

**Supplemental Groundwater Quality
Characterization Work Plan**

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

Prepared for
Cabot Corporation
Two Seaport Lane
Suite 1300
Boston, MA 02210

Prepared by
Gradient Corporation
20 University Road
Cambridge, MA 02138

November 28, 2007

Table of Contents

	<u>Page</u>
1	Introduction 1
2	Scope of Work 2
2.1	Potential for Contamination in Hawthorn Group deposits at the Cabot Site 2
2.2	Former Cabot Lagoons 2
2.3	Interceptor trench effectiveness 3
2.4	Frequency of development and sampling of monitoring wells..... 4
2.5	Lift Station Odors 4
3	Proposed Schedule..... 5

List of Tables

Table 1	Proposed Amended Expanded Groundwater Monitoring Program - 2007
---------	---

List of Figures

Figure 1	Groundwater Sampling Locations
Figure 2	Pre-Remedy Groundwater Data - 1989
Figure 3	Pre- and Post-Remedy Concentrations of Phenol at ITW-17/WMW-17E

Attachments

Attachment A	Depth of Vertical Capture Zone of Groundwater Interceptor Trench
--------------	--

1 Introduction

This report defines the scope of supplemental groundwater quality characterization to be conducted at the eastern portion of the Cabot Carbon/Koppers Superfund Site (“Site”) – an United States Environmental Protection Agency (USEPA) request in response to the Five Year Review Report for the Site (USACE, 2006)¹. The Five Year Review Report identified five Cabot-related issues, which have been discussed on conference calls and in written correspondence (Cabot, 2006; USEPA, 2007)². This report lists these five issues and presents the supplemental actions to be taken by Cabot, as discussed and agreed upon during the conference call with USEPA on October 2, 2007.

¹ U.S. Army Corps of Engineers (USACE). 2006. Second Five-Year Review Report for Cabot Carbon/Koppers Superfund Site, Gainesville, Florida. April.

² Cabot Corporation (Cabot). 2006. Letter to Amy L. McLaughlin (United States Environmental Protection Agency) re: Five Year Review- Cabot/Koppers Superfund Site, Gainesville, Florida. July 25.
United States Environmental Protection Agency. 2007. Letter to Wayne M. Reiber (Cabot Corporation) re: Five Year Review- Cabot/Koppers Superfund Site, Gainesville, Florida. September 11.

2 Scope of Work

2.1 Potential for Contamination in Hawthorn Group deposits at the Cabot Site

Issue: The Five-Year Review Report raised concerns regarding the potential for surficial aquifer contamination attributable to Cabot to migrate downwards into the Hawthorne Group formation.

Based on the comprehensive soil and groundwater quality data set available for the Site and the fate and transport characteristics of pine tar, impacts from former Cabot operations are not anticipated to affect the Hawthorn Group deposits. On the other hand, contamination has been detected in the Hawthorn Group deposits at the Koppers property. USEPA indicated that Koppers is currently collecting additional data to define the downgradient extent of contamination in this aquifer unit, including installation and sampling of monitoring wells on the former Cabot property.

Proposed Action: If the data collected by Koppers show that pine processing indicator compounds (*e.g.*, terpenes and terpenoids) are detected at elevated concentrations in the Hawthorn Group deposits on the Cabot property, then Cabot will undertake additional investigations. However, it was agreed on the October 2 conference call that Cabot does not need to undertake additional actions to address this issue at this time.

2.2 Former Cabot Lagoons

Issue: USEPA has requested that groundwater quality be characterized at all monitoring wells, located east of the Koppers property and in the vicinity of the former Cabot lagoons, to determine if the lagoons are a continuing source of contamination.

