-M district (DeSoto County Zoning Code § 2309). Other permitted uses include gardening and greenhouses, golf courses, tennis courts, and swimming pools. Churches and community facilities such as libraries are allowed with a special use permit.

Most of the property in Hull has been zoned A-10. There have been, however, significant recent developments in the neighborhood trending toward commercial or industrial use. Two parcels at the intersection of Route 17 and Hull Avenue are zoned Commercial Neighborhood (CN). Allowable uses in a CN district include automobile service stations, a number of retail stores, restaurants, medical clinics, financial institutions and legal services.

More significantly, a substantial portion of the land immediately north of Hull Avenue and west of Route 17 has been rezoned from Rural Agricultural to Industrial Heavy (IH). The rezoning of approximately 632 acres of land at the northwest corner of U.S. Route 17 and Hull Avenue was approved by DeSoto County on June 26, 2007 (Rezoning Order 2007-12). This land was assembled through purchases in January 2006 by DeSoto Land Holdings, LLC of Fort Myers, Florida. The recently rezoned area is less than one-half of a mile from the Study Area.

The land uses allowed in the IH district include manufacturing and warehousing, asphalt and cement plants, junk yards, chemical plants and "other intensive commercial, industrial or manufacturing uses," per DeSoto County Zoning Ordinance § 2318(A)(1).

It is CSXT's understanding, based on conversations with DeSoto County planning officials that DeSoto Land Holdings, LLC intends to sell the assembled property that has been rezoned for heavy industrial use to a building products manufacturer.

7.0 SUMMARY OF SITE RISKS

The baseline risk assessment estimates what risks the Site poses if no action is taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the baseline risk assessment for the Nocatee Hull Creosote Site.

7.1 Human Health Risk

The baseline risk assessment for human health (HHRA) is an analysis of the potential risks to human health caused by hazardous substances released from a site in the absence of any additional actions to control or mitigate the releases. Preparation of a HHRA is required by the National Contingency Plan (NCP), which states that the lead agency for a Superfund site shall conduct a site-specific HHRA as part of the RI process (40 CFR §300.430).

To assess potential public health risks, three major aspects of chemical effects and exposure must be considered: 1) the presence of chemicals with toxic characteristics; 2) the existence of pathways by which human receptors may contact site-related chemicals; and 3) the presence of human receptors. The absence of any of these three aspects would result in an incomplete exposure pathway and an absence of quantifiable risk.

As part of the SRI, a HHRA was conducted for the Nocatee Hull Creosote Site (Gannett, 2002) following standard USEPA guidelines (EPA, 1989). The data collected for the SRI were found to meet the data quality objectives of the project and were determined to be of adequate quality for use in the Risk assessment.

The exposure assessment concluded that current receptors may include: *West of Hull Avenue* – current trespasser (adult and youth), current recreational user (adult and youth), future on-site worker (adult), future construction worker (adult), and future resident (adult and child); *East of Hull Avenue* – current resident (child and adult), current recreational user (adult and youth), and current construction worker (adult). Receptors were identified separately for these two areas due to different current and future potential land uses in these areas. Potentially complete exposure pathways examined in this risk assessment were:

- ingestion of soil,
- dermal contact with soil,
- inhalation of dust,
- ingestion of ground water,
- dermal contact with groundwater,
- inhalation of volatile organic compounds (VOCs) released from groundwater,
- ingestion of sediment, and
- dermal contact with sediment.

EPA's reference toxicity values were obtained for each chemical of potential concern (COPC). These values were combined with estimates of human intake to characterize the cancer and non-cancer risks associated with the site.

EPA's acceptable target range for carcinogenic risk at Superfund sites is 1×10^{-4} to 1×10^{-6} (also written as 1E-4 to 1E-6). The State of Florida acceptable cancer risk is less than or equal to 10^{-6}. The assessment concluded that the total incremental lifetime cancer risk west of Hull Avenue ranged from 3×10^{-4} to 3×10^{-3} for current adult and youth trespasser, future site worker, future adult and child resident and current recreational adult and youth. Exposure to surface soil and sediment accounts for most of the cancer risk. Non-cancer risk for the same area ranged from 5 to 42 for future site adult worker and future adult and child resident. The majority of the risk was from exposure to shallow and intermediate groundwater. On the east side of Hull Avenue, the total incremental lifetime cancer risk ranged from 2×10^{-4} to 4×10^{-2} for current adult and child resident, current construction worker and current adult and youth recreation. Surface soil, subsurface soil and shallow and intermediate groundwater contributed most of the risk. Non-cancer risk for this area ranged from an HI of 2 to 102. The construction worker risk was from exposure to subsurface soils. The other groups received their risk from exposure to surface soil and shallow and intermediate groundwater. In terms of contaminants, PAHs are the most significant contributor to risk, accounting for nearly all the excess risk in the soils and surficial groundwater aquifer.

The HHRA defined chemicals of concern (COCs) for the site by identifying the contaminants in an exposure scenario that exceed an excess cancer risk level of 1×10^{-4} or an HI of 1. The HHRA then calculated remedial goal option (RGO) levels by combining the intake levels of each COC from all appropriate exposure routes for a particular medium and rearranging the risk equations to solve for the concentration term (i.e., the RGO). RGOs provide remedial design staff with long-term targets to use during analysis and selection of remedial alternatives. Ideally, such goals, if achieved, will comply with applicable or relevant and appropriate requirements (ARARs) and result in residual risks that fully satisfy National Contingency Plan (NCP) requirements for the protection of human health and the environment. Risk-based RGOs are guidelines and do not establish that cleanup to meet these goals is warranted. When selecting the remedy for the Site, the RGO may be incorporated as the remediation goal if no ARAR exists for the contaminant.

7.1.1 Identification of Chemicals of Concern

As stated previously, data used in this evaluation were obtained from the SRI. COPCs are chemicals whose data are of sufficient quality for use in the quantitative risk assessment, are potentially site-related, and represent the most significant contaminants in terms of potential toxicity to humans.

The data were grouped into specific areas of concern for evaluation in the HHRA. The data groupings were based on the physical characteristics of the area and the current and potential future uses of the area.

All data generated by Gannett Fleming sampling efforts were validated in accordance with national and regional USEPA validation guidance and the Work Plans for conducting the SRI and sampling effort. The data were summarized to show all chemicals that were positively identified in at least one (1) sample. Included in this group were unqualified results and results that were qualified with a "*J*", which means the chemical was present but the concentration was estimated. "U" qualified data were used in the Risk Assessment, but the data were modified in order to perform statistical assessment of the data. Tentatively identified compounds (qualified with an *N*) were not included.

An assessment of the quality of the data for use in the Risk Assessment was performed using the PARCC analysis that determines the precision, accuracy, representativeness, comparability and completeness of the data. The PARCC analysis was performed in accordance with current USEPA data quality guidance (EPA, 1992). The data collected from the SRI were found to meet the data quality objectives of the project and were determined to be of adequate quality for use in the Risk Assessment.

Finally, the detection limits achieved for the Study Area samples were compared to associated screening values to determine if methods used were sufficiently robust to meet the data quality objectives for this Risk Assessment.

Next, the laboratory data were tabulated to show the range of detections above the sample quantification limit (SQL), the number of detections above the SQL, and the number of samples that were collected.

These positively identified chemicals were screened to exclude chemicals that, although present, are not important in terms of potential human health effects. The screening criteria fall into two (2) categories:

(1) Inorganics that are essential nutrients or normal components of human diets were excluded. Calcium, magnesium, potassium, and sodium were excluded because they are essential nutrients; and

(2) Inorganic and organic chemicals whose maximum concentration was lower than a risk-based concentration corresponding to an excess cancer risk level of 1×10^{-6} or a Hazard Quotient (HQ) level of 0.1 using residential land use assumptions were excluded.

A list of COCs was derived from the COPCs identified for the Site. COCs are the most significant contaminants in an exposure scenario that exceed an excess cancer risk level of 1×10^{-4} or an HI of 1. More specifically, COCs having individual excess cancer risk levels equal to or greater than 1×10^{-6} or an HQ equal to or greater than 0.1 in a given exposure scenario which had a total cancer risk exceeding 1×10^{-6} or an HI exceeding 1. COPCs that exceed state or federal ARARs are also COCs. **Table 7-1** summarizes the COCs, range of detections, total number of analyses and number of exceeded results.

7.1.2 Exposure Assessment

An exposure assessment identifies pathways where receptors may be exposed to site contaminants and estimates the frequency, duration, and magnitude of such exposures. Exposure assessment involves: 1) characterization of the physical setting of the area, 2) identification of potential receptors and exposure pathways, 3) identification of exposure point concentrations and doses, and 4) identification and discussion of uncertainties.

Exposure pathways are determined in a Conceptual Site Model (CSM) that incorporates information on the potential chemical sources, release mechanisms, affected media, potential exposure pathways, and known receptors to identify complete exposure pathways. A pathway is considered complete if: 1) there is a source or chemical release from a source; 2) there is an exposure point where contact can occur; and 3) there is a route of exposure (oral, dermal, or inhalation) at the contact point through which the chemical may be taken into the body. All of the exposure scenarios considered in the Nocatee Hull Creosote Site risk assessment are summarized in **Table 7-2**.

Source media and potential exposure media for the Study Area include surface soil, subsurface soil, groundwater (shallow, intermediate and deep zones of the surficial aquifer), surface water and wetland soil/stream sediments.

Potential receptors were identified through review of Study Area conditions, observations made during Study Area visits, identification of expected and/or possible land uses and determination of complete exposure pathways. A CSM was developed to address potential risk to receptors from site related constituents. The CSM is used to illustrate the potential pathways for each of the human receptors to unit-related contaminants. The routes through which exposure to these pathways may occur include, but are not limited to: dermal contact with contaminated media, ingestion of contaminated media (soil, surface water, groundwater), inhalation of fugitive dusts and volatile emissions. **Table 7-2** presents the potential current and future receptors that may be exposed to some or all of the affected environmental media both east and west of Hull Avenue at the Study Area. Receptors are identified separately for these two areas due to different current and future potential land uses in these areas.

Quantitative risks were also developed for Central Tendency (CT) exposure. CT exposure is designed to provide prospective for risk managers and compliance with USEPA guidance. USEPA Region 4 prefers that the CT exposure evaluation be presented as part of the Uncertainty Analysis. Therefore, CT exposure scenarios are discussed and evaluated in the uncertainty section and also summarized in the summary and conclusion section of the Risk Assessment.

Risk Assessments are conducted using a representative Exposure Point Concentration (EPC). For this Risk Assessment, EPCs were calculated for COPCs only. Ideally, the EPC should be the true average concentration within the exposure unit. However, because of the uncertainty associated with estimating the true average concentration, the 95% Upper Confidence Limit (UCL) of the arithmetic mean is used to determine the EPC. The 95% UCLs were compared to the maximum concentration found for each analyte and the smaller of the two was chosen as the EPC and used for the dose calculations. In cases where the data set was small, the maximum concentration was used as the exposure point concentration.

The exposure parameters selected are intended to determine the Reasonable Maximum Exposure (RME) for each receptor scenario under current Study Area conditions. The RME is the highest exposure that is reasonably expected to occur at a Study Area. USEPA has established default exposure assumptions for quantifying theoretical exposure doses of Study Area constituents (EPA 1991). When default exposure parameters were not available, parameters were determined based on professional judgment to reflect the specific conditions in the Study Area.

The SRI, Section 8, Tables 8.3-1 through 8.3-16 present the 95% UCLs, the Maximum Concentrations and the EPC selected for each COPC evaluated in each media evaluated. It should be noted that for groundwater, after thorough statistical evaluation, the maximum concentration was selected as the EPC in most cases.

Calculation of intake factors or the daily dose for each chemical and receptor was performed for the appropriate exposure pathway. (e.g., inhalation, ingestion, dermal)

The sources and degree of uncertainty associated with the estimation of exposure needs to be taken into consideration. Major potential sources of uncertainty include, 1) the monitoring data used in the report, which may or may not be representative of actual site conditions, 2) the assumptions and input variables used to estimate exposure concentrations in the exposure models, and 3) the values of the intake variables used to calculate intake (EPA, 1989).

In addition to these three sources of uncertainty is the uncertainty associated with "hot spot" analysis and the likelihood that a receptor would be exposed to the maximum or 95% UCL of the mean concentration for a given analyte that may be present in a "hot spot" as opposed to a receptor being exposed to a more representative concentration (i.e., mean or median concentration).

7.1.3 Toxicity Assessment

The purpose of the toxicity assessment is to weigh available evidence regarding the potential for particular constituents to cause adverse effects in exposed individuals and to provide, where possible, an estimate of the relationship between the extent of exposure to a constituent and the increased likelihood of adverse effects (EPA, 1989).

The toxicity assessment is composed of two parts: 1) Hazard Identification, and 2) Dose Response Evaluation. Exposures to carcinogenic and non-carcinogenic toxic constituents are responsible, by definition, for creating toxic endpoints or effects. There are also differences in the biological processes through which carcinogenic and non-carcinogenic constituents can cause adverse effects to a receptor. Therefore, the evaluation of carcinogenic and non-carcinogenic health effects is evaluated separately in the HHRA.

Toxicity values used in the quantitative Risk Assessment were chosen using the following hierarchy of toxicity information resources.

- The USEPA on-line Integrated Risk Information System (IRIS) database (EPA, 2001) containing toxicity values that have undergone the most rigorous Agency review.
- The latest version of the annual Human Evaluation Assessment and Summary Tables (HEAST), including all supplements (EPA, 1997)
- Other USEPA documents, memoranda, former Environmental Criteria and Assessment Office, or National Center for Environmental Assessment (NCEA) derivations for the Superfund Technical Support Center.

EPA toxicity values that were used in this assessment include:

- reference dose values (RfDs) for non-carcinogenic effects
- carcinogenic slope factors (CSFs) for excess carcinogenic risks

RfDs have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting non-carcinogenic (systemic) effects. RfDs are ideally based on studies where either animal or human populations were exposed to a given compound by a given route of exposure for the major portion of the life span (referred to as a chronic study). The RfD is derived by determining dose-specific effect levels from all the available quantitative studies and applying uncertainty factors to the most appropriate effect level to determine an RfD for humans. The RfD represents a threshold for toxicity. An RfD reflects the human lifetime exposure to a given chemical via a given route at a dose that should not result in adverse health effects, even for the most sensitive members of the population.

RfDs for inhalation exposure (RfD_i) are derived from reference concentration values (RfCs). RfCs are concentrations in air, expressed in mg/m^3, that are thought to represent a level without appreciable risk of deleterious effects from chronic (lifetime) exposure. A human body weight of 70 kg and an inhalation rate of 20 m^3/day are used to convert between a concentration in air (RfC) expressed in mg/m^3 and an inhaled intake expressed in units of mg/kg-day.

CSFs are route-specific values derived only for compounds that have been shown to cause an increased incidence of tumors in either human or animal studies. The CSF is an upper bound estimate of the probability of a response per unit intake of a chemical over a lifetime and is determined by low-dose extrapolation from human or animal studies. When an animal study is used, the final CSF is adjusted to account for extrapolation of animal data to humans. If the studies used to derive the CSF were conducted for less than the life span of the test organism, the final CSF is adjusted to reflect risk associated with lifetime exposure.

The toxicity assessment for carcinogenic PAHs (cPAHs) is performed with a Toxic Equivalence Factor (TEF) methodology. The toxicity of cPAHs is based on a relative potency of each compound to that of benzo(a)pyrene. USEPA Region 4 guidance (EPA, 1995) recommends TEF values to be used for each of the carcinogenic PAHs. These TEF values are presented in the SRI, Appendix B-5, Table C-6.3.

USEPA Region 4 guidance recommends that dermal exposure to cPAHs be assessed qualitatively. Therefore, dermal contact with cPAHs was assessed using the appropriate oral CSFs and their TEFs with a default Gastrointestinal Absorption Factor (GAF) value of 50% (SVOCs).

In addition, provisional inhalation toxicity values are provided for benzo(a)pyrene. The inhalation CSF for benzo(a)pyrene is 3.1 $(mg/kg\text{-}day)^{-1}$ and the inhalation unit risk is 0.88 $(mg/m^3)^{-1}$. Inhalation toxicity values for the remaining cPAHs were based on their corresponding TEFs.

Tables 7-3, 7-4, 7-5 and 7-6 summarize the toxicity values for non-carcinogenic COPCs, and carcinogenic COPCs for areas east and west of Hull Avenue.

7.1.4 Risk Characterization

The final step of the HHRA is risk characterization. Human intakes for each exposure pathway are integrated with EPA reference toxicity values to characterize risk. Carcinogenic and non-carcinogenic effects are estimated separately.

To characterize the overall potential for non-carcinogenic effects associated with exposure to multiple chemicals, 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:

$$Hazard\ Index = ADD_1/RfD_1 + ADD_2/RfD_{2...} + ADD_i/RfD_i$$

where:

ADD_i = Average Daily Dose (ADD) for the i^{th} toxicant
RfD_i = Reference Dose for the i^{th} 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. Indices greater than one (1) will be generated any time intake for any of the COCs exceeds its RfD. However, given a sufficient number of chemicals under consideration, it is also possible to generate an HI greater than one (1) even if none of the individual chemical intakes exceeds its respective RfD.

For carcinogens, risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the potential carcinogen. This is also referred to as incremental or excess individual lifetime cancer risk. For a given chemical and route of exposure, excess lifetime cancer risk is calculated as follows:

$$Risk = Lifetime\ Average\ Daily\ Dose\ (LADD) \times Carcinogenic\ Slope\ Factor\ (CSF)$$

These risks are probabilities that are generally expressed in scientific notation (i.e., 1×10^{-6} or 1E-6). An incremental lifetime cancer risk of 1×10^{-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, EPA assumes that the risk associated with multiple exposures is equivalent to the sum of their individual risks.

Potentially complete exposure routes are:

- ingestion of soil,
- dermal contact with soil,
- inhalation of dust,
- ingestion of groundwater,
- dermal contact with groundwater,
- inhalation of volatile organic compounds (VOCs) released from groundwater,
- ingestion of sediment, and
- dermal contact with sediment

The risks for these exposure scenarios are summarized in **Tables 7-7 through 7-19**. A brief summation of those exposure scenarios found to be unacceptable follows:

In the Plant and Peace River Floodplain Area, Current Recreational Youth, Future Site Worker, and Future Resident Adult and Child exposure assumptions exceed the Superfund acceptable baseline risk level of $1.0E^{-4}$. In the Oak Creek Area, the Current Residential Adult and Child exposure assumptions exceed the acceptable risk level. The HHRA shows risk to be predominantly from carcinogenic and non-carcinogenic PAHs and arsenic. West of Hull Avenue, carcinogenic risk is primarily from soil exposure while non-carcinogenic risk is from exposure to shallow and intermediate groundwater. East of Hull Avenue, both carcinogenic and non-carcinogenic risk is primarily from exposure to shallow and intermediate groundwater.

7.1.5 Remediation Goals

The establishment of health-based remediation goals serves as an important means of guiding remedial activities. A health-based approach is utilized when remediation goals promulgated by state and federal agencies are not available. The approach to developing health-based standards is derived from the risk assessment process. The risk assessment is essentially a process by which the magnitude of potential cancer risks and other health effects at a site can be evaluated quantitatively. A remediation goal is established by back-calculating a health-based protective contaminant concentration given exposure assumptions and a target cancer risk of 1×10^{-6} or a Hazard Index of 1. Site contaminant concentrations were also compared to FDEP SCTLs (Soil Cleanup Target Concentrations) and GCTLs (Groundwater Cleanup Target Concentrations) in Tables I & II of Chapter 62-777 FAC, considered Relevant and Appropriate Requirements, and where there were exceedances, resulted in the addition of those contaminants to the COC list. For COCs where an SCTL or GCTL was exceeded, the SCTL or GCTL was incorporated as the remediation goal. Soil groundwater protection criteria were not available for arsenic and therefore results for arsenic in a Site Specific Leachability Study performed in 2003 (Gannett, 2003c) were used to establish a remediation goal.

The concept of the remediation goals inherently incorporates the concept of exposure reduction which allows remedial alternatives to be flexible. The COC remediation goals for the Nocatee Hull Creosote Site are presented in **Table 7-20.**

7.1.6 Uncertainty Analysis

Uncertainty will always surround estimates of environmental concentrations at the Nocatee Hull Creosote Site. Uncertainty in the analytical data may be linked to sample density and distribution, collection procedures in the field, seasonal fluctuations and accuracy of the sample analysis.

Since the assumptions and other aspects of Risk Assessment are intended to be conservative, some degree of uncertainty is inherent to the process. Inherent sources of uncertainty typically relate to four areas: 1) data evaluation process, 2) exposure assessment, 3) toxicity assessment, and 4) risk characterization. A detailed discussion of the uncertainty analysis for the Site can be found in Section 8.6 of the SRI.

7.2 Ecological Risk

A Screening-Level Ecological Risk Assessment (SLERA) was conducted for the Site. The results of the SLERA indicated that several constituents in the environmental media at several locations on the Site had potential to pose adverse effects on valued ecological assets (assessment endpoints). **Tables 7-21** and **7-22** contain details of this evaluation. Soil, surface water and sediment samples were collected to determine concentrations of Constituents of Potential Ecological Concern (COPECs) for use in media-specific toxicity testing. Data on exposure and effects were integrated into a statement about risks to the previously established assessment endpoints. The risk description provided information important for interpreting the risk results and identifying potential thresholds for adverse effects on the assessment endpoints. Risk management incorporates the results of the risk assessment with other considerations that are weighed when making and justifying the final risk management decisions.

The risk characterization process determined that two assessment endpoints appeared to be at risk from total PAHs (tPAHs) at the Site. Healthy populations and communities of terrestrial invertebrates seemed to be at risk due to direct exposure to tPAHs within surface soil at the former plant area. Healthy populations and communities of benthic invertebrates appeared to be at risk due to direct exposure to tPAHs in sediment in Oak Creek. A summary of the ecological risk assessment results is presented in **Table 7-23.**

Step 8 of the SLERA recommended clean-up levels to protect ecological receptors at the Site of 45 milligrams per kilogram (mg/kg) tPAHs in soil and 10 mg/kg tPAHs in sediments (ARCADIS, 2007). After additional literature review, FDEP proposed an alternative level of 35 mg/kg tPAHs in soil. Since the PRP has indicated a desire to satisfy both Superfund and Florida RBCA requirements during remediation, the lower soil concentration has been incorporated into the final FFS in evaluating the various alternatives. While soils have an ecological cleanup level of 35 mg/kg tPAHs, it is felt that the much lower HHRA cleanup goal for benzo(a)pyrene TEF will drive the remediation of most surface soils at the Site.

Uncertainties in the Ecological Risk Assessment

General sources of uncertainty include uncertainties in the conceptual site model, uncertainties in the exposure estimates, and uncertainties in the risk characterization. Uncertainties in the ecological risk assessment at the site include uncertainties in the bioavailability of creosote wastes to soil invertebrates and aquatic invertebrates. This uncertainty involves the ability to measure the concentrations of PAHs in soil or sediment and to relate these concentrations to bioavailable fractions that are toxic to invertebrate communities.

Site-specific uncertainties in the ecological risk assessment are listed in **Table 7-23.**

8.0 REMEDIAL ACTION OBJECTIVES

CERCLA and the NCP define remedial action objectives (RAOs) that are applicable to all Superfund sites. They relate to the statutory requirements for the development of remedial actions. Site-specific RAOs relate to potential exposure routes and specific contaminated media, such as soil, and are used to identify target areas of remediation and contaminant concentrations.

They require an understanding of the contaminants in their respective media and are based upon the evaluation of risk to human health and the environment, protection of ground water, information gathered during the RI, applicable guidance documents, and federal and state ARARs. RAOs must be identified as specifically as possible without unduly limiting the range of alternatives that can be developed for detailed evaluation.

The following RAOs were developed for the Nocatee Hull Creosote Site:

- Protect potential future commercial workers in the Plant and Peace River Floodplain Area from risks associated with ingestion, inhalation, and dermal contact with soils, groundwater or sediments containing Site COC concentrations exceeding the Preliminary Remediation Goals (PRGs)

- Protect current and potential future residents in the Oak Creek Area from risks associated with ingestion, inhalation, and dermal contact with soils, groundwater or sediments containing Site COC concentrations exceeding the PRGs
- All Areas:
  - o Prevent ingestion, inhalation, and dermal contact w/ soil, groundwater and sediment containing Site COCs exceeding PRGs
  - o Minimize infiltration & leaching to groundwater; reduce transport to surface water; manage exposure to down-gradient receptors
  - o Comply with federal & state ARARs in soil, groundwater and sediment in Site impacted areas
  - o Protect the environment from risks to populations and communities of benthic invertebrates associated with soils, sediments and groundwater discharges containing COC concentrations exceeding the PRGs

The RAO for ecological risk is to reduce the bulk media concentrations of Site COCs to below Site cleanup goals which is anticipated to reduce COC toxicity effects on the ecosystem to acceptable levels.

Attainment of the Site-specific COC Cleanup Goals presented in **Table 7-20** is expected to accomplish these RAOs.

9.0 DESCRIPTION OF ALTERNATIVES

Contaminants with concentrations above remediation goals and technologies which most effectively address the contaminants were considered in the development of remedial action alternatives. The goal in developing remedial action alternatives is to provide a range of cleanup options together with sufficient information to adequately compare alternatives against each other. **Figures 9-1** and **9-2** illustrate the extent of soil and ground-water contamination to be addressed by the remedial alternatives.

Alternatives for the Plant and Peace River Floodplain Areas and the Oak Creek Area were assembled separately to allow flexibility for potentially separate implementation schedules. Seven alternatives for the Plant and Peace River Floodplain and five alternatives for the Oak Creek Area were retained for detailed evaluation against nine criteria, per the NCP. Detailed descriptions of the retained alternatives follow.

9.1 Plant and Peace River Floodplain Areas (PPRFA)

9.1.1 Alternative 1 - No Further Action

Cost Summary

Capital Cost: $0
O&M Cost: $878,000
Present Worth Total Cost: $345,000 @ discount rate = 7%
Time to Construct: 0 years
Time to Achieve RAOs: ** Not Achieved **

This alternative is required by the NCP and is used as a basis for comparison with other alternatives. This *in-situ* alternative would continue existing actions including maintenance of the fence around the Plant and Peace River Floodplain Areas, maintenance of the Plant Area and environmental monitoring to track potential contaminant migration.

This alternative does not achieve RAOs or chemical-specific ARARs. Location- and action-specific ARARs do not apply to this alternative since further remedial actions will not be conducted.

9.1.2 Alternative 2 - Land Use Controls, Excavation of Soils, Consolidation, Capping, Slurry Wall, Free Product Recovery, MNA, Ecological Monitoring

Cost Summary

Capital Cost: $2,789,000
O&M Cost: $2,394,000
Present Worth Total Cost: $4,153,000 @ discount rate = 7%
Time to Construct: <1 year
Time to Achieve RAOs: 30 years

Institutional Controls restricting the property to commercial use and prohibiting extraction of groundwater from the surficial aquifer would be implemented. Excavation would be restricted in areas where subsurface soils exceed direct exposure (DE) cleanup goals to ensure adequate health and safety precautions are used and that excavated soils are properly managed. A slurry wall would be used to contain soils, DNAPL and groundwater exceeding cleanup goals in the former plant operations area (approximately 4.6 acres). The slurry wall would be keyed into low-permeability clays near the top of the Hawthorn Group (approximately 65 ft bls). A low-permeability capping system would be installed over the area encompassed by the slurry wall to minimize infiltration. Free product recovery systems currently installed as an interim measure would continue to operate until free product is no longer recoverable. Increased surface water runoff would be managed by promoting sheet flow in a radial pattern.

Approximately 28,400 cubic yards of soil and sediment exceeding direct exposure, ecological or leachability cleanup goals outside the cap footprint would be excavated and consolidated under the cap system. Clean backfill would be placed in the excavated areas, as needed, to maintain a two foot depth to remaining soils exceeding direct exposure cleanup goals. Erosion control would be implemented in disturbed areas. Piezometers would be used inside and outside the slurry wall for hydraulic monitoring.

Monitored Natural Attenuation (MNA) would be used outside the slurry wall to achieve groundwater cleanup goals. Groundwater monitoring would be used to verify the integrity of the slurry wall and assess the effectiveness of source control and natural attenuation remedy components. Excavating sediments exceeding ecological cleanup goals (estimated one acre) located in parts of the braided stream and floodplain areas requires significant disturbance to terrestrial habitat (estimated four acres) resulting in the destruction of forested, riparian and wetland habitats. Ecological monitoring is included in lieu of sediment excavation in areas where ecological destruction is believed to exceed the benefit gained by removing the contaminated sediment.

This alternative achieves RAOs and would comply with all chemical-specific, action-specific and location-specific ARARs. Table 6-1 of the Focused Feasibiltiy Study gives additional details.

9.1.3 Alternative 3 – Land Use Controls, Excavation of Soil, Consolidation, Capping, Slurry Wall, Free Product Recovery, In-situ Biosparging, MNA, Ecological Monitoring
Cost Summary
Capital Cost: $3,885,000
O&M Cost: $3,360,000
Present Worth Total Cost: $5,970,000 @ discount rate = 7%
Time to Construct: <1 year
Time to Achieve RAOs: 30 years

This alternative contains all of the components of PPRFA Alternative 2 plus it adds treatment of groundwater outside the slurry wall by bioremediation via *in-situ* biosparging in select areas, as well as by MNA. Precise numbers and locations of biosparging points would be determined in the Remedial Design but conceptual locations have been identified in **Figure 9-1**.

This alternative achieves RAOs and would comply with all chemical-specific, action-specific and location-specific ARARs. Table 6-1 of the Focused Feasibiltiy Study gives additional details.

9.1.4 Alternative 4 - Land Use Controls, Excavation of Soil/Sediment, Off-site Disposal, Capping, Slurry Wall, Free Product Recovery, In-situ Biosparging, MNA
Cost Summary
Capital Cost: $5,799,000
O&M Cost: $3,360,000
Present Worth Total Cost: $7,884,000 @ discount rate = 7%
Time to Construct: 1 year
Time to Achieve RAOs: 30 years

This alternative contains all of the components of PPRFA Alternative 3 except only soils exceeding the cleanup goals within the limits of the slurry wall would remain in place. Soils exceeding DE and leachability criteria outside the cap footprint, as well as sediments exceeding ecological cleanup goals, would be excavated and taken off-site for disposal. Off-site disposal would include transportation and disposal (T&D) at a Class D landfill.

This alternative achieves RAOs and would comply with all chemical-specific, action-specific and location-specific ARARs. Table 6-1 of the Focused Feasibiltiy Study gives additional details.

9.1.5 Alternative 5 – Land Use Controls, Excavation of Soil/Sediment, Treatment via LTTD and Stabilization, Capping, Slurry Wall, Free Product Recovery, In-situ Biosparging, MNA

Cost Summary

Capital Cost: $7,980,000
O&M Cost: $3,360,000
Present Worth Total Cost: $10,064,000 @ discount rate = 7%
Time to Construct: 1 year
Time to Achieve RAOs: 30 years

This alternative contains all of the components of PPRFA Alternative 4 except that soils exceeding DE and leachability cleanup goals beyond the cap footprint, as well as sediments exceeding ecological cleanup goals, would be excavated and treated on-site using a mobile, indirect fired thermal desorption unit. Following thermal treatment, arsenic impacted soils would be treated via stabilization/solidification. Treated soils and sediment would be transported and placed into the borrow pit.

This alternative achieves RAOs and would comply with all chemical-specific, action-specific and location-specific ARARs. Table 6-1 of the Focused Feasibiltiy Study gives additional details.

9.1.6 Alternative 6 - Land Use Controls, Excavation of Soil, Off-site Disposal, Free Product Recovery, In-situ Biosparging, MNA, Ecological Monitoring

Cost Summary

Capital Cost: $6,056,000
O&M Cost: $4,872,000
Present Worth Total Cost: $8,654,000
Time to Construct: <1 year
Time to Achieve RAOs: 30 years

This alternative contains all components of PPRFA Alternative 5 except the slurry wall is not constructed. Instead all soils exceeding DE and leachability cleanup goals are excavated and transported off-site for disposal. Off-site disposal would include T&D at a Class D landfill. Groundwater treatment via *in-situ* biosparging would be expanded over a larger area where groundwater exceeds the cleanup goals. Biosparge points would be placed within the borrow pit, at the down-gradient edge of the borrow pit and within the Plant Area in numerous locations across the former plant operation area.

This alternative achieves RAOs and would comply with all chemical-specific, action-specific and location-specific ARARs. Table 6-1 of the Focused Feasibiltiy Study gives additional details.

9.1.7 Alternative 7 - Land Use Controls, Excavation of Soil/Sediment, Treatment via LTTD and Stabilization, Free Product Recovery, In-situ Biosparging, MNA

Cost Summary

Capital Cost: $10,338,000
O&M Cost: $4,992,000
Present Worth Total Cost: $13,016,000 @ discount rate = 7%
Time to Construct: 1 year
Time to Achieve RAOs: 30 years

This alternative contains all components of PPRFA Alternative 6 except instead of transporting all excavated soils off-site for disposal, the soils would be treated on-site using a mobile, indirect fired thermal desorption unit as in PPRFA Alternative 5. Following thermal treatment, arsenic impacted soils would be treated via stabilization/solidification. Excavated areas, including the borrow pit, would be backfilled with treated fill to match the existing grade.

This alternative achieves RAOs and would comply with all chemical-specific, action-specific and location-specific ARARs. Table 6-1 of the Focused Feasibiltiy Study gives additional details.

9.2 Oak Creek Area (OCA)

9.2.1 Alternative 1 - No Further Action

Cost Summary

Capital Cost: $0
O&M Cost: $467,000
Present Worth Total Cost: $193,000 @ discount rate = 7%
Time to Construct: 0 years
Time to Achieve RAOs: ** Not Achieved **

This alternative is required by the NCP and is used as a basis for comparison with other alternatives. This alternative would continue existing actions including maintenance of the fence around the CMA, maintenance of the CMA, potable well monitoring and environmental monitoring to track contaminant migration.

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

9.2.2 Alternative 2 - Temporary Land Use Controls, Excavation of Soil/Sediment, Off-site Disposal, Potable Water Carbon Filters, MNA

Cost Summary

Capital Cost: $2,014,000
O&M Cost: $698,000
Present Worth Total Cost: $2,443,000 @ discount rate = 7%
Time to Construct: <1 year
Time to Achieve RAOs: 17 years

Temporary land use controls would be implemented to prohibit residential use of property with soil contamination exceeding Site COC cleanup goals and to prohibit the extraction of groundwater from the surficial aquifer in areas where groundwater exceeds Site COC cleanup goals. The temporary land use controls would be removed once Site COC cleanup goals are achieved.

Soils above the mean-low water table will be excavated. This should address soils exceeding DE, leachability and ecological cleanup goals due to the shallow nature of the water table in this area. Excavation of sediments exceeding ecological cleanup goals will also occur. The excavated material would be transported off-site for disposal at a Class D landfill. Backfilling of the creek bed would include installation of a geotextile fabric and riprap within the creek bed. All other excavated areas would be backfilled with clean fill to match existing grade. Erosion control would be implemented in disturbed areas.

MNA would be used to treat groundwater exceeding cleanup goals. Point of Use (POU) treatment would be implemented using carbon filters at any potable wells with groundwater exceeding Primary Drinking Water Standards (PDWS). Groundwater monitoring and maintenance of the POU systems would be required until groundwater cleanup goals are achieved.

This alternative achieves RAOs and would comply with all chemical-specific, action-specific and location-specific ARARs. Table 6-9 of the Focused Feasibiltiy Study gives additional details.

9.2.3 Alternative 3 - Temporary Land Use Controls, Excavation of Soil/Sediment, Plant Area Treatment via LTTD and Stabilization, Potable Water Carbon Filters, MNA

Cost Summary

Capital Cost: $3,807,000
O&M Cost: $698,000
Present Worth Total Cost: $4,236,000 @ discount rate = 7%
Time to Construct: <1 year
Time to Achieve RAOs: 17 years

This alternative contains all components of OCA Alternative 2 except excavated soils are treated using a mobile, indirect fired thermal desorption unit located at the Plant Area. Treated soils would then be used as fill material as appropriate in the Plant and Peace River Floodplain Areas. This alternative is most efficient when coupled with PPRFA Alternatives 5 and 7.

This alternative achieves RAOs and would comply with all chemical-specific, action-specific and location-specific ARARs. Table 6-9 of the Focused Feasibiltiy Study gives additional details.

9.2.4 Alternative 4 - Temporary Land Use Controls, Excavation of Soil/Sediment, Off-site Disposal, New Deep Potable Wells, In-situ Biosparging, MNA

Cost Summary

Capital Cost: $3,074,000
O&M Cost: $1,312,000
Present Worth Total Cost: $4,107,000 @ discount rate = 7%
Time to Construct: <1 year
Time to Achieve RAOs: 11 years

This alternative contains all of the components of OCA Alternative 2 plus it adds treatment of groundwater by bioremediation via *in-situ* biosparging in select areas followed by MNA. Biosparging is designed to create an aerobic environment in the surficial aquifer to aerobically biodegrade organic constituents exceeding cleanup goals and to decrease the dissolved concentrations of arsenic by co-precipitating dissolved arsenic with dissolved iron onto the aquifer matrix. Biosparging points would be placed hydraulically upgradient of areas where shallow, intermediate or deep zones of the surficial groundwater aquifer exceed cleanup goals. A conceptual layout appears in **Figure 9-2** but specific locations and numbers of biosparging points would be determined in Remedial Design. Groundwater monitoring would be performed to assess the effectiveness in reducing contaminant concentrations below cleanup goals. Domestic wells exceeding PDWS related to Site COCs would be properly abandoned and replaced with deeper wells drilled into the artesian aquifer located below the Hawthorn Group.

This alternative achieves RAOs and would comply with all chemical-specific, action-specific and location-specific ARARs. Table 6-9 of the Focused Feasibiltiy Study gives additional details.

9.2.5 Alternative 5 - Temporary Land Use Controls, Excavation of Soil/Sediment, Consolidation with Plant Area Soils Under Cap, Public (County) Water Supply, In-situ Biosparging, MNA

Cost Summary

Capital Cost: $4,163,000
O&M Cost: $1,312,000
Present Worth Total Cost: $5,196,000 @ discount rate = 7%
Time to Construct: <1 year
Time to Achieve RAOs: 11 years

This alternative contains all of the components of OCA Alternative 4 except excavated soils are transferred to the Plant Area and consolidated with Plant Area soils under the cap. Also, instead of deeper wells to replace domestic wells exceeding PDWS related to Site COCs, the wells would be replaced with public (County)-supplied water from the newly installed water line.

This alternative achieves RAOs and would comply with all chemical-specific, action-specific and location-specific ARARs. Table 6-9 of the Focused Feasibiltiy Study gives additional details.

10.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

After an initial screening process, retained alternatives are evaluated against the nine criteria specified in the NCP. The nine criteria are divided into three categories: two threshold criteria, five primary balancing criteria, and two modifying criteria. **Tables 10-1** and **10-2** present a summary of the comparative analysis of the Plant and Peace River Floodplain Area and the Oak Creek Area, respectively, along with the ranking scores for each evaluation criteria. The performance of each alternative against the criteria (except for present worth cost) was ranked on a scale from 0 to 5. A score of 0 indicates that none of the criterion's requirements were met, while a score of 5 is a desirable comparative score indicating all of the requirements for the criterion were met. These scores are simple ratings to translate the results of the relative comparison among alternatives; they are not additive.

Brief summaries of the first seven criteria for the Plant and Peace River Floodplain Area and the Oak Creek Area follow:

10.1 Plant and Peace River Floodplain Area (PPRFA)

<u>Threshold Criteria</u>

10.1.1 Overall Protection of Human Health and the Environment

PPRFA Alternatives 2 through 7 would meet the Site RAOs for soil by eliminating potential direct contact and protect groundwater through physical barriers. Additionally, land use controls and fencing would strengthen the effectiveness and long-term reliability of the engineering control by restricting future land use and access, as well as restricting groundwater use from the surficial aquifer. PPRFA Alternatives 2 and 3 would provide the highest level of overall protection. Groundwater treatment is more aggressive under PPRFA Alternatives 6 and 7 due to the number of areas undergoing treatment via biosparging. PPRFA Alternatives 3 and 4 provide more aggressive groundwater treatment than PPRFA Alternative 2. PPRFA Alternatives 2, 3 and 6 involve ecological monitoring in lieu of sediment excavation, therefore potential risks to the environment associated with sediments exceeding ecological criteria remain for a longer period of time.

10.1.2 Compliance with ARARs

This criterion addresses whether or not a remedy is expected to meet any identified "applicable" or "relevant and appropriate" federal or more stringent state environmental laws or regulations (i.e., ARARs) under CERCLA Section 121(d). Alternatively, it will evaluate whether a waiver of an ARAR can be invoked under CERCLA Section 121(d)(4).

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Only those promulgated state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate (40 CFR Part 300.5). Identification of ARARs and analysis of each alternative's compliance with ARARs appears in the Focused Feasibility Study (ARCADIS, 2008c).

Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely on the basis of location. Examples of location-specific ARARs include state and federal requirements to protect floodplains, critical habitats, and wetlands, and solid and hazardous waste facility sighting criteria.

Action-specific ARARs are technology or activity based requirements or limitations on actions taken with respect to hazardous wastes. These requirements are triggered by particular remedial activities that are selected to accomplish a remedy. Since there are usually several alternative actions for any remedial site, various requirements can be ARARs.

Chemical-specific ARARs are specific numerical quantity restrictions on individually-listed contaminants in specific media. Examples of chemical-specific ARARs include drinking water standards and ambient air quality standards. Because there are usually numerous contaminants of potential concern for any remedial site, various numerical requirements can be ARARs. This remedy has chosen to incorporate FDEP SCTLs (Soil Cleanup Target Levels) and GCTLs (Groundwater Cleanup Target Levels) as relevant and appropriate requirements, where they exist for Site COCs in Tables I and II of Chapter 62-777 FAC and are based on protection of human health criteria. **Table 7-20: COC Cleanup Goals** identifies the Site contaminants where this has been applied.

All PPRFA alternatives would meet their respective soil, groundwater and sediment ARARs from Federal and State laws given sufficient time. For groundwater, natural processes (MNA) may not be sufficient to meet chemical-specific ARARs in a reasonable time frame.

Primary Balancing Criteria

10.1.3 Long-Term Effectiveness and Permanence

Each alternative was assessed for the long-term effectiveness and permanence it presents, along with the degree of certainty that the alternative will prove successful. Factors considered as appropriate included:

- magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities. The characteristics of the residuals are considered to the degree that they remain hazardous, taking into account their T/M/V and propensity to bioaccumulate.

- adequacy and reliability of controls such as containment systems and institutional controls such as land and/or ground-water use restrictions on a property deed that are necessary to manage treatment residuals and untreated waste. This factor addresses the uncertainties associated with land disposal for providing long-term protection from residuals; the assessment of the potential need to replace technical components of the alternative; and the potential exposure pathways and risks posed should the remedial action need replacement.

PPRFA Alternatives 2 through 5 provide a higher level of long-term effectiveness and permanence than PPRFA Alternatives 6 and 7 by providing more definitive containment of subsurface soils and DNAPL sources to groundwater. PPRFA Alternatives 2 through 5 eliminate risks to the potential receptors from direct exposure via containment. All PPRFA alternatives require long-term management and five-year reviews. All PPRFA alternatives are adequate and reliable in controlling exposure to residuals that may remain at the Site.

10.1.4 Reducing Toxicity, Mobility or Volume (T/M/V) Through Treatment
The degree to which each alternative employs recycling or treatment that reduces T/M/V was assessed, including how treatment is used to address the principal threats posed by the soil and ground water. Factors considered, as appropriate, included the following:

- treatment or recycling processes that alternatives employ and materials they will treat;
- amount of hazardous substances, pollutants, or contaminants that will be destroyed, treated, or recycled;
- degree of expected reduction of T/M/V of the waste due to treatment or recycling and specification of which reduction(s) are occurring;
- degree to which treatment is irreversible;
- type and quantity of residuals that will remain following treatment, considering persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents; and
- degree to which treatment reduces inherent hazards posed by principal threats at the Site.

PPRFA Alternatives 2, 3 and 4 reduce the mobility of COCs within soil through containment, but provide no or varying degrees of active treatment of soils. All PPRFA alternatives reduce toxicity and volume of COCs in groundwater through *in situ* biosparging and/or by natural attenuation. All PPRFA alternatives rely on some degree of natural attenuation to aid in the remediation of the residuals remaining in the soil. None of the PPRFA alternatives except Alternatives 5 and 7 produce any residuals from treatment.

10.1.5 Short-Term Effectiveness
The short-term effectiveness of each alternative was assessed considering the:

- short-term risks that might be posed to the community during implementation of an alternative;
- potential impacts on workers during remedial action and effectiveness and reliability of protective measures;

- potential environmental impacts of remedial action and effectiveness and reliability of mitigative measures during implementation; and

- time until protection is achieved.

All PPRFA alternatives would provide equal protection to the workers and community through the use of PPE and construction techniques (e.g., dust and odor suppression). PPRFA Alternatives 2, 3 and 6 leave sediment exceeding PRGs in place versus removal under the remaining PPRFA alternatives. Monitoring incorporated into PPRFA Alternatives 2, 3 and 6 avoids destruction of habitat which would result in more adverse impacts on the riparian and wetland environments.

All PPRFA alternatives have an estimated implementation time of approximately one year. All PPRFA alternatives create short-term risks of community and worker exposure and the potential of fugitive dust during excavation, transportation, treatment, off-site disposal, grading, and/or cap construction. Excavation risks appear manageable by using appropriate engineering and construction management controls.

10.1.6 Implementability

The ease or difficulty of implementing each alternative was assessed by considering the following types of factors as appropriate:

- Technical feasibility, including technical difficulties and unknowns associated with construction and operation of a technology, reliability of technology, ease of undertaking additional remedial actions, and ability to monitor effectiveness of remedy.

- Administrative feasibility, including activities needed to coordinate with other offices and agencies and ability and time required to obtain any necessary approvals and permits from other agencies (e.g., off-site disposal).

- Availability of services and materials, including availability of adequate off-site treatment, storage capacity, and disposal capacity and services; availability of necessary equipment and specialists, and provisions to ensure any necessary additional resources; availability of services and materials; and availability of prospective technologies.

