
From: Scott Miller
Sent: 08/22/2012 07:43 AM EDT
To: Debbie Jourdan
Subject: Fw: Re: Coliseum documents

Debbie,
Please save this to SDMS for Capitol City Plume.
Thank you

Scott Miller
Remedial Project Manager
Superfund Division
Superfund Remedial Branch
Section C
U.S. EPA Region 4
61 Forsyth Street, SW
Atlanta, GA 30303
Phone (404) 562-9120
Fax (404) 562-8896

-----Forwarded by Scott Miller/R4/USEPA/US on 08/22/2012 07:42AM -----

> To: Kay Wischkaemper/R4/USEPA/US@EPA
> From: Ralph Howard/R4/USEPA/US
> Date: 08/21/2012 05:49PM
> Cc: Scott Miller/R4/USEPA/US@EPA
> Subject: Re: Coliseum documents
>
> Kay, I haven't found much useful...I did find out these things:
>
> 1. The engineered wetland area is the areas shown on maps in those "Low-Lying Area" status reports you have, on the maps. See the attached July 2007 report. It's the areas (both of em I think) outlined in orange.
>
> 2. It's hard to find any more of the wells, in the SDMS reports. But they should be in this "Sitewide' report attached, their "FS." If you have some graphics support, have the person look carefully at these (admittedly crappy) maps.
> Also - the status reports you don't have, the few up through 2009, *Have* gone into SDMS, and they have electronic PDF maps that seem to blow up well (or better). Shall I send or can you get 'em?
>
> 3. These notes (meeting notes may 2007), may be worth a read for background knowledge...
>
> Later,

Ralph O. Howard, Jr.
Site Evaluation Coordinator,
Remedial Project Manager
U.S. EPA Region 4
Superfund Division, Superfund Remedial and
Site Evaluation Branch
61 Forsyth Street, S.W., Atlanta Georgia 30303
Phone 404-562-8829

United States Environmental Protection Agency

(See attached file: May 2007 meeting notes.pdf)(See attached file: Eval Sitewide Corrective Measures Report [likeAnFS].pdf)(See attached file: July 2007 =Investig of Low-Lying Areas= Report.pdf)

Kay Wischkaemper---08/21/2012 11:33:19 AM---Ralph can you email or get me a map of the wetland treatment system. In the 2011 report the map is

From: Kay Wischkaemper/R4/USEPA/US
To: Ralph Howard/R4/USEPA/US@EPA
Date: 08/21/2012 11:33 AM
Subject: Ralph can you email or get me a map of the wetland treatment system

---

Ralph can you email or get me a map of the wetland treatment system. In the 2011 report the map is not clear about this.

Thanks, Kay

Kay Wischkaemper P.G.
Hydrogeologist
USEPA Region 4, Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW, Atlanta, GA 30303
o: 404.562.8641 cell: 404-326-2719
f: 404.562.8842
wischkaemper.kay@epa.gov

SUMMARY REPORT FOR THE JULY 2007 SAMPLING EVENT

INVESTIGATION OF "LOW-LYING AREAS"

Coliseum Boulevard Plume Site Montgomery, Alabama

DEPARTMENT OF TRANSPORTATION

October 2007

Submitted to:

The Alabama Department of Environmental Management
Montgomery, Alabama

DEPARTMENT OF TRANSPORTATION

SUMMARY REPORT FOR THE JULY 2007 SAMPLING EVENT

INVESTIGATION OF "LOW-LYING AREAS"

TABLE OF CONTENTS

Introduction

The ALDOT (Alabama Department of Transportation) is investigating the soil and groundwater for TCE (trichloroethylene) in the area known as the Coliseum Boulevard Plume in Montgomery, Alabama. The investigation is being conducted under the direction of the ADEM (Alabama Department of Environmental Management). The investigation is comprised of four general investigative areas: 1) the Kilby Ditch, 2) the Probehole 12 area, 3) Low-Lying Areas, and 4) Southwest Area. This report contains results of samples of sediment and surface water collected from the Low-Lying Areas during the 2007 3rd Quarter Event.

The Low-Lying Areas consist of three (3) different areas. Each of the Low-Lying Areas are located northeast of the Kilby Ditch (Figure 1). The construction of roads, railroad tracks, and other human and natural activities has resulted in the impoundment of water in these Low-Lying Areas. The smallest Low-Lying area (about 2 acres) is located south of North Boulevard and north of Russell Corporation. Surface water in this area is recharged from Kilby Ditch, storm-water runoff, a wastewater / stormwater outfall from Russell Corporation, and a high water table. Between North Boulevard and the railroad tracks is a Low-Lying Area that is about 12 acres. North of the railroad tracks (identified as Western Railway of Alabama) is the largest Low-Lying Area in this investigation at about 33 acres in size. The water from Kilby Ditch generally continues to flow under North Boulevard and discharges into a perennial stream that is north of North Boulevard. The perennial stream continues and divides into braided streams that generally flow to the east and north. The Low-Lying Areas north of the railroad tracks and the area between North Boulevard and the railroad tracks are not hydraulically connected by surface water.

The surface water and sediment monitoring events for the Low-Lying Areas are being performed in accordance with the Addendum 04 of the Comprehensive Work Plan. Sample locations A through H are north of the railroad tracks and are monitored annually. Sample locations I through M are north of North Boulevard but south of the railroad tracks are monitored semi-annually. Locations N through P are south of North Boulevard and are monitored quarterly.