Proposed Action: Although the low soil concentrations and declining groundwater concentrations measured in the surficial aquifer near the former Cabot lagoons strongly indicate that they are not a continuing source of contamination (Cabot, 2006), per EPA's request, Cabot will perform a one-time expanded groundwater monitoring event, similar to that performed in March 2005. The objective of this monitoring event will be to characterize current groundwater quality in the surficial aquifer in the vicinity of the Cabot lagoons and downgradient areas. Therefore, the quarterly sampling event will be expanded to include a total of 18 monitoring wells (9 routinely sampled and 9 additional wells; see Figure 1) located east of the Koppers property. Groundwater samples will be analyzed for the complete quarterly

monitoring program list, which includes all compounds of concern identified in the Record of Decision (ROD) and a few additional analytes (see Table 1). All monitoring wells will be redeveloped before they are sampled to ensure that the samples are representative of aquifer conditions. Results of this expanded monitoring event will be evaluated in conjunction with groundwater data being collected upgradient of the Cabot Lagoons (by Koppers) to appropriately account for contributions from all potential sources.

2.3 Interceptor trench effectiveness

Issue: The Five-Year Review Report raised concerns regarding the effectiveness of the Cabot interceptor trench. USEPA has requested that Cabot install additional monitoring wells or advance direct push points to demonstrate that the interceptor trench is effectively capturing contaminated groundwater in the surficial aquifer. However, a review of the following pre- and post-trench installation groundwater quality data and other analyses results discussed below strongly indicates that the interceptor trench is effectively controlling migration of affected groundwater within the surficial aquifer:

- A review of pre-remedy groundwater quality data collected on the former Cabot property and at the adjacent Steadham property (located east and downgradient of North Main Street) indicated that the pre-remedy lateral extent of the groundwater plume was limited and clearly defined (see Figure 2). The highest pre-remedy groundwater concentrations, east of North Main Street, were detected at ITW-17, which was located immediately downgradient of the Northeast Lagoon. Although low concentrations were detected at SW-2, located on the Steadham Property and to the northeast of ITW-17, it is not clear whether these were associated with the former Cabot property. No site-related contaminants were detected at any other monitoring wells east of North Main Street, including ITW-18. This may be attributed to the historical drainage ditch along North Main Street that intercepted a vast majority of shallow groundwater and prevented off-Site migration (Figure 2). Therefore, even prior to trench installation, the groundwater plume was localized to the ITW-17 area.
- Following the installation of the trench, Site-related compounds have not been detected at wells WMW-17E and WMW-18E, which replaced wells ITW-17 and ITW-18 (see Figure 3)³. The absence of site-related compounds in these wells, which are screened across the surficial aquifer, is clear indication that the trench is effectively capturing groundwater from the entire thickness of the surficial aquifer. Additionally, given that WMW-17E is located in the area where historically (pre-remedy) elevated groundwater concentrations were detected, (*i.e.*, WMW-17E is ideally located to evaluate trench effectiveness) additional monitoring wells are not necessary.
- Finally, the post-remedy groundwater quality data discussed above are consistent with groundwater flux calculations that were performed to evaluate whether the trench was capturing the entire thickness of the surficial aquifer. Calculations indicate that the vertical extent of the trench capture zone ranges from 37 to 40 feet, which is greater than the thickness of the surficial aquifer (Attachment A). Note, these calculations utilized an average groundwater extraction rate

³ Note, phenol has never been detected at well WMW-18E in almost 15 years of quarterly monitoring.

at the trench of 47 gpm and a (WHI-defined) hydraulic conductivity of 21 ft/day for the surficial aquifer, and a range of values for hydraulic gradient (6.95×10^{-3} to 8.95×10^{-3} ft/ft) and capture zone widths (1,325 to 1,554 feet) (see Attachment A).

Proposed Action: Overall, 10 years of post-remedy groundwater quality data from strategically positioned monitoring wells provide substantial evidence that the trench is effective in capturing the entire saturated thickness of the surficial aquifer and collecting any additional trench-performance data is unnecessary.

2.4 Frequency of development and sampling of monitoring wells

Issue: USEPA has requested that the wells included in the next groundwater monitoring event be redeveloped to ensure that groundwater samples collected are representative of aquifer conditions.

Proposed Action: As mentioned in Section 2.2, all monitoring wells included in the expanded groundwater monitoring event will be redeveloped prior to sampling.

2.5 Lift Station Odors

Issue: The issue of groundwater-related odors emanating from the Cabot lift station and sumps was raised in the Five-Year Review Report. Although air concentrations of compounds attributable to the lift station were well below health-based thresholds and do not pose a risk to human health (Weston, 2005)⁴, carbon filters were installed to minimize odor emanation.