All PPRFA alternatives involving construction of the containment measures and biosparging systems do not pose any technical implementability difficulties. PPRFA Alternatives 5 and 7 may present some administrative difficulties and take more time to implement. PPRFA Alternative 6 would involve the transport of a large volume of soils exceeding PRGs for off-site disposal that would have a significant short-term impact on the community from the large number of truckloads required to transport the impacted soils through the community. Disruption to the community for these alternatives would be significant. All PPRFA alternatives require coordination with other agencies for land use controls and concurrence of the selected remedial actions. All remedial technologies are proven and reliable.

10.1.7 Cost

Cost estimates for each alternative were based on conceptual engineering and design. The type of costs that were assessed included:

- capital costs, including both direct and indirect costs;
- annual O&M; and
- net present total worth of capital and O&M costs.

The present worth of each alternative provides the basis for the cost comparison. The present worth cost represents the amount of money that, if invested in the initial year of the remedial action at a given rate, would provide the funds required to make future payments to cover all costs associated with the remedial action over its planned life. The present worth analysis was performed on all remedial alternatives using a 7 percent discount rate over a period of 30 years. Present worth cleanup costs needed to meet performance standards are within the range of +50% to -30% accuracy.

PPRFA Alternatives 5 and 7 have the highest capital costs. PPRFA Alternatives 4 and 6 have similar capital costs. PPRFA Alternative 2 has the lowest capital cost of all the alternatives. PPRFA Alternatives 3, 4 and 5 have similar short-term O&M cost associated with the *in situ* biosparging system. PPRFA Alternative 3 has the highest log-term O&M costs associated with operating a biosparging system and ecological monitoring.

10.2 Oak Creek Area (OCA)

<u>Threshold Criteria</u>

10.2.1 Overall Protection of Human Health and the Environment

OCA Alternatives 2 through 5 would meet the general RAOs for soil and sediment by eliminating potential direct contact and for the protection of groundwater through *in situ* treatment and/or natural attenuation. OCA Alternative 5 would provide the highest level of overall protection through excavation and placement under the Plant Area cap of soils and sediment exceeding PRGs, an alternative water supply and *in situ* treatment and natural attenuation of groundwater.

10.2.2 Compliance with ARARs

OCA Alternatives 2 through 5 would comply with chemical-specific ARARs and TBCs concerning worker and public safety. All OCA alternatives would meet soil and sediment PRGs (which represent chemical-specific ARARs) upon completion of clean backfilling and restoration. Groundwater PRGs would be achieved upon completion of *in situ* treatment and/or MNA. Action-specific ARARs would be achieved for certain alternatives. Location specific ARARs related to the Oak Creek floodplain are applicable to all the alternatives.

<u>Primary Balancing Criteria</u>

10.2.3 Long-Term Effectiveness and Permanence

OCA Alternatives 4 and 5 provide a higher level of long-term effectiveness and permanence than OCA Alternatives 2 and 3 by providing an alterantive water supply as well as treatment of groundwater exceeding PRGs via biosparging. All OCA alternatives are expected to eliminate or significantly reduce residual risks from soils/sediments to acceptable levels to current and future receptors as well as to provide long-term reliability through removal and off-site disposal. All OCA alternatives are adequate and reliable in controlling exposure to any COC residuals that may remain in the Oak Creek Area.

10.2.4 Reducing Toxicity, Mobility or Volume (T/M/V) Through Treatment

OCA Alternative 3 reduces the mobility, toxicity and volume of COCs in soil and sediment through excavation and treatment. Remaining OCA alternatives reduce the mobility of COCs within soil/sediment through excavation and either off-site disposal or consolidation with Plant Area soils under the cap. All groundwater technologies within the OCA alternatives reduce toxicity and volume of COCs in groundwater through *in situ* treatment and/or by natural attenuation. All OCA alternatives rely on some degree of natural attenuation to aid in the remediation of the residuals remaining in the groundwater.

10.2.5 Short-Term Effectiveness

All OCA alternatives would potentially affect the health and safety of the community during earth-moving activities. Implementation of all alternatives would require construction, operations and sampling personnel to utilize training and PPE because excavation and grading are involved, and therefore, some risks would be incurred during remedial actions. All OCA alternatives would provide equal protection to the workers and community through the use of PPE, construction techniques (e.g., dust and odor suppression), and air monitoring. All soil and sediment OCA alternatives have an estimated construction time of approximately one year or less. Excavation risks appear manageable by using appropriate engineering and construction management controls. The environmental impacts (e.g., fugitive dust, runoff) are expected to be minimal during implementation of all alternatives via the use of appropriate engineering controls.

10.2.6 Implementability

None of the OCA alternatives pose significant technical implementability difficulties. OCA Alternatives 4 and 5 may present some administrative difficulties and take more time to implement because of potential community acceptance issues. OCA Alternative 3 with LTTD treatment may present permitting and community acceptance issues. All OCA alternatives would involve the transport of large volumes of soils/sediment that would have a short-term impact on the community because of the number of truckloads required to transport the soils/sediment exceeding PRGs through the community and either over regional roadways or to the Plant Area for consolidation beneath a cap. All remedial technologies are proven and reliable. Future remedial actions are easily implemented for all alternatives.

10.2.7 Cost

OCA Alternative 5 exhibits the highest capital and overall project cost but is estimated to achieve remedial goals much quicker than other alternatives. OCA Alternative 3 has the second highest overall cost associated with the LTTD treatment. All OCA alternatives have similar long-term O&M cost associated with either long-term MNA and/or active groundwater remediation.

Modifying Criteria

10.3 Agency Acceptance (Site-wide)

The State of Florida, as represented by the Florida Department of Environmental Protection, has been the support agency during the CERCLA process for the Nocatee Hull Creosote Site. In accordance with 40 CFR §300.430, FDEP as the support agency, has provided review and input of the many documents generated during this process.

10.4 Community Acceptance (Site-wide)

Based on comments expressed at the September 11, 2008 public meeting, the community has significant concern about potential past exposure to Site contaminants and questions if the technology being proposed (slurry wall/cap) is a reliable, long-term solution for the former plant area. Some expressed a preference to excavate all contaminated soil to 65 feet below land surface and haul away. Others expressed concern about the ability to control dust and odor during any excavation efforts at the Site. It does appear that many want a protective remedy implemented quickly because the investigation has been going on a long time without a solution being implemented. Specific responses to comments by the community can be found in ***Part 3: Responsiveness Summary*** of this document, as well as in the transcript of the public meeting which is located in the Administrative Record for the Site.

11.0 PRINCIPAL THREAT WASTE

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (40 CFR §300.430(a)(1)(iii)(A)). Identifying principal threat wastes 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. Conversely, non-principal threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied.

Principal threat waste at this Site is limited to the DNAPL and soils heavily contaminated with creosote PAHs. Previous response actions removed the most significant concentrations of contamination from the plant process, sump and borrow pit areas. The remaining soil concentrations continue to be a direct exposure threat and a groundwater leachability threat. They are sporadically distributed both horizontally and vertically throughout the Site. Recovery of DNAPL more recently has indicated amounts of flowable DNAPL no longer exist in the Plant Area. Therefore, containment of the residual principal threat waste is felt to be acceptable. Inorganic contaminants detected above remediation goals are more limited in distribution but may have resulted in occurrences of inorganic ground-water contamination. While not anticipated, any excavated soils categorizing as RCRA hazardous waste would be treated pursuant to RCRA requirements (40 CFR §268) prior to off-site disposal at an appropriately permitted facility.

12.0 SELECTED REMEDY

12.1 Rationale for the Selected Remedy

The Preferred Alternative for cleaning up the Nocatee Hull Creosote Site is the combination of the Plant and Peace River Floodplain Areas Alternative 3 (Land Use Controls, Excavation of Soil/Sediment, Consolidation, Capping, Slurry Wall, Free Product Recovery, *In-situ* Biosparging, MNA, Ecological Monitoring) and the Oak Creek Area Alternative 5 (Temporary Land Use Controls, Excavation of Soil/Sediment, Consolidation with Plant Area Soils Under Cap, Public (County) Water Supply, *In-situ* Biosparging, MNA).

This combination of alternatives will achieve substantial risk reduction in an accelerated manner. By isolating the source area (the Plant Area) utilizing permanent containment measures (slurry wall/cap) and consolidating contaminated soil and sediment from the borrow pit and braided stream under the cap, this will allow immediate treatment impact (biosparging) to the adjacent groundwater which has migrated away from the source area. Excavation and consolidation of contaminated soil and sediment from the Oak Creek Area back to the slurry wall/cap area at the plant site will remove contaminated source material which will allow expedited recovery of groundwater impacts in the Oak Creek Area through proactive treatment using biosparging technology.

12.2 Description of the Selected Remedy

The major components of the selected remedy include:

Plant and Peace River Floodplain Areas

- The former plant operations area contains soils, DNAPL, and groundwater with concentrations greater than cleanup goals that will be contained by a slurry wall and low-permeability capping system to encapsulate Site contamination and minimize rainfall infiltration;
- The bottom of the slurry wall will be keyed into low-permeability clays (10^{-8} to 10^{-10} cm/sec) near the top of the Hawthorn Group;
- The free-product recovery system currently installed as an interim measure will continue to operate until free-flowing DNAPL is no longer recoverable;
- Piezometers will be incorporated into the slurry wall design to allow for hydraulic monitoring both inside and outside of the slurry wall;
- Surface water runoff will be managed by promoting sheet flow of the run-off in a radial pattern;
- Contaminated soils outside of the slurry wall that exceed COC cleanup goals will be excavated and consolidated to the slurry wall/cap area. Surface soils with concentrations exceeding direct exposure cleanup goals to a depth of two ft bls and soils with concentrations exceeding leachability cleanup goals from land surface to the mean-low water table will be excavated and consolidated;
- Clean soil will be placed in excavated areas, as needed, to maintain at least a two-foot depth above remaining soils that exceed direct exposure criteria;

- Sediment "hot spots" exceeding 100 mg/kg total PAHs will be excavated while remaining sediments exceeding sediment cleanup criteria will be monitored until concentrations drop below COC cleanup goals;
- Institutional Controls will be implemented to prohibit residential use on the property, prohibit the extraction of groundwater from the surficial aquifer for drinking or irrigation purposes, and restrict any future excavation in areas where subsurface soils exceed direct exposure cleanup goals to ensure future excavation is properly managed;
- Groundwater outside the slurry wall will be treated by bioremediation via *in-situ* biosparging in select areas, as well as by MNA;
- Groundwater monitoring will be used to document the progress toward cleanup goals and to verify the integrity of the slurry wall; and
- Performance of the remedy will be evaluated every five years as part of a Five-Year Review required by CERCLA since contamination will remain inside the slurry wall on a permanent basis. Lack of progress in attaining groundwater cleanup goals outside the slurry wall or failure of the permanent containment engineering controls will result in the evaluation of alternatives to correct the issue.

Oak Creek Area

- Soils above the mean-low water table and sediments exceeding ecological cleanup goals will be excavated and transferred to the Plant Area for consolidation with Plant Area soils under the low-permeability cap;
- Backfilling of the creek bed will include installation of a geotextile fabric and riprap within the creek bed area. Other excavated areas will receive clean fill to match the existing grade. Restoration efforts for erosion control will be implemented where excavation and backfilling occur;
- Groundwater treatment will include bioremediation via *in-situ* biosparging, in select areas, and MNA;
- Domestic wells exceeding PDWS related to Site COCs or Table 7-20 groundwater cleanup goals will be properly abandoned and replaced with public (County)-supplied water from the recently installed water line; and
- Temporary Institutional Controls will be implemented to prohibit residential use of property with soil contamination exceeding Site COC cleanup goals and prohibiting the extraction of groundwater from the surficial aquifer for drinking or irrigation purposes in areas where groundwater exceeds Site COC cleanup goals. The temporary land use controls would be removed once Site COC cleanup goals are attained.

Site-wide

- Monitoring of groundwater for aluminum and iron will be required throughout the Site remediation process to track remediation impacts on these elevated concentrations of Florida GCTL contaminants; and
- Groundwater concentrations of aluminum and iron will be re-evaluated after Site COC cleanup goals have been achieved to determine if they pose an unacceptable health threat.

Remediation Goals, also referred to as Cleanup Goals, for the COCs at the Nocatee Hull Creosote Site are identified in **Table 7-20.** During the time between the release of the Proposed

Plan and the finalization of the Record of Decision (ROD), it has been learned that a new Provisional Peer Review Toxicity Values (PPRTV) Slope Factor has been developed for 1-methylnaphthalene based on its potential carcinogenicity. PPRTV fall in Tier 2 of toxicity source information, per OSWER Directive 9285.7-53 dated December 5, 2003, and therefore are acceptable values for use in determining risk and cleanup goals at Superfund sites (EPA, 2003). Using this new carcinogenic slope factor and the carcinogenic tap water equation from the EPA Regional Screening Levels (September 2008 version) found at the EPA Region 4 Superfund website, a groundwater cleanup goal of 2.3 ug/L has been calculated for 1-methylnaphthalene and inserted into the Site COC Cleanup Goals listed in Table 7-20. The default concentration for soil leachability of this compound (from Table II of Chapter 62-777, FAC) has been retained as the cleanup goal. The Site-specific soil leachability of this compound based on the revised groundwater goal will be evaluated in the remedial design to determine if the Table II default SCTL will be adequate or if additional soils will need to be removed for protection of groundwater. Review of existing data suggest that removal of soils exceeding the Total B(a)P TEF cleanup goal may address this change in 1-methylnaphthalene toxicity categorization. If a change in the cleanup goal for 1-methylnaphthalene in soils is required, it will be documented in an Explanation of Significant Differences (ESD).

Principal threat waste at this Site includes DNAPL and heavily stained creosote soils, indicative of potential residual DNAPL, in the saturated and unsaturated zones of the former creosote wood treating plant that continue to serve as source material causing adverse groundwater impacts. Principal threat waste, exceeding remediation goals, located outside the slurry wall area will be excavated and consolidated within the slurry wall area and under the low-permeability cap. Free-phase DNAPL, located within the proposed slurry wall area, will continue to be recovered by the automated DNAPL recovery system and shipped off-site for proper disposal. *In situ* biosparging will treat Site contaminants located outside the slurry wall area in the saturated zone and groundwater.

The Plant and Peace River Floodplain Areas include Institutional Controls prohibiting residential use on the property, prohibiting the extraction of groundwater from the surficial aquifer until cleanup goals are achieved, and restricting any future excavation in areas where subsurface soils exceed direct exposure cleanup goals to ensure future excavation is properly managed. The former plant operations area containing soils, DNAPL, and groundwater with concentrations greater than cleanup goals would be contained by a slurry wall and low-permeability capping system to minimize lateral migration of contaminants and rainfall infiltration. The bottom of the slurry wall would be keyed into low-permeability clays (10^{-8} to 10^{-10} cm/sec) near the top of the Hawthorn Group. The free-product recovery system currently installed as an interim measure would continue to operate until free product is no longer recoverable. Increased surface water runoff will be managed by promoting sheet flow of surface water run-off in a radial pattern. Excavated soils and sediments outside of the slurry wall that exceed cleanup goals would be consolidated to the slurry wall/cap area. Surface soils with concentrations greater than direct exposure cleanup goals to a depth of two ft bls and soils with concentrations greater than leachability cleanup goals from land surface to the mean-low water table would be excavated and consolidated. Clean soil would be placed in excavated areas, as needed, to maintain at least a two-foot depth above remaining soils that exceed direct exposure criteria. Piezometers will be incorporated into the slurry wall design to allow for hydraulic monitoring both inside and outside of the wall.

The areal extent of the terrestrial habitat lost during contaminated sediment excavation in the Peace River Floodplain is estimated to be four times larger than the area of benthic invertebrate habitat protected by removal of those sediments. Overall, the impacts to forested riparian and wetland ecosystems due to sediment excavation would be substantially greater, and more certain, than the risks to benthic invertebrates posed by the sediments containing concentrations exceeding ecological criteria. As a result, ecological monitoring is included in lieu of sediment excavation in these areas. Sediment "hot spots" exceeding 100 mg/kg tPAHs would be excavated while remaining sediments would be monitored until concentrations drop below sediment cleanup criteria. Current data suggest these "hot spots" are located at the discharge point of the borrow pit and in the adjacent braided stream area and can be reached without major disturbance of the terrestrial habitat. Ecological monitoring would include periodic visual observation, as well as, environmental sampling once every five years to provide data for Five-Year Reviews. The estimated time it will take to reach sediment cleanup goals is uncertain at this time, therefore data gathered during the Five-Year Review process will be used to estimate the rate of degradation of the COCs. Supplemental technologies to accelerate the natural degradation process will be evaluated for implementation if it is determined that limited degradation is occurring. Incorporation of technologies that evaluate sediment pore water (using solid phase microextraction (SPME) or other appropriate methods) to assess continued bioavailability of COCs to benthic invertebrates would be considered in developing a monitoring plan. These monitoring methods would also be used to assess possible recontamination of Oak Creek sediments after excavation and streambed restoration actions until groundwater in the Oak Creek area has attained cleanup goals.

Groundwater outside the slurry wall would be treated by bioremediation via *in-situ* biosparging in select areas, as well as by MNA. Biosparging points or galleries would be placed both east and west of the slurry wall to accelerate the degradation of Site contaminants in the groundwater. Groundwater monitoring would be used to document the progress toward cleanup goals and to verify the integrity of the slurry wall. Performance of the remedy would be evaluated every five years as part of a Five-Year Review required by CERCLA since contamination would remain inside the slurry wall on a permanent basis. Lack of progress in attaining groundwater cleanup goals outside the containment area or failure of the permanent containment engineering controls would result in the evaluation of alternatives to correct the issue. These remediation components are expected to satisfy Florida RBCA Risk Management Option II (RMO II) criteria for soil and groundwater in the Plant and Peace River Floodplain Areas.

The Oak Creek Area includes temporary land use controls prohibiting residential use of property with soil contamination exceeding Site COC cleanup goals and prohibiting the extraction of groundwater from the surficial aquifer for drinking or irrigation purposes in areas where groundwater exceeds Site COC cleanup goals. The temporary land use controls would be removed once Site COC cleanup goals are achieved. Soils above the mean-low water table and sediments exceeding ecological cleanup goals will be excavated and transferred to the Plant Area for consolidation with Plant Area soils under the low-permeability cap. Backfilling of the creek bed would include installation of a geotextile fabric and riprap within the creek bed area. Other excavated areas would receive clean fill to match the existing grade. Restoration efforts for erosion control would be implemented where excavation and backfilling occur.

Groundwater treatment would include bioremediation via *in-situ* biosparging, in select areas, and MNA. Biosparging will enhance aerobic biodegradation of organic constituents exceeding cleanup goals and decrease dissolved concentrations of arsenic and iron by co-precipitation onto the aquifer matrix. Domestic wells exceeding PDWS related to Site COCs or Table 7-20 groundwater cleanup goals would be properly abandoned and replaced with public (County)-supplied water from the recently installed water line (expected availability – September 2008). These remediation components are expected to satisfy Florida RBCA RMO I criteria for soil, sediment and groundwater in the Oak Creek Area.

Aluminum and iron, which are well-known naturally occurring metals in Florida groundwater, appear at elevated concentrations in groundwater across the Site. Monitoring of these contaminants will be required throughout the Site remediation process to track remediation impacts on these elevated concentrations of Florida GCTL contaminants. Groundwater concentrations of aluminum and iron will be re-evaluated after Site COC cleanup goals have been achieved to determine if they pose an unacceptable threat.

EPA believes the Preferred Alternative meets the threshold criteria, provides the best balance of trade-offs among the other alternatives and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, and satisfies the preference for treatment as a principal element. This alternative is recommended because it will provide substantial risk reduction in a timely manner by encapsulating the source area with a slurry wall/cap system to eliminate continued migration of contaminated groundwater. Source material constituting a principal threat (i.e., DNAPL) will be recovered to the extent practicable and contaminated groundwater outside the slurry wall/cap system will begin immediate treatment utilizing biosparging technology. Biosparging will enhance aerobic biodegradation of organic constituents exceeding cleanup goals and decrease dissolved concentrations of arsenic and iron by co-precipitation onto the aquifer matrix.

EPA expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA Section 121(b): 1) be protective of human health and the environment; 2) comply with ARARs; 3) be cost-effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfy the preference for treatment as a principal element.

12.3 Selected Remedy Cost

Estimated costs for the Selected Remedy are as follows:

Cost Summary

Capital Cost: $8.0 million

O&M Cost: $4.7 million

Present Worth Total Cost: $11.2 million @ discount rate = 7%

Time Period: Time to construct < 1 year; Time to achieve cleanup goals: Plant & Peace River Floodplain Area – 30 years, Oak Creek Area – 11 years.

A detailed cost estimate for the selected remedy is included as **Table 12-1**. The cost summary table is based on the best available information regarding the anticipated scope of the remedial action. Changes in the cost elements are likely to occur as a result of new information and data collected during the remedial design phase. Major changes may be documented in the form of a memorandum to the Administrative Record file, an Explanation of Significant Differences (ESD), or a ROD amendment. The projected cost is based on an order-of-magnitude engineering cost estimate that is expected to be within +50 or -30 percent of the actual project cost.

12.4 Expected Outcome of the Selected Remedy

Implementation of the selected remedy and achievement of the remediation goals established in **Table 7-20** will accomplish the remedial action objectives for the Site. There are no anticipated adverse socio-economic impacts for the selected remedy.

The selected remedy will provide protection of human health and the environment by eliminating, reducing, or controlling risk at the Site through removal, treatment, engineering controls, and Institutional Controls to formalize land and ground-water use restrictions at the Site. Future land use at the Plant and Peace River Floodplain Areas will be restricted to commercial usage while potential future land use in the Oak Creek Area will be residential after remediation goals have been attained.

13.0 STATUTORY DETERMINATIONS

Under CERCLA Section 121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the Selected Remedy meets these statutory requirements.

Protection of Human Health and the Environment

The Selected Remedy will provide protection of human health and the environment by eliminating, reducing, or controlling risk at the Site through the excavation, consolidation and encapsulation within a slurry wall/cap system of contaminated soils and sediments containing Site COCs above remediation goals at the Nocatee Hull Creosote Site. In-situ biosparging of the surficial ground-water aquifer will restore ground water to health-based criteria at the Site. The Selected Remedy will eliminate the threat of exposure to the COCs via direct contact with, or ingestion of contaminated soil, sediment and ground water. Short term threats associated with the Selected Remedy will be controlled through monitoring and engineering controls (i.e., ground-water monitoring, dust control during excavation, consolidation and capping, etc.). Permanent Institutional Controls will be used at the Plant and Peace River Areas to prohibit residential use on the property and prohibit extraction of groundwater from the surficial aquifer. Excavation would be restricted in areas where subsurface soils exceed direct exposure cleanup goals to ensure adequate health and safety precautions are used and that excavated soils are properly managed. Temporary Institutional Controls will be used in the Oak Creek Area to restrict residential land use and ground-water use until remediation goals are achieved. In addition, no adverse cross-media impacts are expected from the Selected Remedy.

Compliance with Applicable or Relevant and Appropriate Requirements
The Selected Remedy complies with all ARARs. Chemical-Specific, Action-Specific, and Location-Specific ARARs are presented in detail in **Tables 13-1, 13-2, and 13-3,** respectively.

Location-Specific ARARs for soil at the Nocatee Hull Creosote Site were evaluated and consisted of location standards for work in a floodplain, protection of endangered species, fish and wildlife coordination, archeological and historical preservation, protection of wetlands, and guidelines for dredged or filled material placement. Location-Specific ARARs will be re-evaluated as details of the remedial design are identified.

Other Criteria , Advisories, or Guidance To Be Considered (TBCs) for This Remedial Action
In implementing the Selected Remedy, a number of non-binding criteria are TBCs. These include:
Guidance for the Data Quality Objectives Process, EPA QA/G-4. August 2000.

Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, EPA Region 4, November 2001.

EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations, Final, QA/R-5. March 2001.

Cost-Effectiveness
In EPA's judgment, the Selected Remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." (40 CFR §300.430(f)(1)(ii)(D)). EPA evaluated the overall effectiveness of those alternatives that satisfied the threshold criteria (were both protective of human health and the environment and ARAR-compliant) by assessing three (3) of the five (5) balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence this alternative represents a reasonable value for the money to be spent.

The estimated present worth total cost of the Selected Remedy is $11.2 million.

Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable
EPA has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Nocatee Hull Creosote Site.

Preference for Treatment as a Principal Element
The Selected Remedy satisfies the statutory preference for treatment as a principal element because ground water and a portion of contaminated soils/sediments will undergo *in situ* treatment (biosparging) as part of the remedial action.

Five-Year Review Requirements
This remedy, when fully completed, will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure at the Plant and Peace River Floodplain Areas. A statutory Five-Year Review will be conducted for the Site within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment. Long-term institutional controls and additional statutory Five-Year Reviews will be required at the Plant and Peace River Floodplain Areas after remediation goals have been achieved.

14.0 DOCUMENTATION OF SIGNIFICANT CHANGES

To fulfill CERCLA §117(b) and NCP §300.430(f)(5)(iii)(B) and §300.430(f)(3)(ii)(A), the ROD must document and discuss the reasons for any significant changes made to the Selected Remedy from the time the Proposed Plan was released for public comment to the final selection of the remedy.

FDEP has identified that a cancer slope factor has been developed for 1-methylnaphthalene and has been incorporated into EPA "Provisional Peer Review Toxicity Values" (PPRTV). PPRTV fall in Tier 2 of toxicity source information, per OSWER Directive 9285.7-53 dated December 5, 2003, and therefore are acceptable values for use in determining risk and cleanup goals at Superfund sites (EPA, 2003). Using this new carcinogenic slope factor and the carcinogenic tap water equation from the EPA Regional Screening Levels (September 2008 version) found at the EPA Region 4 Superfund website, a groundwater cleanup goal of 2.3 ug/L has been calculated for 1-methylnaphthalene and inserted into the Site COC Cleanup Goals listed in Table 7-20. The default concentration for soil leachability of this compound (from Table II of Chapter 62-777 FAC) has been retained as the cleanup goal. The Site-specific soil leachability of this compound based on the revised groundwater goal will be evaluated in the remedial design to determine if the Table II default SCTL will be adequate or if additional soils will need to be removed for protection of groundwater. Review of existing data suggest that removal of soils exceeding the Total B(a)P TEF cleanup goal may address this change in 1-methylnaphthalene toxicity categorization. If a change in the cleanup goal for 1-methylnaphthalene in soils is required, it will be documented in an Explanation of Significant Differences (ESD).

Additional changes to Table 7-20: COC Cleanup Goals include the following: **Plant & Peace River Floodplain Area** – 1) the Surface Soil Goal for Benzo(a)pyrene has been changed, for clarity, from the $SCTL_{(Leach)}$ of 8 ppm to the SCTL for commercial direct exposure (0.7 ppm) which is equal to the Total B(a)P TEF goal. The Surface Soil $SCTL_{(Leach)}$ goal of 8 ppm for benzo(a)pyrene could not be exceeded without first exceeding the commercial direct exposure and Total B(a)P TEF goals; 2) the Subsurface Soil Goal for Total B(a)P TEF was changed to 8 ppm to protect leaching to groundwater. Provisions are available to use institutional controls on unsaturated soils (vadose zone) two feet or more below land surface to prevent future direct exposure; **Oak Creek Area** – 1) the Surface Soil Goal for Benzo(a)pyrene has been changed from the $SCTL_{(Leach)}$ of 8 ppm to the SCTL for residential direct exposure (0.1 ppm) which is equal to the Total B(a)P TEF goal; 2) the Surface Soil Goal for Benzo(g,h,i)perylene was changed from the $SCTL_{(Leach)}$ of 32,000 ppm to the SCTL for residential direct exposure (2,500 ppm) which is a lower goal; 3) the Subsurface Soil Goal for Total B(a)P TEF was changed to 8 ppm to protect leaching to groundwater for the same reasons as stated in the Plant & Peace River Floodplain Area changes above.

An additional change was added to the text of the selected remedy to clarify the criteria triggering the abandonment of a potable well and replacement with public (County)-supplied water. The criteria now states "Domestic wells exceeding PDWS related to Site COCs or Table 7-20 groundwater cleanup goals would be properly abandoned and replaced with public (County)-supplied water ...". This clarification was made to be more inclusive of all Site COCs since the ROD identifies protective groundwater cleanup goals for Site COCs in Table 7-20 and some of these compounds do not have Primary Drinking Water Standards. This is not expected to have an adverse effect since all domestic wells known to be impacted with Site related COCs have already been abandoned and public water provided as an alternative.

No other significant changes were made to the Selected Remedy from the time the Proposed Plan was released for public comment to the final selection of the remedy.

15.0 REFERENCES

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PART 3: RESPONSIVENESS SUMMARY

Introduction

This Responsiveness Summary for the Nocatee Hull Creosote Site has been prepared in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and the National Contingency Plan (NCP), 40 CFR §300.430(f). This Responsiveness Summary documents, for the public record, EPA's response to comments received on the Proposed Plan during the public comment period.

Overview of Comment Period

The Proposed Plan for the Nocatee Hull Creosote Site was issued on August 27, 2008. A 30-day public comment period ran from August 28, 2008 to September 26, 2008. Two sequential requests for extensions of the comment period were received on September 25 and October 27 and were granted which extended the comment period to November 26, 2008. A public meeting was held on September 11, 2008, at the Mount Olive CME Church, at 7653 SW Hull Avenue, Hull, Florida. A number of comments were received during the public meeting and are addressed below. A copy of the transcript from the meeting is included in the Administrative Record file. In addition, written comments were received on November 26, 2008 from a representative of several of the residents living in the area surrounding the Site. These comments are also addressed below.

Summary of Questions and Comments Received During the Proposed Plan Public Meeting on September 11, 2008 and EPA's Responses:

1. Does the NPL-Caliber designation remove any benefits to the community that would have been available if the Site had been listed on the NPL?

   Response: No. EPA Region 4 has used the NPL-Caliber designation when a Potentially Responsible Party (PRP) was willing to enter into an Administrative Order on Consent (AOC) with EPA to perform the RI/FS process. The process is equivalent to what would be performed had the Site been listed but is used to reduce administrative process time and move the Site more quickly to remedy selection and implementation.

2. Many people who have lived in the immediate area surrounding the Site have developed cancer and other health effects which they believe are related to the Site contamination.

   Response: The Agency for Toxic Substances and Disease Registry (ATSDR) is tasked in the Superfund legislation (42 U.S.C. §9604(i)) with evaluation of public health exposure and disease that may be the result of discharges from a Superfund site. ATSDR performed a Public Health Assessment for the Site which was finalized in June 2002. In Section 6.0 – Conclusions, they classify the Nocatee Hull Creosote Site as "no apparent" public health hazard. The report is included in the Administrative Record, a copy of which is located in the DeSoto County Public Library in Arcadia, Florida. EPA has forwarded the continued health concerns about the Site to the ATSDR for additional consideration.

3. Have people who have performed worked on the Site over the last 10 years (i.e., mowing, etc.) been exposed to Site contaminants?

   Response: The exposure assumptions used to estimate risk at the Site assume multiple exposures to Site contaminants over many days of the year and for many years. The primary contaminants have a low odor threshold (i.e., easily detected by smell) but are not very volatile and therefore do not present a significant threat through vapor inhalation. In addition, the Site is vegetated which reduces the potential level of exposure. Infrequent exposure to minor amounts of dust at the Site would not be expected to result in an unacceptable exposure to Site contaminants. In addition, the cleanup that occurred in the 1980s removed much of the surface contamination and appears to have covered the Plant Area with a layer of clean soil.

4. A number of wells in the area, especially grove wells, may have been installed without casing and extend into the deeper aquifer possibly creating a path for contaminated groundwater in the shallow aquifer to migrate to the deeper aquifer.

   Response: Extensive groundwater studies at the Site have identified the location of shallow aquifer contamination related to Site contaminants. Two deep wells that are located within the area impacted by Site contaminants are identified as the on-site artesian irrigation well to the west of the former plant operations area and HMW-120 located on the western side of the former plant operations area. HMW-120 is screened from 130-140 ft below land surface (bls). Sample results from HMW-120 suggest it is not acting as a viable conduit to the deeper aquifer. It is also noted that the deeper aquifer is a confined aquifer (artesian) and therefore would be trying to push up into the shallow aquifer through any breach in the confining layer (i.e., the Hawthorn Group).

5. When you dig out the contamination, are you going to stir it up more than it is in it's current state? Will the excavation to install the slurry wall cause the contaminated groundwater to move toward resident's potable wells?

   Response: Standard construction methods to control dust and odor will be used to avoid creating an exposure or nuisance issue during remedy implementation. Excavation and transport to the slurry wall area will be performed using techniques designed to prevent spillage/leakage while in transit. The excavation for the slurry wall will cause minimal and temporary disturbance to the area that should not result in any significant migration of contaminated groundwater.

6. Concern was raised about digging through the clay layer when installing the slurry wall and causing contaminant migration to the deeper aquifer.

   Response: The slurry wall will only be "keyed" into the clay layer to a depth of about 5 feet. This should not result in penetration through the clay layer. An additional safeguard is that the slurry wall will seal itself into the clay sidewalls thus also preventing a route for contaminants to follow.

7. Can all of the contamination be dug out and hauled away?

Response: Contamination in the former Plant Area, while sporadic and pocketed, is found as deep as 60 – 65 feet bls where the DNAPL recovery is occurring. Depth to groundwater in this same area varies from 8 to 12 feet bls. Digging out this area to these depths would require control of significant groundwater intrusion, shifting sand lenses, and tiered step back walls to avoid side-wall collapse. The practicability of this approach is questionable. The slurry wall/cap is an accepted form of engineering control which immobilizes the contamination to prevent migration to surrounding areas.

8. What was the source of the arsenic found at the Site?

Response: It is uncertain, based on limited historical information, as to the use of arsenical compounds in the former Site operations. Analytical investigation data do not identify the presence of the other constituents of the most common form of arsenical treatment compound that was used in the past, chromated copper arsenate or CCA. Historically, arsenic compounds have been used in agricultural applications, as pesticides around building structures, and as herbicides along railroad tracks. Knowledge of the original source of the arsenic is not essential since it was included as an analyte in the various investigations of contamination at the Site. Because it has been found in some areas of the Site, it has been included as a COC and has a cleanup goal established in the remedy.

9. There is creosote in the Oak Creek Area which runs under Oak Creek Road and into Oak Creek which flows to the Peace River.

Response: The transport mechanism for the creosote contamination in the Control Measures Area (CMA) located in the Oak Creek Area is thought to have been either from transport and dumping in this location or via surface drainage from the Site to the culvert under Hull Avenue and then flowing via surface drainage features to the CMA which is a low-lying area where it could accumulate. Investigations have focused on both transport mechanisms. One argument against the surface drainage theory is that the main railroad right-of-way should have served as a barrier for surface flow from the Plant Area and there is no indication there was a drainage culvert under the main rail line. Other documented drainage features at the Plant Area suggest most of the process area was intentionally drained to the borrow pit area. The creosote contamination in the CMA continued to drain under Oak Creek Road (which was built sometime between 1972 and 1978 based on historical aerial photographs) and into Oak Creek. When discovered in 2001 during Superfund Site investigations, a separator system was installed to capture any creosote migrating from the CMA toward Oak Creek. Subsequent investigations during the Streamlined Remedial Investigation have identified creosote contaminated sediment in Oak Creek running from the entrance of the drainage ditch for approximately 175 feet downstream which will be removed as part of the remedy.

10. Will the culvert under Hull Avenue remain? Does Site contamination run off with the surface water drainage?

Response: The culvert under Hull Avenue continues to allow surface water drainage of the limited area between the former railroad main line rail bed and Hull Avenue, which is not considered to be a contaminated area. The culvert would need to remain for this purpose. As stated earlier, it appears the former railroad main line appears to have been an elevated barrier between the Site and Hull Avenue and therefore is not expected to be receiving significant surface water drainage from the Site. Also, surface water at the Site is not expected to contain contamination due to earlier cleanups which occurred in the 1980s and appear to have placed clean fill across the Plant Area.

11. Fish in the Peace River were observed, years ago, to have birth defects

Response: EPA is not aware of any reports of fish deformities in the Peace River that may have been observed in recent times. Sediment sampling in the Peace River where Site runoff discharges from the Peace River Floodplain does not show significant levels of Site contaminants.

12. Contamination will be left in place and monitored. You are not going to deal with the contamination. The entombed waste affects our property values because it is there forever.

Response: The contamination will be contained using commonly used engineering controls which will remove the possibility of completed pathways of exposure to the contaminated media. The responsible party will be required to maintain and monitor the performance of the remedy as long as the contamination remains above protective levels. All contaminated areas outside the containment area (i.e., the slurry wall and cap) will be cleaned to protective levels for the anticipated future use of the land. As long as contamination remains at the Site, Superfund will require a formal evaluation of the remedy, at least every five years, to ensure the remedy continues to function properly and be protective. While EPA is not an expert in property value issues, it stands to reason that if property values were to be impacted by the presence of the Site which has been there in some form for 100 years, they already have been. Implementing a protective remedy at the Site should result in improved property values.

13. What measures will be taken to monitor groundwater flow after the slurry wall is installed? Will groundwater flow direction in the area change due to the slurry wall/cap system?

Response: Once the remedy is selected in the Record of Decision, implementation details about the components of the remedy will be evaluated and designed as part of the Remedial Design phase. Part of this consideration will address how to handle the additional surface water runoff from the capped area. Design features will be incorporated to redirect the flow off the cap while retarding the rate of flow so as to approximate current drainage conditions and avoid excessive erosion away from the cap area. The conceptual approach used for costing the alternative in the FFS utilized sheet flow in a radial pattern. This may be fine-tuned in the Remedial Design. Whatever engineering control is ultimately used, it will be evaluated to ensure it does not cause adverse redirection of contaminated groundwater such that it adversely affects adjacent property and that the groundwater component of the remedy outside the slurry wall can be effective in remediating groundwater contaminant levels.

14. How long will it take to get all of the construction and other measures in place?

    Response: Once EPA approves a Remedial Design Plan it is likely to take one to two years to construct all components of the remedy. While the FFS estimate states less than one year, the unpredictability of wet weather and hurricane season on the ability to accomplish certain construction tasks suggests it may be one to two years. A number of activities can be conducted concurrently, such as excavation and consolidation to the slurry wall area while the slurry wall is being installed. Other features such as the groundwater *in situ* biosparging may need to be installed sequentially after the slurry wall and cap have been constructed. It should be pointed out that two other steps must occur before construction can begin – negotiation between EPA and the responsible party to formalize an enforcement agreement to implement the remedy and the drafting and approval of a Remedial Design which will take some time due to the review and comment process.

15. The public has been trying to find out when they are going to be connected to the public water line. Why do some residents get connected and some do not?

    Response: The water line had to go through inspection and acceptance procedures by local government including a formal acceptance by the Board of County Commissioners at a Commission meeting before residential connections could occur. The water line was constructed by the responsible party but must be deeded over to the local water utility as part of the acceptance procedure. The water line was officially accepted by the DeSoto County Board of County Commissioners on September 23, 2008 via Resolution Number 2008-66. Residential connections started within the next day or two. To EPA's knowledge, all connections to the water line have been completed along Hull Avenue and Oak Creek Road except for residences located on Magic Road (a privately owned road) which had an easement issue relating to clear title which would allow an owner to authorize the extension of the water line into this area. EPA intends to work with local government and the responsible party to identify a method to overcome this issue.

<u>Summary of Written Questions and Comments Received During the Public Comment Period and EPA's Responses:</u>

From legal council representing residents living near the Site:

16. Commenter suggested EPA had not adequately addressed the serious human health concerns related to potential exposure to chemicals from the various and ongoing releases from the plant.

Response: EPA is unaware of any ongoing releases of significant amounts of Site contamination from the Plant Area. There continues to be the potential for migration of existing contamination (the more likely media being contaminated groundwater movement). The remedy is focused on removing this potential quickly by isolating the primary source area within the slurry wall/cap system. Contaminated groundwater outside the slurry wall/cap system will be treated *in situ* with biosparging. The chemical properties of the creosote constituents are such that they readily attach to soil and other naturally occurring organic matter and therefore are slow to migrate. While they have a low solubility in groundwater, small amounts do solubalize and become more mobile with groundwater movement. Groundwater monitoring has identified where the contaminated groundwater is located. In the Oak Creek Area, two private potable wells had been impacted by trace amounts of the more soluble, and therefore mobile, compounds that have been identified at the site. Those potable wells had carbon filter systems installed when the compounds were first detected. These properties have since been acquired by the responsible party, residents have been relocated, the potable wells properly abandoned, and the potential for exposure eliminated. With recent land acquisition by the responsible party, all properties know to have contamination of COCs identified for the Site are fenced and possible current routes of exposure are controlled.

17. EPA has not provided assurances that all of the potential contaminants have been identified and delineated.

Response: EPA feels there has been extensive investigation of the contamination present at the Site since initiating Superfund activities in 1999. Sampling locations and analytical data gathered throughout the Superfund process including initial site investigations, the Streamlined Remedial Investigation, and various supplemental data reports have included broad-based analyte lists of chemicals in evaluating the nature and extent of contamination at the Site leading to the identification and evaluation of alternatives to address real or potential threats at the Site.

18. Citizens remain concerned about the safety of their potable water supply from the groundwater and the impacts to their health related to past, current, and future ingestion of this water

Response: All residences surrounding the Site along Hull Avenue and Oak Creek Road where legal authority to grant construction of a public water line could be conveyed have been connected to the public water line constructed by the responsible party and accepted by the County (as described in Question #15 above). The area on Magic Road has conveyance issues which remain to be solved. Use of private wells for potable use should have ceased at the residences now connected to the public water line. Sampling evidence to date had shown only two private wells, located directly adjacent to the CMA and in the continuing drainage path to Oak Creek, being impacted by Site related contaminants and they had carbon filters installed as an immediate solution. Use of those two wells has been eliminated at this time and the wells have been properly abandoned (i.e., removed).

19. Previous sampling of potable water wells appears inadequate because the analyses performed were too narrow and were not based on the latest data.

Response: Private potable well sampling overseen by EPA has included broad-based analytes including chemicals in the families of volatile organic compounds, semi-volatile organic compounds, and heavy metals. Over time these lists of analytes were reduced to the contaminants being detected at the Site. The contamination is co-mingled in most areas and therefore it is expected that the more soluble, and therefore more mobile, contaminants would migrate to the potable wells first, as demonstrated by the two potable wells with contamination of benzene and naphthalene. Many of the Site contaminants have very low solubility in groundwater and tend to adhere strongly to soil particles.

20. There has been no attempt to correlate the sampling events to the depths of the potable wells and fluctuating water tables.

Response: It is not unusual to have limited information about the construction details of older residential potable wells. For this and other reasons, these wells are not typically used as a first defense to monitor groundwater contaminant migration. Site investigation monitoring wells at the Nocatee Site were typically installed in clusters of three to evaluate different depths (i.e., zones) of the shallow aquifer which was broken into three zones due to differences in geologic formation characteristics. Residential potable wells are sampled when they are located near areas of contaminated groundwater migration to insure they do not become contaminated. Thus, as more information about the location and flow direction of contaminated groundwater becomes available during the investigation, monitoring of potable wells for contaminant impact can be adjusted accordingly. Site data suggests all wells in the path of possible contaminated groundwater flow were monitored.

21. The highly elevated number of cancer victims has been largely ignored. Commenter is not aware of a single attempt to quantify, in any meaningful manner, the number of cancer cases that appear highly elevated. Seems to be largely ignored or deferred to outside health agencies.

Response: As stated in Question #2 above, the Agency for Toxic Substances and Disease Registry (ATSDR) is tasked in the Superfund legislation (42 U.S.C. §9604(i)) with evaluation of public health exposure and disease that may be the result of discharges from a Superfund site. ATSDR performed a Public Health Assessment for the Site which was finalized in June 2002. In Section 6.0 – Conclusions, they classify the Nocatee Hull Creosote Site as "no apparent" public health hazard. The report is included in the Administrative Record, a copy of which is located in the DeSoto County Public Library in Arcadia, Florida. EPA has forwarded the continued health concerns about the Site to the ATSDR for additional consideration.

22. The citizens have expressed concerns that the preferred remedy will be overly disruptive and lengthy prior to completion.

Response: Implementation of the remedy components on the Plant and Peace River Floodplain Area should cause minimal disruption to the surrounding properties. Remedy components in the Oak Creek Area originally envisioned use of Oak Creek Road for access but with the acquisition of properties surrounding the CMA, access is now envisioned to occur from Hull Avenue with minimal disruption on Oak Creak Road. The one exception will be the removal of contaminated soils and sediment on the east side of Oak Creek Road and in Oak Creek. This will require periodic crossing of Oak Creek Road to transport excavated material back to the Plant Area. The excavation component on the east side of Oak Creek Road will probably take a minimal amount of time to implement.

23. There are concerns related to releases to the air and groundwater caused by the remedy and that measures to contain them will be ineffective. No air monitoring plan (AMP) has been proposed or discussed. There is no indication of any measures to address the strong, objectionable odors that will almost certainly be produced when these contaminated soils are unearthed. Noise and odor abatement measures are a necessary detail in an alternative remedy evaluation but have been ignored or deferred.

Response: As stated in Question #5 above, standard construction methods to control dust and odor will be used to avoid creating an exposure or nuisance issue while the remedy is being implemented. Excavation and transport to the slurry wall area will be performed using techniques designed to prevent spillage/leakage while in transit. The excavation for the slurry wall will cause minimal and temporary disturbance to the area that should not result in any significant migration of contaminated groundwater. Specific details about air monitoring will be evaluated in the remedial design. The materials being excavated are not major quantities or concentrations of creosote as were initially present during plant operations and therefore may not present as much of an odor problem as some may anticipate.

24. Commenter expressed concern over the apparent omission of a number of serious contaminants from the list of COCs. Commenter suggests the primary flaw in the COC designation resulted from the faulty premise that coal tar creosote was the only wood preservative ever used at the facility. Commenter goes on to suggest the well-documented history of uniform railroad tie preservation processes utilized during the subject facilities operational life strongly supports the conclusion that other chemicals were almost certainly used.

Response: As stated in Question #17 above, EPA has included broad-based analyte lists of chemicals for analysis of investigation samples during the Superfund process in evaluating the nature and extent of contamination at the Site. This was intended, in part, to identify if other treatment chemicals common to the wood treating industry may have been used at the Site. Resulting analytical results did not suggest this to be the case. These results can be found in various investigation documents included in the Administrative Record for the Site.

