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**Remedy Status and Expanded Remedy
Performance Monitoring Report**

**Cabot Carbon/Koppers Superfund Site
Gainesville, Florida**

Prepared for
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September 30, 2005

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October 5, 2005

Amy McLaughlin
United States Environmental Protection Agency
61 Forsyth Street, SW
Atlanta, Georgia 30303

Re: Remedy Status and Expanded Remedy Performance Monitoring
Eastern Portion of the Cabot Carbon/Koppers Superfund Site,
Gainesville Florida.

Dear Amy:

Please find enclosed 5 copies of a report titled: "Remedy Status and Expanded Remedy Performance Monitoring – Cabot Carbon/Koppers Superfund Site, Gainesville Florida." As we discussed, copies of this report have also been sent directly to Kelsey Helton at Florida Department of Environmental Protection, John Mousa at Alachua County Environmental Protection Department and Brett Goodman at the Gainesville Regional Utilities.

This report presents the results of an expanded groundwater and surface water quality assessment of the Eastern portion the Cabot Carbon/Koppers Superfund Site undertaken at the request of USEPA and FDEP (i.e., area excluding the KII facility). The report also evaluates the effectiveness of the remedial actions undertaken at the Eastern Site. Overall, the study concludes that remedial actions implemented at the Eastern Site continue to be protective of human health and the environment.

Please contact me at 617-342-6023 should you have any questions or wish to discuss is study.

Sincerely,

A handwritten signature in black ink, appearing to read 'Wayne M. Reiber'.

Wayne M. Reiber
Manager, Environmental Assessment
and Remediaton

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Executive Summary

The Cabot Carbon/Koppers Superfund Site (Site), which is located in Gainesville, Florida, consists of two distinct portions: a wood treating facility, which is owned and operated by Koppers Industries Inc. (KII); and a former pine oil/tar plant, which was owned and operated by Cabot Carbon from 1945 to 1966. Remedial actions required by the Record of Decision (US EPA, 1990) – installation of a groundwater interceptor trench and removal of soils from the Northeast Lagoon – were implemented at the Eastern Site (*i.e.*, area excluding the KII facility) in 1995. Investigations and remedial planning are currently on-going for the wood treating facility, particularly because Dense Non-Aqueous Phase Liquid (DNAPL) related impacts have been found in the deep aquifers (Hawthorn and Floridian aquifers) at the KII facility.

Objectives

Since the second 5-year Superfund remedy review for the Eastern Site is to be undertaken in 2005/2006, the United States Environmental Protection Agency (USEPA) and the Florida Department of Environmental Protection (FDEP) requested that the scope of the routine remedy performance monitoring be expanded to assess current groundwater quality. Groundwater samples were collected from 18 monitoring wells (routine sampling includes 9 wells) and analyzed for Site-related Compounds of Concern (COCs) and pine tar indicator compounds (terpenes and terpenoids). In addition, surface water samples were also collected at two locations downstream of the groundwater interceptor trench system to assess Site impact on surface water quality.

This report utilizes these data and other historical information (*e.g.*, the risk assessment, which was the primary basis for the remedy) and approximately 10 years of remedy performance monitoring data to:

- Evaluate the effectiveness of the remedial actions undertaken at the Eastern Site in terms of protecting human health and the environment;
- Evaluate whether groundwater quality in the deep aquifers (Hawthorn and Floridian) is likely to be affected by potential DNAPL sources, if any, present at the Eastern Site.

Findings and Conclusions

Based on a comprehensive data review and analysis the following conclusions were reached:

- The remedial actions undertaken at the Eastern Site continue to remain protective of human health and the environment – confirming the conclusion reached in the previous 5-year review undertaken in 2000 by the Army Corp. of Engineers on the behalf of USEPA.
- Groundwater elevation and groundwater quality data collected along and downgradient of the interceptor trench indicate that the trench is effectively capturing groundwater from the surficial aquifer. Additionally, groundwater concentrations at monitoring wells throughout the Eastern Site continue to decline.
- Groundwater quality at the former Cabot Lagoons for phenol – the key compound-related to pine processing operations undertaken at the former Cabot property – continue to comply with the ROD-specified groundwater cleanup goal (no phenol cleanup goal exceedances have been noted for over 10 years at the former Cabot property). Groundwater quality data for terpenes and terpenoids (obtained as part of the 2005 expanded round of monitoring) – additional pine processing indicator compounds – indicated the presence of these compounds in the immediate vicinity of the former Cabot Lagoons, but rapid attenuation (to less than 1 µg/l) within 250 feet.
- An examination of soil and groundwater quality data indicates that no DNAPL is expected to be present at the former Cabot property. This conclusion is supported by low soil and groundwater concentrations (well below concentration thresholds indicative of NAPL) and a declining temporal trend in groundwater concentrations. In addition, even if pine tar DNAPL were present, due to its high viscosity (sludge or paste like material at ambient temperatures), pine tar would take between 62 to 400 years to migrate through the surficial aquifer deposits. Furthermore, DNAPL would need to pool to a thickness of more than 23 to 44 feet above the Hawthorn Clay layer before pine tar mobilization into the deeper aquifers could begin. Overall, groundwater quality in the deeper aquifer is not expected to be affected by pine processing-related compounds – a conclusion that was verified by the absence of pine processing-related compounds in monitoring wells screened in the deep (Hawthorn) aquifer.
- A review of aerial photographs and property ownership records indicates that Cabot never owned, operated, or used the Northeast Lagoon. The Northeast Lagoon abutted a former railroad track, with the eastern edge of the Lagoon being built into the railroad embankment. In addition, the chemical fingerprint of soil samples collected from the Northeast Lagoon confirms that the Lagoon was not associated with Cabot operations (elevated levels of carcinogenic PAHs detected in soils in the Northeast Lagoon, whereas no carcinogenic PAHs found at the former Cabot property). Nonetheless, a majority of the vadose zone soils from the Northeast Lagoon was excavated and disposed off-Site.
- Groundwater quality data collected at the Northeast Lagoon (monitoring wells ITW-13 and ITW-14) indicate exceedances of the ROD-specific groundwater CUGs. However, groundwater concentrations at these monitoring wells continue to decline since a portion

of the groundwater interceptor trench lies within the footprint of the Northeast Lagoon and continues to remove contaminant mass from this area.

- Although a limited quantity of residual NAPL may be present at the water table at the Northeast Lagoon, DNAPL is not likely to be present. Concentration-depth profiling data indicate elevated soil concentrations for PAHs to be present at and near the water table (5 to 10 ft-bgs) and a sharp decline in concentrations beyond that depth. In addition, groundwater concentrations even at the deep monitoring well (ITW-13) continue to decline due to the operation of the groundwater interceptor trench.

Overall, the remedial actions implemented at the Eastern Site continue to be protective of human health and the environment.

1 Introduction

The Cabot Carbon/Koppers Superfund Site (Site), which is located in Gainesville, Florida, consists of two distinct portions: a wood treating facility, which is owned and operated by Koppers Industries Inc. (KII); and a former pine tar plant, which was owned and operated by Cabot Carbon from 1945 to 1966 (Figure 1-1). The eastern portion of the Site, *i.e.*, between the KII property and North Main Street, is referred to as the "Eastern Site" and is the primary subject of this report. Remedial actions, as required in the Record of Decision (US EPA, 1990), were implemented at the Eastern Site in 1995. Investigations and remedial planning are currently on-going for the wood treating facility, particularly because Dense Non-Aqueous Phase Liquid (DNAPL) related impacts have been found in the deep aquifers (Hawthorn and Floridian aquifers) at the KII facility.

Since the second 5-year Superfund remedy review for the Eastern Site is to be undertaken in 2005/2006, the United States Environmental Protection Agency (USEPA) and the Florida Department of Environmental Protection (FDEP) requested that the scope of the routine remedy performance monitoring be expanded to define current groundwater quality. This report:

- Evaluates the effectiveness of the remedial actions undertaken at the Eastern Site in terms of protecting human health and the environment – utilizing historical information (*e.g.*, the risk assessment, which was the primary basis for the remedy) and remedy performance monitoring data, including the expanded round of data requested by EPA and FDEP; and
- Evaluates whether groundwater quality in the deep aquifers (Hawthorn and Floridian) is likely to be affected by potential DNAPL sources, if any, present at the Eastern Site.

The analysis results, which are presented in the remainder of the report, indicate that the remedial actions implemented at the Eastern Site continue to be protective of human health and the environment. Furthermore, no DNAPL sources are present at the Eastern Site and groundwater quality in the deep aquifers is not likely to be affected.

2 Site Background

This chapter presents a brief discussion of the Site's setting, operational and ownership history, and hydrogeologic conditions.

2.1 Setting

The Site is located in the northern portion of the City of Gainesville, Florida, an urbanized area. The Site is bounded by two busy roads – the North Main Street to the east and NE 23rd Avenue to the South. A number of car dealerships, businesses, restaurants, and other commercial establishments are located along these streets.