Proposed Action: USEPA has acknowledged that Cabot has successfully resolved the lift station odor issue and does not need to take any further action (USEPA, 2007).

⁴ Weston Solutions, Inc (Weston). 2005. Ambient Air Quality Impact and Worker Exposure Assessment Cabot Carbon Lift Station- Eastern Portion of Cabot Carbon/Koppers Superfund Site, Gainesville, Florida. May.

3 Proposed Schedule

The expanded groundwater monitoring event (see Section 2.2) will be implemented during a quarterly sampling event after Koppers has installed additional monitoring wells on the former Cabot property. The sampling schedule will be coordinated with USEPA so that groundwater quality data collected at the monitoring wells proposed here-in (Section 2.2) are contemporaneous with groundwater quality data collected by Koppers at newly installed monitoring wells on the former Cabot property.

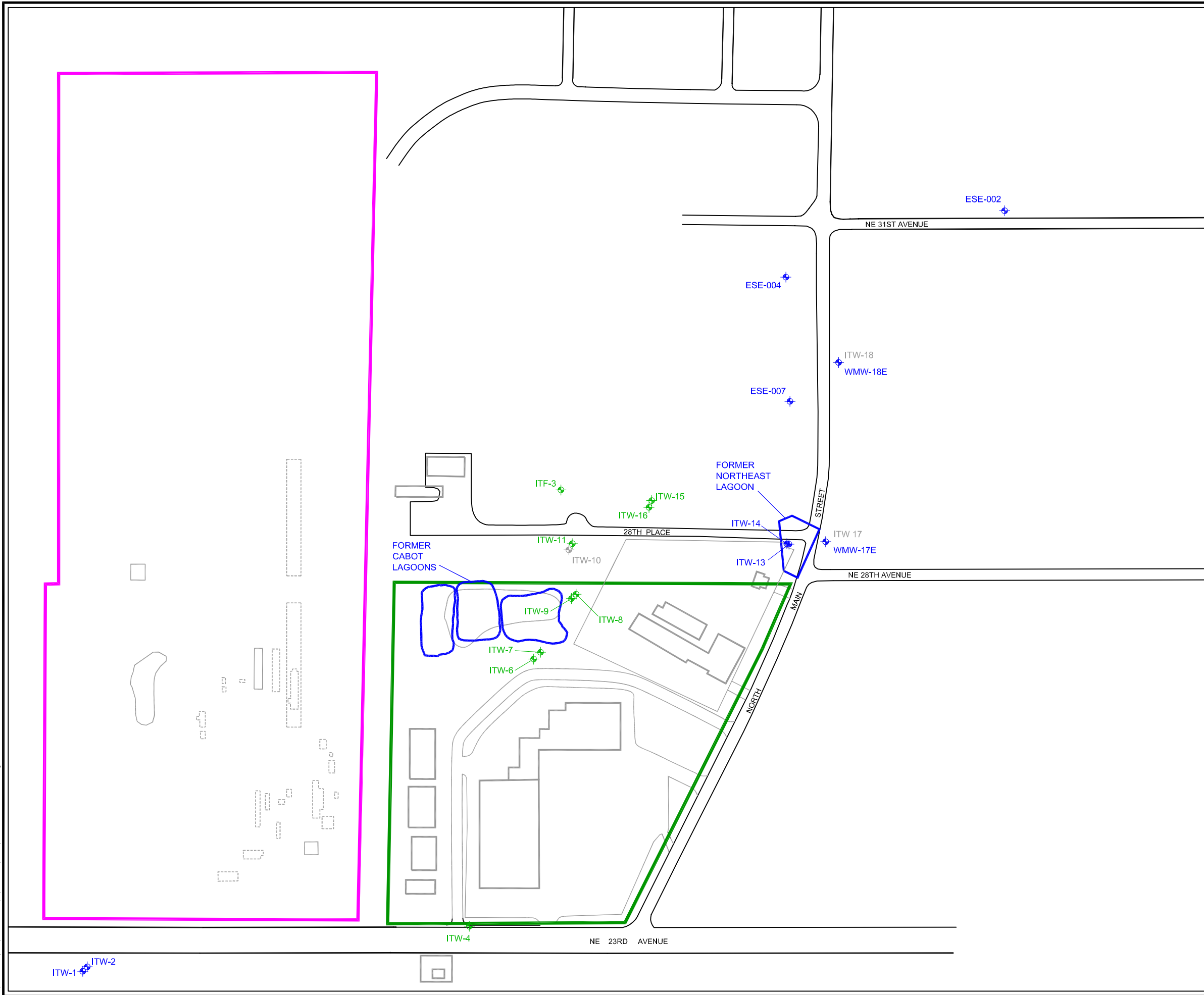
Table 1
Proposed Amended Expanded Groundwater Monitoring Program - 2007
Cabot Carbon/Koppers Superfund Site
Gainesville, Florida