25. Commenter suggests from the book Some Facts About Treating Railroad Ties by W. F. Goltra that there was a routine and regular practice of mixing zinc chloride and other additives with creosote.

Response: Significant concentrations of zinc were not identified in the analytical results for soil and groundwater at the Site. Therefore, there is no evidence it was used as a treatment chemical at the Site. Regardless of whether it was used in the process, had elevated levels of zinc been detected that caused an unacceptable level of risk based on Site exposure assumptions zinc would have been carried forward as a COC with a cleanup goal.

26. Commenter suggests that treatment of the coal tar mixtures as a static and homogenous combination of a specific set of PAHs that can effectively be monitored and assessed by the list of COCs in the Proposed Plan contradicts the historical literature. Moreover, according to the Public Health Statement published for creosote by ATSDR: "About 300 chemicals have been identified in coal tar creosote, but as many as 10,000 others may be in this mixture."

Response: Creosote does consist of more chemicals than appear in the COC list. These chemicals are co-dissolved in the creosote mix and have varying levels of solubility in water, varying molecular structures and weights, varying concentrations in the mix, and varying degrees of toxicity. They fall into the semi-volatile organic chemical (SVOC) range based on boiling points. EPA feels the analysis for VOC and SVOC contaminants is a good representation of the total mixture in both toxicity and mobility in the environment and as such serves as an indicator in evaluating the presence and need for remediation of the contamination.

27. Commenter references literature that indicates that by the 1920s the costly creosote was diluted with petroleum, coal tar, and other additives. Commenter goes on to reference that other major wood preservatives were widely used during the latter period of the subject facility's operation including the arsenical preservative, ammoniacal copper arsenate (ACA), and the chlorinated phenol, pentachlorophenol (Penta). Commenter suggests the COC list does not contain, nor adequately address the likely presence of Penta and ACA at the site.

Response: Analytical profiles for the sampling and analyses work performed at the Site during the Superfund investigation process were designed to detect these additional chemicals that have historically been used in the wood treating industry. Data results do not suggest a significant presence of these chemicals that would suggest they were used in the former wood treating process.

From E Sciences, Inc. providing technical support to legal council representing residents living near the Site:

28. Commenter suggests 20% of all wells be re-sampled and analyzed for Dibenzo-p-dioxins, Dibenzofurans, Furan, Pentachlorophenol, and Tetrachlorophenol to evaluate their

presence based on the EPA document entitled *Presumptive Remedies for Soils, Sediments, and Sludges at Wood Treater Sites*, dated December 1995.

Response: Early EPA screening of the Site included analysis for the above compounds in the most likely areas of the Site where they might have been used. The results were negative for any significant presence of the compounds and therefore they were eliminated from further consideration during the SRI.

29. Commenter questions the use of the terms DNAPL, free-product, and introduces LNAPL in relation to the use of the free-product term. They also suggest the composition of coal tar and creosote mixtures changed over the period from 1910 to 1950. They suggest the need to know the full chemical composition of the DNAPL to determine if there should be additional compounds added to the COC list

   Response: The commenter acknowledges at the beginning of their comments they have only reviewed the Focused Feasibility Study Report. Review of other documents that make up the entire Administrative Record would show that broad-based analytical characterization of contamination has occurred at the Site since the Superfund process was initiated in 1999. Initial identification of Contaminants of Potential Concern (COPCs) and the refining of the list of Chemical of Concern (COCs) took place using broad-based analytical evaluations during initial site screening and throughout the Streamlined Remedial Investigation. EPA feels the current list of COCs adequately addresses the location of Site contamination and allows it to select a remedy that will adequately address the potential risks posed by the Site.

30. Groundwater flow maps and a discussion of groundwater flow direction should be included in the FFS.

   Response: The Superfund process typically generates many documents over time to delineate the "nature and extent of contamination" related to a Site. That is one reason an Administrative Record of the significant documents utilized in the remedy decision process is maintained and made available to the public for review. Not all information can be carried forward to the next subsequent document due to size and readability concerns. Therefore, data is usually summarized in subsequent documents. The Administrative Record contains the Data Summary Report (2005) and the Supplemental Data Summary Report (2006) that focused extensively on groundwater contamination and flow direction. The report contains Figures 6, 7, and 8 which present groundwater flow directions in the shallow, intermediate, and deep zones of the surficial aquifer.

31. Commenter refers to Figures 3-10, 3-11, and 3-12 and indicates it appears these contaminant plumes are not fully delineated. They go on to suggest use of groundwater modeling in lieu of additional groundwater wells.

   Response: Most Site investigations have data gaps even after several rounds of groundwater monitoring well installations. There remain a minor number of areas where additional monitoring wells would be useful. This has been identified as a task for the remedial design phase of the work where additional fine tuning of the contaminant picture and other chemical and geological factors are clarified for the design of the remedy. Due to the heterogeneous nature of most subsurface geological formations, the use of modeling is not always a reliable method for predicting where contaminated groundwater may be flowing. Modeling tends to see more use in the early stages of investigation when there are limited monitoring locations and data available. When the use of a broad network of monitoring locations is a viable alternative, they are expected to provide a higher quality of data for interpreting contaminated groundwater flow directions.

32. Commenter quotes the "remedial goal option for intermediate groundwater in the Oak Creek Area is total PAHs < 0.608 ppm" from Figure 3-11 of the FFS. They also point out that Section 6.4.4.1 describes the installation of replacement potable wells in the "intermediate artesian aquifer". They suggest replacement wells should not be placed in this same aquifer.

    Response: While the wording can be confusing, an attempt was made in all documents to distinguish between the three zones of the shallow aquifer (shallow, intermediate, and deep zones) which have differing geological characteristics and have been impacted by Site contamination versus the deeper uncontaminated intermediate aquifer (which is confined and therefore artesian). It is the intent in Section 6.4.4.1 to state that installation of replacement potable wells would be in the uncontaminated intermediate aquifer which is artesian (versus the intermediate zone of the shallow aquifer). Figure 3-11 of the FFS represents data results from the Intermediate Monitoring Wells which are mostly screened from 33 – 38 feet below land surface in the intermediate zone of the shallow aquifer.

33. Commenter requests clarification to the statement in Section 6.4.5 about Public (County) Water Supply in discussion of Oak Creek Area Alternative 5. Is DeSoto County willing to install a water line to the residents and who will ultimately pay for the water line?

    Response: The Superfund remedy holds the responsible party liable for implementation of the remedy selected in a Record of Decision. At this Site, the installation of a public water line extended from Hwy 17 has been a concurrent activity coordinated by the responsible party with the County. The impact to two potable wells and the installation of carbon filter systems was viewed as an immediate response to the issue until public water could be made available. The responsible party has paid for the design and installation of the water line and has paid to make connections to the line by individual properties. The only exception for the area directly around the Site is the Magic Road area where the granting of an easement to run the line across private property was hindered by the lack of a clear title to grant the easement.

34. Commenter identifies that Section 6.4.4 and 6.4.5 indicate the residents of Oak Creek Area "would likely require temporary relocation during construction activities". Commenter suggests that this is an undue burden to these residents.

Response: This issue was identified in the FFS as a potential issue during construction activities. With the acquisition of additional property around the CMA by the responsible party, this issue may become moot or be minimized. Evaluation during the remedial design will review the need for any temporary relocation of residents. If temporary relocation is determined to be necessary, the residents will be contacted and alternatives discussed. EPA would look to the responsible party to fund any costs associated with temporary relocation if it becomes necessary for implementation of the remedy.

35. Section 3.1.3 references "an approximately 3-foot thick layer of dense green clay exists across the western, northern, and eastern portions of the Study Area", yet this layer is not depicted on the geological cross-sections presented as Figures 3-1, 3-2, and 3-3. This clay unit could play a significant role in the migration of the contaminants and possibly inhibit remediation.

Response: The clay layer appears in parts of all three Figures at approximately minus 14 (-14) feet mean sea level (msl). In reviewing this information, EPA did not feel the layer was consistent enough to serve as a confining layer and therefore asked the responsible party to confirm that a continuous clay layer existed that could be used to anchor the slurry wall. That layer is identified in Figure 3-1 at minus 24 (-24) feet msl which puts it about 65 feet below land surface at the Plant Area where the slurry wall will be installed. The thinner clay layer at -14 feet msl may have an influenced on contaminant migration. It is felt the slurry wall can be installed through this layer to the deeper clay at -65 feet msl. This will eliminate any further migration from the Plant Area which is felt to be the continuing source of contaminated groundwater migration away from the Site. Site contamination located outside the slurry wall will be remediated using the other components of the selected remedy.

- END OF RESPONSIVENESS SUMMARY -

APPENDIX A
TABLES
(Nocatee Hull Creosote ROD)

TABLE 7-1

Table 4-1. Summary of Constituents of Concern and Preliminary Remediation Goals, CSXT Nocatee/Hull Creosote Site, Hull (Nocatee), Florida.

Constituent	Groundwater (ug/L)				
	PRG	Minimum Detected Concentration	Maximum Detected Concentration	Total Number of Analyses	Number of Exceeded Results
	GCTLs				GCTLs
VOCs					
Benzene	1	1	120	76	19
Ethylbenzene	30	0.3	120	76	13
Toluene	40	0.63	400	76	11
Xylenes (total)	20	3	460	76	15
SVOCs					
1-Methylnaphthalene	28	0.13	620	76	25
2-Methylnaphthalene	28	0.24	1200	76	22
Acenaphthene	20	0.10	750	76	24
Benzo(a)anthracene	0.05	0.56	330	76	11
Benzo(a)pyrene	0.2	0.94	260	76	7
Benzo(b)fluoranthene	0.05	0.85	310	76	11
Benzo(k)fluoranthene	0.5	0.78	320	76	13
Carbazole	1.8	0.16	330	56	18
Chrysene	4.8	0.39	400	76	4
Dibenzo(a,h)anthracene	0.005	0.43	210	76	4
Dibenzofuran	28	0.15	240	56	18
Fluorene	280	0.15	520	76	1
Indeno(1,2,3-cd)pyrene	0.05	0.48	180	76	9
METALS					
Aluminum	200	9.2	11000	76	34
Arsenic	10	5	50	76	7
Iron	300	40	47000	76	65

Footnotes on Page 5.

TABLE 7-1 (2 of 5)

Table 4-1. Summary of Constituents of Concern and Preliminary Remediation Goals,
CSXT Nocatee/Hull Creosote Site, Hull (Nocatee), Florida.

Potable Water (ug/L)									
Constituent	PRG			Minimum Detected Concentration	Maximum Detected Concentration	Total Number of Analyses	Number of Exceeded Results		
	PDWS/SDWS	MCL	MCLG				PDWS/SDWS	MCL	MCLG
VOCs									
Benzene	1	5	0	1.7	4.9	11	3	0	3
Methylene Chloride	5	5	0	1.4	1.4	11	0	0	1
Metals									
Iron	300	300	300	440	1900	11	6	6	6

Footnotes on Page 5.

Table 4-1. Summary of Constituents of Concern and Preliminary Remediation Goals, CSXT Nocatee/Hull Creosote Site, Hull (Nocatee), Florida.

Surface Soil (mg/kg)												
	PRG				Minimum Detected	Maximum Detected	Total Number of	Number of Exceeded Results			
Constituent	LEACH	Res SCTL	Com SCTL	ECO	Concentration	Concentration	Analyses	LEACH	Res SCTL	Com SCTL	ECO
SVOCs											
1-Methylnaphthalene	4	200	1800	NS	0.063	17	104	3	0	0	NA
2-Methylnaphthalene	8.5	210	2100	S	0.48	88	104	2	0	0	S
Acenaphthene	6	2400	20000	S	0.45	12	104	2	0	0	S
Acenaphthylene	4	1800	20000	S	0.0033	11	104	2	0	0	S
Anthracene	2500	21000	300000	S	0.002	41	100	0	0	0	S
Benzo(a)anthracene	140	C	C	S	0.0044	26	100	0	7	0	S
Benzo(a)pyrene	57	0.1	0.7	S	0.0054	25	104	0	9	32	S
Benzo(b)fluoranthene	8.8	C	C	S	0.0033	48	100	13	9	0	S
Benzo(g,h,i)perylene	32000	2500	52000	S	0.011	29	104	0	0	0	S
Benzo(k)fluoranthene	94	C	C	S	0.0062	16	100	0	9	0	S
Chrysene	300	C	C	S	0.0061	34	100	0	9	0	S
Dibenzo(a,h)anthracene	53	C	C	S	0.011	8.7	100	0	3	0	S
Fluoranthene	1200	3200	59000	S	0.0035	100	104	0	0	0	S
Fluorene	160	2600	33000	S	0.039	50	104	0	0	0	S
Indeno(1,2,3-cd)pyrene	24	C	C	S	0.013	24	100	0	9	0	S
Naphthalene	28	55	300	S	0.0044	31	104	1	0	0	S
Phenanthrene	250	2200	36000	S	0.0026	200	100	0	0	0	S
Pyrene	880	2400	45000	S	0.0033	130	104	0	0	0	S
Total PAH	NS	NS	NS	45	0.01836	788	104	NA	NA	NA	18
Arsenic	1.4	2.1	12	NS	0.61	91	80	19	6	5	0
Other											
FL PRO	340	460	2700	NS	19	1000	2	1	0	0	0

Footnotes on Page 5.

Table 4-1. Summary of Constituents of Concern and Preliminary Remediation Goals, CSXT Nocatee/Hull Creosote Site, Hull (Nocatee), Florida.

Subsurface Soils (mg/kg)					
Constituent	PRG LEACH	Minimum Detected Concentration	Maximum Detected Concentration	Total Number of Analyses	Number of Exceeded Results LEACH
VOCs					
Benzene	0.007	0.99	0.99	7	1
Ethylbenzene	0.6	1.3	1.3	7	1
Toluene	0.5	2.5	2.5	7	1
Xylenes (total)	0.2	0.011	6.5	6	1
SVOCs					
1-Methylnaphthalene	4	0.045	4.3	41	1
Acenaphthene	6	0.12	97	41	1
Acenaphthylene	4	7.5	7.5	41	1
Benzo(b)fluoranthene	8.8	0.0051	120	41	1
Metals					
Arsenic	1.4	0.58	44	24	2

Footnotes on Page 5.

Table 4-1. Summary of Constituents of Concern and Preliminary Remediation Goals, CSXT Nocatee/Hull Creosote Site, Hull (Nocatee), Florida.

Sediment (mg/kg)					
Constituent	PRG	Minimum Detected Concentration	Maximum Detected Concentration	Total Number of Analyses	Number of Exceeded Results
	ECO				ECO
SVOCs					
2-Methylnaphthalene	S	2	13	40	7
Acenaphthene	S	3.3	16	40	6
Acenaphthylene	S	0.028	3.3	40	4
Anthracene	S	0.0053	150	40	12
Benzo(a)anthracene	S	0.0059	140	40	16
Benzo(a)pyrene	S	0.0073	140	40	16
Benzo(b)fluoranthene	S	0.012	160	40	16
Benzo(g,h,i)perylene	S	0.023	98	40	16
Benzo(k)fluoranthene	S	0.014	94	40	16
Chrysene	S	0.01	300	40	16
Dibenzo(a,h)anthracene	S	0.02	53	40	13
Fluoranthene	S	0.044	430	40	15
Fluorene	S	0.023	16	40	8
Indeno(1,2,3-cd)pyrene	S	0.02	62	40	15
Naphthalene	S	0.075	21	40	6
Phenanthrene	S	0.0071	110	40	14
Pyrene	S	0.013	360	40	16
Total PAH	10	14.68	2014	40	16

Footnotes:
VOCs - Volatile organic compounds
SVOCs - Semi-volatile organic compounds
ug/L - Micrograms per liter
mg/kg - Milligrams per kilogram
NA - Not applicable.
S - Results were summed and compared against the value. If the reported result was non-detect, one half of the detection was used.
NS - No applicable standard
C - To compare the lab value to the criteria, an embedded formula multiplies the lab value by the
TEF and the calculated results are summed and then compared against the benzo(a)pyrene standards.
PRG - Preliminary Remediation Goal
GCTLs - FDEP Groundwater Cleanup Target Level (Chapter 62-780 F.A.C.).
MCL - Federal Drinking Water Criteria - Maximum Contaminant Level (SDWA 40CFR 141.11-141.16).
MCLG - Federal Drinking Water Criteria - Maximum Contaminant Level Goal (SDWA 40CFR 141.50-141.51).
PDWS/SDWS - FDEP Primary and Secondary Drinking Water Standards (Chapter 62-550 F.A.C.).
LEACH - Specific Soil Leachability (Gannett Fleming 2003e and Chapter 62-780 F.A.C.)
ECO - Soil Ecological Cleanup Level (ARCADIS, 2005b).
RES SCTLs - Residential FDEP Soil Cleanup Target Level.
COM SCTL - Commercial FDEP Soil Cleanup Target Level.
Values for minimum and maximum concentration are for detected compounds only.
The total number of analyses are given for each compound by matrix.
The number of exceeded results are presented for each criterion by matrix.
FDEP - Florida Department of Environmental Protection

TABLE 7-2

TABLE 8-1.1
SELECTION OF EXPOSURE PATHWAYS
Nocatee Former Creosote Wood Treating Plant Site
LOCATIONS WEST OF HULL ROAD

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	West/East of Hull Rd.	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Surface Soil	Soil	Soil	Trespasser	Adult	Ingestion	West of Hull Rd.	Quant	Trespasser may be exposed to surface soil.
						Dermal	West of Hull Rd.	Quant	Trespasser may be exposed to surface soil.
					Youth	Ingestion	West of Hull Rd.	Quant	Trespasser may be exposed to surface soil.
						Dermal	West of Hull Rd.	Quant	Trespasser may be exposed to surface soil.
		Air	Particulates and Volatilization of VOCs	Trespasser	Adult	Inhalation	West of Hull Rd.	Quant	Trespasser may be exposed to airborne contaminants from surface soil.
					Youth	Inhalation	West of Hull Rd.	Quant	Trespasser may be exposed to airborne contaminants from surface soil.
		Soil	Soil	Recreational User	Adult	Ingestion	West of Hull Rd.	Quant	Recreational User may be exposed to surface soil in the Peace River Area.
						Dermal	West of Hull Rd.	Quant	Recreational User may be exposed to surface soil in the Peace River Area.
					Youth	Ingestion	West of Hull Rd.	Quant	Recreational User may be exposed to surface soil in the Peace River Area.
						Dermal	West of Hull Rd.	Quant	Recreational User may be exposed to surface soil in the Peace River Area.
		Air	Particulates and Volatilization of VOCs	Recreational User	Adult	Inhalation	West of Hull Rd.	Quant	Recreational User may be exposed to airborne contaminants from surface soil in the Peace River Area.
					Youth	Inhalation	West of Hull Rd.	Quant	Recreational User may be exposed to airborne contaminants from surface soil in the Peace River Area.
	Subsurface Soil	Soil	Soil	Trespasser	Adult	Ingestion	West of Hull Rd.	None	It is assumed that the trespasser is not exposed to subsurface soils.
						Dermal	West of Hull Rd.	None	It is assumed that the trespasser is not exposed to subsurface soils.
					Youth	Ingestion	West of Hull Rd.	None	It is assumed that the trespasser is not exposed to subsurface soils.
						Dermal	West of Hull Rd.	None	It is assumed that the trespasser is not exposed to subsurface soils.
		Air	Particulates and Volatilization of VOCs	Trespasser	Adult	Inhalation	West of Hull Rd.	None	It is assumed that the trespasser is not exposed to subsurface soils.
					Youth	Inhalation	West of Hull Rd.	None	It is assumed that the trespasser is not exposed to subsurface soils.
	Groundwater	Groundwater	Potable Well Water	Trespasser	Adult	Ingestion	West of Hull Rd.	None	It is assumed that the trespasser is not exposed to groundwater.
						Dermal	West of Hull Rd.	None	It is assumed that the trespasser is not exposed to groundwater.
					Youth	Ingestion	West of Hull Rd.	None	It is assumed that the trespasser is not exposed to groundwater.
						Dermal	West of Hull Rd.	None	It is assumed that the trespasser is not exposed to groundwater.
		Air	Volatilization of VOCs	Trespasser	Adult	Ingestion	West of Hull Rd.	None	It is assumed that the trespasser is not exposed to groundwater while at the site.
						Dermal	West of Hull Rd.	None	It is assumed that the trespasser is not exposed to groundwater while at the site.
					Youth	Ingestion	West of Hull Rd.	None	It is assumed that the trespasser is not exposed to groundwater while at the site.
						Dermal	West of Hull Rd.	None	It is assumed that the trespasser is not exposed to groundwater while at the site.
	Surface Water	Surface Water	Peace River	Recreational User	Adult	Ingestion	West of Hull Rd.	Quant	Recreational user may be exposed to surface water from the Peace River areas.
						Dermal	West of Hull Rd.	Quant	Recreational user may be exposed to surface water from the Peace River areas.
					Youth	Ingestion	West of Hull Rd.	Quant	Recreational user may be exposed to surface water from the Peace River areas.
						Dermal	West of Hull Rd.	Quant	Recreational user may be exposed to surface water from the Peace River areas.
		Air	Volatilization of VOCs	Recreational User	Adult	Ingestion	West of Hull Rd.	None	This pathway presents a negligible risk to receptor.
						Dermal	West of Hull Rd.	None	This pathway presents a negligible risk to receptor.
					Youth	Ingestion	West of Hull Rd.	None	This pathway presents a negligible risk to receptor.
						Dermal	West of Hull Rd.	None	This pathway presents a negligible risk to receptor.
	Sediment	Sediment	Peace River	Recreational User	Adult	Ingestion	West of Hull Rd.	Quant	Recreational users may be exposed to wetland/stream sediments.
						Dermal	West of Hull Rd.	Quant	Recreational users may be exposed to wetland/stream sediments.
					Youth	Ingestion	West of Hull Rd.	Quant	Recreational users may be exposed to wetland/stream sediments.
						Dermal	West of Hull Rd.	Quant	Recreational users may be exposed to wetland/stream sediments.
Future	Surface Soil	Surface Soil	Soil	Construction Worker	Adult	Ingestion	West of Hull Rd.	None	Construction worker is evaluated for subsurface soil exposure only.
						Dermal	West of Hull Rd.	None	Construction worker is evaluated for subsurface soil exposure only.
				On-Site Worker	Adult	Ingestion	West of Hull Rd.	Quant	Future On-site worker may be exposed to surface soil.
						Dermal	West of Hull Rd.	Quant	Future On-site worker may be exposed to surface soil.
				Residents	Adult	Ingestion	West of Hull Rd.	Quant	Future resident may be exposed to surface soil.
						Dermal	West of Hull Rd.	Quant	Future resident may be exposed to surface soil.
					Child	Ingestion	West of Hull Rd.	Quant	Future resident may be exposed to surface soil.
						Dermal	West of Hull Rd.	Quant	Future resident may be exposed to surface soil.

		Air	Particulates and Volatilization of VOCs	Construction Worker	Adult	Inhalation	West of Hull Rd.	None	Construction worker is evaluated for subsurface soil exposure only.
				On-Site Worker	Adult	Inhalation	West of Hull Rd.	Quant	Future On-site worker may be exposed to airborne contaminants from surface soil.
				Residents	Adult	Inhalation	West of Hull Rd.	Quant	Future resident may be exposed to airborne contaminants from surface soil.
					Child	Inhalation	West of Hull Rd.	Quant	Future resident may be exposed to airborne contaminants from surface soil.
	Subsurface Soil	Subsurface Soil	Underground Digging	Construction Worker	Adult	Ingestion	West of Hull Rd.	Quant	Construction worker may be exposed to subsurface soil resulting from excavation activities at the site.
						Dermal	West of Hull Rd.	Quant	Construction worker may be exposed to subsurface soil resulting from excavation activities at the site.
				On-Site Worker	Adult	Ingestion	West of Hull Rd.	None	On-site worker not likely to be exposed to subsurface soil.
						Dermal	West of Hull Rd.	None	On-site worker not likely to be exposed to subsurface soil.
				Residents	Adult	Ingestion	West of Hull Rd.	None	Future resident not likely to be exposed to subsurface soil.
						Dermal	West of Hull Rd.	None	Future resident not likely to be exposed to subsurface soil.
					Child	Ingestion	West of Hull Rd.	None	Future resident not likely to be exposed to subsurface soil.
						Dermal	West of Hull Rd.	None	Future resident not likely to be exposed to subsurface soil.
		Air	Particulates and Volatilization of VOCs	Construction Worker	Adult	Inhalation	West of Hull Rd.	Quant	Construction worker may be exposed to airborne subsurface soil contaminants resulting from excavation activities at the site.
				On-Site Worker	Adult	Inhalation	West of Hull Rd.	None	On-site worker not likely to be exposed to subsurface soil.
				Residents	Adult	Inhalation	West of Hull Rd.	None	Future resident not likely to be exposed to subsurface soil.
					Child	Inhalation	West of Hull Rd.	None	Future resident not likely to be exposed to subsurface soil.
	Groundwater	Groundwater	Potable Well Water	Construction Worker	Adult	Ingestion	West of Hull Rd.	None	Construction worker not likely to be exposed to groundwater.
						Dermal	West of Hull Rd.	None	Construction worker not likely to be exposed to groundwater.
				On-Site Worker	Adult	Ingestion	West of Hull Rd.	Quant	On-site worker may be exposed to groundwater.
						Dermal	West of Hull Rd.	Quant	On-site worker may be exposed to groundwater.
				Residents	Adult	Ingestion	West of Hull Rd.	Quant	Future resident may be exposed to groundwater from a private well.
						Dermal	West of Hull Rd.	Quant	Future resident may be exposed to groundwater from a private well.
					Child	Ingestion	West of Hull Rd.	Quant	Future resident may be exposed to groundwater from a private well.
						Dermal	West of Hull Rd.	Quant	Future resident may be exposed to groundwater from a private well.
		Air	Volatilization of VOCs	Construction Worker	Adult	Inhalation	West of Hull Rd.	None	Construction worker not likely to be exposed to groundwater.
				On-Site Worker	Adult	Inhalation	West of Hull Rd.	None	It is assumed that the on-site worker will not shower at the site.
				Residents	Adult	Inhalation	West of Hull Rd.	None	Assumed to be equal to risks from ingestion pathway.
					Child	Inhalation	West of Hull Rd.	None	Pathway not evaluated since children are assumed to bath rather than shower.
	Surface Water	Surface Water	Peace River	Construction Worker	Adult	Ingestion	West of Hull Rd.	None	Construction worker not likely to be exposed to surface water.
						Dermal	West of Hull Rd.	None	Construction worker not likely to be exposed to surface water.
				On-Site Worker	Adult	Ingestion	West of Hull Rd.	None	Pathway more conservatively evaluated in recreational scenarios.
						Dermal	West of Hull Rd.	None	Pathway more conservatively evaluated in recreational scenarios.
		Air	Volatilization of VOCs	Construction Worker	Adult	Inhalation	West of Hull Rd.	None	Pathway more conservatively evaluated in recreational scenarios.
				On-Site Worker	Adult	Inhalation	West of Hull Rd.	None	Pathway more conservatively evaluated in recreational scenarios.
	Sediment	Sediment	Peace River	Construction Worker	Adult	Ingestion	West of Hull Rd.	None	Pathway more conservatively evaluated in recreational scenarios.
						Dermal	West of Hull Rd.	None	Pathway more conservatively evaluated in recreational scenarios.
				On-Site Worker	Adult	Ingestion	West of Hull Rd.	None	Pathway more conservatively evaluated in recreational scenarios.
						Dermal	West of Hull Rd.	None	Pathway more conservatively evaluated in recreational scenarios.

TABLE 8-1.2
SELECTION OF EXPOSURE PATHWAYS
Nocatee Former Creosote Wood Treating Plant Site
LOCATIONS EAST OF HULL ROAD

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	West/East of Hull Rd.	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Surface Soil	Soil	Soil	Residents	Adult	Ingestion	East of Hull Rd.	Quant	Current resident may be exposed to surface soil.
						Dermal	East of Hull Rd.	Quant	Current resident may be exposed to surface soil.
					Child	Ingestion	East of Hull Rd.	Quant	Current resident may be exposed to surface soil.
						Dermal	East of Hull Rd.	Quant	Current resident may be exposed to surface soil.
				Construction Worker	Adult	Ingestion	East of Hull Rd.	None	Construction Worker is evaluated for subsurface soil only.
						Dermal	East of Hull Rd.	None	Construction Worker is evaluated for subsurface soil only.
		Air	Particulates and Volatilization of VOCs	Residents	Adult	Inhalation	East of Hull Rd.	Quant	Current resident may be exposed to airborne contaminants from surface soil.
					Child	Inhalation	East of Hull Rd.	Quant	Current resident may be exposed to airborne contaminants from surface soil.
				Construction Worker	Adult	Inhalation	East of Hull Rd.	None	Construction Worker is evaluated for subsurface soil only.
	Subsurface Soil	Subsurface Soil	Underground Digging	Construction Worker	Adult	Ingestion	East of Hull Rd.	Quant	Construction worker may be exposed to subsurface soil resulting from excavation activities.
						Dermal	East of Hull Rd.	Quant	Construction worker may be exposed to subsurface soil resulting from excavation activities.
		Air	Particulates and Volatilization of VOCs	Construction Worker	Adult	Inhalation	East of Hull Rd.	Quant	Construction worker may be exposed to airborne subsurface soil contaminants resulting from excavation activities.
	Groundwater	Groundwater	Potable Well Water	Residents	Adult	Ingestion	East of Hull Rd.	Quant	Current resident may be exposed to groundwater from a private well.
						Dermal	East of Hull Rd.	Quant	Current resident may be exposed to groundwater from a private well.
					Child	Ingestion	East of Hull Rd.	Quant	Current resident may be exposed to groundwater from a private well.
						Dermal	East of Hull Rd.	Quant	Current resident may be exposed to groundwater from a private well.
		Air	Volatilization of VOCs	Residents	Adult	Inhalation	East of Hull Rd.	None	Assumed to be equal to risks from ingestion pathway.
					Child	Inhalation	East of Hull Rd.	None	Pathway not evaluated since children are assumed to bath rather than shower.
	Surface Water	Surface Water	Oak Creek	Recreational User	Adult	Ingestion	East of Hull Rd.	Quant	Recreational user may be exposed to surface water.
						Dermal	East of Hull Rd.	Quant	Recreational user may be exposed to surface water.
					Child	Ingestion	East of Hull Rd.	Quant	Recreational user may be exposed to surface water.
						Dermal	East of Hull Rd.	Quant	Recreational user may be exposed to surface water.
		Air	Volatilization of VOCs	Recreational User	Adult	Inhalation	East of Hull Rd.	None	This pathway presents a negligible risk to receptor.
					Child	Inhalation	East of Hull Rd.	None	This pathway presents a negligible risk to receptor.
	Sediment	Sediment	Oak Creek	Recreational User	Adult	Ingestion	East of Hull Rd.	Quant	Recreational user may be exposed to wetland/stream sediments.
						Dermal	East of Hull Rd.	Quant	Recreational user may be exposed to wetland/stream sediments.
					Child	Ingestion	East of Hull Rd.	Quant	Recreational user may be exposed to wetland/stream sediments.
						Dermal	East of Hull Rd.	Quant	Recreational user may be exposed to wetland/stream sediments.

Table 7-1

SUMMARY OF HABITAT AREAS AND CONSTITUENTS OF POTENTIAL ECOLOGICAL CONCERN (COPECs)
NOCATEE/HULL FORMER CREOSOTE WOOD TREATING PLANT SITE
HULL (NOCATEE), FLORIDA

Habitat Area	Habitat Type	Soil COPECs	Sediment COPECs	Surface Water COPECs
West of Hull Road				
Former Creosote Wood Treating Plant Area	Terrestrial	tPAH, mercury, arsenic, copper, and vanadium		
Braided Stream	Semi-aquatic/Aquatic		tPAH and barium	barium
Borrow Pit	Terrestrial/Semi-aquatic	acenapthlene and tPAH		
Floodplain West of Hull Road	Terrestrial	tPAH, mercury, and vanadium		
Peace River	Aquatic		tPAH and barium	barium
East of Hull Road				
Oak Creek Grid Area	Terrestrial	tPAH		
Oak Creek Floodplain	Terrestrial	tPAH		
Oak Creek Ditch	Semi-aquatic/Aquatic		tPAH and barium	barium
Oak Creek	Aquatic		tPAH and barium	barium

Notes:
tPAHs - total Polynuclear Aromatic Hydrocarbons

TABLE 7-3

TABLE 8-5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Nocatee Former Creosote Wood Treating Plant Site - East of Hull Road

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1) (GAF)	Adjusted Dermal RfD	Units	Primary Target Organ/Effects	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (2) (MM/DD/YY)
VOCs										
Benzene	Chronic	3.00E-03	mg/kg-day	0.97	2.91E-03	mg/kg-day	Blood	NA	EPA/NCEA	
Chloroform	Chronic	1.00E-02	mg/kg-day	1.00	1.00E-02	mg/kg-day	Liver	1000	IRIS	01/10/00
Tetrachloroethene	Chronic	1.00E-02	mg/kg-day	1.00	1.00E-02	mg/kg-day	Liver	1000	IRIS	01/10/00
SVOCs										
Acenaphthene	Chronic	6.00E-02	mg/kg-day	0.31	1.86E-02	mg/kg-day	Liver	3000	IRIS	01/10/00
Acenaphthylene	Chronic	2.00E-02	mg/kg-day	0.80	1.60E-02	mg/kg-day	Blood	3000	Surrogate 1	NA
Benz(a)anthracene	NA	NA	NA	0.50	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	0.50	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	0.50	NA	NA	NA	NA	NA	NA
Benzo (g,h,i) perylene	Chronic	2.00E-02	mg/kg-day	0.80	1.60E-02	mg/kg-day	Blood	3000	Surrogate 1	NA
Benzo(k)fluoranthene	NA	NA	NA	0.31	NA	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	0.70	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	0.50	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	NA	0.50	NA	NA	NA	NA	NA	NA
Dibenzofuran	Chronic	4.00E-03	mg/kg-day	0.80	3.20E-03	mg/kg-day	Blood	NA	EPA/NCEA	
Fluoroanthene	Chronic	4.00E-02	mg/kg-day	0.31	1.24E-02	mg/kg-day	Neurological/Liver/blood	3000	IRIS	01/10/00
Fluorene	Chronic	4.00E-02	mg/kg-day	0.50	2.00E-02	mg/kg-day	Blood	3000	IRIS	01/10/00
Indeno(1,2,3-cd)pyrene	NA	NA	NA	0.50	NA	NA	NA	NA	NA	NA
1-methyl-Naphthalene	Chronic	2.00E-02	mg/kg-day	0.80	1.60E-02	mg/kg-day	Blood	3000	Surrogate 2	NA
2-methyl-Naphthalene	Chronic	2.00E-02	mg/kg-day	0.80	1.60E-02	mg/kg-day	Blood	3000	EPA/NCEA	
Naphthalene	Chronic	2.00E-02	mg/kg-day	0.80	1.60E-02	mg/kg-day	Blood	3000	IRIS	01/10/00
Phenanthrene	Chronic	2.00E-02	mg/kg-day	0.80	1.60E-02	mg/kg-day	Blood	3000	Surrogate	NA
Pyrene	Chronic	3.00E-02	mg/kg-day	0.31	9.30E-03	mg/kg-day	Kidney	3000	IRIS	01/10/00
Metals										
Aluminum	Chronic	1.00E+00	mg/kg-day	0.10	1.00E-01	mg/kg-day	Neurological effects	NA	EPA/NCEA	06/20/94
Arsenic	Chronic	1.00E-03	mg/kg-day	0.95	9.50E-04	mg/kg-day	Hyperpigmentation/Keratosis	3	IRIS	01/10/00
Chromium	Chronic	3.00E-03	mg/kg-day	0.02	6.00E-05	mg/kg-day	None Identified	300	IRIS	01/10/00
Copper	Chronic	4.00E-02	mg/kg-day	0.30	1.20E-02	mg/kg-day	Gastrointestinal tract	NA	HEAST	07/01/97
Iron	Chronic	3.00E-01	mg/kg-day	0.15	4.50E-02	mg/kg-day	Liver	NA	EPA/NCEA	07/07/93
Mercury (3)	Chronic	3.00E-04	mg/kg-day	0.07	2.10E-05	mg/kg-day	Kidney	10	IRIS	03/27/00
Vanadium	Chronic	7.00E-03	mg/kg-day	0.01	7.00E-05	mg/kg-day	Blood	NA	HEAST	1997

NA = Not Available

RfD = Reference Dose

IRIS = Integrated Risk Information System, US Environmental Protection Agency, http://www.epa.gov/iris

EPA/NCEA = US Environmental Protection Agency/National Center for Environmental Assessment

HEAST = Health Effects Assessment Summary Tables, US Environmental Protection Agency, July 1997.

(1) Oral Reference Dose * Gastrointestinal Absorption Factor (GAFs) = Adjusted Dermal Reference Dose

Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance, 2000.

Chemical-Specific GAF values were obtained from the Oak Ridge National Laboratory TOX Information Site: http://risk.lsd.ornl.gov/cgi-bin/tox/

When chemical-specific GAF values were not available EPA Region 4 default values of 80% for volatile organics, 50% for semivolatile organics and 20% for inorganics were used.

(2) For IRIS values, the date that the IRIS database was searched is provided.

(3) Mercuric Chloride toxicity value used.

TABLE 7-4

TABLE 8-5.2

NON-CANCER TOXICITY DATA – INHALATION

Nocatee Former Creosote Wood Treating Plant Site - East of Hull Road

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Adjusted Inhalation RfD (1)	Units	Primary Target Organ/Effects	Combined Uncertainty/Modifying Factors	Sources of RfC:RfD: Target Organ	Dates (2) (MM/DD/YY)
VOCs									
Benzene	Chronic	5.95E-03	mg/m^3	1.70E-03	mg/kg-day	Blood	NA	EPA/NCEA	
Chloroform	Chronic	3.01E-04	mg/m^3	8.60E-05	mg/kg-day	Liver/Kidneys	NA	EPA/NCEA	
Tetrachloroethene	Chronic	4.90E-01	mg/m^3	1.40E-01	mg/kg-day	Liver/Kidneys	NA	EPA/NCEA	
SVOCs									
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	Chronic	3.15E-03	mg/m^3	9.00E-04	mg/kg-day	Respiratory	3000	Surrogate 1	NA
Benz(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoroanthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (g,h,i) perylene	Chronic	3.15E-03	mg/m^3	9.00E-04	mg/kg-day	Respiratory	3000	Surrogate 1	NA
Benzo(k)fluoroanthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoroanthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
1-methyl-Naphthalene	NA	NA	NA	NA	NA	NA	NA	Surrogate 2	NA
2-methyl-Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	Chronic	3.15E-03	mg/m^3	9.00E-04	mg/kg-day	Respiratory	3000	IRIS	01/10/00
Phenanthrene	Chronic	3.15E-03	mg/m^3	9.00E-04	mg/kg-day	Respiratory	3000	Surrogate 1	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS									
Aluminum	Chronic	3.50E-03	mg/m^3	1.00E-03	mg/kg-day	Respiratory	NA	EPA/NCEA	
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	Chronic	1.05E-04	mg/m^3	3.00E-05	mg/kg-day	Respiratory	300	IRIS	01/10/00
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (3)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA

NA = Not Available

RfD = Reference Dose

IRIS = Integrated Risk Information System, US Environmental Protection Agency, http://www.epa.gov/iris

EPA/NCEA = US Environmental Protection Agency/National Center for Environmental Assessment.

HEAST = Health Effects Assessment Summary Tables, US Environmental Protection Agency, July 1997.

(1) Oral Reference Dose * Gastrointestinal Absorption Factor (GAFs) = Adjusted Dermal Reference Dose

Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance, 2000.

Chemical-Specific GAF values were obtained from the Oak Ridge National Laboratory TOX Information Site: http://risk.lsd.ornl.gov/cgi-bin/tox/

When chemical-specific GAF values were not available EPA Region 4 default values of 80% for volatile organics, 50% for semivolatile organics and 20% for inorganics were used.

TABLE 7-5

TABLE 8-6.1

CANCER TOXICITY DATA – ORAL/DERMAL

Nocatee Former Creosote Wood Treating Plant Site - West of Hull Road

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor (GAF)	Adjusted Dermal Cancer Slope Factor (1)	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (2) (MM/DD/YY)
VOCS							
Benzene	2.90E-02	0.97	2.99E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	01/10/00
Chloroform	6.10E-03	1.00	6.10E-03	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/10/00
Tetrachloroethene	5.20E-02	1.00	5.20E-02	$(mg/kg\text{-}day)^{-1}$	B2	EPA/NCEA	Tox Profile
SVOCS							
Acenaphthene	NA	0.31	NA	NA	NA	NA	NA
Acenaphthylene	NA	0.80	NA	NA	NA	NA	NA
Benz(a)anthracene	7.30E-01	0.50	1.46E+00	$(mg/kg\text{-}day)^{-1}$	B2	EPA Region 4	1995
Benzo(a)pyrene	7.30E+00	0.50	1.46E+01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/10/00
Benzo(b)fluoranthene	7.30E-01	0.50	1.46E+00	$(mg/kg\text{-}day)^{-1}$	B2	EPA Region 4	1995
Benzo (g,h,i) perylene	NA	0.80	NA	NA	D	NA	NA
Benzo(k)fluoranthene	7.30E-02	0.31	2.35E-01	$(mg/kg\text{-}day)^{-1}$	B2	EPA Region 4	1995
Carbazole	2.00E-02	0.70	2.86E-02	$(mg/kg\text{-}day)^{-1}$	B2	HEAST	07/01/97
Chrysene	7.30E-03	0.50	1.46E-02	$(mg/kg\text{-}day)^{-1}$	B2	EPA Region 4	1995
Dibenzo(a,h)anthracene	7.30E+00	0.50	1.46E+01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/10/00
Dibenzofuran	NA	0.80	NA	NA	NA	NA	NA
Fluoranthene	NA	0.31	NA	NA	NA	NA	NA
Fluorene	NA	0.50	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	7.30E-01	0.50	1.46E+00	$(mg/kg\text{-}day)^{-1}$	B2	EPA Region 4	1995
1-methyl-Naphthalene	NA	0.80	NA	NA	NA	NA	NA
2-methyl-Naphthalene	NA	0.80	NA	NA	NA	NA	NA
Naphthalene	NA	0.80	NA	NA	NA	NA	NA
Phenanthrene	NA	0.80	NA	NA	NA	NA	NA
Pyrene	NA	0.31	NA	NA	NA	IRIS	01/10/00
METALS							
Aluminum	NA	0.10	NA	NA	NA	NA	NA
Arsenic	1.50E+00	0.80	1.88E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	01/10/00
Chromium	NA	0.02	NA	NA	NA	NA	NA
Copper	NA	0.30	NA	NA	NA	NA	NA
Iron	NA	0.15	NA	NA	NA	NA	NA
Mercury (3)	NA	0.07	NA	NA	NA	NA	NA
Vanadium	NA	0.01	NA	NA	NA	NA	NA

NA = Not Available

EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

IRIS = Integrated Risk Information System, US Environmental Protection Agency, http://www.epa.gov/iris

EPA/NCEA = US Environmental Protection Agency/National Center for Environmental Assessment (as per EPA Region 3 RBC Tables, October 2000)

HEAST = Health Effects Assessment Summary Tables, US Environmental Protection Agency, July 1997.

(1) Oral Cancer Slope Factor/Gastrointestinal Absorption Factor (GAFs) = Adjusted Dermal Cancer Slope Factor

Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance, 2000.

Chemical-Specific GAF values were obtained from the Oak Ridge National Laboratory TOX Information Site: http://risk lsd.ornl.gov/cgi-bin/tox/

When chemical-specific GAF values were not available EPA Region 4 default values of 80% for volatile organics, 50% for semivolatile organics and 20% for inorganics were used.

(2) For IRIS values, the date that the IRIS database was searched is provided

(3) Cancer Slope Factors for the carcinogenic PAHs are based on their Toxic Equivalency Factors to Benzo(a)pyrene.
See Table 6.6-3 for TEF values

TABLE 7-6

TABLE 8-6.2

CANCER TOXICITY DATA -- INHALATION

Nocatee Former Creosote Wood Treating Plant Site - East of Hull Road

Chemical of Potential Concern	Unit Risk	Units	Adjustment (1)	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (2) (MM/DD/YY)
VOCS								
Benzene	8.29E-06	$(ug/m3)^{-1}$	3500	2.90E-02	$(mg/kg-day)^{-1}$	A	IRIS	01/10/00
Chloroform	2.31E-05	$(ug/m3)^{-1}$	3500	8.10E-02	$(mg/kg-day)^{-1}$	B2	IRIS	00/10/00
Tetrachloroethene	5.71E-07	$(ug/m3)^{-1}$	3500	2.00E-03	$(mg/kg-day)^{-1}$	B2	EPA/NCEA	
SVOCS								
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA
Benz(a)anthracene	8.86E-05	$(ug/m3)^{-1}$	3500	3.1E-01	$(mg/kg-day)^{-1}$	NA	EPA Region 4	1995
Benzo(a)pyrene	8.86E-04	$(ug/m3)^{-1}$	3500	3.1E+00	$(mg/kg-day)^{-1}$	B2	EPA Region 4	1995
Benzo(b)fluoroanthene	8.86E-05	$(ug/m3)^{-1}$	3500	3.1E-01	$(mg/kg-day)^{-1}$	B2	EPA Region 4	1995
Benzo (g,h,i) perylene	NA	NA	NA	NA	NA	D	NA	NA
Benzo(k)fluoroanthene	8.86E-06	$(ug/m3)^{-1}$	3500	3.1E-02	$(mg/kg-day)^{-1}$	B2	EPA Region 4	1995
Carbazole	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	8.86E-07	$(ug/m3)^{-1}$	3500	3.1E-03	$(mg/kg-day)^{-1}$	B2	EPA Region 4	1995
Dibenzo(a,h)anthracene	8.86E-04	$(ug/m3)^{-1}$	3500	3.1E+00	$(mg/kg-day)^{-1}$	B2	EPA Region 4	1995
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA
Fluoroanthene	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	8.86E-05	$(ug/m3)^{-1}$	3500	3.1E-01	$(mg/kg-day)^{-1}$	B2	EPA Region 4	1995
1-methyl-Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA
2-methyl-Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA
METALS								
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	4.31E-03	$(ug/m3)^{-1}$	3500	1.51E+01	$(mg/kg-day)^{-1}$	A	IRIS	00/10/00
Chromium	1.17E-02	$(ug/m3)^{-1}$	3500	4.10E+01	$(mg/kg-day)^{-1}$	A	HEAST	07/01/97
Copper	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (3)	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA

NA = Not Available
EPA Region 4 = EPA Region 4 Bulletins, 1995
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
IRIS = Integrated Risk Information System, US Environmental Protection Agency, http://www epa.gov/ins
EPA/NCEA = US Environmental Protection Agency/National Center for Environmental Assessment
HEAST = Health Effects Assessment Summary Tables, US Environmental Protection Agency, July 1997
(1)Adjustment Factor applied to Unit Risk to calculate Inhalation Slope Factor =
70kg x 1/20m3/day x 1000ug/mg

EPA Group.
A - Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data are
B2 - Probable human carcinogen - indicates sufficient evidence in animal
inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

(2) For IRIS values, the date that the IRIS database was searched is provided.
For HEAST values, provide the date of HEAST.
For NCEA values, provide the date of the article provided by NCEA.