The total area of the Superfund Site is approximately 170 acres; of which, the former Cabot property covers approximately 34 acres, the KII wood treating facility approximately 90 acres, and the balance being the undeveloped area north of the former Cabot property (Figure 1-1). The former Cabot property is now occupied by a shopping mall and associated parking, and an automobile dealership (Figure 1-1).

The Site is relatively flat with topographic elevations ranging from 150 to 200 feet above mean sea level. Surface water drainage at the Eastern Site is controlled by a storm water pond located in the northwestern portion of the former Cabot property, a storm water pond at the intersection of North Main Street and 31st Avenue, and a concrete lined drainage ditch that runs along North Main Street. The drainage ditch runs north along the eastern edge of the Site until it intersects an east-west ditch (near NE 31st Avenue), which discharges into Springstead Creek and ultimately to Hogtown Creek.

2.2 Site History

2.2.1 Ownership History

Industrial operations at the former Cabot property were undertaken from approximately 1911 to 1967. Williamson Chemical Company and Florida Industrial Corporation produced turpentine and naval stores (oils and tars derived from pine trees and used as wood rope and sail coatings on ships) at the property from 1911 to 1928. Retort Chemical Company (Retort) built the pine processing plant in 1928.

Cabot acquired the pine plant in 1945 and operated it until approximately 1966. In June 1967, Cabot sold the property to a local developer – Mr. Raymond Tassinari. In October 1967, Mr. Tassinari breached the former Cabot Lagoons (described in detail below), which are believed to have had a 5 to 6 foot earthen berm, and released the contents of the Lagoons. Remediation of this release is believed to have consisted of: blending the contents into surficial soils throughout the affected area. Between 1977 and 1978, the property was developed as a shopping mall and a car dealership, which are currently located at the property.

2.2.2 Operational History

The pine processing operation undertaken at the former Cabot property utilized a relatively simple process, which extracted and concentrated oils and tars that naturally occur in pine trees. It consisted of first pyrolyzing pine tree stumps (heating in the absence of air) to high temperatures (800° F) in retorts (Figure 2-1). The pyrolyzation products were: charcoal, light pine oils, pyrolygneous acids, and pine tars. For the first few years of the plant's operation, the liquids from this process (oils, acids, condensed gases and tars) were allowed to settle in a concrete-lined, acid water pond. From 1949 onwards, after the construction of the three former Cabot Lagoons, pyrolyzation liquids were conveyed to the former Cabot Lagoons. The light-end liquids and pine tar were recovered from the Cabot Lagoons, refined in a still, and sold as final products (Figure 2-1). The pyrolygneous acids, the only waste material produced by the operation, evaporated from the surface of the Lagoons.

2.3 Geology and Hydrogeology

2.3.1 Site Stratigraphy

The geologic and hydrogeologic understanding for the Site has evolved in the last five years due to additional data collected at the KII facility. The initial conceptual site model, presented in the RI report (Hunter/ESE, 1989), identified three key stratigraphic units: an unconfined surficial aquifer, an approximately 50-foot layer of low permeability clay referred to as the Intermediate aquifer (Hawthorn Formation), and the Floridian limestone aquifer, a highly productive unit and a regional water supply source.

Hydrogeologic data collected at the KII property has led to the refinement of this model. The Intermediate aquifer is not one large low permeability clay unit as previously believed, but instead a

series of clay and silt/clay-sand units, resulting in two water bearing sub-units – the Upper Hawthorn Group and the Lower Hawthorn Group – as depicted on the generalized cross-section on Figure 2-2. The key hydrogeologic characteristics of these aquifer systems, as reported in the Field Investigation Activities Report (TRC, 2002) and Groundwater Flow and Transport Report (GeoTrans, 2004) are summarized below:

Surficial Aquifer System

- Lithology: fine- to medium-grained quartz sand with trace amounts of silt and clay
- Thickness: approximately 20 to 30 feet
- Hydraulic conductivity: approximately 7×10^{-3} cm/sec
- Depth to water in the surficial aquifer on Site is typically about 5 feet below ground surface.

Upper Hawthorn

- Lithology: clayey sand
- Thickness: approximately 35 to 40 feet
- Hydraulic conductivity: on average 1×10^{-5} cm/sec (TRC, 2002)

Lower Hawthorn

- Lithology: clayey sand
- Thickness: approximately 30 feet
- Hydraulic conductivity: on average 2×10^{-5} cm/sec (TRC, 2002)

Floridian (US ACE, 2000)

- Lithology: limestone
- Thickness: over 1000 ft
- Hydraulic conductivity: high permeability, primary source of potable water in the Gainesville area.