Routinely Sampled Wells	Additional Proposed Wells	Parameters ¹	Analytical Method
ITW-1	ITF-3	Anthracene	8310
ITW-2	ITW-4	Phenanthrene	
ITW-13	ITW-6	Acenaphthylene	
ITW-14	ITW-7	Fluorene	
WMW-17E	ITW-8	Fluoranthene*	
WMW-18E	ITW-9	Pyrene	
ESE-002	ITW-11	Naphthalene	
ESE-004	ITW-15	Benzo(a)pyrene	
ESE-007	ITW-16	Benzo(a)anthracene	
		Benzo(b)fluoranthene	
		Benzo(k)fluoranthene	
		Dibenzo(a,h)anthracene	
		Indeno(1,2,3-c,d)pyrene	
		Chrysene	
		Phenol	8270
		Pentachlorophenol (PCP)	
		Arsenic	6010
		Chromium	
		Benzene	8021
		Ethylbenzene*	
		Toluene*	
		Xylene*	
		Methyl tert-butyl ether (MTBE)*	

Notes:

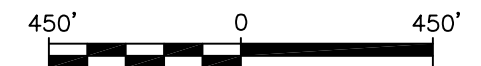
1. Parameters include Compounds of Concern identified in the Record of Decision (ROD) and additional compounds identified by an asterix (*).

T:\204079\Graphics Group\CAD\GIS\100\204079_100-03.dwg



L E G E N D

- FORMER CABOT PROPERTY BOUNDARY
- KOPPERS PROPERTY BOUNDARY
- CURRENT SITE FEATURES
- ◆ ITW-2 WELLS ROUTINELY MONITORED
- ◆ ITW-6 ADDITIONAL WELLS TO BE SAMPLED IN EXPANDED MONITORING EVENT
- ◆ ITW-10 ABANDONED WELLS