(3) Cancer Slope Factors for the carcinogenic PAHs are based on their Toxic Equivalency Factors to Benzo(a)pyrene.

TABLE 7-7

TABLE 8-10.1
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Nocatee Former Creosote Wood Treatment Plant Site
West of Hull Road

Scenario Timeframe:	Current
Receptor Population:	Trespasser
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Former Creosote Plant Area	Benzo (a) anthracene	1.37E-06	3.52E-10	1.62E-05	1.76E-05
			Benzo (a) pyrene	7.61E-06	1.96E-09	9.02E-05	9.78E-05
			Benzo (b) fluoranthene	1.47E-06	3.79E-10	1.74E-05	1.89E-05
			Benzo (k) fluoranthene	6.12E-08	1.58E-11	1.17E-06	1.23E-06
			Dibenzo(a,h) anthracene	5.73E-07	1.48E-10	6.80E-06	7.37E-06
			Indeno(1,2,3-cd)pyrene	2.93E-07	7.54E-11	3.47E-06	3.77E-06
			(Total)	1.14E-05	2.93E-09	1.35E-04	1.47E-04
Soil	Surface Soil	Borrow Pit Area	Benzo (a) anthracene	9.51E-07	2.45E-10	1.13E-05	1.22E-05
			Benzo (a) pyrene	4.75E-06	1.22E-09	5.64E-05	6.11E-05
			Benzo (b) fluoranthene	7.13E-07	1.84E-10	8.46E-06	9.17E-06
			Benzo (k) fluoranthene	2.82E-08	7.27E-12	5.40E-07	5.68E-07
			Dibenzo(a,h) anthracene	2.38E-06	6.12E-10	2.82E-05	3.06E-05
			Indeno(1,2,3-cd)pyrene	3.27E-07	8.41E-11	3.88E-06	4.20E-06
			(Total)	9.15E-06	2.36E-09	1.09E-04	1.18E-04
						Total Risk Across All Exposure Routes	2.64E-04

TABLE 7-8

TABLE 8-10.2
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Nocatee Former Creosote Wood Treating Plant Site - West of Hull Road

Scenario Timeframe:	Current
Receptor Population:	Trespasser
Receptor Age:	Youth

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Former Creosote Plant Area	Benzo (a) anthracene	1.52E-06	3.91E-10	1.80E-05	1.95E-05
			Benzo (a) pyrene	8.45E-06	2.18E-09	1.00E-04	1.09E-04
			Benzo (b) fluoranthene	1.63E-06	4.21E-10	1.94E-05	2.10E-05
			Benzo (k) fluoranthene	6.80E-08	1.75E-11	1.30E-06	1.37E-06
			Dibenzo(a,h) anthracene	6.37E-07	1.64E-10	7.55E-06	8.19E-06
			Indeno(1,2,3-cd)pyrene	3.26E-07	8.38E-11	3.86E-06	4.19E-06
			(Total)	1.26E-05	3.25E-09	1.50E-04	1.63E-04
Soil	Surface Soil	Borrow Pit Area	Benzo (a) anthracene	1.06E-06	2.72E-10	1.25E-05	1.36E-05
			Benzo (a) pyrene	5.28E-06	1.36E-09	6.26E-05	6.79E-05
			Benzo (b) fluoranthene	7.92E-07	2.04E-10	9.39E-06	1.02E-05
			Benzo (k) fluoranthene	3.14E-08	8.07E-12	6.00E-07	6.31E-07
			Dibenzo(a,h) anthracene	2.64E-06	6.80E-10	3.13E-05	3.40E-05
			Indeno(1,2,3-cd)pyrene	3.63E-07	9.35E-11	4.31E-06	4.67E-06
			(Total)	1.02E-05	2.62E-09	1.21E-04	1.31E-04
						Total Risk Across All Exposure Routes	2.94E-04

TABLE 7-9

TABLE 8-10.3
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Nocatee Former Creosote Wood Treating Plant Site - West of Hull Road

Scenario Timeframe:	Current
Receptor Population:	Recreational Adult
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Peace River/Braided Stream Area	Benzo (a) anthracene	2.97E-06	7.65E-10	3.52E-05	3.82E-05
			Benzo (a) pyrene	4.16E-05	1.07E-08	4.93E-04	5.35E-04
			Benzo (b) fluoranthene	4.16E-06	1.07E-09	4.93E-05	5.35E-05
			Benzo (k) fluoranthene	1.55E-07	3.98E-11	2.95E-06	3.11E-06
			Chrysene	5.05E-08	1.30E-11	5.99E-07	
			Dibenzo(a,h) anthracene	6.24E-06	1.61E-09	7.40E-08	6.32E-06
			Indeno(1,2,3-cd)pyrene	1.55E-06	3.98E-10	4.23E-06	5.77E-06
			(Total)	5.67E-05	1.46E-08	5.86E-04	6.42E-04
Surface Water	Surface Water	Peace River/Braided Stream Area	Iron	NA	NA	NA	0.00E+00
			(Total)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sediment	Sediment	Peace River/Braided Stream Area	Benzo (a) anthracene	8.02E-07	NA	8.68E-06	9.48E-06
			Benzo (a) pyrene	4.16E-06	NA	4.50E-05	4.92E-05
			Benzo (b) fluoranthene	5.94E-07	NA	6.43E-06	7.02E-06
			Dibenzo(a,h) anthracene	3.86E-06	NA	4.18E-05	4.56E-05
			Indeno(1,2,3-cd)pyrene	1.19E-07	NA	1.29E-06	1.40E-06
			(Total)	9.54E-06	0.00E+00	1.03E-04	1.13E-04
						Total Risk Across All Exposure Routes	7.55E-04

TABLE 7-10

TABLE 8-10.4
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Nocatee Former Creosote Wood Treating Plant Site - West of Hull Road

Scenario Timeframe:	Current
Receptor Population:	Recreational Youth
Receptor Age:	Youth

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Peace River/Braided Stream Area	Benzo (a) anthracene	3.30E-06	8.50E-10	3.91E-05	4.24E-05
			Benzo (a) pyrene	4.62E-05	1.19E-08	5.48E-04	5.94E-04
			Benzo (b) fluoranthene	4.62E-06	1.19E-09	5.48E-05	5.94E-05
			Benzo (k) fluoranthene	1.72E-07	4.42E-11	3.28E-06	3.45E-06
			Chrysene	5.61E-08	1.44E-11	6.65E-07	
			Dibenzo(a,h) anthracene	6.93E-06	1.78E-09	8.22E-08	7.02E-06
			Indeno(1,2,3-cd)pyrene	1.72E-06	4.42E-10	2.04E-05	2.21E-05
			(Total)	6.30E-05	1.62E-08	6.66E-04	7.29E-04
Surface Water	Surface Water	Peace River/Braided Stream Area	Iron	NA	NA	NA	0.00E+00
			(Total)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sediment	Sediment	Peace River/Braided Stream Area	Benzo (a) anthracene	8.91E-07	NA	9.64E-06	1.05E-05
			Benzo (a) pyrene	4.62E-06	NA	5.00E-05	5.46E-05
			Benzo (b) fluoranthene	6.60E-07	NA	7.14E-06	7.80E-06
			Dibenzo(a,h) anthracene	4.29E-06	NA	4.64E-05	5.07E-05
			Indeno(1,2,3-cd)pyrene	1.32E-07	NA	1.43E-06	1.56E-06
			(Total)	1.06E-05	0.00E+00	1.15E-04	1.25E-04
						Total Risk Across All Exposure Routes	8.55E-04

TABLE 7-11

TABLE 8-10.5
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Nocatee Former Creosote Wood Treating Plant Site - West of Hull Road

Scenario Timeframe:	Future
Receptor Population:	Site Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Former Creosote Plant Area	Benzo (a) anthracene	5.87E-06	6.04E-09	1.61E-04	1.67E-04						
			Benzo (a) pyrene	3.27E-05	3.36E-08	8.97E-04	9.29E-04						
			Benzo (b) fluoranthene	6.31E-06	6.50E-09	1.73E-04	1.80E-04						
			Benzo (k) fluoranthene	2.63E-07	2.70E-10	1.16E-05	1.19E-05						
			Dibenzo(a,h) anthracene	2.46E-06	2.53E-09	6 76E-05	7.01E-05						
			Indeno(1,2,3-cd)pyrene	1.26E-06	1.29E-09	3.45E-05	3.58E-05						
			Arsenic	4.74E-07	1.16E-08	1.88E-06	2.36E-06	Arsenic	Hyperpigmentation/Keratosis	8.86E-04	NA	2.95E-03	3.84E-03
								Copper	Gastrointestinal tract	5.01E-03	NA	1.77E-03	6.78E-03
								Iron	Liver	8.40E-03	NA	5.91E-03	1.43E-02
			(Total)	4.93E-05	6.18E-08	1.35E-03	1.40E-03	(Total)		1.43E-02	NA	1.06E-02	2.49E-02
Soil	Surface Soil	Borrow Pit Area	Benzo (a) anthracene	4.08E-06	4.20E-09	1.12E-04	1.16E-04						
			Benzo (a) pyrene	2.04E-05	2.10E-08	5.60E-04	5.81E-04						
			Benzo (b) fluoranthene	3.06E-06	3.15E-09	8.40E-05	8.71E-05						
			Benzo (k) fluoranthene	1.21E-07	1 25E-10	5.37E-06	5.49E-06						
			Dibenzo(a,h) anthracene	1.02E-05	1.05E-08	2.80E-04	2 90E-04						
			Indeno(1,2,3-cd)pyrene	1.40E-06	1 44E-09	3.85E-05	3.99E-05						
			Arsenic	4.46E-07	1.09E-08	1.76E-06	2.22E-06	Arsenic	Hyperpigmentation/Keratosis	8.32E-04	NA	2.77E-03	3.61E-03
								Iron	Liver	6.70E-03	NA	4.72E-03	1.14E-02
			(Total)	3.97E-05	5.13E-08	1.08E-03	1.12E-03	(Total)		7.53E-03	NA	7.49E-03	1.50E-02
Groundwater	Intermediate GW	Intermediate GW	Benzene	1.72E-06	NA	1.43E-07	1.87E-06						
								1-methylnaphthalene	Blood	1.13E-01	NA	NA	1.13E-01
								2-methylnaphthalene	Blood	2.35E-01	NA	NA	2.35E-01
								Naphthalene	Blood	1.57E+00	NA	7.05E-01	2.27E+00
								Phenanthrene	Blood	3.42E-02	NA	8.28E-02	1.17E-01
								Arsenic	Hyperpigmentation/Keratosis	4.89E-02	NA	NA	4.89E-02
								Chromium	None Identified	1.17E-01	NA	1.94E-02	1.37E-01
			Arsenic	2.62E-05	NA	NA	2.62E-05	Iron	Liver	1.07E-01	NA	NA	1.07E-01
			(Total)	2.79E-05	0.00E+00	1.43E-07	2.81E-05	(Total)		2.22E+00	0.00E+00	8.07E-01	3.03E+00
Groundwater	Shallow Groundwater	Shallow Groundwater	Carbazole	3.91E-06	NA	NA	3.91E-06						
								2-methylnaphthalene	Blood	1.22E-01	NA	NA	1.22E-01
								Dibenzofuran	NA	3.42E-01	NA	NA	3.42E-01
								Naphthalene	Blood	8.81E-01	NA	3.97E-01	1.28E+00
			Arsenic	2.62E-05	NA	NA	2.62E-05	Arsenic	Hyperpigmentation/Keratosis	4.89E-02	NA	NA	4.89E-02
								Iron	Liver	1.53E-01	NA	NA	1.53E-01
			(Total)	3.01E-05	0.00E+00	0.00E+00	3.01E-05	(Total)		1.55E+00	0.00E+00	3.97E-01	1.94E+00
						Total Risk Across All Exposure Routes	2 58E-03					Total Hazard Index Across All Exposure Routes	5.01E+00

Total Blood HI =	4.13E+00
Total Liver HI =	2.86E-01

TABLE 7-12

TABLE 8-10.6
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Nocatee Former Creosote Wood Treating Plant Site - West of Hull Road

Scenerio Timeframe:	Current
Receptor Population:	Construction Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Former Creosote Plant Area	Benzo (b) fluoranthene	3.53E-07	3.78E-11	1.01E-06	1.36E-06
			Arsenic	4.23E-06	1.07E-08	1.74E-06	5.98E-06
			(Total)	4.58E-06	1.08E-08	2.75E-06	7.34E-06
						Total Risk Across All Exposure Routes	7.34E-06

TABLE 7-13

TABLE 8-10.7
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Nocatee Former Creosote Wood Treating Plant Site - West of Hull Road

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Former Creosote Plant Area	Benzo (a) anthracene	1.58E-05	4.06E-09	1.87E-04	2.03E-04						
			Benzo (a) pyrene	8 78E-05	2.26E-08	1.04E-03	1.13E-03						
			Benzo (b) fluoranthene	1.70E-05	4.37E-09	2.01E-04	2.18E-04						
			Benzo (k) fluoranthene	7 06E-07	1.82E-10	1 35E-05	1 42E-05						
			Dibenzo(a,h) anthracene	6.62E-06	1.70E-09	7.85E-05	8 51E-05						
			Indeno(1,2,3-cd)pyrene	3 38E-06	8 70E-10	4 01E-05	4.35E-05						
			Arsenic	1.28E-06	7.78E-09	2.18E-06	3.46E-06	Arsenic	Hyperpigmentation/Keratosis	2.48E-03	NA	3.57E-03	6.05E-03
								Copper	Gastrointestinal tract	1.40E-02	NA	2.13E-03	1.62E-02
								Iron	Liver	2.35E-02	NA	7.15E-03	3.07E-02
			(Total)	1 32E-04	4.16E-08	1.56E-03	1.70E-03.	(Total)		4.00E-02	NA	1 29E-02	5 29E-02
Soil	Surface Soil	Borrow Pit Area	Benzo (a) anthracene	1 10E-05	2.82E-09	1.30E-04	1 41E-04						
			Benzo (a) pyrene	5 49E-05	1.41E-08	6.50E-04	7 05E-04						
			Benzo (b) fluoranthene	8 23E-06	2.12E-09	9 76E-05	1 06E-04						
			Benzo (k) fluoranthene	3 26E-07	8 38E-11	6 23E-06	6 55E-06						
			Dibenzo(a,h) anthracene	2.74E-05	7 06E-09	3.25E-04	3 53E-04						
			Indeno(1,2,3-cd)pyrene	3 77E-06	9.71E-10	4.47E-05	4.85E-05						
			Arsenic	1.20E-06	7.31E-09	2.05E-06	3.25E-06	Arsenic	Hyperpigmentation/Keratosis	2.33E-03	NA	3.35E-03	5.68E-03
								Iron	Liver	1.88E-02	NA	5 70E-03	2.45E-02
			(Total)	1.07E-04	3.45E-08	1.26E-03	1.36E-03	(Total)		2.11E-02	NA	9 06E-03	3.02E-02
Groundwater	Intermediate GW	Intermediate GW	Benzene	4 63E-06	4.63E-06	NA	9 26E-06	Benzene	Blood	1.55E-01	1.55E-01	NA	3 11E-01
								1-methylnaphthalene	Blood	3.15E-01	NA	NA	3.15E-01
								2-methylnaphthalene	Blood	6.58E-01	NA	NA	6.58E-01
								Acenaphthene	Liver	1.78E-01	NA	NA	1.78E-01
								Acenaphthylene	Blood	1.92E-01	NA	NA	1.92E-01
								Fluorene	Blood	1.16E-01	NA	NA	1.16E-01
								Naphthalene	Blood	4.38E+00	NA	4.23E+00	8.61E+00
								Phenanthrene	Blood	9.59E-02	NA	4.97E-01	5 93E-01
			Arsenic	7 06E-05	NA	NA	7.05E-05	Arsenic	Hyperpigmentation/Keratosis	1.37E-01	NA	NA	1.37E-01
								Chromium	None Identified	3.29E-01	NA	8.22E-02	4.11E-01
								Iron	Liver	3.00E-01	NA	NA.	3.00E-01
			(Total)	7 51E-05	4.63E-06	0.00E+00	7.97E-05	(Total)		6.86E+00	1.55E-01	4 81E+00	1.18E+01
	Shallow Groundwater	Shallow Groundwater						1-methylnaphthalene	Blood	2.33E-01	NA	NA	2.33E-01
								2-methylnaphthalene	Blood	3 42E-01	NA	NA	3.42E-01
								Acenaphthylene	Blood	1 08E-01	NA	NA	1 08E-01
			Carbazole	1.05E-05	NA	NA	1.05E-05						
								Dibenzofuran	NA	9.59E-01	NA	NA	9.59E-01
								Naphthalene	Blood	2 47E+00	NA	2.38E+00	4 85E+00
			Arsenic	7 05E-05	NA	NA	7.05E-05	Arsenic	Hyperpigmentation/Keratosis	1.37E-01	NA	NA	1.37E-01
								Chromium	None Identified	4.57E-02	NA	1.14E-02	5.71E-02
								Iron	Liver	4.29E-01	NA	NA	4.29E-01
			(Total)	8.10E-05	0.00E+00	0 00E+00	8.10E-05	(Total)		4 72E+00	0.00E+00	2.39E+00	7.11E+00
						Total Risk Across All Exposure Routes	3 22E-03					Total Hazard Index Across All Exposure Routes	1.90E+01

Total Blood HI = 1.63E+01
Total Liver HI = 9.32E-01

TABLE 7-14

TABLE 8-10.8
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Nocatee Former Creosote Wood Treating Plant Site - West of Hull Road

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

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Former Creosote Plant Area	Benzo (a) anthracene	3 68E-05	3.55E-09	1.07E-04	1 44E-04						
			Benzo (a) pyrene	2 05E-04	1.98E-08	5 98E-04	8 01E-04						
			Benzo (b) fluoranthene	3 96E-05	3 82E-09	1 15E-04	1.55E-04						
			Benzo (k) fluoranthene	1.65E-06	1.59E-10	7.74E-06	9 39E-06						
			Dibenzo(a,h) anthracene	1.54E-05	1.49E-09	4 50E-05	6 04E-05						
			Indeno(1,2,3-cd)pyrene	7 89E-06	7 61E-10	2 30E-05	3 09E-05						
			Arsenic	2.98E-06	6 81E-09	1 25E-06	4 23E-06	Arsenic	Hyperpigmentation/Keratosis	2.31E-02	NA	8 18E-03	3 13E-02
								Copper	Gastrointestinal tract	1.31E-01	NA	4 89E-03	1.36E-01
								Iron	Liver	2.19E-01	NA	1.64E-02	2.36E-01
			(Total)	2.72E-04	3.64E-08	8 96E-04	1 20E-03	(Total)		3.74E-01	NA	2.95E-02	4.03E-01
Soil	Surface Soil	Borrow Pit Area	Benzo (a) anthracene	2.56E-05	2.47E-09	7.45E-05	1.00E-04						
			Benzo (a) pyrene	1.28E-04	1.24E-08	3.73E-04	5.01E-04						
			Benzo (b) fluoranthene	1.92E-05	1.85E-09	5.59E-05	7.51E-05						
			Benzo (k) fluoranthene	7.60E-07	7.33E-11	3.57E-06	4.33E-06						
			Dibenzo(a,h) anthracene	6.40E-05	6.18E-09	1.86E-04	2.50E-04						
			Indeno(1,2,3-cd)pyrene	8.80E-06	8.49E-10	2.56E-05	3.44E-05						
			Arsenic	2.79E-06	6.39E-09	1.17E-06	3 97E-06	Arsenic	Hyperpigmentation/Keratosis	2.17E-02	NA	7.69E-03	2.94E-02
								Iron	Liver	1.75E-01	NA	1 31E-02	1.88E-01
			(Total)	2.49E-04	3.02E-08	7.20E-04	9 69E-04	(Total)		1.97E-01	NA	2 08E-02	2.18E-01
Groundwater	Intermediate GW	Intermediate GW	Benzene	2 70E-06	NA	4 02E-07	3 10E-06	Benzene	Blood	3 62E-01	NA	5 39E-02	4 16E-01
								1-methylnaphthalene	Blood	7 35E-01	NA	NA	7 35E-01
								2-methylnaphthalene	Blood	1.53E+00	NA	NA	1.53E+00
								Acenaphthene	Liver	4.16E-01	NA	NA	4 16E-01
								Acenaphthylene	Blood	4 47E-01	NA	NA	4.47E-01
								Fluorene	Blood	2.72E-01	NA	NA	2.72E-01
								Naphthalene	Blood	1.02E+01	NA	8.28E+00	1 85E+01
								Phenanthrene	Blood	2.24E-01	NA	9.73E-01	1.20E+00
			Arsenic	4 11E-05	NA	NA	4.11E-05	Arsenic	Hyperpigmentation/Keratosis	3.20E-01	NA	NA	3.20E-01
								Chromium	None Identified	7.67E-01	NA	1.85E-01	9.52E-01
								Iron	Liver	7.01E-01	NA	NA	7.01E-01
			(Total)	4.38E-05	0.00E+00	4.02E-07	4.42E-05	(Total)		1.60E+01	0.00E+00	9.49E+00	2.56E+01
Groundwater	Shallow Groundwater	Shallow Groundwater					NA	1-methylnaphthalene	Blood	5.43E-01	NA	NA	5.43E-01
							NA	2-methylnaphthalene	Blood	7.99E-01	NA	NA	7.99E-01
							NA	Acenaphthylene	Blood	2.53E-01	NA	NA	2.53E-01
			Carbazole	6.14E-06	NA	NA	6 14E-06						
							NA	Dibenzofuran	NA	2.24E+00	NA	NA	2.24E+00
							NA	Naphthalene	Blood	5.75E+00	NA	4.66E+00	1.04E+01
			Arsenic	4.11E-05	NA	NA	4.11E-05	Arsenic	Hyperpigmentation/Keratosis	3.20E-01	NA	NA	3.20E-01
							NA	Iron	Liver	1.00E+00	NA	NA	1.00E+00
			(Total)	4 72E-05	0.00E+00	0.00E+00	4.72E-05	(Total)		1.09E+01	0.00E+00	4.66E+00	1.56E+01
						Total Risk Across All Exposure Routes	2.27E-03					Total Hazard Index Across All Exposure Routes	4.17E+01

NA = Not Applicable

Total Blood HI =	3.51E+01
Total Liver HI =	2.54E+00
Total Skin HI =	7 00E-01

TABLE 7-15

TABLE 8-10.9 RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Nocatee Former Creosote Wood Treating Plant Site - East of Hull Road

Scenario Timeframe:	Current
Receptor Population:	Recreational
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Oak Creek - Floodplain	Benzo(a)anthracene	9.51E-07	6.99E-14	1.13E-05	1.22E-05
			Benzo(a)pyrene	4.75E-06	3.50E-13	5.64E-05	6.11E-05
			Benzo(b)fluoranthene	1.37E-06	1.01E-13	1.62E-05	1.76E-05
			Benzo(k)fluoranthene	4.16E-08	3.06E-15	7.95E-07	8.37E-07
			Dibenzo(a,h)anthracene	7.73E-07	5.68E-14	9.16E-06	9.93E-06
			Indeno(1,2,3-cd)pyrene	5.65E-07	4.15E-14	6.69E-06	7.26E-06
			(Total)	8.45E-06	6.21E-13	1.00E-04	1.09E-04
Water	Surface Water	East of Hull Road	No COPCs	NA	NA	NA	NA
Sediment	Sediment	Ditch	Arsenic	1.47E-07	--	3.43E-06	3.58E-06
			Benzo(a)anthracene	9.51E-07	--	4.08E-06	5.03E-06
			Benzo(a)pyrene	4.75E-06	--	2.00E-05	2.48E-05
			Benzo(b)fluoranthene	1.37E-06	--	3.56E-06	4.93E-06
			Dibenzo(a,h)anthracene	7.73E-07	--	1.48E-06	2.26E-06
			(Total)	7.99E-06	--	3.26E-05	4.06E-05
Sediment	Sediment	Downstream	Benzo(a)pyrene	8.67E-08	--	9.37E-07	1.02E-06
			Dibenzo(a,h)anthracene	1.99E-07	--	2.15E-06	2.35E-06
			(Total)	2.86E-07	--	3.09E-06	3.38E-06
						Total Risk Across All Exposure Routes	1.53E-04

NA = Not Applicable

TABLE 7-16

TABLE 8-10.10 RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Nocatee Former Creosote Wood Treating Plant Site - East of Hull Road

Scenerio Timeframe:	Current
Receptor Population:	Recreational
Receptor Age:	Youth

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Oak Creek - Floodplain	Benzo(a)anthracene	1.06E-06	7.77E-14	1.25E-05	1.36E-05
			Benzo(a)pyrene	5.28E-06	3.88E-13	6.26E-05	6.79E-05
			Benzo(b)fluoranthene	1.52E-06	1.12E-13	1.80E-05	1.95E-05
			Dibenzo(a,h)anthracene	8.58E-07	6.31E-14	1.02E-05	1.10E-05
			Indeno(1,2,3-cd)pyrene	6.27E-07	4.61E-14	7.44E-06	8.06E-06
			(Total)	9.34E-06	6.87E-13	1.11E-04	1.20E-04
Water	Surface Water	East of Hull Road	No COPCs	NA	NA	NA	NA
Sediment	Sediment	Ditch	Arsenic	2.44E-06	--	3.81E-06	6.25E-06
			Benzo(a)anthracene	1.82E-06	--	1.96E-05	2.15E-05
			Benzo(a)pyrene	8.91E-06	--	9.64E-05	1.05E-04
			Benzo(b)fluoranthene	1.58E-06	--	1.71E-05	1.87E-05
			Benzo(k)fluoranthene	6.93E-08	--	1.21E-06	1.28E-06
			Dibenzo(a,h)anthracene	6.60E-07	--	7.14E-06	7.80E-06
			(Total)	1.55E-05	--	1.45E-04	1.55E-04
Sediment	Sediment	Downstream	Benzo(a)pyrene	9.63E-08	--	1.04E-06	1.14E-06
			Dibenzo(a,h)anthracene	2.21E-07	--	2.39E-06	2.61E-06
			(Total)	3.17E-07	--	3.43E-06	3.75E-06
						Total Risk Across All Exposure Routes	2.78E-04

TABLE 7-17

TABLE 8-10.11 RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Nocatee Former Creosote Wood Treating Plant Site - East of Hull Road

Scenario Timeframe:	Current
Receptor Population:	Construction Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical		Non-Carcinogenic Hazard Quotient			
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	East of Hull Road	Benzo(a)anthracene	4.46E-06	4.78E-10	1.27E-05	1.72E-05	1-Methylnaphthalene	Blood	6.81E-02	--	1.22E-01	1.90E-01
			Benzo(a)pyrene	2.16E-05	2.31E-09	6.16E-05	8.32E-05	2-Methylnaphthalene	Blood	1.06E-01	--	1.89E-01	2.95E-01
			Benzo(b)fluoranthene	3.13E-06	3.36E-10	8.97E-06	1.21E-05						
			Dibenzo(a,h)anthracene	1.67E-05	1.79E-09	4.76E-05	6.43E-05						
								Fluoranthene	Neurological/Liver/blood	6.22E-02	--	2.87E-01	3.49E-01
			Indeno(1,2,3-cd)pyrene	8.82E-07	9.45E-11	2.52E-06	3.40E-06						
								Naphthalene	Blood	1.60E-01	8.96E-04	2.85E-01	4.46E-01
								Phenanthrene	Blood	1.67E-01	9.36E-04	2.98E-01	4.66E-01
			(Total)	4.67E-05	5.01E-09	1.33E-04	1.80E-04	(Total)		5.62E-01	1.83E-03	1.18E+00	1.75E+00
						Total Risk Across All Exposure Routes	1.80E-04					Total Risk Across All Exposure Routes	1.75E+00

Total Blood HI = 1.75E+00

TABLE 7-18

TABLE 9-10.12 RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Nocatee Former Creosote Wood Treating Plant Site - East of Hull Road

Scenario Timeframe:	Current
Receptor Population:	Residential
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical		Non-Carcinogenic Hazard Quotient			
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	East of Hull Road	Arsenic	2.77E-05	4.83E-11	4.73E-05	7.50E-05	Arsenic	Hyperpigmentation/Keratosis	5.38E-02	--	7.75E-02	1.31E-01
			Benzo(a)anthracene	8.09E-08	5.95E-14	9.59E-07	1.04E-06						
			Benzo(a)pyrene	2.40E-06	1.77E-13	2.85E-05	3.09E-05						
			Benzo(b)fluoranthene	3.44E-07	2.53E-14	4.08E-06	4.42E-06						
			Benzo(k)fluoranthene	1.63E-08	1.20E-15	3.12E-07	3.28E-07						
			Dibenzo(a,h)anthracene	2.84E-07	2.09E-14	3.37E-06	3.65E-06						
			Indeno(1,2,3-cd)pyrene	1.80E-07	1.33E-14	2.14E-06	2.32E-06						
			(Total)	3.10E-05	4.88E-11	8.67E-05	1.18E-04	(Total)		5.38E-02	--	7.75E-02	1.31E-01
Groundwater	Intermediate Groundwater	East of Hull Road	1-Methylnaphthalene	--	--	--	--	1-Methylnaphthalene	Blood	1.22E-01	--	--	1.22E-01
			2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene	Blood	2.86E-01	--	--	2.86E-01
			Arsenic	6.06E-05	--	--	6.06E-05	Arsenic	Hyperpigmentation/Keratosis	1.16E-01	--	--	1.16E-01
			Benzo(a)anthracene	4.46E-06	--	1.86E-04	1.91E-04						
			Benzo(a)pyrene	2.26E-05	--	1.64E-03	1.66E-03						
			Benzo(b)fluoranthene	1.92E-06	--	1.43E-04	1.45E-04						
			Fluorene	--	--	--	--	Fluorene	Blood	1.37E-01	--	--	1.37E-01
			Iron	--	--	--	--	Iron	Liver	1.61E-01	--	--	1.61E-01
			Naphthalene	--	--	--	--	Naphthalene	Blood	5.07E+00	--	4.89E+00	9.96E+00
			Phenanthrene	--	--	--	--	Phenanthrene	Blood	6.85E-02	--	3.55E-01	4.24E-01
			(Total)	8.96E-05	--	1.96E-03	2.05E-03	(Total)		5.96E+00	--	5.25E+00	1.12E+01
Groundwater	Shallow Groundwater	East of Hull Road	1-Methylnaphthalene	--	--	--	--	1-Methylnaphthalene	Blood	2.05E-01	--	--	2.05E-01
			2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene	Blood	2.67E-01	--	--	2.67E-01
			Acenaphthene	--	--	--	--	Acenaphthene	Liver	1.42E-01	--	--	1.42E-01
			Arsenic	6.20E-04	--	--	6.20E-04	Arsenic	Hyperpigmentation/Keratosis	1.21E+00	--	--	1.21E+00
			Benzene	9.74E-06	--	--	9.74E-06	Benzene		3.26E-01	--	--	3.26E-01
			Benzo(a)anthracene	2.95E-05	--	1.23E-03	1.26E-03						
			Benzo(a)pyrene	1.51E-04	--	1.09E-02	1.11E-02						
			Benzo(b)fluoranthene	2.47E-05	--	1.83E-03	1.86E-03						
			Benzo(k)fluoranthene	1.03E-06	--	--	1.03E-06						
			Dibenzo(a,h)anthracene	1.03E-04	--	2.01E-02	2.02E-02						
			Fluorene	--	--	--	--	Fluorene	Blood	1.64E-01		--	1.64E-01
			Indeno(1,2,3-cd)pyrene	8.23E-06	--	1.11E-03	1.12E-03						
			Iron	--	--	--	--	Iron	Liver	1.75E+00		--	1.75E+00
			Naphthalene	--	--	--	--	Naphthalene	Blood	2.60E-01	--	2.51E-01	5.12E-01
			Phenanthrene	-	--	--	--	Phenanthrene	Blood	1.78E-01	--	9.23E-01	1.10E+00
			(Total)	9.47E-04	--	3.52E-02	3.61E-02	(Total)		4.50E+00	--	1.17E+00	5.68E+00
						Total Risk Across All Exposure Routes	3.83E-02					Total Risk Across All Exposure Routes	1.70E+01

Total Blood HI =	1.32E+01
Total Liver HI =	2.06E+00
Total Skin HI =	1.45E+00

TABLE 7-19

TABLE 8-10.13 RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Nocatee Former Creosote Wood Treatment Plant Site

Scenario Timeframe:	Current
Receptor Population:	Residential
Receptor Age:	Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical		Non-Carcinogenic Hazard Quotient			
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	East of Hull Road	Arsenic	6.46E-05	4.22E-11	2.71E-05	9.17E-05	Arsenic	Hyperpigmentation/Keratosis	1.67E+00	--	7.03E-01	2.38E+00
			Benzo(a)anthracene	1.89E-07	5.21E-14	1.27E-07	3.16E-07						
			Benzo(a)pyrene	5.60E-06	1.55E-13	3.77E-06	9.37E-06						
			Benzo(b)fluoranthene	8.03E-07	2.21E-14	5.39E-07	1.34E-06						
			Benzo(k)fluoranthene	3.80E-08	1.05E-15	--	3.80E-08						
			Dibenzo(a,h)anthracene	6.63E-07	1.83E-14	4.46E-07	1.11E-06						
			Indeno(1,2,3-cd)pyrene	4.21E-07	1.16E-14	2.83E-07	7.03E-07						
				7.72E-06	2.60E-13	5.16E-06	1.29E-05						
			(Total)	7.23E-05	4.25E-11	3.23E-05	1.05E-04	(Total)		1.67E+00	--	7.03E-01	2.38E+00
								Arsenic	Hyperpigmentation/Keratosis	9.16E-01	--	--	9.16E-01
Groundwater	Intermediate Groundwater	East of Hull Road						1-Methylnaphthalene	Blood	2.85E-01	--	--	2.85E-01
								2-Methylnaphthalene	Blood	6.68E-01	--	--	6.68E-01
								Acenaphthene	Liver	2.02E-01	--	--	2.02E-01
								Acenaphthylene	Blood	2.09E-01	--	--	2.09E-01
								Fluorene	Blood	3.20E-01	--	--	3.20E-01
			Benzo(a)anthracene	2.60E-09	--	9.11E-05	9.11E-05						
			Benzo(a)pyrene	1.32E-08	--	8.00E-04	8.00E-04	Naphthalene	Blood	1.18E+01	--	6.46E+01	7.64E+01
			Benzo(b)fluoranthene	1.12E-09	--	6.98E-05	6.98E-05	Phenanthrene	Blood	1.60E-01	--	6.95E-01	8.55E-01
										1.37E+01		6.53E+01	
								Iron	Liver	3.75E-01	--	--	3.75E-01
			(Total)	1.69E-08	--	9.61E-04	9.61E-04	(Total)		1.50E+01	--	6.53E+01	8.02E+01
Groundwater	Shallow Groundwater	East of Hull Road											
			Arsenic	3.62E-04	--	--	3.62E-04	Arsenic	Hyperpigmentation/Keratosis	9.38E+00	--	--	9.38E+00
								Iron	Liver	4.09E+00	--	--	4.09E+00
			Benzene	5.68E-06	--	8.46E-07	6.53E-06	Benzene	Blood	7.62E-01	--	1.13E-01	8.75E-01
			Benzo(a)anthracene	1.72E-05	--	2.02E-05	3.74E-05	1-Methylnaphthalene	Blood	4.79E-01	--	--	4.79E-01
			Benzo(a)pyrene	8.80E-05	--	1.14E-04	2.02E-04	2-Methylnaphthalene	Blood	6.23E-01	--	--	6.23E-01
			Benzo(b)fluoranthene	1.44E-05	--	1.00E-04	1.15E-04	Acenaphthene	Liver	3.30E-01	--	--	3.30E-01
			Dibenzo(a,h)anthracene	6.00E-05	--	9.84E-03	9.90E-03	Acenaphthylene	Blood	1.44E-01	--	--	1.44E-01
								Fluorene	Blood	3.84E-01	--	--	3.84E-01
			Indeno(1,2,3-cd)pyrene	4.80E-06	--	5.44E-04	5.49E-04	Naphthalene	Blood	6.07E-01	--	4.92E-01	1.10E+00
				1.90E-04		1.06E-02		Phenanthrene	Blood	4.16E-01	--	1.81E+00	2.22E+00
										2.98E+00		2.30E+00	
			(Total)	5.52E-04	--	1.06E-02	1.12E-02	(Total)		1.72E+01	--	2.41E+00	1.96E+01
						Total Risk Across All Exposure Routes	1.22E-02					Total Risk Across All Exposure Routes	1.02E+02

Total Blood HI =	8.45E+01
Total Liver HI =	5.00E+00
Total Skin HI =	1.27E+01

TABLE 7-20

						COC Cleanup Goals (pg 2 of 2)					
Oak Creek Area											
			SURFACE SOILS (0 to 2' bls)			**SUBSURFACE SOILS (2' bls to water table)**		**SEDIMENT**		**GROUNDWATER**	
Contaminant	TEF Factor		Cleanup Goal (ppm)	Health-based Standard Basis		Cleanup Goal (ppm)	Health-based Standard Basis	SLERA (ppm)	Basis	Cleanup Goal (ppb)	Health-based Standard Basis
1-Methylnaphthalene			**3.1**	FL $SCTL_{(Leach)}$		**3.1**	FL $SCTL_{(Leach)}$	---		**2.3**	EPA Reg 4[1]
2-Methylnaphthalene			**8.5**	FL $SCTL_{(Leach)}$		**8.5**	FL $SCTL_{(Leach)}$	---		**28**	FL GCTL
Acenaphthene			**2.1**	FL $SCTL_{(Leach)}$		**2.1**	FL $SCTL_{(Leach)}$	---		**20**	FL GCTL
Acenaphthylene			**27**	FL $SCTL_{(Leach)}$		**27**	FL $SCTL_{(Leach)}$	---		**210**	FL GCTL
Anthracene			**2,500**	FL $SCTL_{(Leach)}$		**2,500**	FL $SCTL_{(Leach)}$	---		**2,100**	FL GCTL
Benzo(a)anthracene	0.1	*	**0.8**	FL $SCTL_{(Leach)}$	*	**0.8**	FL $SCTL_{(Leach)}$	---		**0.05**	FL GCTL
Benzo(a)pyrene	1	*	**0.1**	FL $SCTL_{(Resident)}$	*	**8**	FL $SCTL_{(Leach)}$	---		**0.2**	MCL
Benzo(b)fluoranthene	0.1	*	**2.4**	FL $SCTL_{(Leach)}$	*	**2.4**	FL $SCTL_{(Leach)}$	---		**0.05**	FL GCTL
Benzo(g,h,i)perylene			**2,500**	FL $SCTL_{(Resident)}$		**32,000**	FL $SCTL_{(Leach)}$	---		**210**	FL GCTL
Benzo(k)fluoranthene	0.01	*	**24**	FL $SCTL_{(Leach)}$	*	**24**	FL $SCTL_{(Leach)}$	---		**0.5**	FL GCTL
Carbazole			**0.2**	FL $SCTL_{(Leach)}$		**0.2**	FL $SCTL_{(Leach)}$	---		**1.8**	FL GCTL
Chrysene	0.001	*	**77**	FL $SCTL_{(Leach)}$	*	**77**	FL $SCTL_{(Leach)}$	---		**4.8**	FL GCTL
Dibenzo(a,h)anthracene	1	*	**0.7**	FL $SCTL_{(Leach)}$	*	**0.7**	FL $SCTL_{(Leach)}$	---		**0.005**	FL GCTL
Dibenzofuran			**15**	FL $SCTL_{(Leach)}$		**15**	FL $SCTL_{(Leach)}$	---		**28**	FL GCTL
Fluoranthene			**1,200**	FL $SCTL_{(Leach)}$		**1,200**	FL $SCTL_{(Leach)}$	---		**280**	FL GCTL
Fluorene			**160**	FL $SCTL_{(Leach)}$		**160**	FL $SCTL_{(Leach)}$	---		**280**	FL GCTL
Indeno(1,2,3-cd)pyrene	0.1	*	**6.6**	FL $SCTL_{(Leach)}$	*	**6.6**	FL $SCTL_{(Leach)}$	---		**0.05**	FL GCTL
Naphthalene			**1.2**	FL $SCTL_{(Leach)}$		**1.2**	FL $SCTL_{(Leach)}$	---		**14**	FL GCTL
Phenanthrene			**250**	FL $SCTL_{(Leach)}$		**250**	FL $SCTL_{(Leach)}$	---		**210**	FL GCTL
Pyrene			**880**	FL $SCTL_{(Leach)}$		**880**	FL $SCTL_{(Leach)}$	---		**210**	FL GCTL
Total B(a)P TEF		*	**0.1**	FL $SCTL_{(Resident)}$	*	**8**	FL $SCTL_{(Leach)}$	---		---	
Total PAHs			---			---		**10**	SLERA	---	
Arsenic			**1.4**	Site-Specific Leach		**1.4**	Site-Specific Leach	---		**10**	MCL
Benzene			**0.007**	FL $SCTL_{(Leach)}$		**0.007**	FL $SCTL_{(Leach)}$	---		**1**	FL MCL
Ethylbenzene			**0.6**	FL $SCTL_{(Leach)}$		**0.6**	FL $SCTL_{(Leach)}$	---		**700**	MCL
Toluene			**0.5**	FL $SCTL_{(Leach)}$		**0.5**	FL $SCTL_{(Leach)}$	---		**1,000**	MCL
Xylenes (total)			**0.2**	FL $SCTL_{(Leach)}$		**0.2**	FL $SCTL_{(Leach)}$	---		**3,500**	EPA Reg 4

[1] = Calculated using EPA Regional Screening Levels Equation (Sept 2008 vs)
Comm = commercial
--- = No goal established

TABLE 7-20

						COC Cleanup Goals (pg 1 of 2)					
Plant & Peace River Floodplain Area											
			SURFACE SOILS (0 to 2' bls)			**SUBSURFACE SOILS (2' bls to water table)**		**SEDIMENT**		**GROUNDWATER**	
Contaminant	TEF Factor		Cleanup Goal (ppm)	Health-based Standard Basis		Cleanup Goal (ppm)	Health-based Standard Basis	SLERA (ppm)	Basis	Cleanup Goals (ppb)	Health-based Standard Basis
1-Methylnaphthalene			**3.1**	FL $SCTL_{(Leach)}$		**3.1**	FL $SCTL_{(Leach)}$	---		**2.3**	EPA Reg 4[1]
2-Methylnaphthalene			**8.5**	FL $SCTL_{(Leach)}$		**8.5**	FL $SCTL_{(Leach)}$	---		**28**	FL GCTL
Acenaphthene			**2.1**	FL $SCTL_{(Leach)}$		**2.1**	FL $SCTL_{(Leach)}$	---		**20**	FL GCTL
Acenaphthylene			**27**	FL $SCTL_{(Leach)}$		**27**	FL $SCTL_{(Leach)}$	---		**210**	FL GCTL
Anthracene			**2,500**	FL $SCTL_{(Leach)}$		**2,500**	FL $SCTL_{(Leach)}$	---		**2,100**	FL GCTL
Benzo(a)anthracene	0.1	*	**0.8**	FL $SCTL_{(Leach)}$	*	**0.8**	FL $SCTL_{(Leach)}$	---		**0.05**	FL GCTL
Benzo(a)pyrene	1	*	**0.7**	FL $SCTL_{(Comm)}$	*	**8**	FL $SCTL_{(Leach)}$	---		**0.2**	MCL
Benzo(b)fluoranthene	0.1	*	**2.4**	FL $SCTL_{(Leach)}$	*	**2.4**	FL $SCTL_{(Leach)}$	---		**0.05**	FL GCTL
Benzo(g,h,i)perylene			**32,000**	FL $SCTL_{(Leach)}$		**32,000**	FL $SCTL_{(Leach)}$	---		**210**	FL GCTL
Benzo(k)fluoranthene	0.01	*	**24**	FL $SCTL_{(Leach)}$	*	**24**	FL $SCTL_{(Leach)}$	---		**0.5**	FL GCTL
Carbazole			**0.2**	FL $SCTL_{(Leach)}$		**0.2**	FL $SCTL_{(Leach)}$	---		**1.8**	FL GCTL
Chrysene	0.001	*	**77**	FL $SCTL_{(Leach)}$	*	**77**	FL $SCTL_{(Leach)}$	---		**4.8**	FL GCTL
Dibenzo(a,h)anthracene	1	*	**0.7**	FL $SCTL_{(Leach)}$	*	**0.7**	FL $SCTL_{(Leach)}$	---		**0.005**	FL GCTL
Dibenzofuran			**15**	FL $SCTL_{(Leach)}$		**15**	FL $SCTL_{(Leach)}$	---		**28**	FL GCTL
Fluoranthene			**1,200**	FL $SCTL_{(Leach)}$		**1,200**	FL $SCTL_{(Leach)}$	---		**280**	FL GCTL
Fluorene			**160**	FL $SCTL_{(Leach)}$		**160**	FL $SCTL_{(Leach)}$	---		**280**	FL GCTL
Indeno(1,2,3-cd)pyrene	0.1	*	**6.6**	FL $SCTL_{(Leach)}$	*	**6.6**	FL $SCTL_{(Leach)}$	---		**0.05**	FL GCTL
Naphthalene			**1.2**	FL $SCTL_{(Leach)}$		**1.2**	FL $SCTL_{(Leach)}$	---		**14**	FL GCTL
Phenanthrene			**250**	FL $SCTL_{(Leach)}$		**250**	FL $SCTL_{(Leach)}$	---		**210**	FL GCTL
Pyrene			**880**	FL $SCTL_{(Leach)}$		**880**	FL $SCTL_{(Leach)}$	---		**210**	FL GCTL
Total B(a)P TEF		*	**0.7**	FL $SCTL_{(Comm)}$	*	**8**	FL $SCTL_{(Leach)}$	---		---	
Total PAHs			---			---		**10**	SLERA	---	
Arsenic			**1.4**	Site-Specific Leach		**1.4**	Site-Specific Leach	---		**10**	MCL
Benzene			**0.007**	FL $SCTL_{(Leach)}$		**0.007**	FL $SCTL_{(Leach)}$	---		**1**	FL MCL
Ethylbenzene			**0.6**	FL $SCTL_{(Leach)}$		**0.6**	FL $SCTL_{(Leach)}$	---		**700**	MCL
Toluene			**0.5**	FL $SCTL_{(Leach)}$		**0.5**	FL $SCTL_{(Leach)}$	---		**1,000**	MCL
Xylenes (total)			**0.2**	FL $SCTL_{(Leach)}$		**0.2**	FL $SCTL_{(Leach)}$	---		**3,500**	EPA Reg 4

[1] = Calculated using EPA Regional Screening Levels Equation (Sept 2008 vs)
Comm = commercial
--- = No goal established

TABLE 7-21

Table 9-10
Selection of Chemicals of Potential Ecological Concern (COPEC)
Surface Soil - Former Creosote Plant Area
Nocatee Former Creosote Wood Treatment Plant Site

Parameter	Units	Detection Frequency	Range of Detected Values	Risk Based Screening Level	SLERA HQ	COPEC?	Screening Exceedances
VOCs							
Acetone	ug/kg	1 / 1	86 - 86	NA	NA	Yes	NA
Tetrachloroethene	ug/kg	1 / 4	6.4 - 6.4	10	0.64	No	0 / 4
Xylenes (total)	ug/kg	1 / 4	7.5 - 7.5	50	0.15	No	0 / 4
PAHs							
1-Methylnaphthalene	ug/kg	2 / 32	490 - 1000	100	10.00	Yes	2 / 32
Acenaphthylene	ug/kg	12 / 32	21.75 - 5505.5	100	55.06	Yes	6 / 32
Anthracene	ug/kg	10 / 35	5.2 - 376.1	100	3.76	Yes	4 / 35
Benzo(a)anthracene	ug/kg	33 / 35	8.2 - 46000	100	460.00	Yes	29 / 35
Benzo(a)pyrene	ug/kg	34 / 35	6 - 65000	100	650.00	Yes	30 / 35
Benzo(b)fluoranthene	ug/kg	34 / 35	6.05 - 94000	100	940.00	Yes	31 / 35
Benzo(g,h,i)perylene	ug/kg	34 / 35	21 - 33000	100	330.00	Yes	31 / 35
Benzo(k)fluoranthene	ug/kg	33 / 35	18 - 63000	100	630.00	Yes	28 / 35
Chrysene	ug/kg	34 / 35	6.8 - 61000	100	610.00	Yes	29 / 35
Dibenzo(a,h)anthracene	ug/kg	20 / 35	18 - 16000	100	160.00	Yes	13 / 35
Fluoranthene	ug/kg	32 / 35	18 - 47000	100	470.00	Yes	23 / 35
Indeno(1,2,3-cd)pyrene	ug/kg	32 / 35	26 - 34000	100	340.00	Yes	27 / 35
Phenanthrene	ug/kg	28 / 35	4.7 - 701.1	100	7.01	Yes	15 / 35
Pyrene	ug/kg	33 / 35	32 - 81000	100	810.00	Yes	29 / 35
Metals							
Aluminum	mg/kg	24 / 24	120 - 5900	50	118.00	Yes	24 / 24
Antimony	mg/kg	1 / 9	3.8 - 3.8	3.5	1.09	Yes	1 / 9
Arsenic	mg/kg	12 / 24	1.2 - 91	10	9.10	Yes	3 / 24
Barium	mg/kg	24 / 24	2.3 - 200	165	1.21	Yes	1 / 24
Cadmium	mg/kg	1 / 24	0.61 - 0.61	1.6	0.38	No	0 / 24
Calcium	mg/kg	9 / 9	200 - 26100	NA	NA	No	NA
Chromium	mg/kg	15 / 24	0.79 - 12	0.4	30.00	Yes	15 / 24
Cobalt	mg/kg	2 / 9	1.7 - 2.5	20	0.13	No	0 / 9
Copper	mg/kg	8 / 9	1.525 - 410	40	10.25	Yes	2 / 9
Iron	mg/kg	24 / 24	79.5 - 16000	200	80.00	Yes	19 / 24
Lead	mg/kg	24 / 24	0.96 - 170	50	3.40	Yes	3 / 24
Magnesium	mg/kg	7 / 9	46.5 - 1660	NA	NA	No	NA
Manganese	mg/kg	9 / 9	1.7 - 79	100	0.79	No	0 / 9
Mercury	mg/kg	15 / 24	0.01425 - 0.56	0.1	5.60	Yes	6 / 24
Nickel	mg/kg	2 / 9	6.2 - 6.4	30	0.21	No	0 / 9
Potassium	mg/kg	1 / 9	220 - 220	NA	NA	No	NA
Sodium	mg/kg	5 / 9	37 - 137	NA	NA	No	NA
Vanadium	mg/kg	4 / 9	2.2 - 9.2	2	4.60	Yes	4 / 9
Zinc	mg/kg	8 / 9	4.2 - 250	50	5.00	Yes	2 / 9

NA - Not applicable or not available.