2.3.2 Groundwater Flow

Groundwater flow direction in the two upper-most hydrogeologic units – the surficial aquifer and the Upper Hawthorn Group – at the Superfund Site is in a north-easterly direction (Figures 2-3 and 2-4). The hydraulic influence of the groundwater interceptor trench, which is located along the western edge of

North Main Street, is clearly visible within the surficial aquifer (Figure 2-3). Groundwater elevation data collected as part of the KII investigation indicates that the groundwater flow direction in the Lower Hawthorn Group and the Floridian aquifer are to the north-west and north, respectively (Figures 2-5 and 2-6). Note, groundwater flow direction within the Lower Hawthorn Group and the Floridian aquifer at the Site is different from the groundwater flow direction in the two upper overburden hydrogeologic units.

3 Remedial Actions

This chapter presents a discussion of the remedial actions undertaken at the Eastern Site including the bases for the remedial actions, the ROD remedy requirements, and a presentation of the key conclusions reached in the prior 5-year remedy review undertaken by the Corp. of Engineers (US ACE, 2000).

3.1 Remedial Objectives and Cleanup Goals

Remedial action objectives (*i.e.*, the need for and extent of remediation) and soil and groundwater cleanup goals (CUGs) for the Site were developed on the basis of a site-specific risk assessment and to comply with federal and state ARARs. Since the operational history (pine plant vs. wood treating) and the chemicals of concern (COCs) for the two portions of the Superfund Site (*i.e.*, former Cabot and KII) were distinct and different, the risk assessment evaluated risks separately for the two portions of the Site. For the former Cabot portion, the risk assessment concluded that:

- Soil direct contact risks (*i.e.*, from incidental ingestion and dermal contact) to all receptors evaluated, including future residents, were acceptable.
- Risks *via* the inhalation pathway (*i.e.*, volatilization and particulate exposure) were also insignificant.
- Hypothetical use of groundwater from the surficial aquifer (using a hypothetical well located along the eastern boundary of the Site) would pose marginal non-cancer health risks – hazard index of 1.2 vs. a target of 1.0.

The results of the risk assessment were used to define one set of soil and groundwater cleanup goals that would be applicable to the KII and the Eastern portions of the Superfund Site. In addition to the risk assessment, compliance with federal and state ARARs (*e.g.*, the benzene groundwater CUG, which is driven by the State's MCL; Table 3-1), and transfer from one media to another (*e.g.*, leaching from soil to groundwater), were also considered in the establishment of soil and groundwater CUGs for the COCs for the two portions of the Superfund Site (Table 3-1). Note, of the COCs identified for the Site, phenol is the only compound that is directly associated with the former Cabot pine processing operations. The other COCs are either associated with wood treating operations (*e.g.*, PAHs, arsenic, chromium, pentachlorophenol) or are ubiquitous in urban settings (*e.g.*, benzene).

3.2 ROD Remedial Requirements

For the Eastern portion of the Site, the ROD-required remedy consisted of:

- Extraction and treatment of affected groundwater from the surficial aquifer since the risk assessment had indicated that hypothetical future potable use (highly unlikely scenario) along the Eastern Site boundary would pose non-cancer risks that marginally exceeded the risk target. Extracted groundwater was to be treated at the Gainesville Regional Utility (GRU).
- Replacement of the North Main Street ditch with a new storm water conveyance system to prevent discharge of affected groundwater into the ditch and subsequent flow into Springstead and Hogtown Creeks.

The remedy was implemented in 1995 as discussed in Section 3.3.

In addition to the above-defined specific remedial requirements, the ROD also required that the following tasks be undertaken as part of the remedial design phase:

1. Subsurface soil sampling to locate and define extent of subsurface soil contamination in the area of a suspected lagoon to the northeast of the former Cabot property;
2. Additional soil sampling in the former Cabot Lagoons;
3. Additional Hawthorn Formation (also referred to as the Intermediate aquifer) groundwater sampling;
4. Sediment sampling in Springstead Creek; and
5. Locate/abandon former Cabot production wells and USTs, if any.

These ROD-required remedial and supplemental study requirements have been fully implemented at the Eastern portion of the Site as discussed in detail in the next section.