MAP SOURCE: ALACHUA COUNTY LAND SURVEYORS, INC. (1992) AND WWL:
 GRADIENT, SOILBASE.DWG 9/9/96 PROJECT# 9204950 KJA

Gradient CORPORATION

20 UNIVERSITY ROAD • CAMBRIDGE, MA 02138 • (617) 395-5000

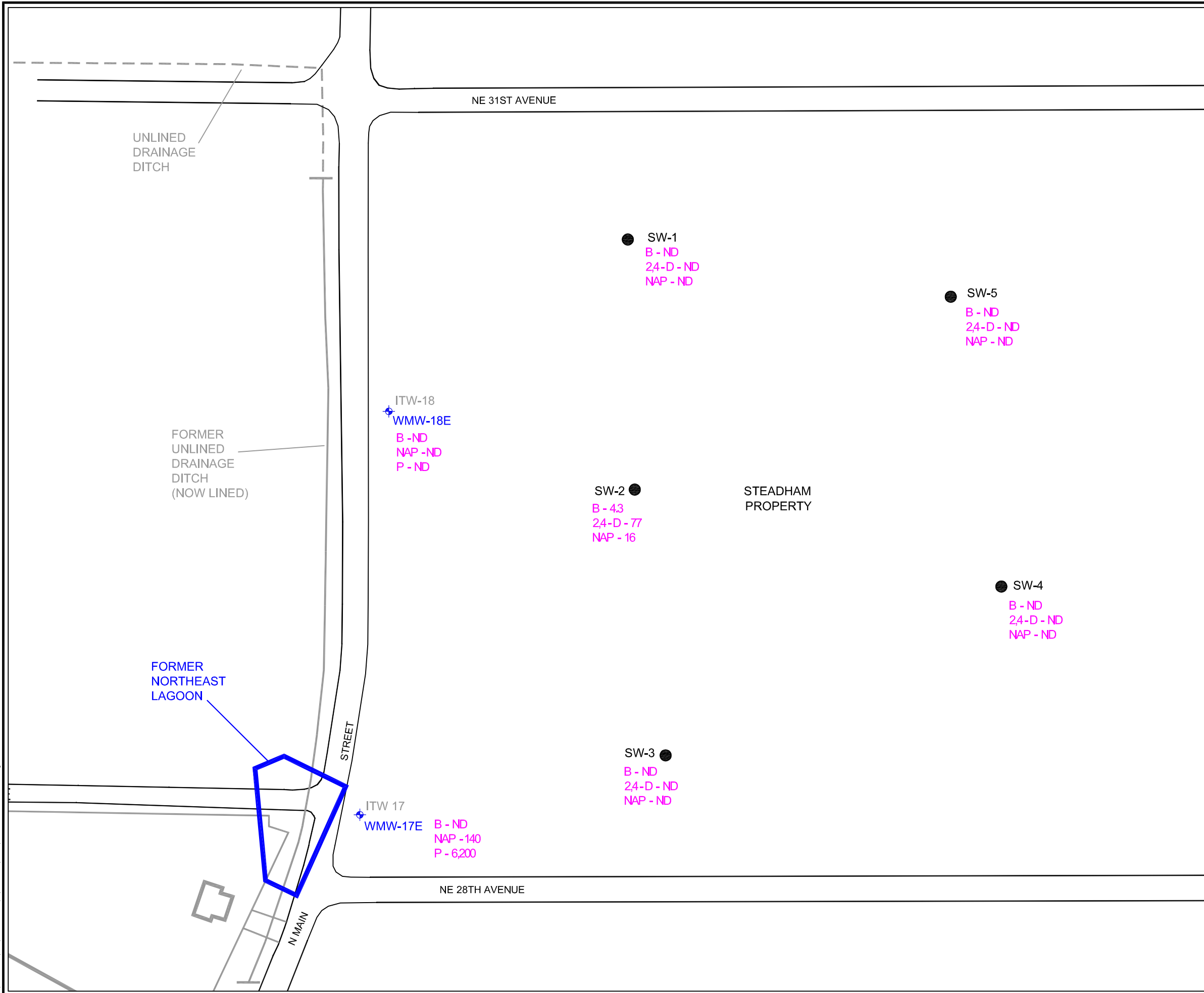
FIGURE 1

Groundwater Sampling Locations

Cabot Carbon/Koppers Superfund Site
Gainesville, FL

Drawing By:	JMP/JMA	Checked By:	MHS	Project No.:	204079
Date:	07/14/06	Date:	07/14/06	File:	204079_100-03

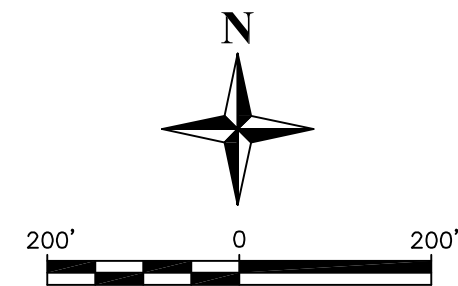
T:\204079\Graphics Group\CAD\GIS\100\204079_100-02.dwg



L E G E N D

- WMW-18E INTERCEPTOR TRENCH MONITORING WELLS
- ITW-10 ABANDONED WELLS
- SW-1 STEADHAM PROPERTY MONITORING WELLS: 1989 STUDY

B= BENZENE (µg/L)
 2,4-D= 2,4 DIMETHYLPHENOL (µg/L)
 NAP= NAPHTHALENE (µg/L)
 P = PHENOL (µg/L)
 ND = NOT DETECTED



MAP SOURCES:
 1) ALACHUA COUNTY LAND SURVEYORS, INC. (1992) AND WWL:
 GRADIENT, SOILBASE.DWG 9/9/96 PROJECT# 9204950 KJA
 2) CONTAMINATION ASSESSMENT REPORT FOR STEADHAM PROPERTY
 MARCH 8, 1989