Table 9-11
Selection of Chemicals of Potential Ecological Concern (COPEC)
Surface Soil - Borrow Pit Area
Nocatee Former Creosote Wood Treatment Plant Site

Parameter	Units	Detection Frequency	Range of Detected Values	Risk Based Screening Level	SLERA HQ	COPEC?	Screening Exceedances
PAHs							
1-Methylnaphthalene	ug/kg	5 / 12	63 - 17000	100	170.00	Yes	4 / 12
2-Methylnaphthalene	ug/kg	4 / 14	340 - 24000	100	240.00	Yes	4 / 14
Acenaphthene	ug/kg	4 / 14	450 - 26000	20000	1.30	Yes	1 / 14
Acenaphthylene	ug/kg	4 / 12	42 - 175	100	1.75	Yes	1 / 12
Anthracene	ug/kg	10 / 14	8.2 - 26000	100	260.00	Yes	6 / 14
Benzo(a)anthracene	ug/kg	14 / 14	6.4 - 32000	100	320.00	Yes	10 / 14
Benzo(a)pyrene	ug/kg	14 / 14	7.8 - 16000	100	160.00	Yes	10 / 14
Benzo(b)fluoranthene	ug/kg	14 / 14	16 - 24000	100	240.00	Yes	11 / 14
Benzo(g,h,i)perylene	ug/kg	13 / 14	19 - 16000	100	160.00	Yes	11 / 14
Benzo(k)fluoranthene	ug/kg	13 / 14	6.8 - 9500	100	95.00	Yes	9 / 14
Chrysene	ug/kg	14 / 14	10 - 33000	100	330.00	Yes	10 / 14
Dibenzo(a,h)anthracene	ug/kg	10 / 14	27 - 8000	100	80.00	Yes	7 / 14
Dibenzofuran	ug/kg	1 / 2	18000 - 18000	100	180.00	Yes	1 / 2
Fluoranthene	ug/kg	13 / 14	24 - 150000	100	1500.00	Yes	11 / 14
Fluorene	ug/kg	8 / 14	39 - 44000	30000	1.47	Yes	1 / 14
Indeno(1,2,3-cd)pyrene	ug/kg	12 / 14	37 - 11000	100	110.00	Yes	8 / 14
Naphthalene	ug/kg	5 / 14	54 - 31000	100	310.00	Yes	4 / 14
Phenanthrene	ug/kg	12 / 14	7.1 - 140000	100	1400.00	Yes	8 / 14
Pyrene	ug/kg	13 / 14	26 - 71000	100	710.00	Yes	10 / 14
Metals							
Aluminum	mg/kg	14 / 14	260 - 4800	50	96.00	Yes	14 / 14
Arsenic	mg/kg	1 / 14	1.7 - 1.7	10	0.17	No	0 / 14
Barium	mg/kg	14 / 14	3.1 - 42	165	0.25	No	0 / 14
Calcium	mg/kg	2 / 2	513 - 690	NA	NA	No	NA
Chromium	mg/kg	11 / 14	1.5 - 8.3	0.4	20.75	Yes	11 / 14
Copper	mg/kg	1 / 2	51.5 - 51.5	40	1.29	Yes	1 / 2
Iron	mg/kg	14 / 14	225 - 6700	200	33.50	Yes	14 / 14
Lead	mg/kg	14 / 14	2.8 - 44.9	50	0.90	No	0 / 14
Magnesium	mg/kg	2 / 2	91.8 - 92.7	NA	NA	No	NA
Manganese	mg/kg	2 / 2	3.9 - 6	100	0.06	No	0 / 2
Mercury	mg/kg	8 / 14	0.047 - 0.12	0.1	1.20	Yes	1 / 14
Vanadium	mg/kg	1 / 2	4.3 - 4.3	2	2.15	Yes	1 / 2
Zinc	mg/kg	2 / 2	10.1 - 105	50	2.10	Yes	1 / 2

NA - Not applicable or not available.

Table 9-12
Selection of Chemicals of Potential Ecological Concern (COPEC)
Surface Soil - Floodplain / Forested Swamp West of Hull Road
Nocatee Former Creosote Wood Treatment Plant Site

Parameter	Units	Detection Frequency	Range of Detected Values	Risk Based Screening Level	SLERA HQ	COPEC?	Screening Exceedances
PAHs							
1-Methylnaphthalene	ug/kg	3 / 13	82 - 4500	100	45.00	Yes	2 / 13
2-Methylnaphthalene	ug/kg	2 / 16	480 - 2000	100	20.00	Yes	2 / 16
Acenaphthene	ug/kg	1 / 16	820 - 820	20000	0.04	No	0 / 16
Acenaphthylene	ug/kg	2 / 13	550 - 1700	100	17.00	Yes	2 / 13
Anthracene	ug/kg	7 / 16	5.3 - 69000	100	690.00	Yes	3 / 16
Benzo(a)anthracene	ug/kg	11 / 16	5.9 - 100000	100	1000.00	Yes	7 / 16
Benzo(a)pyrene	ug/kg	11 / 16	7.3 - 140000	100	1400.00	Yes	8 / 16
Benzo(b)fluoranthene	ug/kg	12 / 16	17 - 140000	100	1400.00	Yes	11 / 16
Benzo(g,h,i)perylene	ug/kg	9 / 16	170 - 98000	100	980.00	Yes	9 / 16
Benzo(k)fluoranthene	ug/kg	9 / 16	40 - 52000	100	520.00	Yes	5 / 16
Chrysene	ug/kg	10 / 16	89 - 170000	100	1700.00	Yes	8 / 16
Dibenzo(a,h)anthracene	ug/kg	8 / 16	20 - 21000	100	210.00	Yes	6 / 16
Fluoranthene	ug/kg	9 / 16	65 - 120000	100	1200.00	Yes	8 / 16
Fluorene	ug/kg	3 / 16	23 - 12000	30000	0.40	No	0 / 16
Indeno(1,2,3-cd)pyrene	ug/kg	9 / 16	64 - 52000	100	520.00	Yes	6 / 16
Naphthalene	ug/kg	3 / 16	75 - 26000	100	260.00	Yes	2 / 16
Phenanthrene	ug/kg	10 / 16	6.7 - 45000	100	450.00	Yes	5 / 16
Pyrene	ug/kg	10 / 16	77 - 210000	100	2100.00	Yes	7 / 16
Metals							
Aluminum	mg/kg	16 / 16	309 - 12000	50	240.00	Yes	16 / 16
Arsenic	mg/kg	8 / 16	0.59 - 5.2	10	0.52	No	0 / 16
Barium	mg/kg	16 / 16	5.4 - 160	165	0.97	No	0 / 16
Beryllium	mg/kg	1 / 9	1.9 - 1.9	1.1	1.73	Yes	1 / 9
Cadmium	mg/kg	1 / 16	0.71 - 0.71	1.6	0.44	No	0 / 16
Calcium	mg/kg	8 / 9	77 - 30700	NA	NA	No	NA
Chromium	mg/kg	12 / 16	1.5 - 25	0.4	62.50	Yes	12 / 16
Copper	mg/kg	6 / 9	3.5 - 41	40	1.03	Yes	1 / 9
Iron	mg/kg	16 / 16	200 - 11000	200	55.00	Yes	15 / 16
Lead	mg/kg	16 / 16	2.2 - 310	50	6.20	Yes	3 / 16
Magnesium	mg/kg	7 / 9	190 - 1260	NA	NA	No	NA
Manganese	mg/kg	9 / 9	1.3 - 65.6	100	0.66	No	0 / 9
Mercury	mg/kg	11 / 16	0.033 - 0.78	0.1	7.80	Yes	5 / 16
Potassium	mg/kg	4 / 9	150 - 397	NA	NA	No	NA
Sodium	mg/kg	6 / 9	77 - 415	NA	NA	No	NA
Vanadium	mg/kg	7 / 9	3.8 - 68	2	34.00	Yes	7 / 9
Zinc	mg/kg	8 / 9	5 - 37	50	0.74	No	0 / 9

NA - Not applicable or not available.

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Tab... 9-13
Selection of Chemicals of Potential Ecological Concern (COPEC)
Sediment - Braided Stream In Channel
CSX - Nocatee, Florida

Parameter	Units	Detection Frequency	Range of Detected Values	Risk Based Screening Level	SLERA HQ	COPEC?	Screening Exceedances
PAHs							
1-Methylnaphthalene	ug/kg	1 / 4	6900 - 6900	330	20.91	Yes	1 / 4
2-Methylnaphthalene	ug/kg	1 / 6	13000 - 13000	330	39.39	Yes	1 / 6
Acenaphthene	ug/kg	1 / 6	16000 - 16000	330	48.48	Yes	1 / 6
Acenaphthylene	ug/kg	1 / 4	63 - 63	330	0.19	No	0 / 4
Anthracene	ug/kg	2 / 6	15000 - 88000	330	266.67	Yes	2 / 6
Benzo(a)anthracene	ug/kg	3 / 6	11 - 27000	330	81.82	Yes	2 / 6
Benzo(a)pyrene	ug/kg	2 / 6	30 - 14000	330	42.42	Yes	1 / 6
Benzo(b)fluoranthene	ug/kg	3 / 6	50 - 20000	655	30.53	Yes	2 / 6
Benzo(g,h,i)perylene	ug/kg	2 / 6	68 - 16000	655	24.43	Yes	1 / 6
Benzo(k)fluoranthene	ug/kg	2 / 6	15 - 8300	655	12.67	Yes	1 / 6
Chrysene	ug/kg	3 / 6	10 - 29000	330	87.88	Yes	2 / 6
Dibenzo(a,h)anthracene	ug/kg	1 / 6	13000 - 13000	330	39.39	Yes	1 / 6
Fluoranthene	ug/kg	3 / 6	670 - 110000	330	333.33	Yes	3 / 6
Fluorene	ug/kg	2 / 6	16000 - 21000	330	63.64	Yes	2 / 6
Indeno(1,2,3-cd)pyrene	ug/kg	2 / 6	25 - 4000	655	6.11	Yes	1 / 6
Naphthalene	ug/kg	1 / 6	3000 - 3000	330	9.09	Yes	1 / 6
Phenanthrene	ug/kg	2 / 6	44000 - 60000	330	181.82	Yes	2 / 6
Pyrene	ug/kg	3 / 6	580 - 89000	330	269.70	Yes	3 / 6
Metals							
Aluminum	mg/kg	9 / 9	250 - 9600	NA	NA	Yes	NA
Arsenic	mg/kg	2 / 9	0.73 - 1.7	7.24	0.23	No	0 / 9
Barium	mg/kg	8 / 8	3.8 - 89	NA	NA	Yes	NA
Beryllium	mg/kg	1 / 6	1.2 - 1.2	NA	NA	Yes	NA
Calcium	mg/kg	5 / 5	268 - 12000	NA	NA	No	NA
Chromium	mg/kg	6 / 9	3.1 - 19	52.3	0.36	No	0 / 9
Copper	mg/kg	1 / 6	5.6 - 5.6	18.7	0.30	No	0 / 6
Iron	mg/kg	9 / 9	72.4 - 3500	NA	NA	Yes	NA
Lead	mg/kg	9 / 9	1.2 - 14	30.2	0.46	No	0 / 9
Magnesium	mg/kg	3 / 5	110 - 500	NA	NA	No	NA
Manganese	mg/kg	4 / 5	2.8 - 9.6	NA	NA	Yes	NA
Mercury	mg/kg	6 / 9	0.028 - 0.073	0.13	0.56	No	0 / 9
Sodium	mg/kg	2 / 5	77 - 140	NA	NA	No	NA
Vanadium	mg/kg	4 / 5	3 - 19	NA	NA	Yes	NA
Zinc	mg/kg	3 / 6	2.5 - 14.3	124	0.12	No	0 / 6

NA - Not applicable or not available.

Table 9-14
Selection of Chemicals of Potential Ecological Concern (COPEC)
Surface Water - Braided Stream In Channel
Nocatee Former Creosote Treatment Plant Area

Parameter	Units	Detection Frequency	Range of Detected Values	Risk Based Screening Level	SLERA HQ	COPEC?	Screening Exceedances
Metals							
Barium	mg/l	1 / 1	0.024 - 0.024	NA	NA	Yes	NA
Iron	mg/l	1 / 1	3 - 3	1	3.00	Yes	1 / 1

NA - Not applicable or not available.

Table 9-15
Selection of Chemicals of Potential Ecological Concern (COPEC)
Sediment - Downstream / Adjacent Peace River
Nocatee Former Creosote Treatment Plant Area

Parameter	Units	Detection Frequency	Range of Detected Values	Risk Based Screening Level	SLERA HQ	COPEC?	Screening Exceedances
PAHs							
1-Methylnaphthalene	ug/kg	2 / 3	110 - 280	330	0.85	No	0 / 3
Acenaphthylene	ug/kg	1 / 3	140 - 140	330	0.42	No	0 / 3
Benzo(a)anthracene	ug/kg	1 / 4	20 - 20	330	0.06	No	0 / 4
Benzo(a)pyrene	ug/kg	1 / 4	39 - 39	330	0.12	No	0 / 4
Benzo(b)fluoranthene	ug/kg	2 / 4	42 - 110	655	0.17	No	0 / 4
Benzo(g,h,i)perylene	ug/kg	1 / 4	51 - 51	655	0.08	No	0 / 4
Benzo(k)fluoranthene	ug/kg	1 / 4	24 - 24	655	0.04	No	0 / 4
Chrysene	ug/kg	1 / 4	20 - 20	330	0.06	No	0 / 4
Metals							
Aluminum	mg/kg	1 / 1	2050 - 2050	NA	NA	Yes	NA
Barium	mg/kg	4 / 4	20 - 120	NA	NA	Yes	NA
Calcium	mg/kg	1 / 1	1250 - 1250	NA	NA	No	NA
Chromium	mg/kg	4 / 4	4.3 - 61	52.3	1.17	Yes	1 / 4
Copper	mg/kg	2 / 4	11 - 15	18.7	0.80	No	0 / 4
Iron	mg/kg	1 / 1	3580 - 3580	NA	NA	Yes	NA
Lead	mg/kg	4 / 4	2 - 20	30.2	0.66	No	0 / 4
Magnesium	mg/kg	1 / 1	268 - 268	NA	NA	No	NA
Manganese	mg/kg	1 / 1	7.8 - 7.8	NA	NA	Yes	NA
Mercury	mg/kg	2 / 4	0.03 - 0.1	0.13	0.77	No	0 / 4
Vanadium	mg/kg	1 / 1	6.6 - 6.6	NA	NA	Yes	NA

NA - Not applicable or not available.

Table 9-16
Selection of Chemicals of Potential Ecological Concern (COPEC)
Surface Soil - Oak Creek Grid Area
Nocatee Former Creosote Wood Treatment Plant Site

Parameter	Units	Detection Frequency	Range of Detected Values	Risk Based Screening Level	SLERA HQ	COPEC?	Screening Exceedances
VOCs							
Acetone	ug/kg	1 / 1	1532.5 - 1532.5	NA	NA	Yes	NA
Ethylbenzene	ug/kg	1 / 5	72 - 72	50	1.44	Yes	1 / 5
Tetrachloroethene	ug/kg	1 / 5	7.9 - 7.9	10	0.79	No	0 / 5
Xylenes (total)	ug/kg	2 / 5	9.3 - 91	50	1.82	Yes	1 / 5
PAHs							
1-Methylnaphthalene	ug/kg	1 / 20	6550 - 6550	100	65.50	Yes	1 / 20
2-Methylnaphthalene	ug/kg	1 / 24	7200 - 7200	100	72.00	Yes	1 / 24
Acenaphthene	ug/kg	2 / 24	5900 - 7600	20000	0.38	No	0 / 24
Acenaphthylene	ug/kg	5 / 20	150 - 2900	100	29.00	Yes	5 / 20
Anthracene	ug/kg	5 / 24	100 - 4000	100	40.00	Yes	4 / 24
Benzo(a)anthracene	ug/kg	10 / 24	4.9 - 8400	100	84.00	Yes	8 / 24
Benzo(a)pyrene	ug/kg	12 / 24	5.4 - 13000	100	130.00	Yes	9 / 24
Benzo(b)fluoranthene	ug/kg	15 / 24	4.7 - 24000	100	240.00	Yes	9 / 24
Benzo(g,h,i)perylene	ug/kg	11 / 24	34 - 4500	100	45.00	Yes	9 / 24
Benzo(k)fluoranthene	ug/kg	11 / 24	6.6 - 12000	100	120.00	Yes	8 / 24
Chrysene	ug/kg	11 / 24	6.1 - 15000	100	150.00	Yes	8 / 24
Dibenzo(a,h)anthracene	ug/kg	3 / 24	120 - 805	100	8.05	Yes	3 / 24
Dibenzofuran	ug/kg	1 / 4	4400 - 4400	100	44.00	Yes	1 / 4
Fluoranthene	ug/kg	8 / 24	720 - 9600	100	96.00	Yes	8 / 24
Fluorene	ug/kg	2 / 24	6250 - 7000	30000	0.23	No	0 / 24
Indeno(1,2,3-cd)pyrene	ug/kg	11 / 24	15 - 6000	100	60.00	Yes	9 / 24
Naphthalene	ug/kg	3 / 24	31 - 10000	100	100.00	Yes	2 / 24
Phenanthrene	ug/kg	8 / 24	8.4 - 10000	100	100.00	Yes	6 / 24
Pyrene	ug/kg	9 / 24	17 - 13000	100	130.00	Yes	8 / 24
Metals							
Aluminum	mg/kg	9 / 9	33 - 2380	50	47.60	Yes	8 / 9
Arsenic	mg/kg	7 / 16	0.4575 - 39.3	10	3.93	Yes	3 / 16
Barium	mg/kg	15 / 16	1.5 - 25.5	165	0.15	No	0 / 16
Calcium	mg/kg	8 / 8	62 - 40800	NA	NA	No	NA
Chromium	mg/kg	8 / 16	1.2 - 5.4	0.4	13.50	Yes	8 / 16
Copper	mg/kg	8 / 15	2.675 - 17	40	0.43	No	0 / 15
Iron	mg/kg	9 / 9	45 - 6700	200	33.50	Yes	8 / 9
Lead	mg/kg	15 / 16	0.62 - 21.1	50	0.42	No	0 / 16
Magnesium	mg/kg	3 / 8	68.5 - 980	NA	NA	No	NA
Manganese	mg/kg	5 / 8	1.625 - 23.7	100	0.24	No	0 / 8
Mercury	mg/kg	11 / 16	0.0036 - 0.2115	0.1	2.12	Yes	5 / 16
Sodium	mg/kg	1 / 8	276 - 276	NA	NA	No	NA
Vanadium	mg/kg	3 / 8	1.575 - 6.9	2	3.45	Yes	2 / 8
Zinc	mg/kg	6 / 8	3.5 - 89.5	50	1.79	Yes	2 / 8

NA - Not applicable or not available.

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Table 9-17
Selection of Chemicals of Potential Ecological Concern (COPEC)
Surface Soil - Floodplain Oak Creek Area
Nocatee Former Creosote Wood Treatment Plant Site

Parameter	Units	Detection Frequency	Range of Detected Values	Risk Based Screening Level	SLERA HQ	COPEC?	Screening Exceedances
PAHs							
1-Methylnaphthalene	ug/kg	3 / 8	46 - 120	100	1.20	Yes	2 / 8
Acenaphthylene	ug/kg	1 / 8	3300 - 3300	100	33.00	Yes	1 / 8
Anthracene	ug/kg	5 / 8	8 - 2500	100	25.00	Yes	3 / 8
Benzo(a)anthracene	ug/kg	7 / 8	11 - 32000	100	320.00	Yes	3 / 8
Benzo(a)pyrene	ug/kg	7 / 8	25 - 16000	100	160.00	Yes	5 / 8
Benzo(b)fluoranthene	ug/kg	7 / 8	58 - 46000	100	460.00	Yes	6 / 8
Benzo(g,h,i)perylene	ug/kg	7 / 8	23 - 17000	100	170.00	Yes	5 / 8
Benzo(k)fluoranthene	ug/kg	7 / 8	14 - 14000	100	140.00	Yes	4 / 8
Chrysene	ug/kg	7 / 8	10 - 35000	100	350.00	Yes	5 / 8
Dibenzo(a,h)anthracene	ug/kg	1 / 8	2600 - 2600	100	26.00	Yes	1 / 8
Fluoranthene	ug/kg	5 / 8	48 - 46000	100	460.00	Yes	4 / 8
Indeno(1,2,3-cd)pyrene	ug/kg	7 / 8	43 - 19000	100	190.00	Yes	5 / 8
Phenanthrene	ug/kg	5 / 8	46 - 5700	100	57.00	Yes	3 / 8
Pyrene	ug/kg	7 / 8	13 - 47000	100	470.00	Yes	3 / 8
Metals							
Aluminum	mg/kg	5 / 5	160 - 1400	50	28.00	Yes	5 / 5
Arsenic	mg/kg	3 / 5	2.4 - 44	10	4.40	Yes	1 / 5
Barium	mg/kg	5 / 5	3.15 - 16	165	0.10	No	0 / 5
Cadmium	mg/kg	3 / 5	0.11 - 0.19	1.6	0.12	No	0 / 5
Calcium	mg/kg	3 / 3	160 - 3700	NA	NA	No	NA
Chromium	mg/kg	4 / 5	0.92 - 4.2	0.4	10.50	Yes	4 / 5
Cobalt	mg/kg	3 / 3	0.25 - 0.87	20	0.04	No	0 / 3
Copper	mg/kg	3 / 3	0.88 - 5.3	40	0.13	No	0 / 3
Iron	mg/kg	5 / 5	205 - 6900	200	34.50	Yes	5 / 5
Lead	mg/kg	5 / 5	1.3 - 21	50	0.42	No	0 / 5
Magnesium	mg/kg	3 / 3	47 - 730	NA	NA	No	NA
Manganese	mg/kg	3 / 3	1.1 - 4.4	100	0.04	No	0 / 3
Mercury	mg/kg	4 / 5	0.0091 - 0.2	0.1	2.00	Yes	2 / 5
Nickel	mg/kg	3 / 3	1.1 - 3.6	30	0.12	No	0 / 3
Potassium	mg/kg	3 / 3	33 - 160	NA	NA	No	NA
Sodium	mg/kg	2 / 3	130 - 340	NA	NA	No	NA
Vanadium	mg/kg	3 / 3	1.3 - 4	2	2.00	Yes	2 / 3
Zinc	mg/kg	3 / 3	1.9 - 22	50	0.44	No	0 / 3

NA - Not applicable or not available.

Table 9-18
Selection of Chemicals of Potential Ecological Concern (COPEC)
Sediment - Ditch Oak Creek Area
Nocatee Former Creosote Wood Treatment Plant Site

Parameter	Units	Detection Frequency	Range of Detected Values	Risk Based Screening Level	SLERA HQ	COPEC?	Screening Exceedances
VOCs							
Ethylbenzene	ug/kg	2 / 2	60 - 110	10	11.00	Yes	2 / 2
Xylenes (total)	ug/kg	2 / 2	84 - 240	40	6.00	Yes	2 / 2
PAHs							
1-Methylnaphthalene	ug/kg	2 / 2	1400 - 4000	330	12.12	Yes	2 / 2
2-Methylnaphthalene	ug/kg	3 / 4	4500 - 27000	330	81.82	Yes	3 / 4
Acenaphthene	ug/kg	4 / 4	3300 - 33000	330	100.00	Yes	4 / 4
Acenaphthylene	ug/kg	1 / 2	340 - 340	330	1.03	Yes	1 / 2
Anthracene	ug/kg	4 / 4	2200 - 23000	330	69.70	Yes	4 / 4
Benzo(a)anthracene	ug/kg	4 / 4	2000 - 55000	330	166.67	Yes	4 / 4
Benzo(a)pyrene	ug/kg	4 / 4	1000 - 27000	330	81.82	Yes	4 / 4
Benzo(b)fluoranthene	ug/kg	4 / 4	1600 - 48000	655	73.28	Yes	4 / 4
Benzo(g,h,i)perylene	ug/kg	2 / 4	1500 - 2100	655	3.21	Yes	2 / 4
Benzo(k)fluoranthene	ug/kg	4 / 4	670 - 21000	655	32.06	Yes	4 / 4
Chrysene	ug/kg	4 / 4	2200 - 73000	330	221.21	Yes	4 / 4
Dibenzo(a,h)anthracene	ug/kg	2 / 4	700 - 2000	330	6.06	Yes	2 / 4
Dibenzofuran	ug/kg	2 / 2	3600 - 24000	655	36.64	Yes	2 / 2
Fluoranthene	ug/kg	4 / 4	7400 - 160000	330	484.85	Yes	4 / 4
Fluorene	ug/kg	4 / 4	4200 - 36000	330	109.09	Yes	4 / 4
Indeno(1,2,3-cd)pyrene	ug/kg	2 / 4	490 - 840	655	1.28	Yes	1 / 4
Naphthalene	ug/kg	4 / 4	1300 - 63000	330	190.91	Yes	4 / 4
Phenanthrene	ug/kg	4 / 4	9400 - 68000	330	206.06	Yes	4 / 4
Pyrene	ug/kg	4 / 4	5000 - 87000	330	263.64	Yes	4 / 4
Metals							
Aluminum	mg/kg	4 / 4	57.3 - 550	NA	NA	Yes	NA
Arsenic	mg/kg	4 / 4	2.9 - 36	7.24	4.97	Yes	3 / 4
Barium	mg/kg	4 / 4	1.6 - 4.4	NA	NA	Yes	NA
Calcium	mg/kg	2 / 2	232 - 4090	NA	NA	No	NA
Chromium	mg/kg	1 / 4	2.1 - 2.1	52.3	0.04	No	0 / 4
Iron	mg/kg	4 / 4	133 - 1200	NA	NA	Yes	NA
Lead	mg/kg	4 / 4	0.7 - 2.4	30.2	0.08	No	0 / 4
Mercury	mg/kg	2 / 4	0.04 - 0.096	0.13	0.74	No	0 / 4
Zinc	mg/kg	2 / 2	24.2 - 24.3	124	0.20	No	0 / 2

NA - Not applicable or not available.

Table 9-19
Selection of Chemicals of Potential Ecological Concern (COPEC)
Sediment - Downstream Oak Creek
Nocatee Former Creosote Wood Treatment Plant Site

Parameter	Units	Detection Frequency	Range of Detected Values	Risk Based Screening Level	SLERA HQ	COPEC?	Screening Exceedances
PAHs							
1-Methylnaphthalene	ug/kg	1 / 5	5650 - 5650	330	17.12	Yes	1 / 5
2-Methylnaphthalene	ug/kg	1 / 7	6100 - 6100	330	18.48	Yes	1 / 7
Acenaphthene	ug/kg	2 / 7	1000 - 8250	330	25.00	Yes	2 / 7
Acenaphthylene	ug/kg	5 / 5	100 - 1060	330	3.21	Yes	4 / 5
Anthracene	ug/kg	3 / 7	21 - 705	330	2.14	Yes	1 / 7
Benzo(a)anthracene	ug/kg	4 / 7	31 - 465	330	1.41	Yes	1 / 7
Benzo(a)pyrene	ug/kg	4 / 7	26 - 435	330	1.32	Yes	1 / 7
Benzo(b)fluoranthene	ug/kg	5 / 7	12 - 715	655	1.09	Yes	1 / 7
Benzo(g,h,i)perylene	ug/kg	4 / 7	34 - 560	655	0.85	No	0 / 7
Benzo(k)fluoranthene	ug/kg	4 / 7	16 - 290	655	0.44	No	0 / 7
Carbazole	ug/kg	1 / 2	775 - 775	655	1.18	Yes	1 / 2
Chrysene	ug/kg	4 / 7	39 - 625	330	1.89	Yes	1 / 7
Dibenzo(a,h)anthracene	ug/kg	4 / 7	24 - 670	330	2.03	Yes	1 / 7
Dibenzofuran	ug/kg	2 / 4	510 - 6000	655	9.16	Yes	1 / 4
Fluoranthene	ug/kg	5 / 7	44 - 1255	330	3.80	Yes	2 / 7
Fluorene	ug/kg	3 / 7	32 - 6500	330	19.70	Yes	2 / 7
Indeno(1,2,3-cd)pyrene	ug/kg	4 / 7	20 - 313	655	0.48	No	0 / 7
Naphthalene	ug/kg	1 / 7	1070 - 1070	330	3.24	Yes	1 / 7
Phenanthrene	ug/kg	3 / 7	42 - 5350	330	16.21	Yes	2 / 7
Pyrene	ug/kg	5 / 7	23 - 840	330	2.55	Yes	2 / 7
Metals							
Aluminum	mg/kg	10 / 10	214 - 2100	NA	NA	Yes	NA
Arsenic	mg/kg	5 / 10	1.4 - 5.8	7.24	0.80	No	0 / 10
Barium	mg/kg	10 / 10	3.4 - 39	NA	NA	Yes	NA
Cadmium	mg/kg	3 / 10	0.69 - 3.3	1	3.30	Yes	1 / 10
Calcium	mg/kg	5 / 5	115 - 1200	NA	NA	No	NA
Chromium	mg/kg	6 / 10	1.6 - 3.6	52.3	0.07	No	0 / 10
Iron	mg/kg	10 / 10	329 - 5900	NA	NA	Yes	NA
Lead	mg/kg	9 / 10	0.73 - 1.5	30.2	0.05	No	0 / 10
Magnesium	mg/kg	3 / 5	88 - 290	NA	NA	No	NA
Manganese	mg/kg	4 / 5	1.7 - 7.1	NA	NA	Yes	NA
Vanadium	mg/kg	3 / 5	1.8 - 7.6	NA	NA	Yes	NA
Zinc	mg/kg	4 / 7	4.7 - 9.2	124	0.07	No	0 / 7

NA - Not applicable or not available.

Table 9-20
Selection of Chemicals of Potential Ecological Concern (COPEC)
Surface Water - Downstream Oak Creek
Nocatee Former Creosote Treatment Plant Site

Parameter	Units	Detection Frequency	Range of Detected Values	Risk Based Screening Level	SLERA HQ	COPEC?	Screening Exceedances
Metals							
Barium	mg/l	1 / 1	0.026 - 0.026	NA	NA	Yes	NA
Iron	mg/l	1 / 1	0.96 - 0.96	1	0.96	No	0 / 1

NA - Not applicable or not available.

TABLE 7-22

TABLE 1-1
ECOLOGICAL LINES-OF-EVIDENCE MATRIX
FORMER CREOSOTE PLANT AREA

Constituent	Plants	Invertebrates	RIVM TV	Background	Other	Rationale for Elimination or Retention	Retain as a COEC?
Acetone	NA	NA		NA	Common Laboratory contaminant	No risk calculated	No
tPAH	All<Screen	Max>Screen Avg<Screen		NA	NA		Yes
Aluminum	NA	NA		Only 2/24 samples> background	Ubiquitous element in soil	Concentrations consistent with bkgd Third most common element in soil No source of anthropogenic Al suspected on site	No
Arsenic	NA	Max>Screen Avg<Screen	Max>Screen	9/24> bkgnd			Yes
Barium	All<Screen	All<Screen	Max>Screen	Only 1/24 samples > bkgnd		Concentrations consistent with background	No
Chromium	Max>Screen Avg>Screen	All<Screen	Max>Screen	Only 3/24 samples> bkgnd		Concentrations consistent with background	No
Copper	Max>Screen Avg<Screen	Max>Screen Avg<Screen	Max>Screen Avg<Screen	4/9> bkgrnd		Avg HQ < 1	Yes

TABLE 7-22 (2 of 13)

TABLE 1-1
ECOLOGICAL LINES-OF-EVIDENCE MATRIX
FORMER CREOSOTE PLANT AREA
Page 2

Constituent	Plants	Invertebrates	RIVM TV	Background	Other	Rationale for Elimination or Retention	Retain as a COEC?
Iron	NA	NA		Range similar to bkgnd	Ubiquitous element in soil	Concentrations consistent with background One of most common elements in soil	No
Lead	NA	All<Screen	Max>Screen	Only 1/24> bkgrnd		Concentrations consistent with background	No
Mercury	Max>Screen Avg<Screen	All<Screen	Max>Screen Avg<Screen	12/24 > bkgnd	Max HQ assuming 100% bioavail 5.6		Yes
Vanadium	NA	NA					Yes
Zinc	NA	Invert-max>screen Remainder< screen	Max>Screen	Only 1/9> bkgrnd		Concentrations consistent with background	No

TABLE 1-2
ECOLOGICAL LINES-OF-EVIDENCE MATRIX
BORROW PIT
SURFACE WATER AND SEDIMENTS

Constituent	Plants	Invertebrates	Surface Water Screen Tier II values	RIVM TV	Background	Other	Rationale for Elimination or Retention	Retain as a COEC?
tPAH	Max>Screen Avg<Screen	Acenaphthene - Max>Screen -Avg>Screen Others- Avg<Screen			NA	NA	Potential for risks to invertebrates from acenaphthene only in one hot spot and from tPAHs.	Yes- one PAH and tPAHs.
Aluminum	NA	NA			Only 2/14 samples> bkgnd	Ubiquitous element in soil	Concentrations consistent with background. Third most common element in soil No source of anthropogenic Al suspected on site	No
Chromium	Max>Screen Avg>Screen	All<Screen		All<screen	Only 4/14 samples>bkgd		Uncertainties associated w/Plant Soil benchmark Concentrations consistent with background	No
Copper	All<Screen	All<Screen				Max HQ from SLERA 1.29	Most detects less than screen, low HQ	No
Iron	NA	NA			1) Range similar to bkgnd	Ubiquitous element in soil	Concentrations consistent with background. One of most common elements in soil	No

TABLE 1-2
ECOLOGICAL LINES-OF-EVIDENCE MATRIX
BORROW PIT
SURFACE WATER AND SEDIMENTS
Page 2

Constituent	Plants	Invertebrates	Surface Water Screen Tier II values	RIVM TV	Background	Other	Rationale for Elimination or Retention	Retain as a COEC?
Mercury	All<Screen	All<Screen		All<Screen	8/14 samples>bkgnd		Concentrations less than screening criteria	No
Vanadium	NA	NA					No risk determined as no screening criteria available	No
Barium (from surface water exposure)	NA	NA	Max>Screen				Potential risk from exposure to surface water	Yes

TABLE 1-3
ECOLOGICAL LINES-OF-EVIDENCE MATRIX
BRAIDED STREAM IN-CHANNEL
SEDIMENT/SURFACE WATER

Constituent	Sediment Tier II Screening Values (FDEP)	Sediment Tier II Screening Values (NOAA)	Surface Water Tier II Screening Values	Background	Other	Rationale for Elimination or Retention	Retain as a COEC?
tPAH	All >Screen for both TEL and PEL	All >Screen for both ERL and ERM	NA	NA	NA	Risks to populations of sediment-dwelling organisms may be present	Yes
Aluminum	NA		NA		Ubiquitous element in sediment	Third most common element in soil No source of anthropogenic Al suspected on site	No
Barium (Surface Water and Sediment)	NA		All>Screen				Yes
Beryllium	NA		NA			No screening values	No
Iron	NA		All>Screen	Only 1/9> background	Ubiquitous element in sediment	Concentrations consistent with background One of most common elements in soil/sediment	No
Vanadium	NA		NA			No screening values	No

TABLE 1-4
ECOLOGICAL LINES-OF-EVIDENCE MATRIX
FLOODPLAIN/SWAMP WEST OF HULL ROAD
SURFACE SOIL

Constituent	Plants	Invertebrates	RIVM TV	Background	Other	Rationale for Elimination or Retention	Retain as a COEC?
tPAH	Max>Screen Avg<Screen	Max>Screen Avg<Screen	Max>Screen	NA	NA	Risks to populations of , plants and invertebrates would be negligible though risks to individuals may exist.	Yes
Aluminum	NA	NA			Ubiquitous element in soil	Third most common element in soil No source of anthropogenic Al suspected on site	No
Beryllium	All<Screen	NA	All<Screen	NA		All concentrations less than screening criteria	No
Chromium	Max>Screen Avg>Screen	All<Screen	All<Screen	NA		Only max>screen for plants. All other concentrations less than screening criteria	No
Copper	All<Screen	All<Screen	Max>Screen Avg>Screen	NA		Only max>screen for RIVM TV. All other concentrations less than screening criteria	No
Iron	NA	NA	NA	Range similar to bkgnd	Ubiquitous element in soil	Concentrations consistent with background. One of most common elements in soil	No
Lead	NA	All<Screen	Max>Screen	Only 1/16> bkgrnd		Concentrations consistent with background	No

TABLE 1-4
ECOLOGICAL LINES-OF-EVIDENCE MATRIX
FLOODPLAIN/SWAMP WEST OF HULL ROAD
SURFACE SOIL

Constituent	Plants	Invertebrates	RIVM TV	Background	Other	Rationale for Elimination or Retention	Retain as a COEC?
Mercury	Max>Screen Avg<Screen		Max>Screen Avg<Screen		Only 5/16 exceeded Region 4 ESV	Assumed % of methylmercury believed to be an overestimate given nature of soil in this area. Risks to populations of , plants and invertebrates would be negligible though risks to individuals may exist.	Yes
Vanadium	NA	Max>Screen				Exceedance of screening criteria.	Yes
Barium (from Braided Stream Surface water only)	NA	NA				No risk determined as no screening criteria available	No

TABLE 1-5
ECOLOGICAL LINES-OF-EVIDENCE MATRIX
PEACE RIVER
SURFACE WATER AND SEDIMENT

Constituent	Sediment Tier II Screening Values (FDEP)	Sediment Tier II Screening Values (NOAA)	Surface Water Screening Values	Background	Other	Rationale for Elimination or Retention	Retain as a COEC?
Barium (Surface Water and Sediment)	NA	Max>48 mg/kg for toxicity to marine amphipods	SW not sampled			SW not sampled for metals in Peace River and exceedances of sediment critieria	Yes
Chromium	Max>TEL Avg<PEL	All<Screen		2/4 compared to bkgnd		All avg less than screening critiera	No
tPAH	Max>TEL					Exceedance of TEL by maximum conc.	Yes

TABLE 7-22 (9 of 13)

TABLE 1-6
ECOLOGICAL LINES-OF-EVIDENCE MATRIX
OAK CREEK GRID AREA
SURFACE SOIL

Constituent	Plants	Invertebrates	RIVM TV	Background	Other	Rationale for Elimination or Retention	Retain as a COEC?
Acetone	NA	NA		NA	Common *Laboratory* contaminant	No screening criteria *available*	No
Ethylbenzene	NA	NA		NA		No screening criteria available	No
Xylenes(total)	NA	NA		NA		No screening criteria available	No
tPAH	All<Screen	Max>Screen		NA	NA	Max.concentrations greater than screening criteria	Yes
Aluminum	NA	NA		Only 1/9 samples> bkgnd	Ubiquitous element in soil	Concentrations consistent with background Third most common element in soil No source of anthropogenic Al suspected on site	No
Arsenic	NA	All<Screen	Max>screen Avg<Screen	Only 6/16 samples> bkgnd		Majority of max concentrations and all avg concentrations less than screening criteria	No
Chromium	Max>Screen Avg>Screen	All<Screen		Only 3/16 samples> bkgnd		Concentrations consistent with background	No
Iron	NA	NA		Range similar to bkgnd	Ubiquitous element in soil	Concentrations consistent with background One of most common	No

TABLE 1-6
ECOLOGICAL LINES-OF-EVIDENCE MATRIX
OAK CREEK GRID AREA
Page 2

Constituent	Plants	Invertebrates	RIVM TV	Background	Other	Rationale for Elimination or Retention	Retain as a COEC?
						elements in soil	
Mercury	All<Screen	All<Screen				Assumed % of methylmercury believed to be an overestimate given nature of soil in this area. All risks were below thresholds.	No

TABLE 1-7
ECOLOGICAL LINES-OF-EVIDENCE MATRIX
OAK CREEK FLOODPLAIN
SURFACE SOIL

Constituent	Plants	Invertebrates	RIVM TV	Background	Other	Rationale for Elimination or Retention	Retain as a COEC?
tPAH	All<Screen	5 of 13 PAH Maxs >Screen OtherMaxs and All Avg<Screen		NA	NA	Risks to populations of mammals and invertebrates would be negligible though risks to individuals may exist.	Yes
Arsenic	NA	All <Screen	Max>Screen Avg<Screen	3/5 samples > bkgnd	Low HQs calculated in SLERA	Risks to populations of mammals and invertebrates would be negligible though risks to individuals may exist.	No
Iron	NA	NA		Range similar to bkgnd	Ubiquitous element in soil	Concentrations consistent with background One of most common elements in soil	No
Mercury	All<Screen	All<Screen				Assumed % of methylmercury believed to be an overestimate given nature of soil in this area. All risks were below thresholds.	No

TABLE 1-8
ECOLOGICAL LINES-OF-EVIDENCE MATRIX
OAK CREEK DITCH
SURFACE WATER AND SEDIMENT

Constituent	Sediment Tier II Screening Values (FDEP)	Sediment Tier II Screening Values (NOAA)	Surface Water Screening Values (Tier II)	Background	Other	Rationale for Elimination or Retention	Retain as a COEC?
Ethylbenzene				NA		No screening criteria available	No
Barium		Max>48 mg/kg toxicity to marine amphipods	Max>screen	NA		Potential risk from exposure to surface water and sediments	Yes, for SW and Seds
Total PAHs	Max and avg of all PAH>screen	Max and avg of all PAH>screen		NA		Max and avg concentrations exceed FDEP and NOAA screening criteria	Yes
Arsenic	Max and Avg>TEL and PEL	Max and Avg>ERL Avg<ERM		NA		Max and avg concentrations exceed FDEP and NOAA screening criteria	Yes

TABLE 1-9
ECOLOGICAL LINES-OF-EVIDENCE MATRIX
OAK CREEK
SURFACE WATER AND SEDIMENT

Constituent	Sediment Tier II Screening Values (FDEP)	Sediment Tier II Screening Values (NOAA)	Surface Water Tier II Screening Values	Background	Other	Rationale for Elimination or Retention	Retain as a COEC?
tPAH	All >TEL and PEL	All Max>ERM AllAvg<ERM	Not a COPEC	NA	NA	Risks to populations of sediment-dwelling organisms may be negligible throughout most of stream though risks to individuals may exist. In area of Macro Stations 2 and 3, sediment concentrations may be adversely affecting sediment-dwelling organisms.	Yes
Cadmium	Max & Avg<PEL	Max>ERL Avg<ERL Max & Avg < ERM	Not a COPEC	No background available	Cadmium has not been found to be site-related	Risks to populations of mammals and avians would be negligible though risks to individuals may exist.	No
Barium	Not a COPEC	Max>screen	All<Screen			*Potential risk from exposure to surface water*	Yes
Iron	NA	NA	Not a COPEC	Only 1/10> back-ground	Ubiquitous element in sediment	Concentrations consistent with background. One of most common elements in soil/sediment	

TABLE 7-23

Summary of Ecological Risk Assessment

Assessment Endpoint	Measurement Endpoints	Measures	Results	Uncertainties
Terrestrial Ecosystems				
1. Maintenance of healthy populations and communities of terrestrial invertebrates	a. Statistical comparison of earthworm (*Eisenia fetida*) survival rates between site and reference location	a. 14-day earthworm survival	a. 100% survival was observed except at nominal highest soil total PAH concentration at Station CP-SS-12, where survival was significantly reduced to 76%.	a. There was uncertainty regarding the magnitude of the total PAH concentration in soil at Station CP-SS-12, because it had the highest concentration in the ESI but had a low concentration in the sampling associated with the earthworm toxicity testing.
	b. Statistical comparison of earthworm (*Eisenia fetida*) growth rates between site and reference location	b. 28-day earthworm survival	b. 100% survival was observed except at Station CP-SS-12, where survival was significantly reduced to 32%.	
		c. 28-day earthworm growth	c. 79% weight loss was observed in earthworms exposed to soils from Station CP-SS-12, compared to about half as much weight loss in the other samples and controls.	