3.3 ROD Implementation

In 1992, Cabot signed a Consent Decree that required implementation of the ROD-required actions (remedial actions and supplemental studies described above) in the Eastern portion of the Site. The supplemental studies, which were implemented as part of the remedial design phase, identified two additional areas requiring additional actions: 1) Affected soil was identified in the area of the suspect lagoon – now referred to as the Northeast Lagoon area – that was excavated and disposed off-site; and 2)

former Cabot production wells were located and properly abandoned (Weston, 1998). Studies undertaken to address the other issues identified in the ROD (Cabot Lagoon soil sampling, Intermediate aquifer monitoring, Springstead Creek sediment sampling, and former Cabot UST location and abandonment) did not require any remedial actions. To summarize, the key remedial actions implemented at the Eastern portion of the Site include: 1) Installation of a Groundwater Interceptor Trench as required in the ROD; and 2) Soil Removal at the Northeast Lagoon. These remedial actions are discussed in further detail in the following sub-sections.

3.3.1 Groundwater Interceptor Trench

In 1985, an interim groundwater remedy, referred to as Project Jumpstart, was installed along the eastern edge of the Site. A drainage ditch located along the west side of North Main Street (referred to as the North Main Street Ditch) was used to collect groundwater, which was then pumped to the GRU sewage treatment plant.

This temporary system was replaced in 1995 by a permanent subsurface drainage trench and collection pipe installed under the North Main Street Ditch. The interceptor trench consists of two perforated pipes (spanning the range of seasonal groundwater elevation fluctuations) surrounded by aggregate fill (Figure 3-1). A cleanout station and four sumps are located along the interceptor trench. Groundwater from either side flows into the trench, and is pumped at the lift station located at the northern end of the trench. Extracted groundwater continues to be pumped to the GRU sewage treatment plant. Over the past 20 years, more than half a billion gallons of impacted groundwater has been captured and treated by the trench system. Groundwater elevation and quality data collected on a quarterly basis indicate that the groundwater interceptor trench is continuing to effectively capture affected groundwater.

As part of the groundwater interceptor trench installation, the North Main Street Ditch (an earthen ditch) was replaced with an engineered concrete-lined swale, as indicated in Figure 3-1. This was required by the ROD to prevent discharge of affected groundwater into the ditch.

3.3.2 Northeast Lagoon

Limited information was available regarding the Northeast Lagoon at the time the ROD was issued and when Cabot signed the Consent Decree. Since then significant additional information has been developed in two stages: 1) Mid 1990s – soil sampling as required by the ROD was undertaken, a risk assessment was conducted, and soils were excavated and disposed off-site; and 2) Late 1990s – ownership and operational history of the Northeast Lagoon was researched and the footprint of the Lagoon was precisely surveyed. The following paragraphs present a summary of the findings from this work.

History

A detailed review of aerial photographs and property deeds for the Northeast Lagoon and adjoining land parcels indicate that:

- Cabot never owned, operated, or used the Northeast Lagoon. The Northeast Lagoon is located north of the former Cabot property as indicated on Figure 3-2.
- The Lagoon abutted a former railroad track (Figure 3-3) and was partly located in the railroad right-of-way.
- Aerial photographs indicate that an engineered berm extended around the Lagoon with the eastern edge being built into the side of the railroad embankment. The presence of this berm would have prevented migration of any surface water originating at the former Cabot property into the Northeast Lagoon.

Since Cabot never owned, operated, or used the Lagoon, operational history of the Lagoon is unavailable to Cabot. However, based on a review of available aerial photographs and other activities (e.g., redevelopment) that have been undertaken in and around the Lagoon, the following history has been developed:

Date	Conclusions
1937 (Figure 3-3)	Earliest available aerial photograph for area. Shows the Northeast Lagoon bounded by railroad track, but no access roads to the Lagoon exist.
1949 (Figure 3-4)	No significant change since 1937 photograph in the vicinity of the Lagoon.
1956 (Figure 3-5)	Last aerial photograph on which Lagoon is visible; Lagoon appears inactive and continues to deteriorate from 1937 to 1956.
1961 (Figure 3-6)	North Main Street constructed, a portion of which overlies the Lagoon, which has been filled-in by this point in time.
1978	28 th Place, which runs through the Lagoon, constructed as part of the development of the shopping mall that currently exists at the former Cabot property.
1993-1994	North Main Street widened; portion of widened street runs through the former Lagoon.

Overall, the above summary clearly demonstrates that the Northeast Lagoon was not associated with operations at the former Cabot property. Furthermore, soil characterization data at the Northeast Lagoon indicate a different chemical signature than the former Cabot property soils corroborating that the Northeast Lagoon is not associated with former Cabot operations.