Gradient CORPORATION
 20 UNIVERSITY ROAD • CAMBRIDGE, MA 02138 • (617) 395-5000

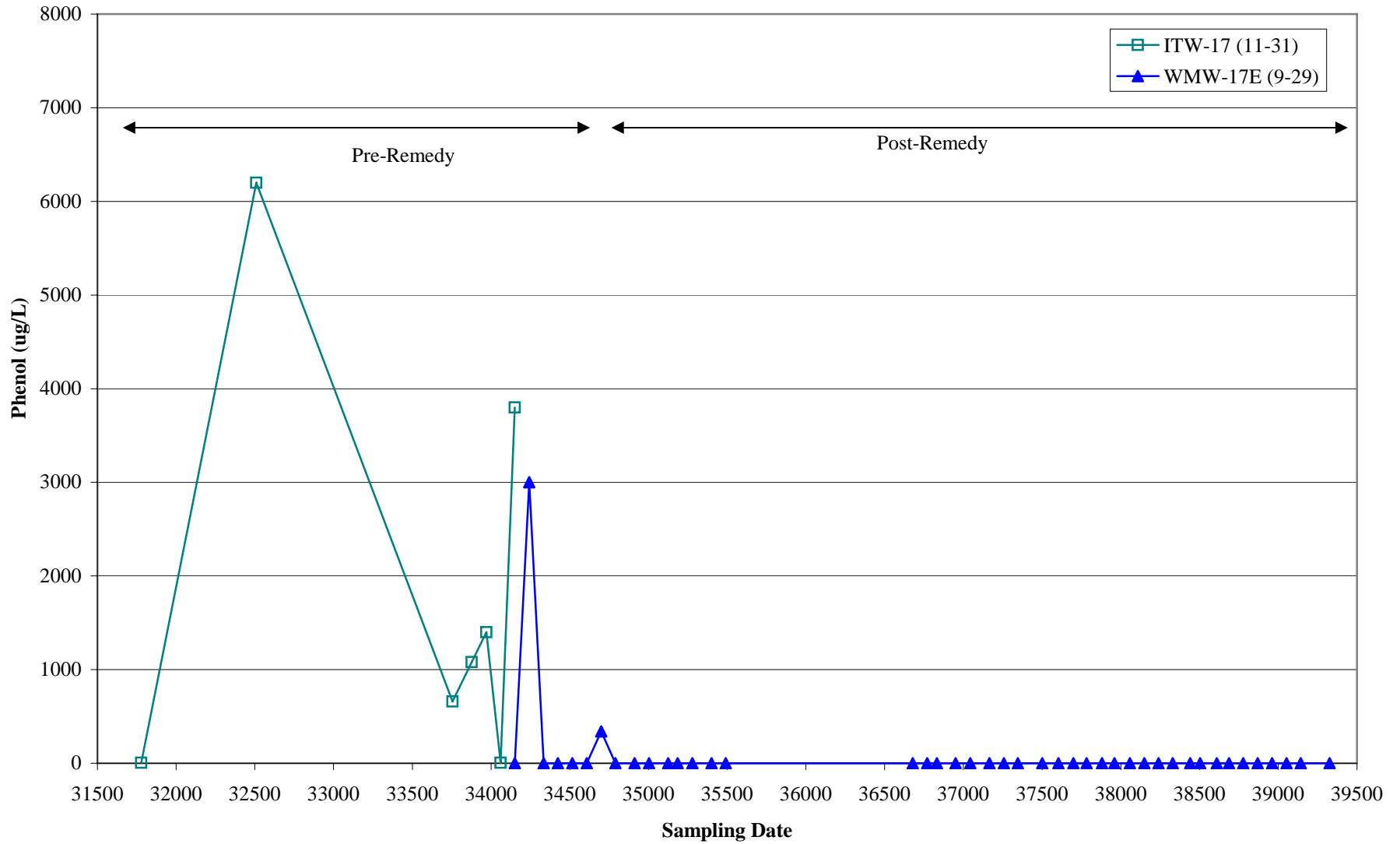
FIGURE 2

Pre-Remedy Groundwater Data - 1989

Cabot Carbon/Koppers Superfund Site
 Gainesville, FL

Drawing By:	MMK	Checked By:	MHS	Project No.:	204079
Date:	10/23/07	Date:	10/23/07	File:	204079_100-02