TABLE 7-23 (2 of 5)

Summary of Ecological Risk Assessment (continued)

Assessment Endpoint	Measurement Endpoints	Measures	Results	Uncertainties
2. Sustainability of terrestrial small mammal and avian populations	a. Hazard quotients greater than 1 for the cotton mouse (*Peromyscus gossypinus*) and American robin (*Turdus migratorius*)	a. Calculation of hazard quotients for the cotton mouse and American robin with food-chain models	a. All hazard quotients for the cotton mouse and American robin were < 1, indicating acceptable risk to terrestrial wildlife.	a. The toxicity reference value for characterizing the risk to avian wildlife exposed to PAHs was uncertain due to lack of toxicity information published in the literature.
	b. Elevated concentrations of COCs measured in the tissues of earthworms exposed to site soils	b. Measured earthworm tissue concentrations and modeled terrestrial vegetation concentrations of COCs to estimate exposure to wildlife through food-chains	b. Bioaccumulation of metals was limited. Aluminum concentrations in earthworms ranged from 13 mg/kg to 19 mg/kg. Arsenic ranged from 11 mg/kg to 16 mg/kg, and zinc ranged from 19 mg/kg to 23 mg/kg.	b. Bioaccumulation of PAHs was measured, but PAHs were not detected in earthworms.

Summary of Ecological Risk Assessment (continued)

Assessment Endpoint	Measurement Endpoints	Measures	Results	Uncertainties
Aquatic Ecosystems				
3. Sustainability of healthy populations and communities of sediment-dwelling organisms	a. Statistical comparison of survival of the benthic midge (*Chironomus riparius)* between site and reference	a. 10-day midge survival	a. Braided stream station (SD-10) had significantly reduced survival (59%) relative to the laboratory control. No significant difference was observed between survival at SD-10 and the reference station. Oak Creek stations SD-04 and SD-06 had significantly reduced survival relative to the reference site (SD-20), but were not significantly different from the laboratory control.	a. Braided stream station (SD-10) had the highest concentration of total PAHs in sediment overall.
	b. Statistical comparison of midge growth between site and reference	b. 10-day midge growth	b. Station SD-12, with the highest total PAH concentration, had the lowest midge weight. This difference was not statistically significant.	Oak Creek station SD-04 had a high total PAH concentration in the ESI, and Station SD-06 had a medium concentration. However, these stations tested lower when re-sampled in conjunction with the toxicity testing.
	c. Comparison of the benthic community assemblages from the site to those of the reference using Rapid Bioassessment methods	c. Samples were taken from stream and creek to compare conditions at high, medium, and low concentrations of total PAHs in sediment.	c. No organisms were found at SD-10 in the braided stream and at SD-6 in Oak Creek. Reduced numbers (5 taxa) were found in SD-4 (High) relative to 30 taxa in SD-21 (Low) and 12 taxa at SD-20 (ref.). Results confirmed potential impacts to benthic communities at stations SD-10, SD-4 and SD-6.	b. Benthic community results can sometimes be uncertain due to confounding effects of variations in the suitability of the habitat for reasons having nothing to do with the contaminants.

TABLE 7-23 (4 of 5)

Summary of Ecological Risk Assessment (continued)

Assessment Endpoint	Measurement Endpoint	Measures	Results	Uncertainties
4. Maintenance of healthy populations and communities of aquatic organisms	a. Statistical comparison of survival of water fleas (*Ceriodaphnia dubia*) between site and reference station	a. 7-day water flea survival	a. Water flea survival (80 to 100 percent) was not significantly reduced at any station.	a. No water was available at Station SD-10 in the braided stream at the time of the study.
	b. Statistical comparison of reproduction of water fleas between site and reference	b. 7-day water flea reproduction	b. The total number of young was significantly reduced at SW-12 and SW-13 in the braided stream and SW-21 in Oak Creek relative to control but not to the reference.	b. The stations where the total numbers of young were reduced (SW-12 and SW-13) had been intended by the study to represent the medium total PAH concentration and the reference station, respectively for the braided stream. The reduction in the numbers of young at Station SW-13, might indicate that it was not an appropriate reference station for the braided stream. Station SW-21 in Oak Creek had been intended to represent the low concentration of total PAHs, it ended up having the highest concentrations.

TABLE 7-23 (5 of 5)

Summary of Ecological Risk Assessment (continued)

Assessment Endpoint	Measurement Endpoint	Measures	Results	Uncertainties
5. Sustainability of mammal and avian populations using semi-aquatic habitats that serve as a forage base for higher trophic-level receptors.	a. Hazard quotients greater than 1 for the Southern short-tailed shrew (*Blarina carolinensis*) and the Carolina wren (*Thryothorus ludovicianus*)	a. Calculation of hazard quotients for the Southern short-tailed shrew and Carolina wren with food-chain models using modeled aquatic invertebrate and vegetation concentrations	a. All hazard quotients for shrew and wren were < 1, indicating acceptable risk to semi-aquatic wildlife.	a. The study had intended to collect crayfish to measure site-specific levels of COCs in prey items for the semi-aquatic and aquatic receptors. Scientists were unable to collect crayfish from the site.
6. Sustainability of mammal and avian populations of upper trophic-level receptors foraging in semi-aquatic and aquatic habitats	a. Hazard quotients greater than 1 for the yellow-crowned night heron (*Nyctanassa violacea*) and the common raccoon (*Procyon lotor*)	a. Calculation of hazard quotients for the night heron and raccoon using modeled aquatic invertebrate and vegetation concentrations.	a. Max NOAEL HQ = 8 for raccoon. Average LOAEL HQ <1. Hazard quotients for the night heron were <1.	a. Because crayfish samples could not be collected, the dose to the raccoon was based on conservative assumptions. Given that the raccoon foraged over an area much greater than the localized area of highest concentration, the HQ for the average concentration provided a reasonable estimate of actual risk.

TABLE 10-1

Table 7-1. Summary of Comparative Analysis of Alternatives for Plant and Peace River Floodplain Areas, CSXT Nocatee/Hull Creosote Site, Hull (Nocatee), Florida.

Criteria	Alternative 1 No Further Action	Alternative 2 Land Use Controls, Excavation of Soil, Consolidation, Capping, Slurry Wall, FPR, MNA, Ecological Monitoring	Alternative 3 Land Use Controls, Excavation of Soil, Consolidation, Capping, Slurry Wall, FPR, *Insitu* Biosparging, MNA, Ecological Monitoring	Alternative 4 Land Use Controls, Excavation of Soil/Sediment, Off-Site Disposal, Capping, Slurry Wall, FPR, *Insitu* Biosparging, MNA	Alternative 5 Land Use Controls, Excavation of Soil/Sediment, Treatment via LTTD and Stabilization, Capping, Slurry Wall, FPR, *Insitu* Biosparging, MNA	Alternative 6 Land Use Controls, Excavation of Soil, Off-Site Disposal, FPR, *Insitu* Biosparging, MNA, Ecological Monitoring	Alternative 7 Land Use Controls, Excavation of Soil/Sediment, Treatment via LTTD and Stabilization, FPR, *Insitu* Biosparging, MNA
THRESHOLD CRITERIA							
Overall Protection of Human Health and the Environment	0	5	5	3	3	4	4
Compliance with ARARs	0	5	5	5	5	5	5
BALANCING CRITERIA							
Long-Term Effectiveness and Permanence	0	4	4	4	5	3	3
Reduction of Mobility, Toxicity, or Volume through Treatment	0	3	4	4	4	4	4
Short-Term Effectiveness	0	4	5	4	4	4	4
Implementability	5	5	5	4	3	3	3
COST							
Capital Cost	$0	$2,789,000	$3,885,000	$5,799,000	$7,980,000	$6,056,000	$10,338,000
O & M Cost	$878,000	$2,394,000	$3,360,000	$3,360,000	$3,360,000	$4,872,000	$4,992,000
Total Project Cost (Calculated 2008)	$878,000	$5,183,000	$7,245,000	$9,159,000	$11,339,000	$10,928,000	$15,330,000
Total Present Worth Cost	$345,000	$4,153,000	$5,970,000	[illegible]	$10,084,000	$6,654,000	[illegible]

Time to construct or process	**0 years**	**<1 year**	**<1 year**	**1 year**	**1 year**	**<1 year**	**1 year**
Time until remedial action objectives achieved	**30 years**	**30 years**	**30 years**	**30 years**	**30 years**	**30 years**	**30 years**

A ranking of "0" indicates noncompliance with criteria, while a ranking of "5" indicates complete compliance with criteria.

TABLE 10-2

Table 7-2. Summary of Comparative Analysis of Alternatives for Oak Creek Area, CSXT Nocatee/Hull Creosote Site, Hull (Nocatee), Florida.

Criteria	Alternative 1 No Further Action	Alternative 2 Temporary Land Use Controls, Excavation of Soil/Sediment, Off-Site Disposal, Potable Water Carbon Filters, MNA	Alternative 3 Temporary Land Use Controls, Excavation of Soil/Sediment, Plant Area Treatment Using LTTD and Stabilization, Potable Water Carbon Filters, MNA	Alternative 4 Temporary Land Use Controls, Excavation of Soil/Sediment, Off-Site Disposal, New Deep Potable Wells, *Insitu* Biosparging, MNA	Alternative 5 Temporary Land Use Controls, Excavation of Soil/Sediment, Consolidation With Plant Area Soil Under Cap, Public (County)Water Supply, *Insitu* Biosparging, MNA
THRESHOLD CRITERIA					
Overall Protection of Human Health and the Environment	0	5	5	5	5
Compliance with ARARs	0	5	5	5	5
BALANCING CRITERIA					
Long-Term Effectiveness and Permanence	0	3	4	5	5
Reduction of Mobility, Toxicity, or Volume through Treatment	0	3	4	4	4
Short-Term Effectiveness	0	3	3	4	5
Implementability	5	5	4	4	4
COST					
Capital Cost	$0	$2,014,000	$3,807,000	$3,074,000	$4,163,000
O & M Cost	$467,000	$698,000	$698,000	$1,312,000	$1,312,000
Total Project Cost (Calculated 2008)	$467,000	$2,712,000	$4,506,000	$4,385,000	$5,475,000
Total Present Worth Cost	$193,000	$2,443,000	$4,236,000	$4,107,000	$5,196,000

Time to construct or process	**0 years**	**<1 year**	**<1 year**	**<1 year**	**<1 year**
Time until remedial action objectives achieved	**30 years**	**17 years**	**17 years**	**11 years**	**11 years**

A ranking of "0" indicates noncompliance with criteria, while a ranking of "5" indicates complete compliance with criteria.

TABLE 12-1

Table 6-4. **Cost Estimate for Plant and Peace River Floodplain Areas: Alternative 3**
CSXT Nocatee/Hull Creosote Site, Hull (Nocatee), Florida.

Items	Unit Price		No. of Units	Cost
Alternative Overview				
Institutional Controls/Deed Restrictions				
Excavate soils above direct contact PRGs, consolidate, and transfer to cap area				
Backfill to match existing grade (in areas outside of cap)				
Install a low-permeable cap over a 201,100 square foot area				
Install a bentonite slurry wall around the edges of the cap to a depth of 65 feet				
Operate an existing free product recovery system for ten years				
The cap will consist of:				
graded and compacted impacted soils				
Granular Composite Clay Liner (GCL)				
24" topsoil over GCL				
vegetative cover				
Pilot test for groundwater treatment				
Groundwater treatment in select areas via oxygen addition will be completed as follows:				
System #1 - includes two lines of biosparging wells, 240 feet and 300 feet long, 2-15 HP rotary air compressors				
System #2 - includes one line of biosparging wells, 430 feet long, 2-10 HP rotary air compressors				
Wells placed on 30' spacing				
Nested wells, air injection at 25' and 50'				
No soil vapor extraction				
Assume 3 cfm per point				
Both systems will be operated with half of the system operating at any time with automated cycling				
MNA for site-wide impacted groundwater consisting of:				
4 years quarterly monitoring				
4 years semi-annual monitoring				
Annual thereafter				
Well network consists of 6 shallow wells (5-15), 12 intermediate wells (20-30), 12 deep wells (45-55)				
Institutional Controls/Deed Restrictions				
Deed Restriction of Land Use to Commercial Uses	10,000	LS	1	10,000
			Subtotal for Institutional Controls Costs	10,000
			Contingency (20%)	2,000
Total Institutional Controls/Deed Restrictions				**12,000**
Soil Remediation Costs (Excavation and Cap Construction)				
A) Infrastructure and Excavation Preparation				
Vegetation Clearing (1)	1,500	/acre	9.0	13,500
Tree Removal (2)	9,000	/acre	1.5	13,500
Access Road Construction (3)	20,000	LS	1	20,000
Construction Trailer (4)	22,000	LS	1	22,000
Surveying (5)	10,000	LS	1	10,000
Silt fences (6)	1.50	/LF	3600	5,400
Dewatering of Area S1 (7)	20,000	LS	1	20,000
B) Excavation (8)	12.20	/ton	16,104	196,500
C) Transfer Excavated Soils to Cap Area (9)	3	/ton	16,104	48,300
D) Backfill and Grading of Excavated Areas (10)	13	/cy	13,420	174,500
E) Site Restoration of Excavated Areas (11)	15,000	/acre	9	135,000
F) Installation of Low-Permeable Cap (12)	69,200	/acre	5	346,000
G) Health & Safety Equipment	60,000	each	1	60,000
H) Laboratory Costs				
Confirmatory Soil Samples	300	/sample	100	30,000
Air Quality Monitoring	300	/sample	100	30,000
			Subtotal for Soil Remediation Costs	1,124,700
Reporting (13)	20,000		1	20,000
On-Site Construction Management (10%)				112,500
Design and Technical Support (10%)				112,500
Project Management (5%)				56,200
			Subtotal	1,425,900
			Contingency (20%)	285,180
Total Soil Remediation Costs (Excavation and Cap Construction)				**1,711,080**

Table 6-4. Cost Estimate for Plant and Peace River Floodplain Areas: Alternative 3
CSXT Nocatee/Hull Creosote Site, Hull (Nocatee), Florida.

Items	Unit Price	No. of Units	Cost
Slurry Wall Construction			
A) Slurry Wall Construction (14)	6 /sq foot	117,000	702,000
B) Geotechnical Sampling/Evaluation	20,000 LS	1	20,000
C) QA/QC Sampling	15,000 LS	1	15,000
D) Health & Safety Equipment	5,000 LS	1	5,000
	Subtotal for Soil Remediation Costs		742,000
Reporting (15)	20,000	1	20,000
On-Site Construction Management (5%)			37,100
Design and Technical Support (7%)			51,900
Project Management (5%)			37,100
		Subtotal	888,100
		Contingency (20%)	177,620
Total Slurry Wall Construction			1,065,720
Cap Operation and Maintenance Costs			
Misc O&M (Years 2-30)	10,000 LS	1 each	10,000
		Subtotal	10,000
		Contingency (20%)	2,000
		Annual Cost Years 2-30	12,000
		Total Cost Years 2-30	348,000
Total Cap O&M (Years 2 - 30)			348,000
Free Product Recovery - Annual Operations and Maintenance Costs			
A) Operations Labor (16)	70 $/hour	48 hours	3,400
B) Free product disposal (17)	325 $/drum	3 drums	1,000
C) Annual Report	10,000 LS	1 each	10,000
D) Misc Site Maintenance/ Travel Expenses	3,000 LS	1 each	3,000
E) Equipment Repair/Replacement	2,500 LS	1 each	2,500
	Subtotal for Annual Groundwater O&M Cost		19,900
Engineering and Technical Support (10%)			2,000
Project Management (10%)			2,000
Annual Free Product Recovery O&M Costs			23,900
Free Product Recovery O&M Costs		Contingency (20%)	4,780
		Annual cost Years 1-10	28,680
Total Free Product Recovery System O&M (Years 1 - 10)			286,800
Groundwater System Capital Cost (Biosparge System) (18)			
A) Pilot test (19)	100,000 LS	1	100,000
B) Nested Injection Point Installation (20)			
Well installation 2"	70 /LF	2,625	183,800
Cuttings disposal (21)	65 /ton	53	3,400
Well completion	500 LS	35	17,500
C) Monitor Well installation (22)			
Well installation 2"	60 /LF	640	38,400
Cuttings disposal (23)	65 /ton	7	500
Well completion	500 LS	16	8,000
D) System Piping (24)	30 LF	1400	42,000
E) Air Compressors (25)	14,000 each	2	28,000
F) Air Compressors (26)	11,000 each	2	22,000
G) Piping/ instrumentation around compressors	6,000 LS	4	24,000
H) Wellhead instrumentation	500 each	70	35,000
I) Electrical Panels - Autodialer	8,000 each	2	16,000
J) Concrete Pad and Building for Air Compressors	18,000 LS	2	36,000
K) Installation Labor			
System installation	50,000 LS	2	100,000
Electrician	10,000 LS	2	20,000
L) Health & Safety Equipment	5,000 LS	1	5,000
	Subtotal for Groundwater System Capital Cost		679,600
Reporting - As-built drawings			30,000
On-Site Construction Management (10%)			68,000
Engineering Design and Technical Support (10%)			68,000
Project Management (10%)			68,000
		Subtotal	913,600
		Contingency (20%)	182,720
Total Groundwater System Capital Costs			1,096,320

Table 6-4. Cost Estimate for Plant and Peace River Floodplain Areas: Alternative 3
CSXT Nocatee/Hull Creosote Site, Hull (Nocatee), Florida.

Items	Unit Price	No. of Units	Cost
Groundwater Operations and Maintenance Costs			
A) Operations Labor (27)	70 $/hour	392 hours	27,400
B) Utilities - electric (28)	1,005 $/HP/year	50 HP	50,300
C) Monitoring			
Labor (29)	60 $/hour	240 hours	14,400
Expenses (30)	1,200 /event	4 events	4,800
Analytical (31)	400 /sample	36 samples	14,400
D) Annual Report	10,000 LS	1 each	10,000
E) Misc Site Maintenance	500 LS	1 each	500
F) Health & Safety Equipment	2,000 LS	1	2,000
G) Equipment Repair/Replacement	5,000 LS	1 each	5,000
	Subtotal for Annual Groundwater O&M Cost		128,800
Engineering and Technical Support (10%)			12,900
Project Management (15%)			19,300
Annual Groundwater System O&M Costs			161,000
Estimated Years of Groundwater O&M (32)		5 years	
		Subtotal	805,000
		Contingency (20%)	161,000
Total Groundwater System O&M (Years 2 - 6)			**966,000**
Monitored Natural Attenuation Monitoring			
Quarterly Sampling Years 1-4			
A) Monitoring (33)			
Labor (34)	70 $/hour	240 hours	16,800
Expenses (35)	1,200 /event	4 events	4,800
Analytical (33)	400 /sample	128 samples	51,200
B) Ecological Monitoring	5,000 /yr	1 each	5,000
C) Annual Report	9,000 LS	1 each	9,000
D) Misc Site Maintenance	500 LS	1 each	500
E) Health & Safety Equipment	2,000 LS	1	2,000
	Subtotal for Annual Long-term Monitoring Cost		89,300
Technical Support (15%)			13,400
Project Management (15%)			13,400
		Subtotal	116,100
		Contingency (20%)	23,220
		Annual Cost Years 1-4	139,320
		Total Cost Years 1-4	557,280
Semi-annual Sampling Years 5-8			
A) Monitoring - semi-annual (33)			
Labor (34)	70 $/hour	120 hours	8,400
Expenses (35)	1,200 /event	2 events	2,400
Analytical (33)	400 /sample	64 samples	25,600
B) Ecological Monitoring	5,000 /yr	1 each	5,000
C) Annual Report	7,000 LS	1 each	7,000
D) Misc Site Maintenance	500 LS	1 each	500
E) Health & Safety Equipment	2,000 LS	1 each	2,000
	Subtotal for Annual Long-term Monitoring Cost		50,900
Technical Support (15%)			7,600
Project Management (15%)			7,600
		Subtotal	66,100
		Contingency (20%)	13,220
		Annual Cost - Years 5-8	79,320
		Total Cost Years 5-8	317,280

TABLE 12-1 (4 of 8)

Table 6-4. Cost Estimate for Plant and Peace River Floodplain Areas: Alternative 3
CSXT Nocatee/Hull Creosote Site, Hull (Nocatee), Florida.

Items	Unit Price	No. of Units	Cost
Annual Sampling Years 9-30			
A) Monitoring (33)			
Labor (34)	70 $/hour	60 hours	4,200
Expenses (35)	1,200 /event	1 events	1,200
Analytical (33)	400 /sample	32 samples	12,800
B) Annual Report	5,000 LS	1 each	5,000
C) Misc Site Maintenance	500 LS	1 each	500
D) Health & Safety Equipment	2,000 LS	1	2,000
	Subtotal for Annual Long-term Monitoring Cost		25,700
Technical Support (15%)			3,900
Project Management (15%)			3,900
		Subtotal	33,500
		Contingency (20%)	6,700
		Annual Cost - Years 9-30	40,200
		Total Cost Years 9-30	884,400
Total Long-term Groundwater Monitoring (Years 1 - 30)			**1,758,960**

Cost Summary		Cost	Present Worth(36)
C	Institutional Controls/Deed Restrictions	$12,000	$12,000
C	Soil Remediation Costs (Excavation and Cap Construction)	$1,711,080	$1,711,080
C	Slurry Wall Construction	$1,065,720	$1,065,720
OM	Cap Operation and Maintenance Costs	$348,000	$147,332
OM	Free Product Recovery - Annual Operations and Maintenance Costs	$286,800	$215,537
C	Groundwater System Capital Cost (Biosparge System)	$1,096,320	$1,024,598
OM	Groundwater Operations and Maintenance Costs	$966,000	$792,158
OM	Monitored Natural Attenuation Monitoring	$1,758,960	$1,001,170
Total Estimated Project Cost (Calculated 2008)		**$7,245,000**	**$5,970,000**

(1) Includes bush hogging in areas S1 (1.36 acres), S2 (0.14 acres), S3 (0.14 acres), and S4 (4.31 acres) and roadways into each area. 6 acres of soil areas plus 3 acres in roadways and buffers around each area = 9 acres
(2) Includes tree removal from Area S1 - 1.36 acres + 10% buffer around area = 1.5 acres
(3) Consists of appropriate road base (shell) laid down for stabilization for truck traffic
(4) Includes set-up of two trailers ($2,000 each for set-up and six months of rental $1,500 per trailer per month)
(5) Includes initial surveying of impacted soil areas and follow-up verification surveying
(6) Assume silt fences are required around the entire perimeter of the excavation areas
(7) Dewatering is required in area S1, which will include installation of a berm across the borrow pit and installation of six de-watering pits around the excavated area and pumping of water to braided stream (assumes no treatment of discharged water)
(8) Assume the following soil removal volume:
S1 = 4,400 CY x 10% fluff = 4,840 CY
S2 = 500 CY x 10% fluff = 550 CY
S3 = 500 CY x 10% fluff = 550 CY
S4 = 13,900 CY, estimated that 10,000 CY is under cap and 3,900 CY needs to be excavated x 10% fluff = 4,290 CY
SSL1 = 1,200 CY x 10% fluff = 1,320 CY
SSL3 = 1,700 CY x 10%=1,870 CY
Total soil excavated = 13,420 CY or 16,104 tons (1.2 tons/CY)
Unit cost includes 2 CY excavator ($250/hr) and 4 CY loader ($200/hr), 10 hours/day, + 30% contractor costs, excavation rate of 400 CY/day = $14.60/CY or $12.20/ton
(9) Includes tracking to cap area and compaction over existing surface
(10) Includes bringing off-site backfill to fill all excavated areas, compact and grade the affected areas, $5CY for backfill and $5/CY for transportation and $3/CY for compaction and grading = $13/CY
(11) Includes final grading and hydroseeding of all affected areas to prevent erosion and re-establish vegetative cover
(12) Low-permeable soil cap consist of the following layers (from bottom to top):impacted soils covered by cap must be graded and compacted, granular composite clay layer, 24" top soil, and vegetative cover - hydroseeding. Per acre cap costs include 24" soil @ 3,230 CY/acre @ $13/CY delivered and compacted = $42,000/acre, hydroseeding @ $1,000/acre, and the granular composite clay liner at $0.6/square foot or $26,200/acre = $69,200/acre
(13) Includes final report documenting all soil removal activities and cap construction
(14) Slurry wall cost includes complete contractor installation costs, the wall measures a distance of 1,800 linear foot x 65 feet deep = 117,000 square foot, $6/sq. ft includes all contractor costs including mob/demob

Table 6-14. Cost Estimate for Oak Creek Area: Alternative 5
CSXT Nocatee/Hull Creosote Site, Hull (Nocatee), Florida.

Items	Unit Price	No. of Units	Cost
Alternative Overview			
Temporary Institutional Controls/Deed Restrictions			
Temporary relocation of residents during active construction			
Excavate soils above direct contact and leachability PRGs			
Transfer excavated soils to plant area and consolidate with Plant Area soils beneath cap			
Backfill excavated areas to match existing grade			
Divert stream flow and excavate sediments near stream that are above ecological PRGs			
Transfer excavated sediments to plant area and consolidate with Plant Area soils beneath cap			
Final cover will include geotextile fabric and rip rap along stream area			
Install City potable water supply line			
Pilot test for groundwater treatment			
Install one biosparging systems			
A centrally located air compressor will provide compressed air to five lines of biosparging wells.			
The five lines will be 100, 100, 100, 140, and 100 feet long for a total of 540 LF			
Wells will be installed on 30' spacing			
Nested wells, air injection at 25' and 50'			
No soil vapor extraction system			
Assume 3 cfm per point			
Post Active Remediation for 5 years			
Well network consists of 4 shallow wells (5-15), 2 intermediate wells (20-30), 2 deep wells (45-55)			
Institutional Controls/Deed Restrictions			
Deed restriction	10,000 LS	1	10,000
		Subtotal for Institutional Controls Costs	10,000
		Contingency (20%)	2,000
Total Institutional Controls/Deed Restrictions			**12,000**
Temporary Relocation of Residents			
A) Moving Cost (1)	2,500 /house	4	10,000
B) Per Diem (Meals & Lodging) (2)	300 /day	30	9,000
		Subtotal relocation cost per family	19,000
		Number of families	3
		Subtotal relocation cost	57,000
		Contingency (20%)	11,400
Total Relocation Cost			**68,400**
Soil Remediation Costs (Excavation and Off-site Disposal)			
A) Infrastructure and Excavation Preparation			
Vegetation Clearing (3)	1,500 /acre	4.0	6,000
Tree Removal (4)	9,000 /acre	2.0	18,000
Access Road Construction (5)	10,000 LS	1	10,000
Construction Trailer (6)	11,000 LS	1	11,000
Surveying (7)	10,000 LS	1	10,000
Silt fences (8)	1.50 /LF	1500	2,300
B) Excavation (9)	12.20 /ton	5,412	66,000
C) Transfer Soils to Plant Area	3 /ton	5,412	16,200
D) Consolidate Soils with Plant Area soils under cap	2 /ton	5,412	10,800
E) Backfill and Grading of Excavated Areas (10)	13 /cy	4,510	58,600
F) Health and Safety Equipment	60,000 LS	1	60,000
G) Site Restoration of Excavated Areas (11)	25,000 /acre	4	100,000
H) Laboratory Costs			
Confirmatory Soil Samples	300 /sample	60	18,000
Air Quality Monitoring	300 /sample	60	18,000
		Subtotal for Soil Remediation Costs	404,900

Table 6-14. Cost Estimate for Oak Creek Area: Alternative 5
CSXT Nocatee/Hull Creosote Site, Hull (Nocatee), Florida.

Items	Unit Price	No. of Units	Cost
Reporting	20,000	1	20,000
On-Site Construction Management (10%)			40,500
Design and Technical Support (10%)			40,500
Project Management (10%)			40,500
		Subtotal	546,400
		Contingency (20%)	109,280
Total Soil Remediation Costs (Excavation and Off-site Disposal)			**655,680**
Sediment Remediation Costs (Divert Flow, Excavation, Off-Site Disposal, and Backfill)			
A) Infrastructure and Excavation Preparation			
Vegetation Clearing (12)	9,000 /acre	1.0	9,000
Tree Removal (13)	12,000 /acre	1.0	12,000
Access Road Construction (14)	10,000 LS	1	10,000
Silt fences (15)	1.50 /LF	1000	1,500
Bladders (16)	5,000 week	6	30,000
De-watering pumps (17)	3,000 week	3	9,000
Dewatering of Excavated Area (18)	10,000 LS	1	10,000
B) Excavation (19)	21.20 /ton	4,224	89,500
C) Transfer Sediments to Plant Area	2 /ton	4,224	8,400
D) Consolidate sed w/ Plant Area soil/sed beneath cap	3 /ton	4,224	12,700
E) Geotextile Installation (20)	2.0 /sq ft	30,000	60,000
F) Excavation Backfill (21)	16 /cy	3,520	56,300
G) Site Restoration (22)	25,000 LS	1.0	25,000
H) Ecological Monitoring	5,000 / year	5.0	25,000
I) Laboratory Costs			
Confirmatory Soil Samples	300 /sample	20	6,000
		Subtotal for Soil Remediation Costs	364,400
Reporting	20,000	1	20,000
Permitting	20,000	1	20,000
On-Site Construction Management (10%)			36,400
Design and Technical Support (10%)			36,400
Project Management (10%)			36,400
		Subtotal	513,600
		Contingency (20%)	102,720
Total Sediment Remediation Costs (Off-site Disposal and Backfill)			**616,320**
Install City Potable Water Line			
A) Installation of City potable water line (23)	1,700,000 LS	1	1,700,000
		Subtotal for Alternate Water Supply Costs	1,700,000
		Contingency (5%)	85,000
Total - City Potable Water Line			**1,785,000**
Groundwater System Capital Cost (Biosparge System) (24)			
A) Pilot test (25)	100,000 LS	1	100,000
B) Nested Injection Point Installation (26)			
Well installation 1"	70 /LF	1,950	136,500
Cuttings disposal (27)	65 /ton	39	2,500
Well completion	500 LS	32	16,000
C) Monitor Well installation (28)			
Well installation 2"	70 /LF	190	13,300
Cuttings disposal (29)	65 /ton	3	200
Well completion	500 LS	6	3,000
D) System Piping (30)	40 LF	1,600	64,000
E) Air Compressors (31)	25,000 each	2	50,000
F) Piping/ instrumentation around compressors	6,000 LS	2	12,000
G) Wellhead instrumentation	500 each	64	32,000
H) Electrical Panels - Autodialer	20,000 each	1	20,000
I) Concrete Pad and Building for Air Compressors	25,000 LS	1	25,000
J) Installation Labor			
System installation	60,000 LS	2	120,000
Electrician	20,000 LS	2	40,000
		Subtotal for Groundwater System Capital Cost	634,500

Table 6-14. Cost Estimate for Oak Creek Area: Alternative 5
CSXT Nocatee/Hull Creosote Site, Hull (Nocatee), Florida.

Reporting - As-built drawings			30,000
On-Site Construction Management (10%)			63,500
Engineering Design and Technical Support (10%)			63,500
Project Management (10%)			63,500
		Subtotal	855,000
		Contingency (20%)	171,000
Total Groundwater System Capital Costs			**1,026,000**
Groundwater Operations and Maintenance Costs			
A) Operations Labor (32)	70 $/hour	704 hours	49,300
B) Utilities - electric (33)	1,005 $/HP/year	50 HP	50,300
C) Monitoring			
Labor (34)	70 $/hour	96 hours	6,700
Expenses (35)	1,200 /event	4 events	4,800
Analytical (36)	400 /sample	60 samples	24,000
D) Annual Report	10,000 LS	1 each	10,000
E) Misc Site Maintenance	500 LS	1 each	500
F) Health and Safety Equipment	2,000 LS	1	2,000
G) Equipment Repair/Replacement	3,000 LS	1 each	3,000
		Subtotal f	150,600
Engineering and Technical Support (10%)			15,100
Project Management (15%)			22,600
Annual Groundwater System O&M Costs			188,300
Estimated Years of Groundwater O&M (37)		5 years	
		Subtotal	941,500
		Continge	188,300
Total Groundwater System O&M (Years 2 - 6)			**1,129,800**
Post Active Remediation Monitoring			
Semi-annual Sampling Years 7-11			
A) Monitoring - semi-annual (38)			
Labor (39)	70 $/hour	48 hours	3,400
Expenses (40)	1,200 /event	2 events	2,400
Analytical	400 /sample	20 samples	8,000
B) Annual Report	7,000 LS	1 each	7,000
C) Misc Site Maintenance	500 LS	1 each	500
D) Health and Safety Equipment	2,000 LS	1	2,000
	Subtotal for Annual Long-term Monitoring Cost		23,300
Technical Support (15%)			3,500
Project Management (15%)			3,500
		Subtotal	30,300
		Contingency (20%)	6,060
		Annual Cost - Years 7-11	36,360
		Total Cost Years 7-11	181,800
Total Post-Active Remediation Monitoring (Years 7 - 11)			**181,800**

Cost Summary			**Present Worth (41)**
C	Soil Remediation Costs (Excavation and Off-site Disposal)	$655,680	$655,680
C	Sediment Remediation Costs (Divert Flow, Excavation, Off-Site Disposal, and Backfill)	$616,320	$616,320
C	Install City Potable Water Line	$1,785,000	$1,785,000
C	Groundwater System Capital Cost (Biosparge System)	$1,026,000	$1,026,000
OM	Groundwater Operations and Maintenance Costs	$1,129,800	$926,481
OM	Post Active Remediation Monitoring	$181,800	$106,294
C	Institutional Controls/Deed Restrictions	$12,000	$12,000
C	Temporary Relocation of Residents	$68,400	$68,400
Total Estimated Project Cost (Calculated 2008)		**$5,475,000**	**$5,196,000**

(1) Cost for moving residents' belongings to temporary lodging and back - assume 4 houses at $2500 each.
(2) Assumes average family size of 4 people.
(3) Includes bush hogging in areas S5 (.07 acre) + S6(0.79 acres)+SD1(.14 acres) = 1.0 acres, and 1 acre of roadways and buffers around each area = 4 acres.
(4) Assumes tree removal from half of the cleared area or 2 acres.
(5) Consists of appropriate road base (shell) laid down for stabilization for truck traffic.
(6) Includes set-up of 1 trailer ($2k each for set-up and 6 months of rental at $1,500 per month).

Table 6-14. Cost Estimate for Oak Creek Area: Alternative 5
CSXT Nocatee/Hull Creosote Site, Hull (Nocatee), Florida.

(7) Includes initial surveying of impacted soil areas and follow-up verification surveying.
(8) Assume silt fences are required around the entire perimeter of the excavation areas.
(9) Assume the following soil removal volume:
S5 = 300 CY x 10% fluff = 330 CY
S6 = 3,800 CY x 10% fluff = 4,180 CY
Total soil excavated = 4,510 CY or 5,412 tons (1.2 tons/CY)
Unit cost includes 2 CY excavator ($250/hr) and 4 CY loader ($200/hr), 10 hours/day, + 30% contractor costs, excavation rate of 400 CY/day = $14.60/CY or $12.20/ton.
(10) Includes bringing off-site backfill to fill all excavated areas, compact and grade the affected areas, $5 CY for backfill and $5/CY for transportation and $3/CY for compaction and grading = $13/CY.
(11) Includes final grading and hydroseeding of all affected areas to prevent erosion and re-establish vegetative cover.
(12) Includes grubbing and vegetation removal of an area 200' x 200', specialized wetland equipment.
(13) Includes specialized tree removal in swampy conditions over an area of 200' x 200'.
(14) Consists of appropriate road base (shell) laid down for stabilization for truck traffic.
(15) Assume silt fences are required around the entire perimeter of the excavation areas.
(16) Includes installation of 2 bladders upstream and downstream of area to divert stream from excavation area. Costs include rental and maintenance and set-up.
(17) Includes weekly rental, operation, and diesel fuel to operate pump to bypass stream flow around the bladders. Costs include rental and maintenance and set-up.
(18) Dewatering is required in excavated area, which will include installation of dewatering trench around the excavated area (150' x 200') and pumping of water to the stream (assumes no treatment of the discharged water).
(19) Sediment removal includes SD1 = 3,200 CY x 10% fluff = 3,520 CY or 4,224 tons. Unit cost includes 2 CY excavator ($250/hr) and 4 CY loader ($200/hr), 10 hours/day, 400 CY/day x 20% = $11/CY or $9/ton. Additional costs for draining excavated sediments on draining box prior to load-out, estimated to be $9/ton, total cost of $18/ton.
(20) Includes installation of geotextile for stabilization in the excavated area (150' x 200') = 30,000 sq ft.
(21) Includes bringing off-site backfill and riprap rock to fill all excavated areas, compact and grade the affected areas, $8 CY for backfill or riprap rock and $5/CY for transportation and $3/CY for compaction and grading = $16/CY.
(22) Includes installation of riprap rock along stream channel and hydroseeding other areas to prevent erosion and re-establish vegetative cover.
(23) Includes the installation of a City water line extension along Hull Road and connection to residences currently using shallow water supply wells, costs include all engineering, permitting, installation, and connections to affected residences. Includes project management, construction oversight, permitting, and reporting.
(24) One centralized air compressor will be installed to supply compressed air to 5 biosparge lines. Line 1=100 LF, line 2=100 LF, line 3=100 LF, line 4=125 LF, and line 5=100 LF for a total of 540 LF. Nested injection points will be installed on a 25-foot spacing, screened at 25 and 50 ft bls. The points will be 1-inch in diameter with 2-foot screens. Air will be injected at a rate of 3 SCFM per point to maximize dissolution and minimize the uncontrolled migration.
(25) Includes design, implementation, operation, reporting and management of pilot test for proposed GW treatment strategy.
(26) Line 1 includes 4 wells, line 2 includes 4 wells, line 3 includes 4 wells, line 4 includes 5 wells, and line 5 includes 4 wells, for a total of 26 nested points at 50 feet and 25 feet deep = 1,950 LF of injection points, 1-inch diameter.
(27) Cuttings based on 0.02 tons/LF for 12-inch borehole includes handling ($20/ton), transportation ($18/ton), and disposal ($27/ton).
(28) Includes 2 deep wells (40-50 feet) and 2 intermediate wells (20-30 feet) and 2 shallow wells, total of 190 LF, 2-inch diameter.
(29) Cuttings based on 0.01 tons/LF of 2-inch well.
(30) Includes below-grade installation of 1-1/2-inch schedule 40 steel air line to supply the injection wells, includes 1600 LF of air line header pipe.
(31) 3 SCFM per point x 52 points per line / 2 (only half of the system will operate at one time) = 78 SCFM per line assuming required injection pressure of 24 psi for deep points. Two 25 HP rotary screw compressors will be centrally located bewteen the biosparge lines.

(32) 12 hours/week and an additional 80 hours/year for unscheduled maintenance = 704 hours (for both systems).
(33) Includes operation of two 25 HP rotary screw compressors, 100% uptime, $0.10 kw-hour electric cost.
(34) 24 hours per event includes prep, travel, and on-site time.
(35) Includes travel costs, perdiem, hotel, sampling expenses, and sampling equipment rental.
(36) 10 samples per event x 4 events per year = 20 samples, assume $400 per sample.
(37) Five years of operation based on professional judgment.
(38) Includes quarterly monitoring of 4 shallow wells, 2 intermediate wells, and 2 deep wells total of 8 samples each event with 2 QA/QC samples, 10 samples per event.
(39) Two sampling events per year (24 hours per event that includes prep, travel, and on-site time).
(40) Includes travel costs, perdiem, hotel, sampling expenses, and sampling equipment rental.
(41) Present worth factor is 7% based on EPA guidance.

Table 13-1: Chemical-Specific ARARs, Criteria and Guidance
Nocatee Hull Creosote Site, Hull, Florida

Requirement	Citation	ARAR Type	Description	Comment
State				
Florida Surface Water Criteria Rule	Chapter 62-302.530 Florida Administrative Code (FAC)	Relevant and Appropriate	Provides surface water classifications and water quality criteria (numeric and narrative) for protection of State surface water bodies. Numeric ambient water quality criteria (AWQC) are relevant during remedial action of the site soil that is impacting surface water.	Remedial Action Objectives (RAOs) require protection of surface water by monitoring surface water for some contaminants of concern (COCs) against AWQC.
Florida Groundwater Classes, Standards, and Exemptions	Chapter 62-520.410 and 62-520.420, FAC	Applicable	Designates the groundwater of the State into five classes and establishes minimum criteria. This rule also specifies that Classes I and II groundwater must meet primary drinking water standards listed in Chapter 62-550.310, FAC.	This rule was used to classify groundwater and establish cleanup goals for groundwater. Groundwater at this Site is considered a potential source of drinking water (Class G-II).
Florida Drinking Water Standards, Monitoring and Reporting	Chapter 62-550.310, FAC	Relevant and Appropriate	Provides primary drinking water quality standards and maximum contaminant levels (MCLs) for public water supply systems that are applicable at the tap and are relevant and appropriate to the restoration of a Class G-II aquifer.	Cleanup goals for some of the COCs in groundwater are based upon MCLs listed in this rule. RAOs require restoration of surficial aquifer to drinking water quality standards.

Florida Contaminant Cleanup Target Levels Rule	Chapter 62-777.170, FAC Tables I & II	Relevant and Appropriate	This rule provides default cleanup criteria, namely cleanup target levels (CTLs) in Tables I and II and an explanation for deriving CTLs for soil, groundwater and surface water that can be used for site rehabilitation (i.e., cleanup).	CTLs for groundwater in Table I of this rule were used to establish cleanup goals for some of the COCs in groundwater at this Site. Soil CTLs in Table II for Direct Exposure and Leachability Based on Groundwater Criteria were used to establish cleanup goals for some of the soil COCs. See Table 7-20 of the ROD.
Florida Contaminant Site Cleanup Criteria Rule – Risk Assessment	Chapter 62-780.650(1)(d), FAC	Relevant and Appropriate	This section of the rule generally provides elements to be addressed when performing a risk assessment. Requires that a lifetime excess cancer risk level of 1.0E-6 and a hazard index of 1 or less shall be used in establishing alternative CTLs for groundwater or soil.	The 1.0E-6 and a hazard index of 1 or less requirement considered in developing site-specific or alternative CTLs for certain COCs.