Soil Characterization and Remediation

A total of 40 soil samples were collected at and in the vicinity of the Northeast Lagoon as part of the supplemental investigation undertaken to define the extent of subsurface soil contamination as required by the ROD. PAHs, a group of compounds not associated with operations undertaken at the former Cabot facility, were primarily detected in soils. The human health risk assessment undertaken to evaluate potential risks to Northeast Lagoon soils concluded that risks were acceptable (Weston, 1993). Nonetheless, a total of 4,673 tons of soils were excavated and transported to Soil Remediation, Inc. (SRI) in Ray City, Georgia for low temperature thermal desorption. All affected soils within the Lagoon footprint in unpaved areas to the water table were excavated and removed. Although the human health risks posed by the Northeast Lagoon soils were acceptable, soil remediation was undertaken: a) to be protective of groundwater quality within the surficial aquifer; and b) the groundwater interceptor trench-related excavation was to go through a portion of the Lagoon, and hence removal and off-site disposal of these soils was not onerous and seemed appropriate.

was under road pavement not excavated

3.4 Five Year Remedy Review Undertaken in 2000

The U.S. Army Corps of Engineers (US ACE), on behalf of EPA, performed the first 5-year remedy review of the Site in September 2000. Key conclusions of this review for the Eastern Site were:

- Remedies implemented in the Eastern portion of the Site remain protective of human health and the environment;
- The groundwater interceptor trench continues to effectively collect constituents in the surficial aquifer throughout its entire length and maintain effective hydraulic control within the upper surficial aquifer; and
- Groundwater concentrations in monitoring wells along the trench are stable or decreasing.

The US ACE review also indicated that since groundwater cleanup goals had not yet been met, the trench should continue to operate, which it has. The review also identified a few areas requiring follow-up (*e.g.*, repairs or abandonment of selected monitoring wells, repair of washout area in drainage ditch, performing a detailed operation and maintenance inspection at the interceptor trench Lift Station), which were addressed. Overall, the US ACE report concluded that the Eastern Site remedy was effectively meeting its design objectives.

4 Remedy Status

This chapter discusses the status of the remedial actions implemented at the Eastern Site, *i.e.*, evaluates whether the remedies continue to be protective of human health and the environment, using all data that are representative of current environmental conditions at the Site (including the quarterly remedy performance monitoring data and the expanded round of monitoring data collected in 2005). An evaluation of whether groundwater quality in the deep aquifers (Hawthorn and Floridian) is likely to be affected by potential DNAPL sources, if any, present at the Eastern Site is also presented.

4.1 Remedy Performance Monitoring Data

4.1.1 Groundwater Interceptor Trench

Groundwater quality and elevation monitoring is undertaken at the Eastern Site on a quarterly basis to assess the performance of the groundwater interceptor trench. The following data are collected during each monitoring event:

- Water elevation measurements are recorded at 42 locations – 10 piezometers, the 4 sumps associated with the interceptor trench, and 28 monitoring wells;
- Groundwater quality samples are collected at a total of 9 surficial aquifer monitoring wells – 2 upgradient/background and 7 monitoring wells located along the groundwater interceptor trench. These samples are analyzed for all COCs identified in the ROD.

These data are presented in quarterly monitoring reports that are submitted to USEPA and FDEP. A summary of the pre- and post-remedy implementation groundwater quality data are summarized in Appendix A.

Monitoring Results

Groundwater elevation and quality data collected since the previous 5-year remedy review indicate that the conclusions reached in the previous review are still valid:

- The groundwater interceptor trench continues to be effective in intercepting and collecting surficial aquifer groundwater. Groundwater elevations clearly demonstrate that groundwater from both sides of the trench is flowing towards the trench.

- Groundwater quality data downgradient of the trench (wells WMW-17E and WMW18E) also indicate that the trench is effectively capturing groundwater.
- Groundwater concentrations in monitoring wells upgradient of the trench are stable or declining indicating that the trench is effectively removing residual mass from the subsurface.
- The interceptor trench has eliminated discharge of affected groundwater to the North Main Street ditch – a remedial objective specified in the ROD.

Overall, the groundwater interceptor trench is effectively meeting its design objectives, and continues to be protective of human health and the environment.

4.1.2 2005 Expanded Monitoring

Since the groundwater interceptor trench-related quality data are collected at locations near the trench, FDEP requested that an expanded round of data be collected in Spring 2005 in preparation for the 5-year remedy review. Gradient developed an expanded scope for the monitoring event, which was discussed with and approved by USEPA and FDEP. The groundwater interceptor trench-related quarterly groundwater monitoring scope was amended to expand the number of wells sampled and the list of constituents analyzed. In addition, surface water samples were also collected.

Groundwater

The scope of the quarterly groundwater monitoring program was expanded to include 9 additional monitoring wells (for a total of 18 wells – 9 routine quarterly monitoring wells and 9 additional wells; Table 4-1; Figure 4-1) located near and downgradient of the former Cabot Lagoons. These monitoring wells have not been sampled recently and were included to provide a comprehensive dataset for the Eastern Site (*i.e.*, beyond the interceptor trench area).