Figure 3
Pre- and Post-Remedy Concentrations of Phenol at ITW-17/WMW-17E
Cabot Carbon/Koppers Superfund Site, Gainesville, Florida



Attachment A

Depth of Vertical Capture Zone Of Groundwater Interceptor Trench

**Table A-1
Depth of Vertical Capture Zone of
Groundwater Interceptor Trench**

Parameter		Value	Units	Source
Average extraction rate of groundwater interceptor trench (approx. half a billion gallons of water extracted in 20 years)	Q	9156	ft ³ /d	Gradient, 2005 ¹
Surficial aquifer hydraulic conductivity	K	21	ft./d	WHI, 2005 ²

Segment 1				
Surficial aquifer hydraulic gradient	i	6.95E-03	ft/ft	Weston, 2006 ³
Width of surficial aquifer intercepted by trench	L	1554	ft.	Figure A-1

Thickness of surficial aquifer intercepted by trench = $Q/(K*i*L)$
= 40 ft.

Segment 2				
Surficial aquifer hydraulic gradient	i	7.26E-03	ft/ft	Weston, 2006 ³
Width of surficial aquifer intercepted by trench	L	1633	ft.	Figure A-1

Thickness of surficial aquifer intercepted by trench = $Q/(K*i*L)$
= 37 ft.

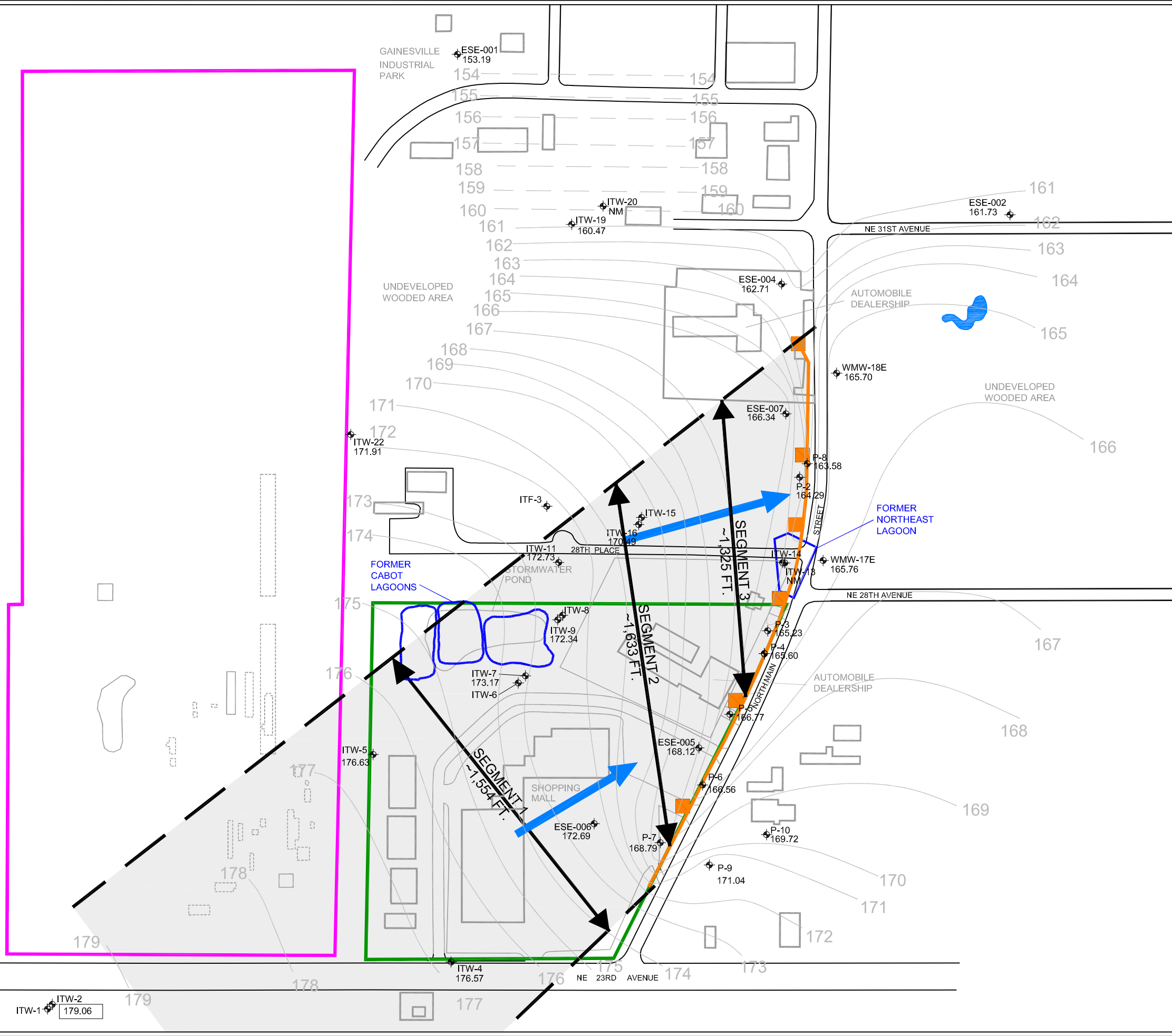
Segment 3				
Surficial aquifer hydraulic gradient	i	8.95E-03	ft/ft	Weston, 2006 ³
Width of surficial aquifer intercepted by trench	L	1325	ft.	Figure A-1