AWQC = ambient water quality criteria
MCLG = maximum contaminant level goal
SDWA = Safe Drinking Water Act
CFR = Code of Federal Regulations
BAT = best available technology
CAA = Clean Air Act
HAPs – hazardous air pollutants
MCL = maximum contaminant level
FFS = Focused Feasibility Study
RCRA = Resource Conservation and Recovery Act
FS = Florida Statute
CWA = Clean Water Act
FAC = Florida Administrative Code
SRI = Streamlined Remedial Investigation
TBC = To Be Considered

Table 13-2: Action-Specific ARARs, Criteria and Guidance
Nocatee Hull Creosote Site, Hull, Florida

Requirement	Citation	ARAR Type	Description	Comment
Federal				
Resource Conservation & Recovery Act (RCRA) Regulations, Identification and Listing of Hazardous Wastes	40 Code of Federal Regulations (CFR) Part 262.11 and 264.13(a)(1)	Applicable	Requires characterization of solid waste and additional characterization of waste determined to be hazardous. Part 261.11 requires determination of whether solid waste is hazardous. Part 263.13(a)(1) requires a detailed chemical and physical analysis of a representative sample of the waste to determine treatment, storage, and disposal requirements.	Response action is expected to generate non-hazardous solid waste (contaminated soil determined not to be hazardous).
State				
Florida Solid Waste Management Facilities – Landfill Final Closure Rule	Chapter 62-701.600(5)(e), (f), (g), and (h), Florida Administrative Code (FAC)	Relevant and Appropriate	Provides requirements for final cover design and construction for a solid waste landfill, including control of stormwater occurring on the landfill property in order to meet the general performance standard in Chapter 62-701.340(1), FAC	Closure and capping of the on-site containment area will meet the relevant provisions of this rule.
Florida Water Well Construction Standards Rule	Chapter 62-532.500, FAC	Applicable	Establishes minimum standards for the location, construction, repair and abandonment of water wells.	The requirements for the construction, repair and abandonment of monitoring, extraction and injection wells will be met.
Florida Natural Attenuation with Monitoring Regulation	Chapter 62-780.690(8)(a) through (c), FAC	Relevant and Appropriate	Specifies the 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 as part of the natural attenuation remedy will be met. (1)

Florida Regulation of Stormwater Discharge - Facility Performance Standards	Chapter 62-25.025(7), FAC	Relevant and Appropriate	Establishes requirements for discharges from stormwater discharge facility to ensure protection of the surface waters of the state.	Erosion and stormwater control best management practices will be implemented during construction to retain sediment on site.
Florida Generic Permit for Stormwater Discharge from Construction Activities	Chapter 62-621.300(4)(a), FAC	Applicable	Requires development and implementation of best management practices (BMPs) and erosion and sedimentation controls for stormwater discharges to ensure protection of the surface waters of the state.	Erosion and stormwater control BMPs will be implemented during construction activities such as well installation to retain sediment on site.
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 Group 4 injection wells associated with aquifer remediation projects.	Requirements pertaining to Class V Group 4 injection wells will be followed.
Florida Active Remediation Regulation for Groundwater In-situ Systems	Chapter 62-780.700(12)(g), FAC	Relevant and Appropriate	Specifies that operations parameters for in-situ systems should include measurements of biological, chemical, or physical indicators that will verify the radius of influence at representative monitoring locations, on a predetermined schedule.	In-situ groundwater remediation will meet the relevant requirements of this rule.[(1)]
Florida Active Remediation Regulation for Groundwater Bioremediation Systems.	Chapter 62-780.750(4)(a) through (c), FAC	Relevant and Appropriate	Specifies that operational parameters for bioremediation systems should include measurements of dissolved oxygen at representative monitoring locations, rates of biological, chemical, or nutrient enhancement additions on a predetermined schedule.	Groundwater remediation will meet relevant requirements of this rule.[(1)]
Florida Post Active Remediation Monitoring Regulation	Chapter 62-780.750(4)(a) through (c), FAC	Relevant and Appropriate	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.[(1)]

Florida General Pollutant Emission Limitation Standards	Chapter 62-296.320(4)(c), FAC	Applicable	Requires reasonable precautions, such as application of water or other dust suppressants, to control emission of particulate matter from any activity including, but not limited to, vehicular movement and construction.	Precautions will be undertaken to prevent fugitive dust emissions from any land disturbance activities.

(1) 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 prepared as part of the Remedial Design or Remedial Action which is approved by the EPA and FDEP.

MCL = maximum contaminant level
MCLG = maximum contaminant level goal
SWDA = Solid Waste Disposal Act
CFR = Code of Federal Regulations
BAT = best available technology

AWQC = ambient water quality criteria
HAPs – hazardous air pollutants
SRI = Streamlined Remedial Investigation
FFS = Focused Feasibility Study
RCRA = Resource Conservation and Recovery Act

Table 13-3: Location-Specific ARARs, Criteria and Guidance
Nocatee Hull Creosote Site, Hull, Florida

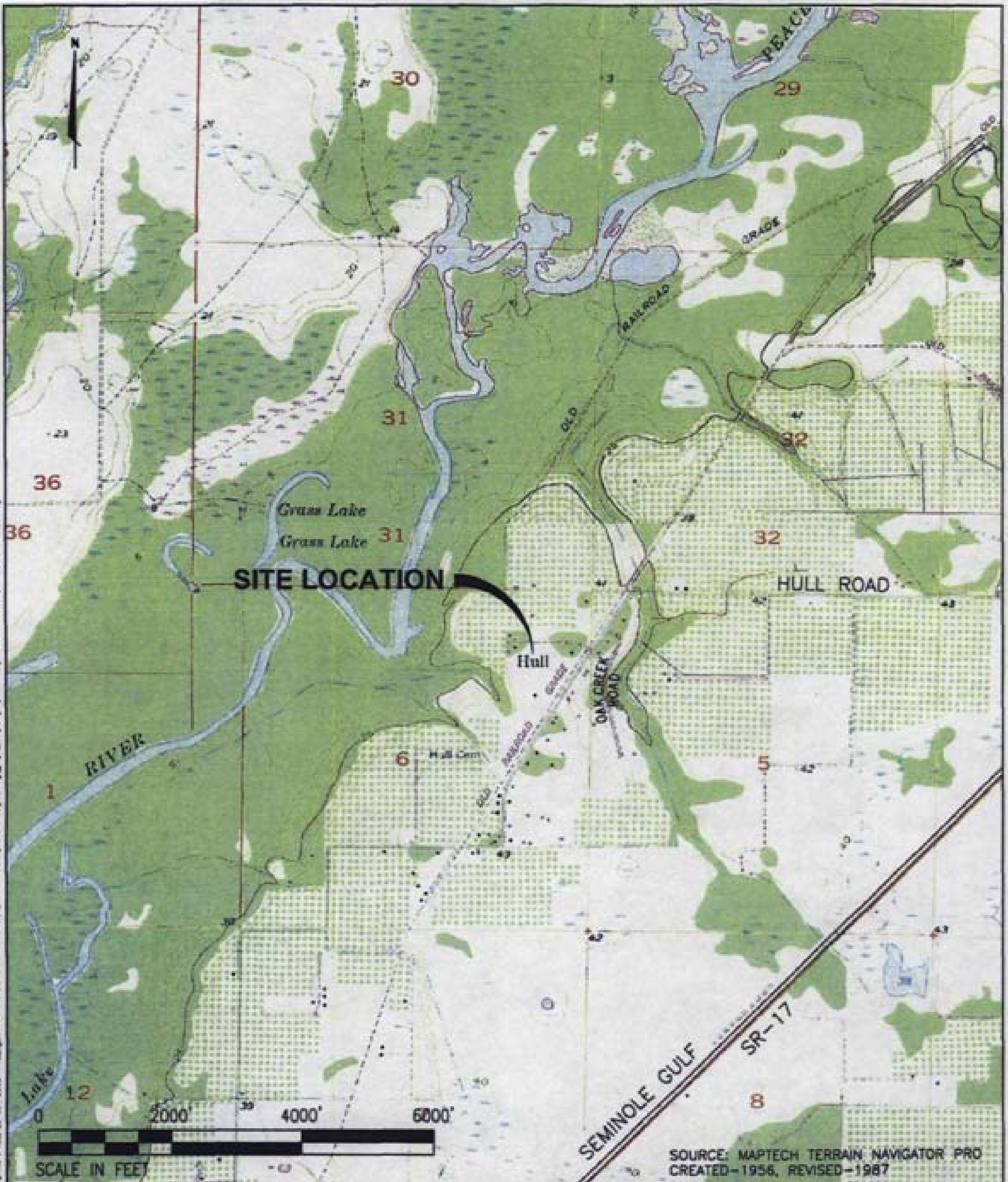
Requirement	Citation	ARAR Type	Description	Comment
Federal				
Clean Water Act Regulations – Section 404(b) Guidelines	40 Code of Federal Regulations (CFR) Part 230.10(a)	Applicable	No discharge of dredged or fill material into an aquatic ecosystem is permitted if there is a practicable alternative that would have less adverse impact.	Remedial work in the Braided Stream, Peace River Floodplain, and Oak Creek involves location encompassing *aquatic ecosystem* as defined in 40 CFR 230.3(c).
Clean Water Act Regulations – Section 404(b) Guidelines	40 CFR Part 230.10(d)	Applicable	No discharge of dredged or fill material shall be permitted unless appropriate and practicable steps in accordance with 40 CFR 230.70 *et seq.* have been taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem.	Remedial work in the Braided Stream, Peace River Floodplain, and Oak Creek involves location encompassing *aquatic ecosystem* as defined in 40 CFR 230.3(c).
Clean Water Act - Nation Wide Permit (38) Cleanup of Hazardous and Toxic Waste	33 CFR Part 323.3(b)	Applicable	Must comply with the substantive requirements of the NWP 38 General Conditions, as appropriate, and any regional or case-specific conditions recommended by the USACE District Engineer, after consultation.	Remedial work in the Braided Stream, Peace River Floodplain, and Oak Creek involves location encompassing *aquatic ecosystem* as defined in 40 CFR 230.3(c).
Fish and Wildlife Coordination Act – Impounding, diverting or controlling of waters	16 United States Code (USC) §662(a)	Relevant and Appropriate	Requires that the U.S. Fish and Wildlife Service and the related state agency be consulted prior to structural modification of any body of water, including wetlands with a view to the conservation of wildlife resources by preventing loss of and damage to such resources.	Oak Creek and the Peace River Floodplain are located in proximity to the Site. These agencies would be consulted to determine protective measures to prevent loss of wildlife resources.

Executive Order 11990 – Protection of Wetlands	Exec. Order 11990 Section 1.(a)	To-Be-Considered (TBC)	Requires Federal agencies to evaluate action to minimize the destruction, loss or degradation of wetlands and to preserve and enhance beneficial values of wetlands.	Sediment excavation in the Peace River Floodplain Area and Oak Creek Area involves probable disturbance of jurisdictional wetlands.
Executive Order 11988 - Floodplain Management	Exec. Order 11,988 Section 2.(a)(2)	TBC	Requires Federal agencies to evaluate the potential effects of actions they may take in a floodplain to avoid, to the maximum extent possible, the adverse impacts associated with direct and indirect development of a floodplain.	Oak Creek Area floodplain may need to be restricted from residential development at completion of the excavation and restoration portion of the remedy.
State				
Florida Environmental Resources Permit Procedures	Chapter 62-343.050 and 343.070, FAC	Applicable	Requires an environmental resource permit when action requires dredging or filling in, on or over wetlands.	FDEP will be consulted to determine the substantive aspects of an environmental resource permit for restoring wetlands.

MCL = maximum contaminant level
MCLG = maximum contaminant level goal
SDWA = Safe Drinking Water Act
CFR = Code of Federal Regulations
BAT = best available technology
AWQC = ambient water quality criteria
HAPs – hazardous air pollutants
SRI = Streamlined Remedial Investigation
FFS = Focused Feasibility Study
RCRA = Resource Conservation and Recovery Act

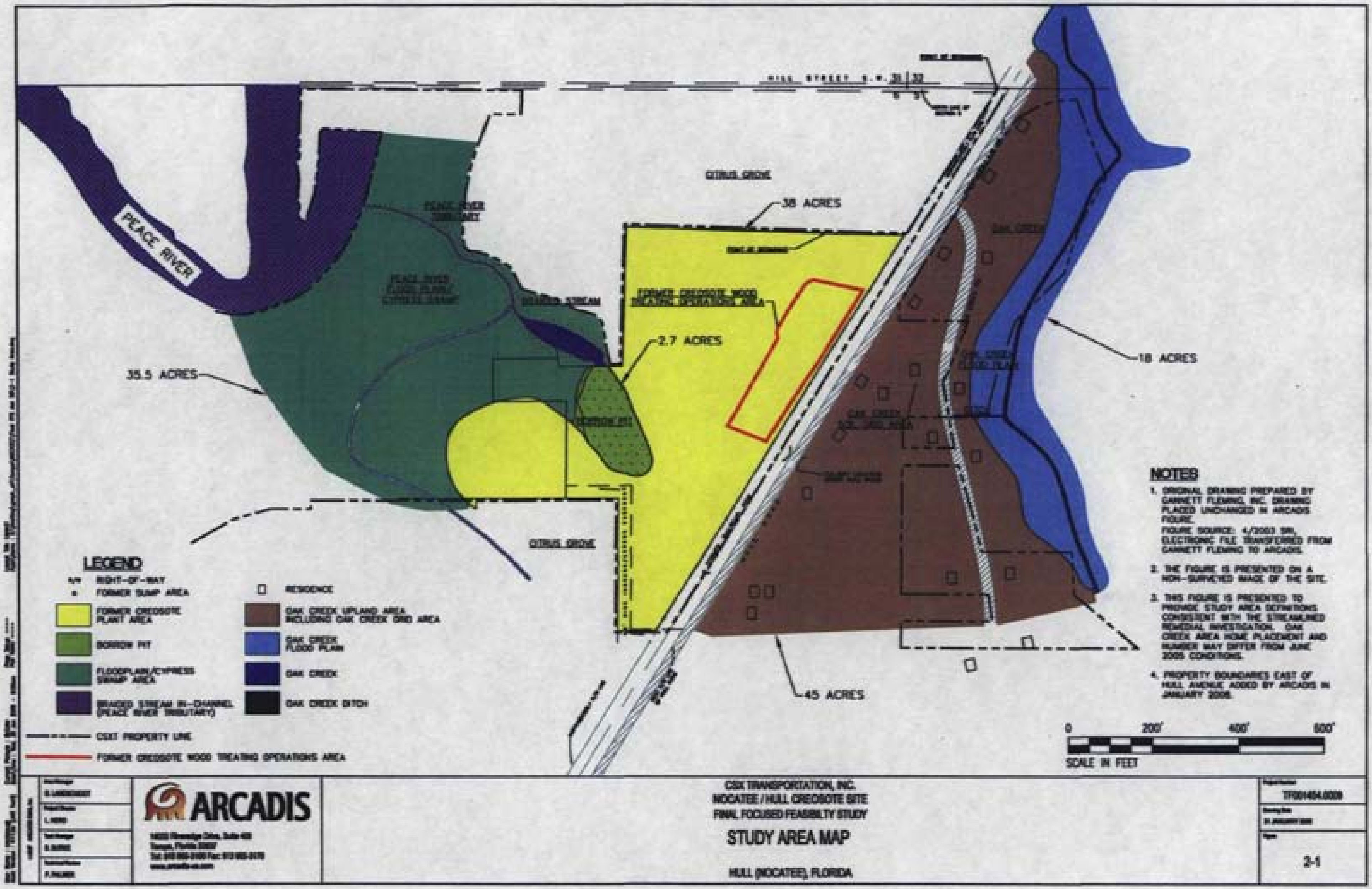
FIGURES
(Nocatee Hull Creosote ROD)

FIGURE 1-1



Area Manager G. LANDSCHOOT Project Director L. HERD Task Manager B. BURKE Technical Review P. PALMER	ARCADIS 14055 Riveredge Drive, Suite 400 Tampa, Florida 33637 Tel: 813 903-3100 Fax: 813 903-3170 www.arcadis-us.com	CSX TRANSPORTATION, INC. NOCATEE / HULL CREOSOTE SITE FINAL FOCUSED FEASIBILTY STUDY LOCATION MAP HULL (NOCATEE), FLORIDA	Project Number TF001454.0009 Drawing Date 31 JANUARY 2008 Figure 1-1

FIGURE 1-2



PEACE RIVER
CITRUS GROVE
38 ACRES
FORMER CREOSOTE WOOD TREATING OPERATIONS AREA
2.7 ACRES
35.5 ACRES
BORROW PIT
CITRUS GROVE
18 ACRES
45 ACRES
LEGEND
R/W RIGHT-OF-WAY
FORMER SUMP AREA
FORMER CREOSOTE PLANT AREA
BORROW PIT
FLOODPLAIN/CYPRESS SWAMP AREA
BRAIDED STREAM IN-CHANNEL (PEACE RIVER TRIBUTARY)
RESIDENCE
OAK CREEK UPLAND AREA INCLUDING OAK CREEK GRID AREA
OAK CREEK FLOOD PLAIN
OAK CREEK
OAK CREEK DITCH
CSXT PROPERTY LINE
FORMER CREOSOTE WOOD TREATING OPERATIONS AREA
NOTES
1. ORIGINAL DRAWING PREPARED BY GANNETT FLEMING, INC. DRAWING PLACED UNCHANGED IN ARCADIS FIGURE.
FIGURE SOURCE: 4/2003 SRI, ELECTRONIC FILE TRANSFERRED FROM GANNETT FLEMING TO ARCADIS.
2. THE FIGURE IS PRESENTED ON A NON-SURVEYED IMAGE OF THE SITE.
3. THIS FIGURE IS PRESENTED TO PROVIDE STUDY AREA DEFINITIONS CONSISTENT WITH THE STREAMLINED REMEDIAL INVESTIGATION. OAK CREEK AREA HOME PLACEMENT AND NUMBER MAY DIFFER FROM JUNE 2005 CONDITIONS.
4. PROPERTY BOUNDARIES EAST OF HULL AVENUE ADDED BY ARCADIS IN JANUARY 2006.
0 200' 400' 600'
SCALE IN FEET
ARCADIS
CSX TRANSPORTATION, INC.
NOCATEE / HULL CREOSOTE SITE
FINAL FOCUSED FEASIBILITY STUDY
STUDY AREA MAP
HULL (NOCATEE), FLORIDA
2-1

FIGURE 1-3

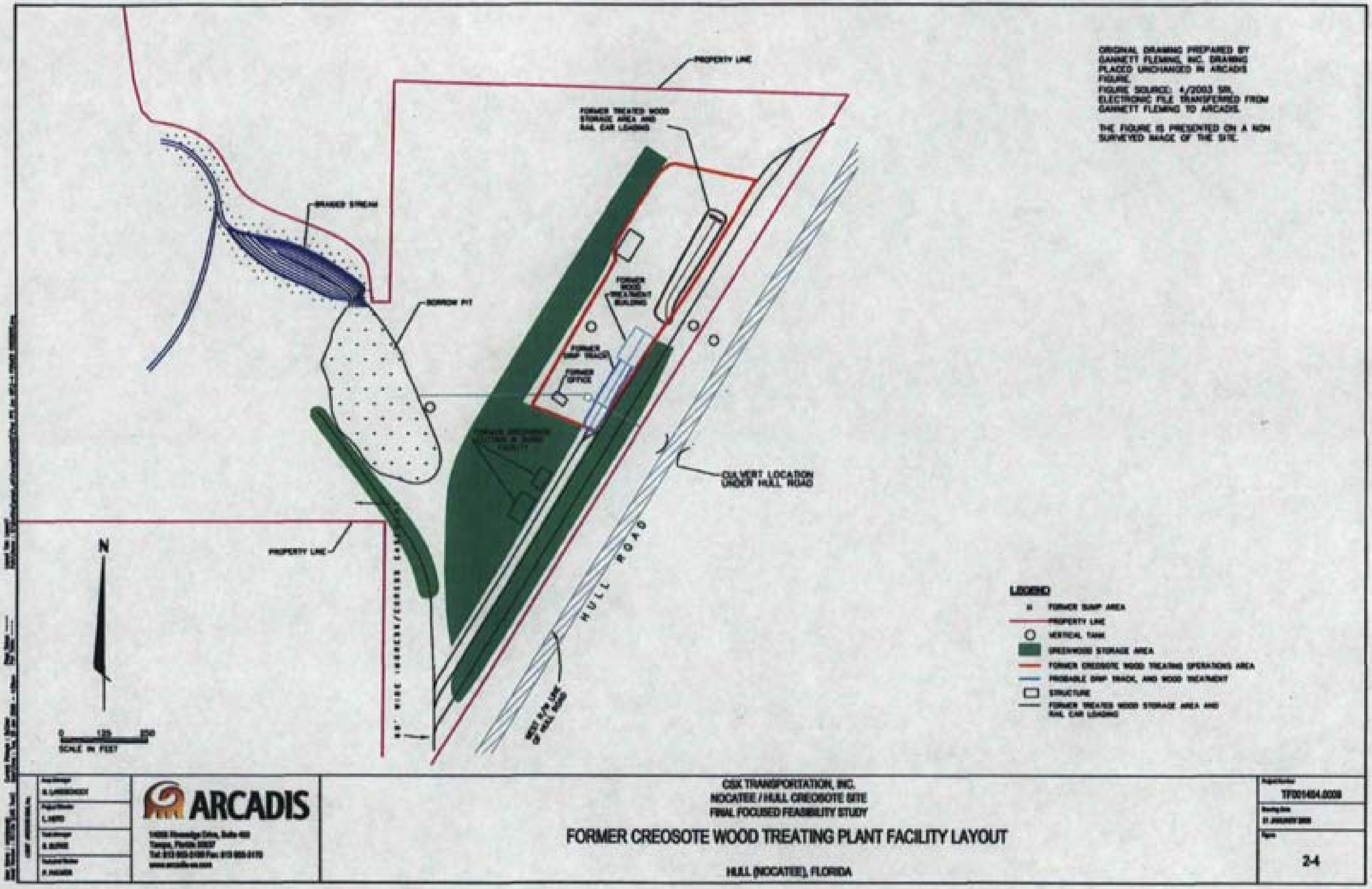
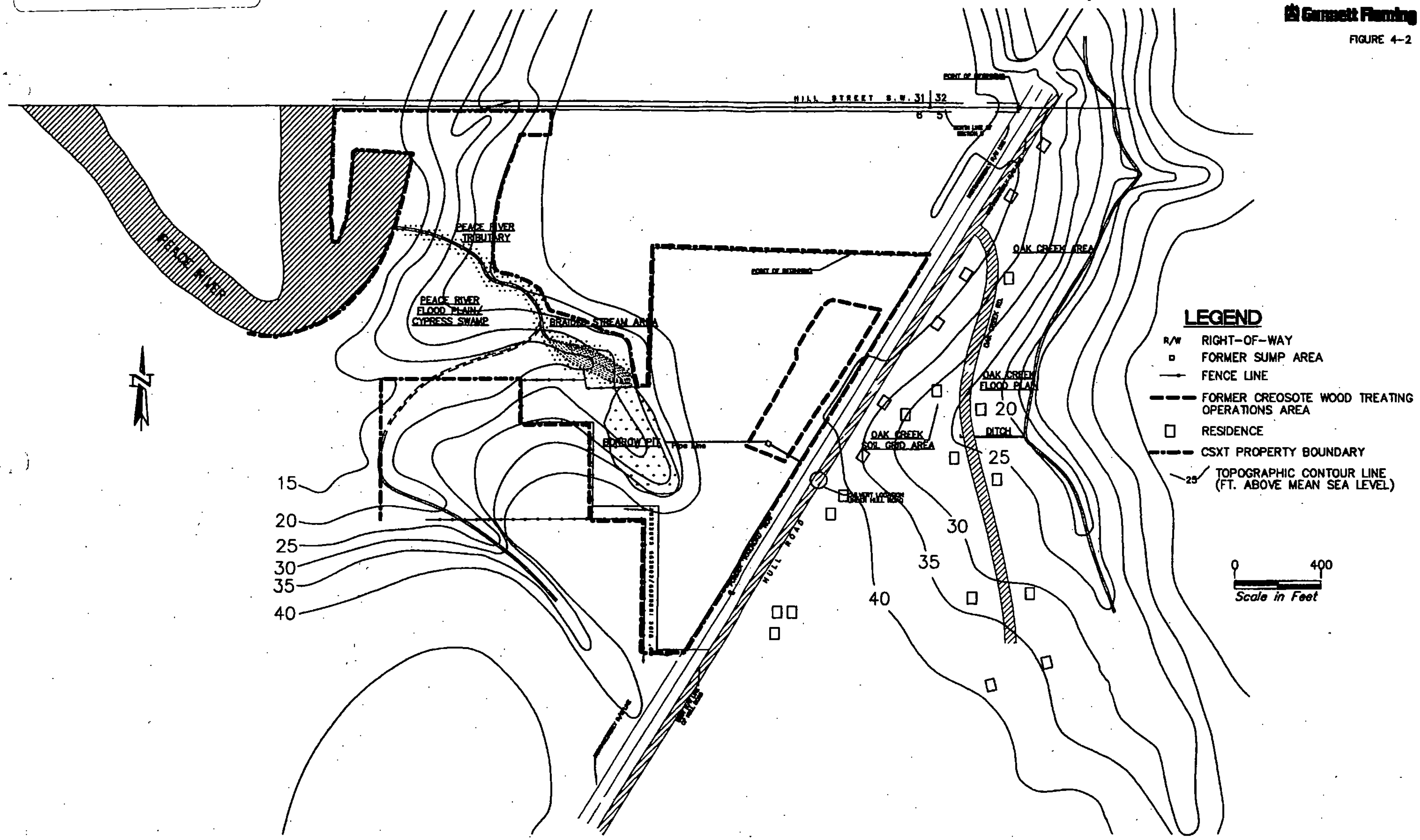

ORIGINAL DRAWING PREPARED BY GANNETT FLEMING, INC. DRAWING PLACED UNCHANGED IN ARCADIS FIGURE.
FIGURE SOURCE: 4/2003 SRI, ELECTRONIC FILE TRANSFERRED FROM GANNETT FLEMING TO ARCADIS.
THE FIGURE IS PRESENTED ON A NON SURVEYED IMAGE OF THE SITE.
PROPERTY LINE
FORMER TREATED WOOD STORAGE AREA AND RAIL CAR LOADING
BRAIDED STREAM
BORROW PIT
FORMER WOOD TREATMENT BUILDING
FORMER DRIP TRACK
FORMER OFFICE
CULVERT LOCATION UNDER HULL ROAD
PROPERTY LINE
HULL ROAD
N
0 125 250
SCALE IN FEET
LEGEND
FORMER SUMP AREA
PROPERTY LINE
VERTICAL TANK
GREENWOOD STORAGE AREA
FORMER CREOSOTE WOOD TREATING OPERATIONS AREA
PROBABLE DRIP TRACK, AND WOOD TREATMENT
STRUCTURE
FORMER TREATED WOOD STORAGE AREA AND RAIL CAR LOADING
ARCADIS
CSX TRANSPORTATION, INC.
NOCATEE / HULL CREOSOTE SITE
FINAL FOCUSED FEASIBILITY STUDY
FORMER CREOSOTE WOOD TREATING PLANT FACILITY LAYOUT
HULL (NOCATEE), FLORIDA
2-4

FIGURE 1-4



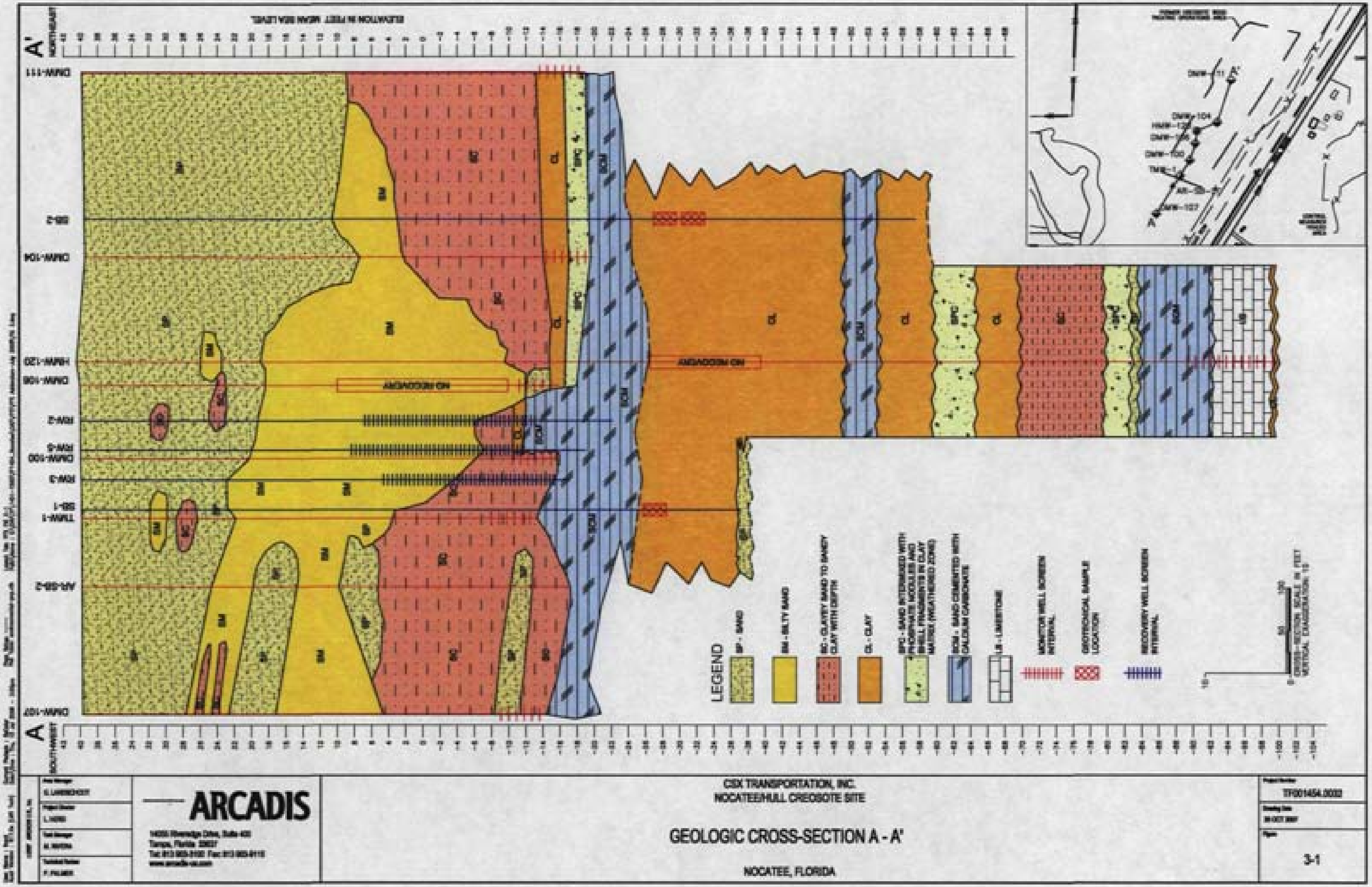
SITE MAP
NOCATEE/HULL FORMER CREOSOTE WOOD TREATING PLANT SITE
HULL (NOCATEE), FLORIDA

040403

FIGURE 1-5

ARCADIS 14055 Riverside Dr., Suite 400 Tampa, FL 33637 Tel 813-903-3100 www.arcadis-us.com	FIGURE 2-2	CSX TRANSPORTATION, INC. NOCATEE / HULL CREOSOTE SITE FINAL FOCUSED FEASIBILITY STUDY **Aerial Map of the CSXT Property and the Study Area (2008)** HULL (NOCATEE), FLORIDA	Project Manager: L. Hard Task Manager: A. Vidal Technical Review: P. Palmer	Area Manager: G. Landschoot Project Number: TF001454.0009 Date: September 9, 2008 Ba

FIGURE 5-1



ARCADIS
CSX TRANSPORTATION, INC.
NOCATEE/HULL CREOSOTE SITE
GEOLOGIC CROSS-SECTION A - A'
NOCATEE, FLORIDA
TF001454.0032
3-1

FIGURE 5-2

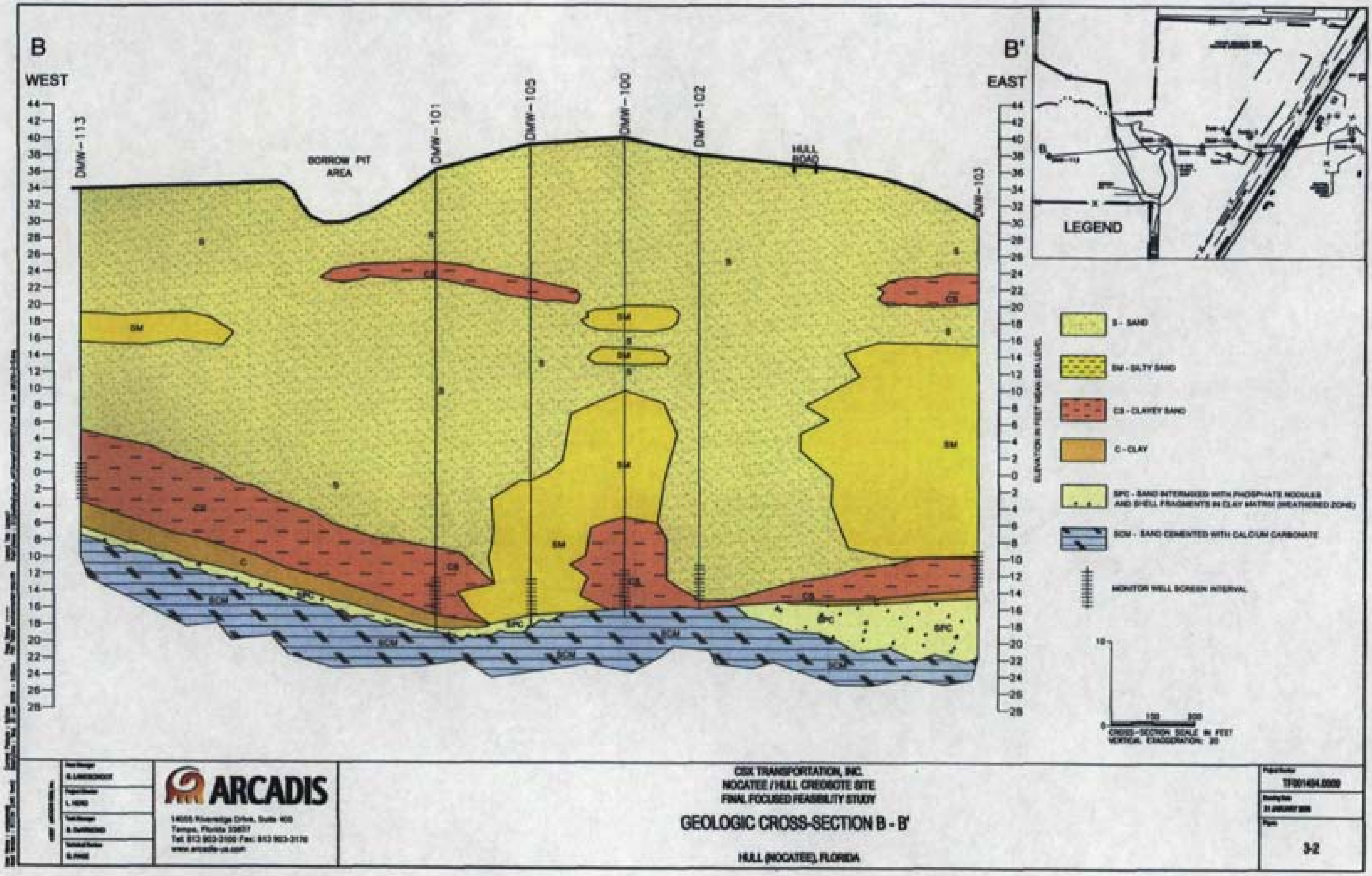

B
B'
WEST
EAST
DMW-113
DMW-101
DMW-105
DMW-100
DMW-102
DMW-103
BORROW PIT AREA
HULL ROAD
ELEVATION IN FEET MEAN SEA LEVEL
LEGEND
S - SAND
SM - SILTY SAND
CS - CLAYEY SAND
C - CLAY
SPC - SAND INTERMIXED WITH PHOSPHATE NODULES AND SHELL FRAGMENTS IN CLAY MATRIX (WEATHERED ZONE)
SCM - SAND CEMENTED WITH CALCIUM CARBONATE
MONITOR WELL SCREEN INTERVAL
CROSS-SECTION SCALE IN FEET
VERTICAL EXAGGERATION: 20
ARCADIS
CSX TRANSPORTATION, INC.
NOCATEE / HULL CREOSOTE SITE
FINAL FOCUSED FEASIBILITY STUDY
GEOLOGIC CROSS-SECTION B - B'
HULL (NOCATEE), FLORIDA
3-2

FIGURE 5-3

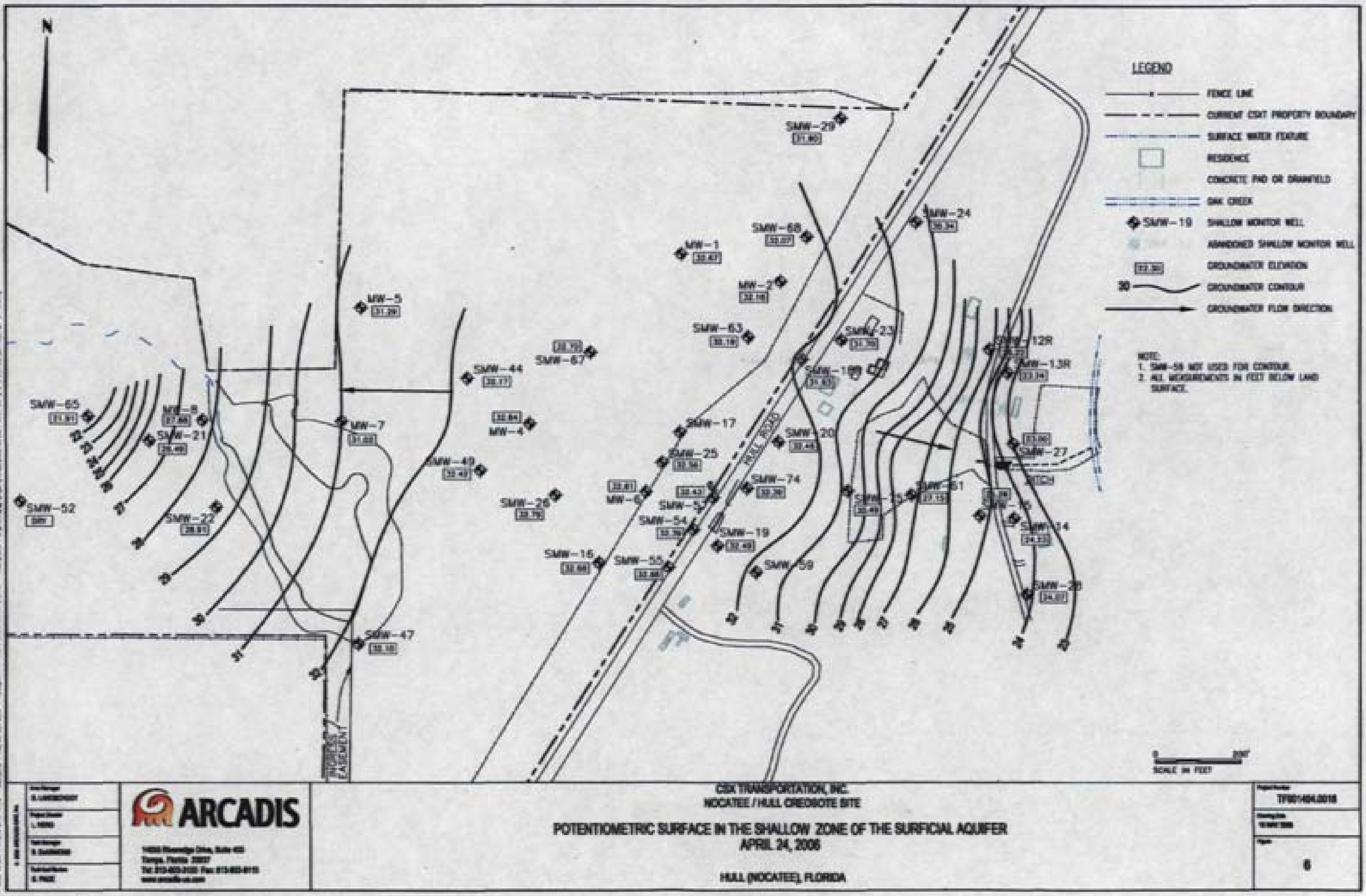

N
LEGEND
FENCE LINE
CURRENT CSXT PROPERTY BOUNDARY
SURFACE WATER FEATURE
RESIDENCE
CONCRETE PAD OR DRAINFIELD
OAK CREEK
SMW-19 SHALLOW MONITOR WELL
ABANDONED SHALLOW MONITOR WELL
GROUNDWATER ELEVATION
GROUNDWATER CONTOUR
GROUNDWATER FLOW DIRECTION
NOTE:
1. SMW-59 NOT USED FOR CONTOUR.
2. ALL MEASUREMENTS IN FEET BELOW LAND SURFACE.
SMW-29
SMW-68
MW-1
MW-2
SMW-24
MW-5
SMW-63
SMW-23
SMW-12R
SMW-13R
SMW-67
SMW-44
SMW-65
MW-8
SMW-21
MW-7
MW-4
SMW-17
SMW-20
SMW-25
SMW-27
SMW-49
SMW-74
SMW-52
SMW-26
MW-6
SMW-22
SMW-54
SMW-19
SMW-14
SMW-16
SMW-55
SMW-59
SMW-47
DITCH
SCALE IN FEET
ARCADIS
CSX TRANSPORTATION, INC.
NOCATEE / HULL CREOSOTE SITE
POTENTIOMETRIC SURFACE IN THE SHALLOW ZONE OF THE SURFICIAL AQUIFER
APRIL 24, 2006
HULL (NOCATEE), FLORIDA
TF001404.0018
6

FIGURE 5-4

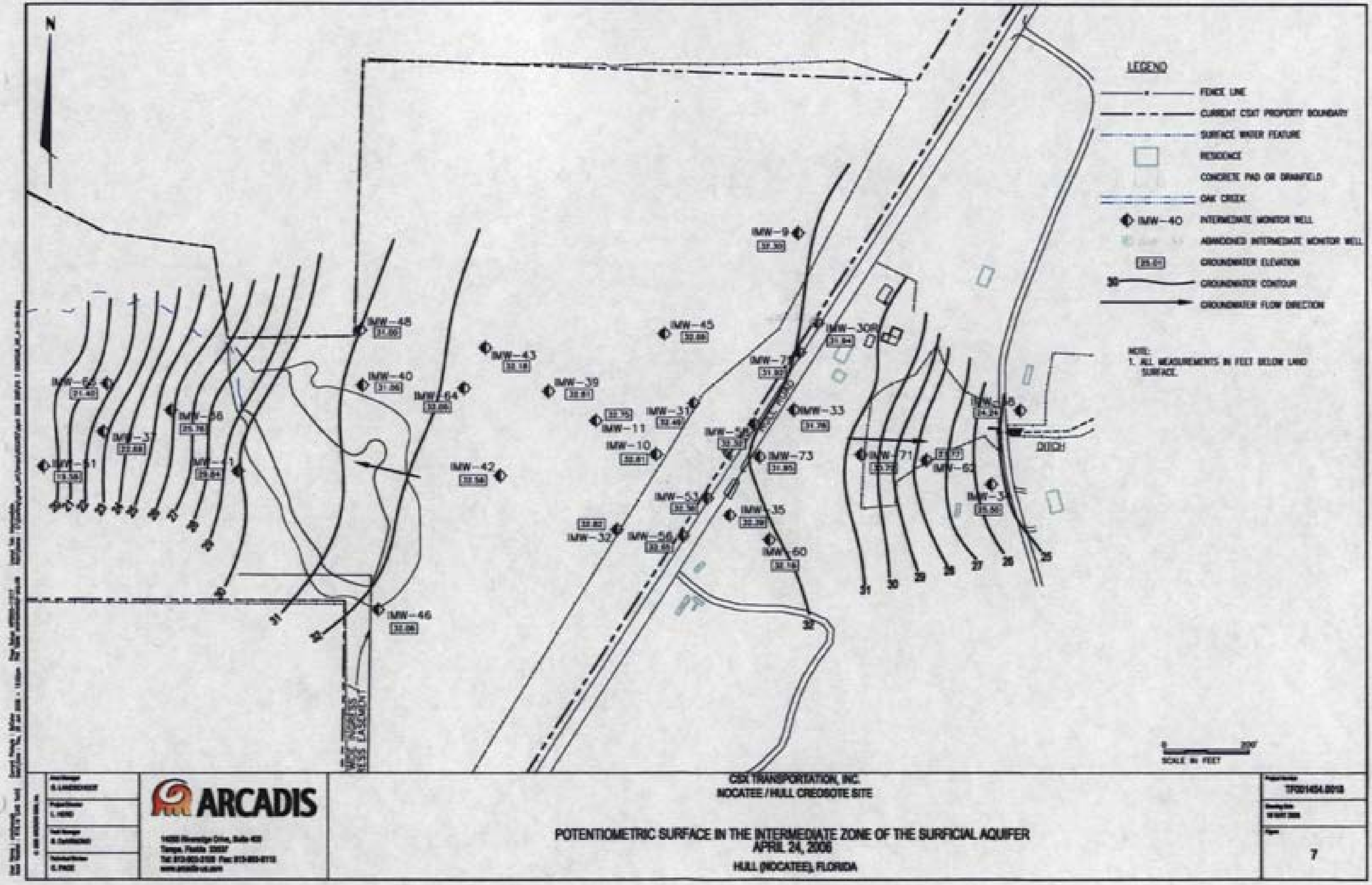

LEGEND
FENCE LINE
CURRENT CSXT PROPERTY BOUNDARY
SURFACE WATER FEATURE
RESIDENCE
CONCRETE PAD OR DRAINFIELD
OAK CREEK
IMW-40 INTERMEDIATE MONITOR WELL
ABANDONED INTERMEDIATE MONITOR WELL
GROUNDWATER ELEVATION
GROUNDWATER CONTOUR
GROUNDWATER FLOW DIRECTION
NOTE:
1. ALL MEASUREMENTS IN FEET BELOW LAND SURFACE.
IMW-9
IMW-48
IMW-45
IMW-43
IMW-40
IMW-64
IMW-39
IMW-11
IMW-10
IMW-42
IMW-37
IMW-36
IMW-41
IMW-33
IMW-73
IMW-71
IMW-62
IMW-35
IMW-60
IMW-32
IMW-46
IMW-30R
DITCH
SCALE IN FEET
ARCADIS
CSX TRANSPORTATION, INC.
NOCATEE / HULL CREOSOTE SITE
POTENTIOMETRIC SURFACE IN THE INTERMEDIATE ZONE OF THE SURFICIAL AQUIFER
APRIL 24, 2006
HULL (NOCATEE), FLORIDA
7