Groundwater samples were collected from the 18 wells in March 2005 and analyzed for VOCs, semi-volatile organics, arsenic, and chromium. Monitoring results are summarized in Table 4-2 and discussed in Section 4.2.

In addition to the ROD COC list, groundwater samples from 4 monitoring wells, one located upgradient (ITW-4) and three downgradient (ITW-8, ITW-9 and ITW-11) of the former Cabot Lagoons,

were also analyzed for terpenes and terpenoids – pine processing indicator compounds. Monitoring results are summarized in Table 4-3 and discussed in Section 4.2.

Expanded scope monitoring results for phenol and terpenes and terpenoids are presented on Figure 4-2.

Surface Water

Two surface water samples (SW-1 and SW-2) were also collected from the east-west running stream located just north of the groundwater interceptor trench (Figure 4-1). These samples were collected to determine whether any groundwater affected by the Eastern portion of the Site was impacting surface water quality. Sample, SW-1, was collected in an area where groundwater impacted by the Eastern portion of the Site would be affecting surface water quality. An upstream sample (SW-2) from the east side of North Main Street was also collected for reference. Note the North Main Street Ditch does not receive any groundwater discharge currently, since groundwater in this area is collected in the interceptor trench, and the Ditch only has surface water after precipitation events.

Surface water samples from the two locations were collected in April 2005 and only analyzed for PAHs using EPA Method 8270. Due to a field oversight, these surface water samples were not analyzed for the acid extractable semi-volatile fraction, which includes phenol. Consequently, surface water samples were recollected in June 2005 and analyzed for the full EPA Method 8270 list.

No compounds were detected in either the April or June 2005 samples collected at both sampling locations (SW-1 and SW-2). Laboratory analytical results are included in Appendix C. These results further demonstrate that the groundwater interceptor trench is effectively preventing discharge of affected groundwater to surface water.

Although no compounds were detected in the surface water samples collected in April and June 2005, it should be noted that the surface water cleanup goal of 1 µg/l for total phenols specified in the ROD is not appropriate for the Eastern Site. The 1 µg/l total phenols value is a State of Florida surface water standard. However, the Florida Administrative Code 62-302.530 (FDEP, 1979) clearly indicates that this standard applies to total chlorinated phenols and total chlorinated cresols. As discussed in Section 2.2, the Cabot Carbon operations produced pine oil and tar products by pyrolyzing wood – a

process that yielded phenol and other compounds (e.g., terpenes and terpenoids – see Section 4.2 for additional details), but no chlorinated phenols or chlorinated cresols. Therefore, a standard based on chlorinated phenols and chlorinated cresols is not appropriate for the Cabot Carbon portion of the Site.¹ Since phenol is the key compound of concern (COC) for the Cabot Carbon portion of the Site (see Section 4.2 for additional detail), the State of Florida surface water standard for phenol (300 µg/l) is more appropriate for this portion of the Site.

4.2 Environmental Conditions and Potential for DNAPL Presence

This section discusses the environmental conditions and the potential for DNAPL presence at the Eastern Site. Since the Northeast Lagoon was never owned, operated, or used by Cabot, the discussion is separated into two components – impacts at and associated with the former Cabot property (but excluding the Northeast Lagoon), and the Northeast Lagoon.

4.2.1 Former Cabot Property

Soil and groundwater quality at the former Cabot property has been well characterized as a result of a series of investigations that have been undertaken over the years. In addition to the CERCLA RI/FS-process and FDEP-driven studies, additional data were collected in the mid-1990s to characterize potential sources at the Cabot property as part of the multi-party cost allocation litigation. All available data are utilized in the following discussion.

Cabot Indicator Compounds

A relatively simple process (pine stump pyrolyzation, without the use of solvent or other chemicals) was used to produce pine products at the former Cabot facility (refer to Section 2.2.2 for details). This process has a relatively distinct chemical fingerprint compared to the other sources of interest at the Superfund Site (i.e., KII-related wood treating, automobile dealership contributions, urban use and/or parking-lot contributions). Pine tars and oils generated during the pine pyrolyzation process primarily contain the following class of relatively low toxicity compounds:

¹ Note, pentachlorophenol (a chlorinated phenol) was used as part of wood treating operations undertaken at the KII facility. This may have led to the chlorinated phenols-based surface water standard as having been specified as the surface water cleanup goal for the entire Superfund Site.