Thickness of surficial aquifer intercepted by trench = $Q/(K*i*L)$
= 37 ft.

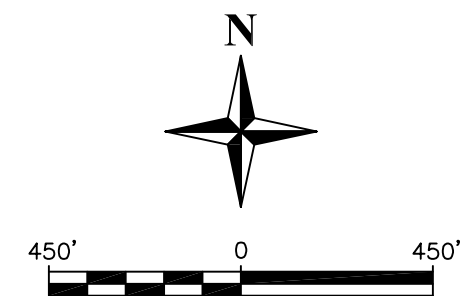
Sources:

- 1) Gradient Corporation (Gradient). 2005. Remedy Status and Expanded Remedy Performance Monitoring Program. September 30.
- 2) Waterloo Hydrogeologic Inc. (WHI). 2005. A Critique of the GeoTrans Flow and Transport Model, Koppers, Inc. Site, Gainesville, Florida. June 7.
- 3) Weston Solutions, Inc (Weston). 2006. Results of Quarterly Groundwater Sampling Conducted March 22, 2006, for First Quarter, 2006 -Eastern Portion of Cabot Carbon/Koppers Superfund Site, Gainesville, Florida. April.

T:\204079\Graphics Group\CAD\GIS\100\204079_100-01-MMKedit11-27.dwg



- LEGEND
- FORMER CABOT PROPERTY BOUNDARY
 - KOPPERS PROPERTY BOUNDARY
 - CURRENT SITE FEATURES
 - FORMER KOPPERS SITE FEATURES
 - GROUNDWATER INTERCEPTOR TRENCH
 - PRIMARY DIRECTION OF GROUNDWATER FLOW
 - SURFICIAL AQUIFER POTENTIOMETRIC HEAD CONTOUR LINE (MEASURED MARCH, 2006)
 - MONITORING WELL
171.91 GROUNDWATER ELEVATION (FT.MSL)
 - GROUNDWATER INTERCEPTOR TRENCH CAPTURE ZONE



MAP SOURCE: ALACHUA COUNTY LAND SURVEYORS, INC. (1992) AND WWL: GRADIENT, SOILBASE.DWG 9/9/96 PROJECT# 9204950 KJA; TRC, 2003

Gradient CORPORATION
20 UNIVERSITY ROAD • CAMBRIDGE, MA 02138 • (617) 395-5000

FIGURE A-1
Lateral Extent of Capture Zone of Groundwater Interceptor Trench in Surficial Aquifer (Weston, 2006)

Cabot Carbon/Koppers Superfund Site
Gainesville, FL

Drawing By: MMK	Checked By: MHS	Project No.: 204079	
Date: 11/27/07	Date: 11/27/07	File: 204079_100-01	