FIGURE 5-5

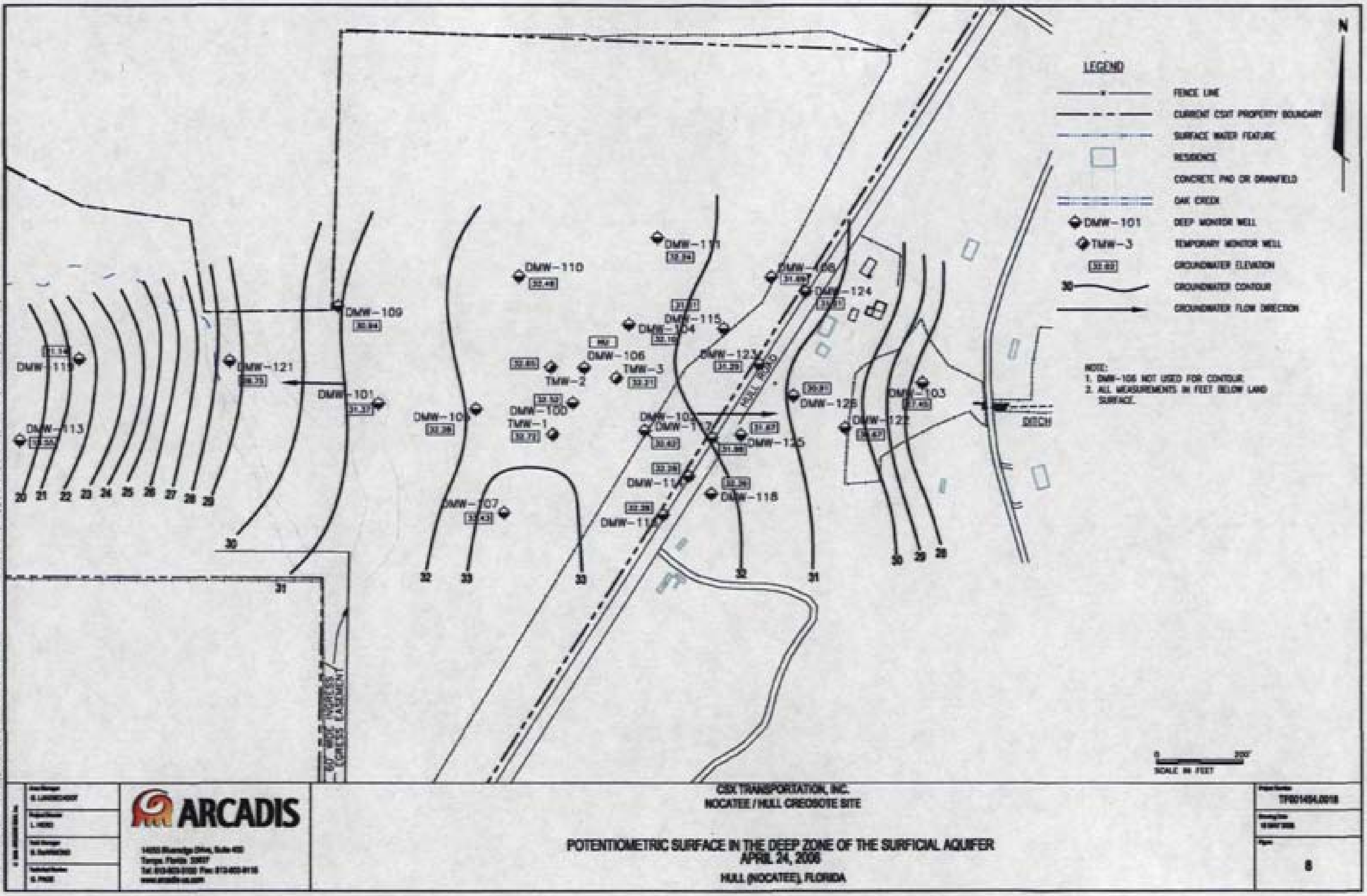
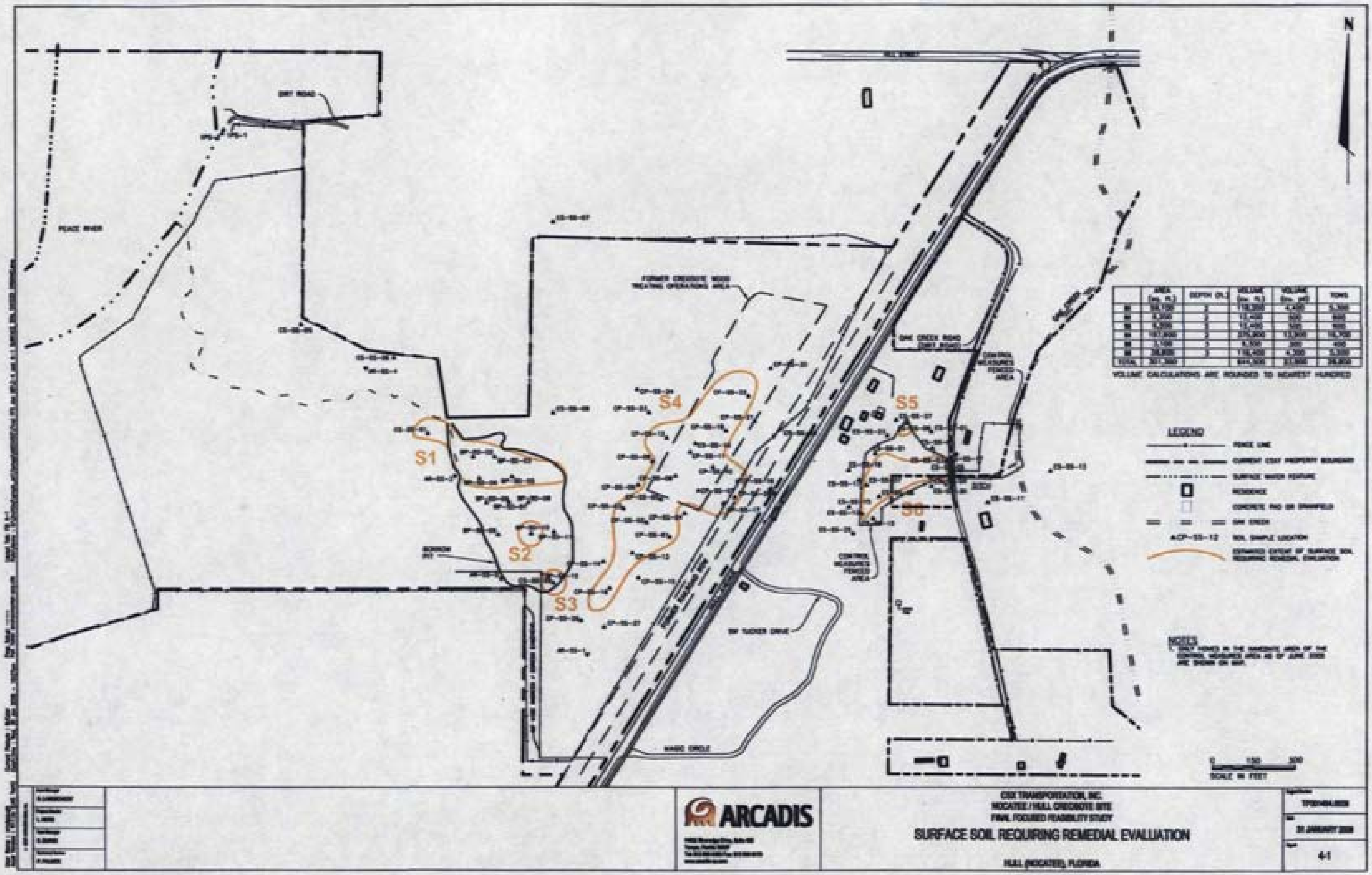

LEGEND
FENCE LINE
CURRENT CSXT PROPERTY BOUNDARY
SURFACE WATER FEATURE
RESIDENCE
CONCRETE PAD OR DRAINFIELD
OAK CREEK
DMW-101 DEEP MONITOR WELL
TMW-3 TEMPORARY MONITOR WELL
GROUNDWATER ELEVATION
GROUNDWATER CONTOUR
GROUNDWATER FLOW DIRECTION
NOTE:
1. DMW-106 NOT USED FOR CONTOUR.
2. ALL MEASUREMENTS IN FEET BELOW LAND SURFACE.
DITCH
SCALE IN FEET
ARCADIS
CSX TRANSPORTATION, INC.
NOCATEE / HULL CREOSOTE SITE
POTENTIOMETRIC SURFACE IN THE DEEP ZONE OF THE SURFICIAL AQUIFER
APRIL 24, 2006
HULL (NOCATEE), FLORIDA

FIGURE 5-6



N
S1
S2
S3
S4
S5
S6
LEGEND
SCALE IN FEET
ARCADIS
CSX TRANSPORTATION, INC.
NOCATEE / HULL CREOSOTE SITE
FINAL FOCUSED FEASIBILITY STUDY
SURFACE SOIL REQUIRING REMEDIAL EVALUATION
HULL (NOCATEE), FLORIDA
4-1

FIGURE 5-7

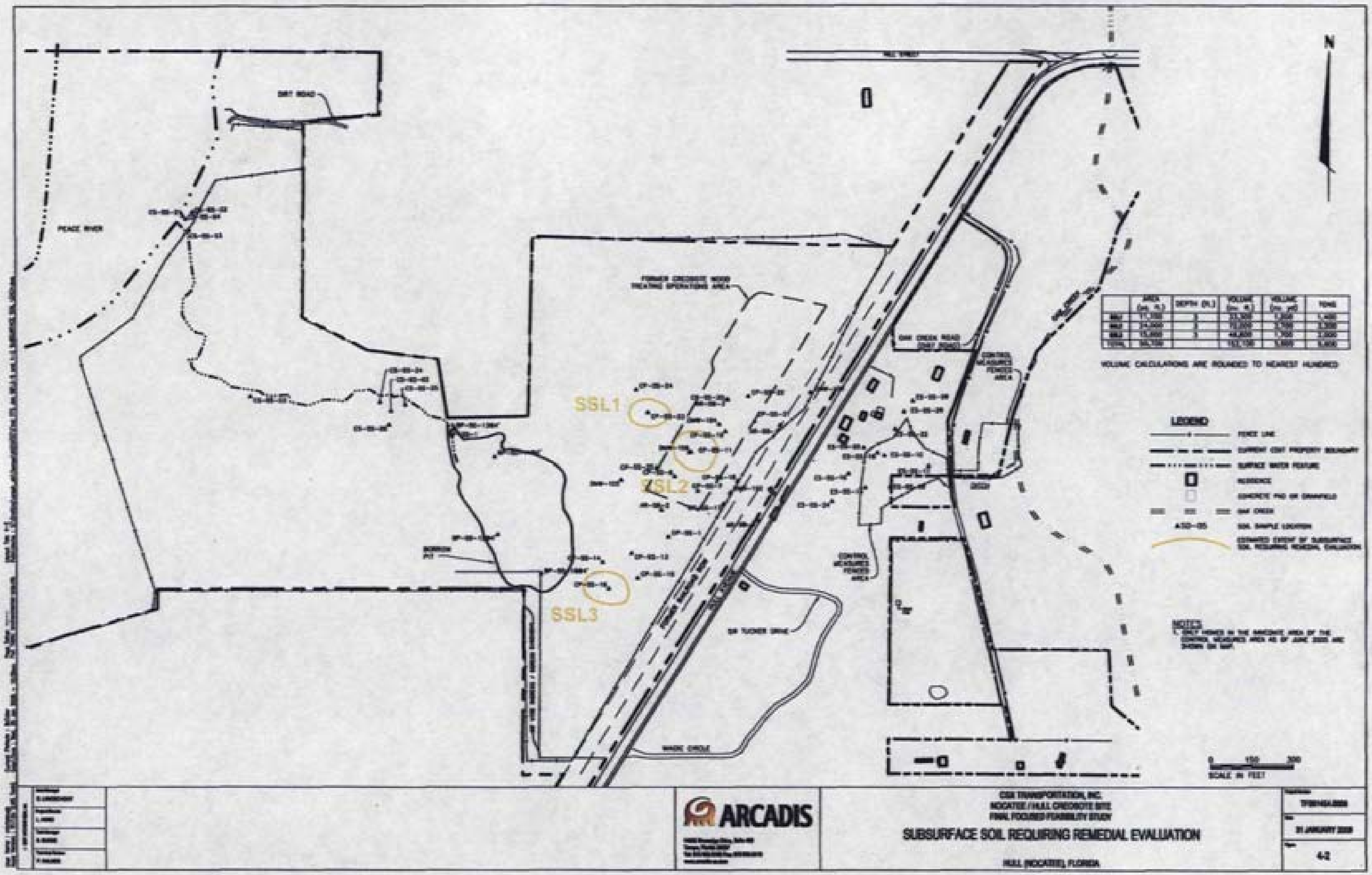

SSL1
SSL2
SSL3
N
VOLUME CALCULATIONS ARE ROUNDED TO NEAREST HUNDRED
LEGEND
FENCE LINE
SURFACE WATER FEATURE
RESIDENCE
CONCRETE PAD OR DRAINFIELD
SOIL SAMPLE LOCATION
SCALE IN FEET
ARCADIS
SUBSURFACE SOIL REQUIRING REMEDIAL EVALUATION
4-2

FIGURE 5-8

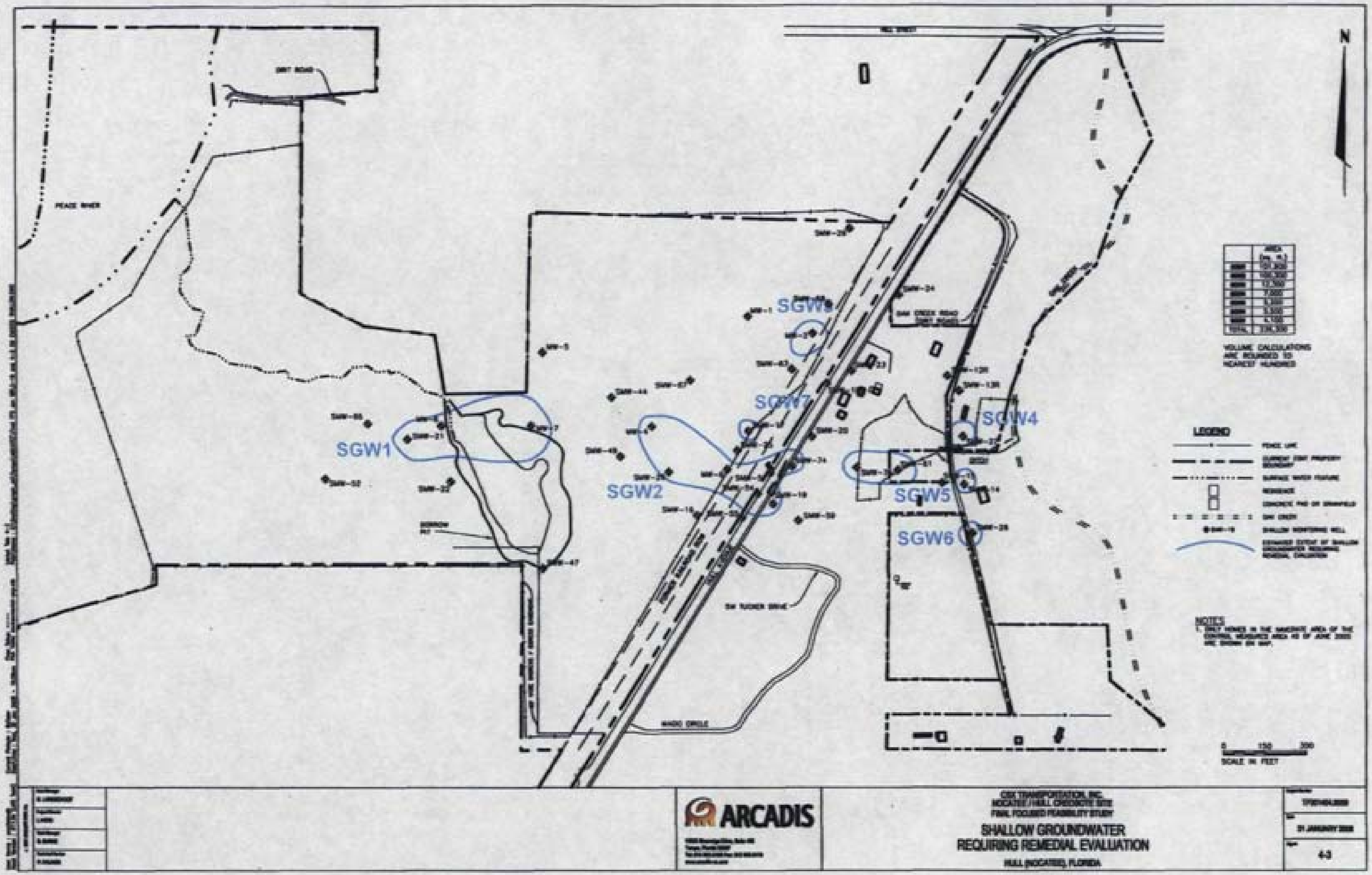
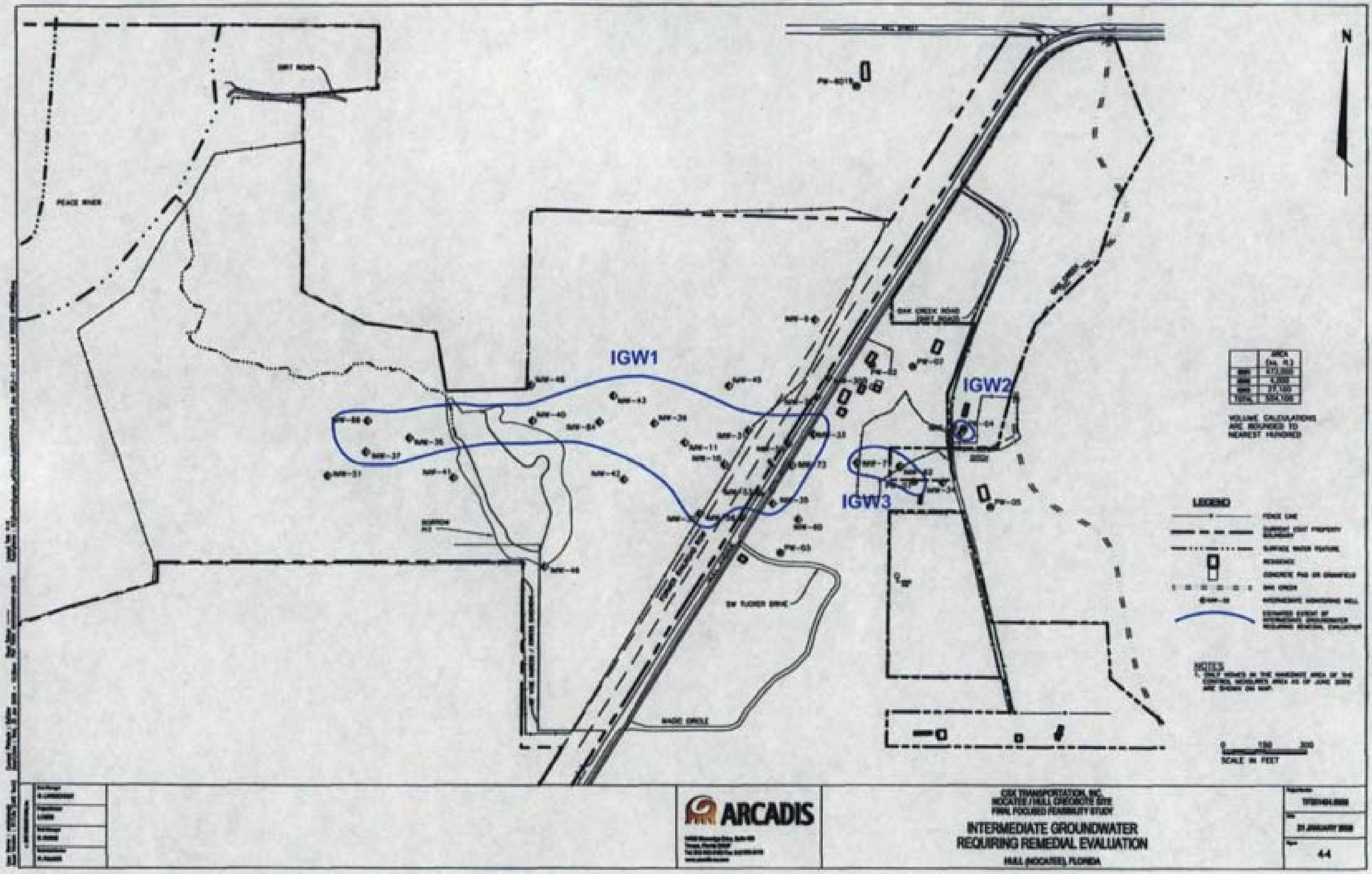
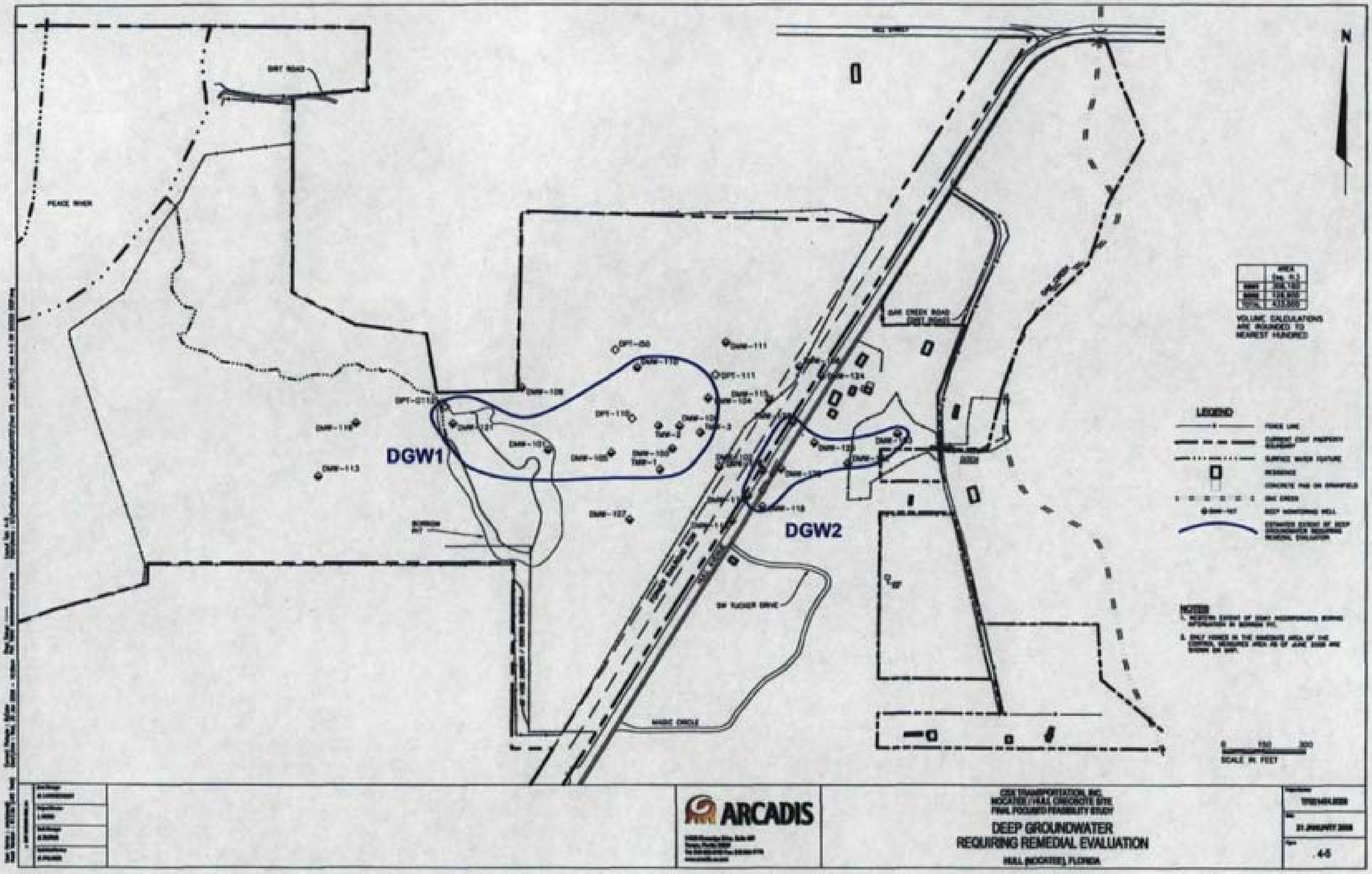

N
SGW1
SGW2
SGW4
SGW5
SGW6
SGW7
LEGEND
SCALE IN FEET
ARCADIS
SHALLOW GROUNDWATER
REQUIRING REMEDIAL EVALUATION
4-3

FIGURE 5-9



N
IGW1
IGW2
IGW3
LEGEND
SCALE IN FEET
ARCADIS
INTERMEDIATE GROUNDWATER
REQUIRING REMEDIAL EVALUATION
4-4

FIGURE 5-10



N
DGW1
DGW2
LEGEND
NOTES
SCALE IN FEET
ARCADIS
DEEP GROUNDWATER
REQUIRING REMEDIAL EVALUATION

FIGURE 5-11

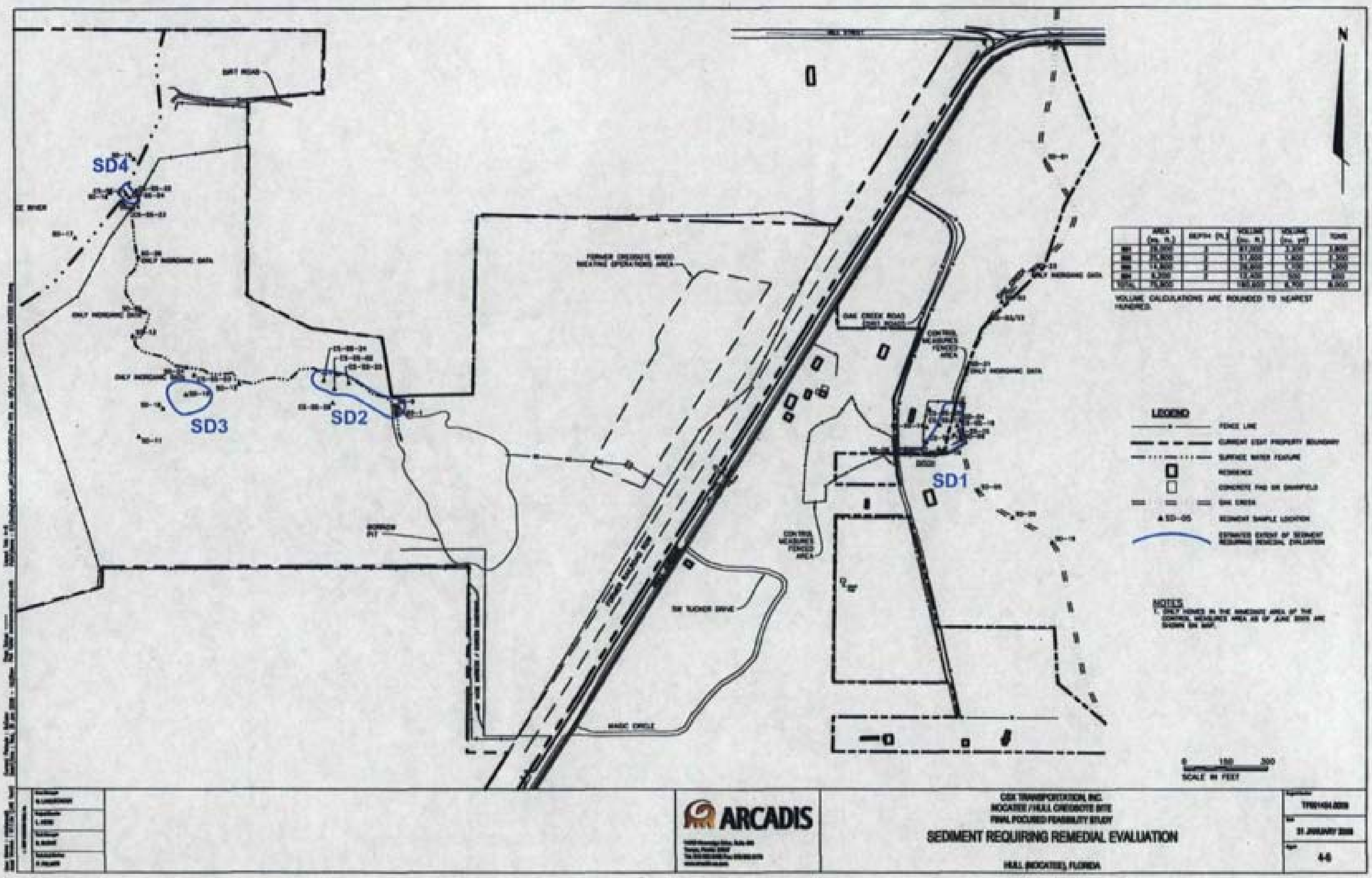
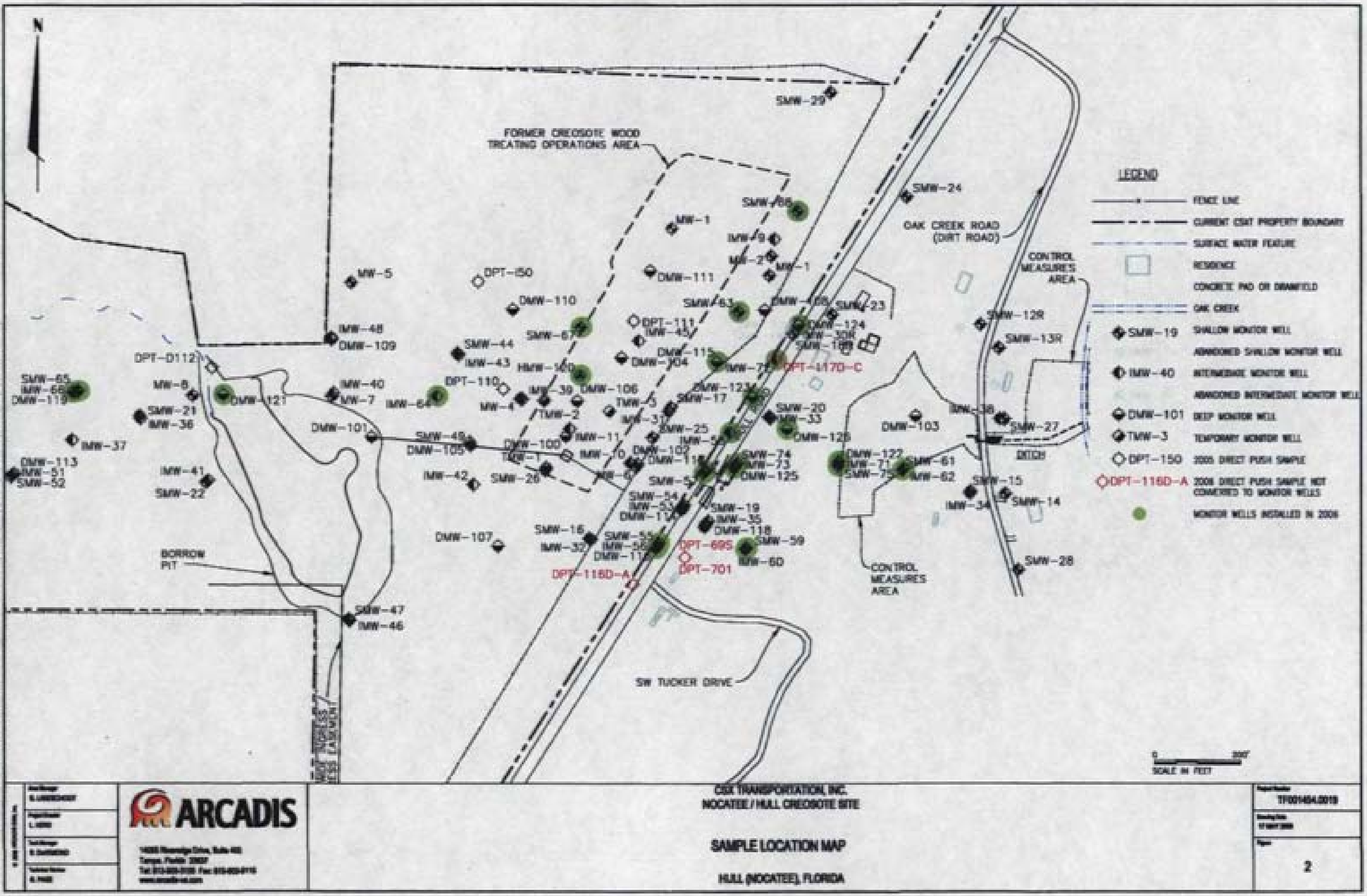

N
SD4
SD3
SD2
SD1
LEGEND
0 150 300
SCALE IN FEET
ARCADIS
CSX TRANSPORTATION, INC.
SEDIMENT REQUIRING REMEDIAL EVALUATION
HULL (NOCATEE), FLORIDA

FIGURE 5-13



ARCADIS

CSX TRANSPORTATION, INC.
NOCATEE / HULL CREOSOTE SITE

SAMPLE LOCATION MAP

HULL (NOCATEE), FLORIDA

2

FIGURE 5-14

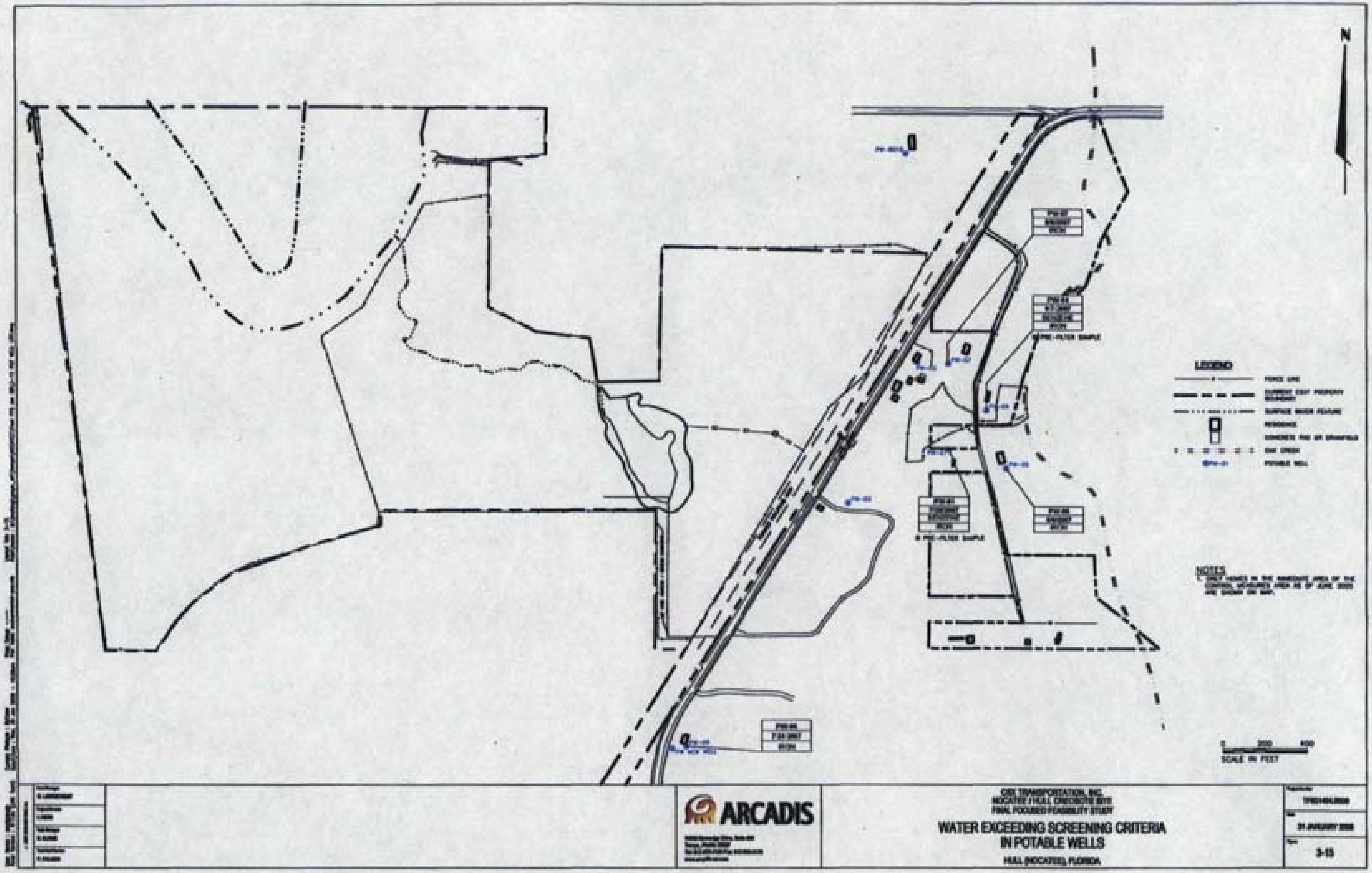

N
LEGEND
NOTES
0
200
400
SCALE IN FEET
ARCADIS
CSX TRANSPORTATION, INC.
NOCATEE / HULL CREOSOTE SITE
FINAL FOCUSED FEASIBILITY STUDY
WATER EXCEEDING SCREENING CRITERIA
IN POTABLE WELLS
HULL (NOCATEE), FLORIDA
3-15

FIGURE 9-1

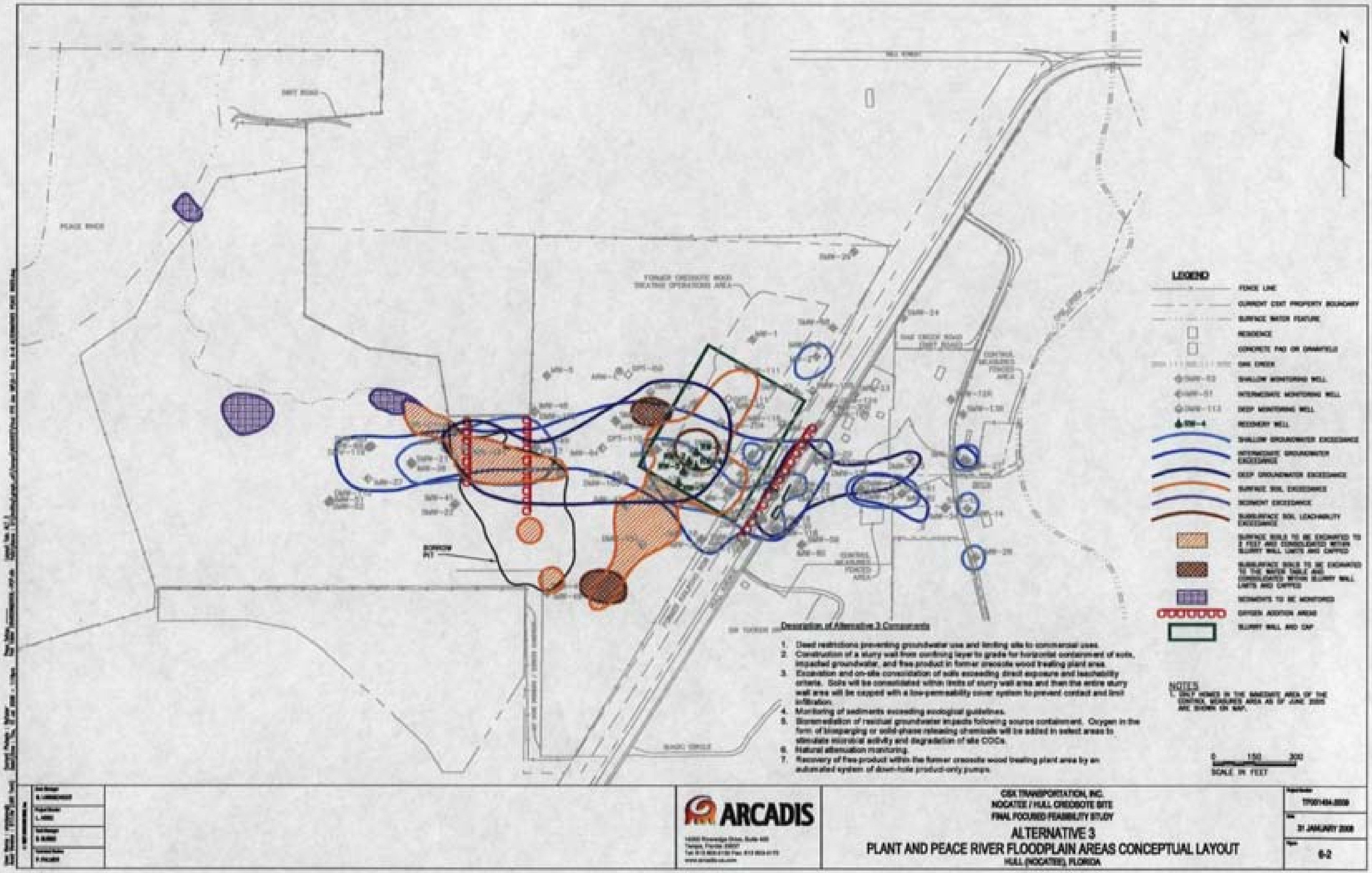
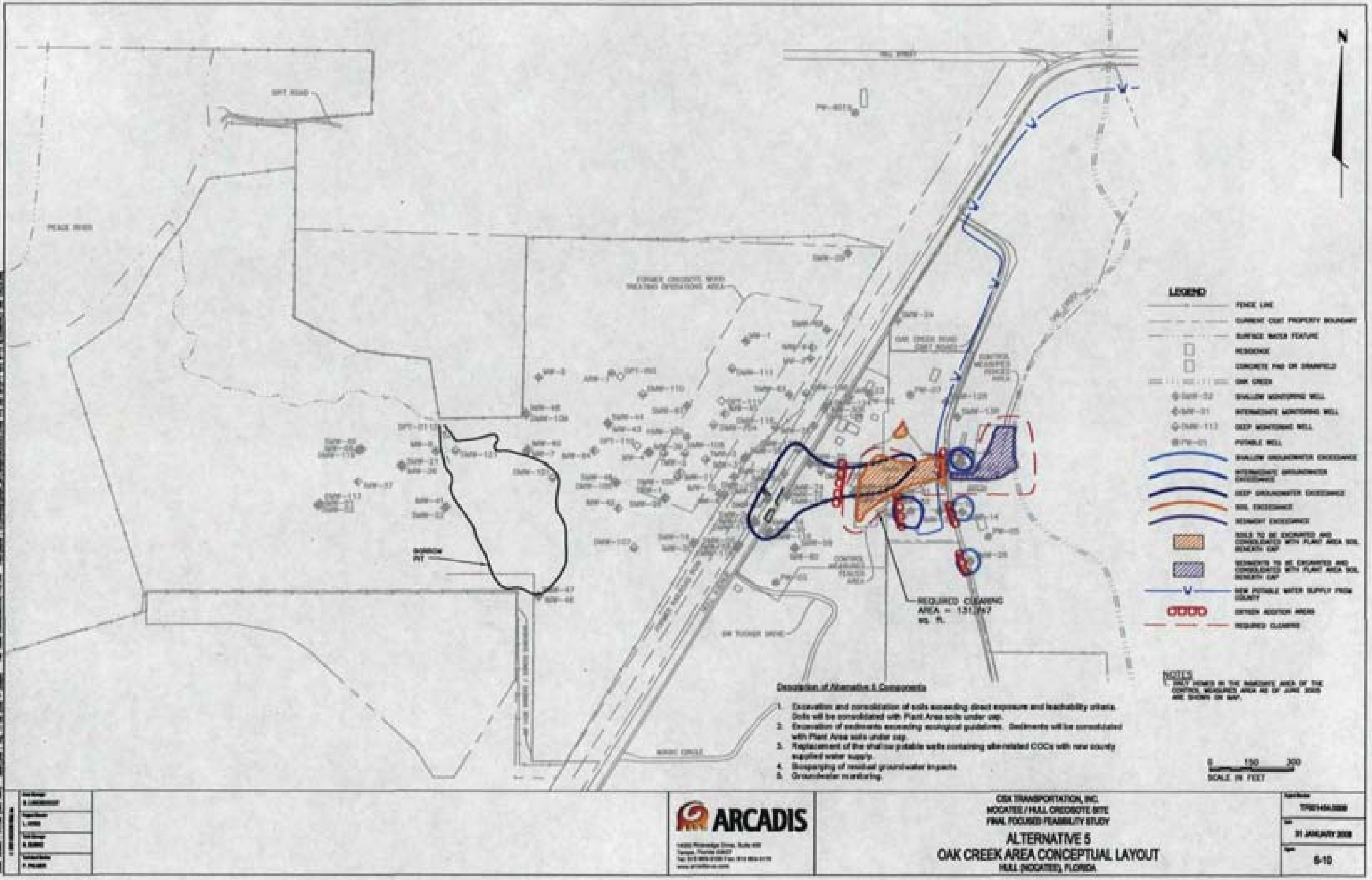

ARCADIS
CSX TRANSPORTATION, INC.
NOCATEE / HULL CREOSOTE SITE
FINAL FOCUSED FEASIBILITY STUDY
ALTERNATIVE 3
PLANT AND PEACE RIVER FLOODPLAIN AREAS CONCEPTUAL LAYOUT
HULL (NOCATEE), FLORIDA
31 JANUARY 2008
LEGEND
SCALE IN FEET
N

FIGURE 9-2



N
HILL STREET
PEACE RIVER
FORMER CREOSOTE WOOD TREATING OPERATIONS AREA
BORROW PIT
REQUIRED CLEARING AREA = 131,747 sq. ft.
LEGEND
FENCE LINE
CURRENT CSXT PROPERTY BOUNDARY
SURFACE WATER FEATURE
RESIDENCE
CONCRETE PAD OR DRAINFIELD
OAK CREEK
SHALLOW MONITORING WELL
INTERMEDIATE MONITORING WELL
DEEP MONITORING WELL
POTABLE WELL
SHALLOW GROUNDWATER EXCEEDANCE
INTERMEDIATE GROUNDWATER EXCEEDANCE
DEEP GROUNDWATER EXCEEDANCE
SOIL EXCEEDANCE
SEDIMENT EXCEEDANCE
SOILS TO BE EXCAVATED AND CONSOLIDATED WITH PLANT AREA SOIL BENEATH CAP
SEDIMENTS TO BE EXCAVATED AND CONSOLIDATED WITH PLANT AREA SOIL BENEATH CAP
NEW POTABLE WATER SUPPLY FROM COUNTY
OXYGEN ADDITION AREAS
REQUIRED CLEARING
NOTES
Description of Alternative 5 Components
1. Excavation and consolidation of soils exceeding direct exposure and leachability criteria. Soils will be consolidated with Plant Area soils under cap.
2. Excavation of sediments exceeding ecological guidelines. Sediments will be consolidated with Plant Area soils under cap.
3. Replacement of the shallow potable wells containing site-related COCs with new county supplied water supply.
4. Biosparging of residual groundwater impacts.
5. Groundwater monitoring.
0 150 300
SCALE IN FEET
ARCADIS
CSX TRANSPORTATION, INC.
NOCATEE / HULL CREOSOTE SITE
FINAL FOCUSED FEASIBILITY STUDY
ALTERNATIVE 5
OAK CREEK AREA CONCEPTUAL LAYOUT
HULL (NOCATEE), FLORIDA
31 JANUARY 2008
9-10