- Phenols (*e.g.*, phenol and 2,4-dimethylphenol);
- Terpenes (*e.g.*, camphene, dipentene);
- Terpenoids (*e.g.*, terpineol, borneol); and
- Resin acids (*e.g.*, abietic acid).

With a few exceptions (*e.g.*, phenol and 2,4-dimethylphenol), compounds present in pine tar and oils are not on the standard CERCLA Target Compound List (TCL). Phenol is the best indicator compound for evaluating impacts associated with former Cabot operations because: a) phenol was considered a COC in the risk assessment and site-specific soil and groundwater CUGs are available, thus providing a means to evaluate the significance of the detected concentrations; and b) phenol is a standard TCL constituent and has been analyzed in almost all studies undertaken at the Site – hence providing a robust size database for this compound. Terpenes and terpenoids are also good indicators of former Cabot operations, however, these compounds are not remedy driving COCs and no CUGs are available for them. Finally, note, that phenols, terpenes, and terpenoids can be attributed to other sources (*e.g.*, phenols unrelated to Cabot found at the KII facility), and are hence not unique Cabot marker compounds, but are good indicators for evaluating pine processing-related contributions on the former Cabot property. The following discussion focuses on phenol and to a lesser extent terpenes and terpenoids for evaluating soil and groundwater quality at the former Cabot property.

Soil

A total of 108 soil borings have been advanced at the former Cabot property, with approximately 135 soil samples submitted for laboratory analyses (Figure 4-3);^{2,3} Appendix B includes a table of concentrations detected in the laboratory samples.

The data available at the time of the issuance of the ROD, and supplemental data collected since then, indicate the presence of relatively low levels of organics with no discrete, definable source areas at the former Cabot property. Given the facility's operational history, the former Cabot Lagoons appeared to have the potential to be a source area. However, when the Lagoons were breached by Mr. Tassinari, he blended the contents of the Lagoon with surrounding soils hence mixing and spreading these

² Soil samples from certain soil boring locations (indicated on Figure 4-3) were screened using a field GC and were not submitted for laboratory analyses.

³ Note, additional samples were collected at the automobile dealership as part of investigations undertaken at that facility to address petroleum releases. These samples are not included in this compilation.

materials. The ROD concluded that the blending of the Lagoon's contents had made the materials "too diluted to currently act as a significant source area" (Page A19). Supplemental soil sampling undertaken near the Lagoons, a ROD requirement, did not encounter elevated phenol levels and confirmed this conceptual model. In fact, the distribution of phenol concentrations (the primary pine processing indicator compound) at the former Cabot property indicates the absence of phenol in a vast majority of the soil samples, with few detected concentrations in and around the former Lagoons (Figure 4-4). Overall, soils at the former Cabot property are not an issue – a conclusion also reached in the RI/FS risk assessment, which found that human health risks *via* the soil pathway were insignificant even under a hypothetical residential land use scenario.

Groundwater

Groundwater concentrations at the former Cabot property have been well below the conservative ROD groundwater CUG for phenol,⁴ the pine processing indicator compound driving the remedy, for a number of years:

- The groundwater CUG for phenol has not been exceeded at any of the 14 monitoring wells at or near the Cabot property in the last 10 years of monitoring (Appendix A; Figure 4-5). ↗ Non-toxic
- Near the former Cabot Lagoons 7 out of the 8 monitoring wells (ITW-6 through ITW-11, ITW-15 and ITW-16) never had a single exceedance of the phenol groundwater CUG (only exception was ITW-10; but concentrations even at this location have been below the CUG since the mid-1990s; Figure 4-5).
- Low levels of phenol (max.- 260 µg/L), well below the ROD groundwater CUG (2,630 µg/L), were detected in the 2005 expanded round of monitoring (Table 4-2 and Figure 4-2).
- No phenol was detected in ITF-3, the representative Hawthorne group well that was included in the 2005 expanded round of monitoring, indicating that the groundwater in the Hawthorne formation has not been impacted by pine processing compounds.

The terpene and terpenoid data collected in the 2005 expanded monitoring round indicate the localized presence of these compounds (on the order of 100 to 1000 µg/l) immediately downgradient of the former Cabot Lagoons (ITW-8 and ITW-9), which is expected, with much lower concentrations (less than 1 µg/l) a short distance away (ITW-11). These data indicate the presence of terpenes and terpenoids is limited to the immediate vicinity of the former Cabot Lagoons.

⁴ Note, the ROD groundwater CUG for phenol (2,630 µg/L) is overly conservative. USEPA's groundwater CUG in the ROD amendment proposed for the KII facility was 22,000 µg/L (US EPA, 2001).