This report provides the results for the July 2007 sampling event, which was a semi-annual event.

Sample Collection

On August 1, 2007, eight (8) locations (locations I through P) were sampled for VOCs in sediments and surface-water (see Table 1 and Figure 2).

A hand auger was used to collect sediment samples at the selected locations. Sediment samples for VOC were collected from the hand auger using an EnCore sampler. A split sample was utilized for moisture content determinations to allow reporting of VOCs on a dry weight basis. Sampling depth has varied as sedimentation depth is influenced by the velocity and depth of the water flow in the Low-Lying Areas. The sediment samples were collected immediately above the first stiff silt, clay, or organic layer, which was approximately 9 inches below land surface (BLS).

Surface-water samples were collected by slowly lowering an upright VOC glass vial, which contained hydrochloric acid as a preservative, into the water. The cap of the VOC vial was used to add water to form a meniscus before sealing the vial with a Teflon-lined cap (zero headspace).

Sediment and surface-water samples were immediately placed on ice, in a cooler, and shipped to **EnviroChem**'s laboratory in Mobile, Alabama for VOC analyses under strict chain-of-custody. The samples were analyzed for VOC's using Method 5035/8260 (sediment) and 8260 (groundwater) as outlined in Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA, SW-846.

Results

The historical and current analytical results for samples collected in the Low-Lying Areas are presented in Tables 2a (sediment results) and 2b (surface water results). Analytical results for the July 2007 sampling event are shown on in Figure 3 (sediment results) and Figure 4 (surface water results).

Sediment

During this event, sediment samples collected at all locations did not contain TCE, cis-1,2-dichloroethene, or vinyl chloride at concentrations of greater than 5 micrograms per kilogram (µg/kg). Laboratory reports are included in the Attachment.

Surface Water

During the April 2007 sampling event, TCE concentrations were detected in four of the eight sample locations sampled. Detected concentrations of TCE ranged from 1.4 µg/l (micrograms per liter) at sample location L to 24.5 µg/l at sample location P. TCE was also detected at locations K and N at concentrations of 4.2 ug/l and 14.9 ug/l. At location O, cis-1,2-dichlorethene was detected at a concentration of 13.8 ug/l and vinyl chloride was detected at a concentration of 2.4 ug/l. Laboratory reports are included in the Attachment.

Preliminary Ecological Screening

A Preliminary Screening Level Evaluation (PSLE) under the Alabama Risk Based Corrective Action (ARBCA) guidance was performed for the CBP site in January 2007. The PSLE involves comparison of the Preliminary Screening Values (PSVs) for trespasser and ecological receptors to recent surface water and sediment data for Kilby Ditch and the Low-lying Areas, as described below. In accordance with the ARBCA Guidance Manual, if a constituent is present in a dataset at a detected concentration, the constituent is termed a chemical of potential concern (COPC). If a detected COPC concentration exceeds the PSV, the COPC is termed a chemical of concern (COC) and requires further evaluation using the ARBCA risk management process.

Since 2001, surface water samples have been collected from 16 locations (A through P) in the Low-lying Areas. Locations A through H, located north of the railroad tracks, are sampled annually. Locations I through M, located north of North Boulevard but south of the railroad tracks, are sampled semi-annually. Locations N through P, located south of North Boulevard, are sampled quarterly. The sampling locations in the Low-lying Areas are shown on Figure 2. Surface water samples have been analyzed for volatile organic constituents.

The potential for human and ecological health risks from exposure to constituents detected in surface water is evaluated by comparing surface water data from the Low-lying Areas to the PSVs, described above. Surface water data from all sampling locations in the Low-lying Areas are used to evaluate the potential for human health risk. \

Table 3a presents data summaries, including frequency of detection and range of detected concentrations, of surface water data from all sampling locations in the Low-lying Areas. The data used to select representative concentrations are from samples collected during the following sampling events: January 2005, April/May 2005, July 2005, October 2005, January 2006, April 2006, July 2006, and October 2006.

As shown in Table 3a, the maximum detected concentrations of all COPCs in surface water are less than the PSVs derived for incidental dermal contact by an adolescent trespasser and consumption of fish by adult sport fishermen. Therefore, there are no COCs in surface water in the Low-lying Areas for incidental dermal contact by an adolescent trespasser and consumption of fish by adult sports fishermen, and human health risks from these exposure pathways are unlikely.

Table 2 presents data summaries, including frequency of detection and range of detected concentrations, of surface water data from sampling locations in the Low-lying Areas. The data used to select representative concentrations and the logic for this selecting this dataset are as described above.

As shown in Table 3b, the maximum detected concentrations of all COPCs in surface water are less than the USEPA Region 4 or USEPA Region 5 ESLs for surface water. Therefore, there are no COCs in surface water in the Low-lying Areas for ecological receptors, and ecological risks are unlikely.

Since 2001, sediment samples have been collected from 16 locations (A through P as described above and shown on Figure 2) in the Low-lying Areas, from depths between 3 and 12 inches, and analyzed for volatile organic constituents. The data used to select representative concentrations are from samples collected during the same sampling events noted above for surface water: January 2005, May 2005, July 2005, October 2005, January 2006, April 2006, July 2006, and October 2006.

The potential for human and ecological health risks from exposure to COPCs detected in sediment is evaluated by comparing sediment data from the Low-lying Areas to the selected or derived PSVs. Table 3 presents a summary of sediment data, including frequency of detection and range of detected concentrations.

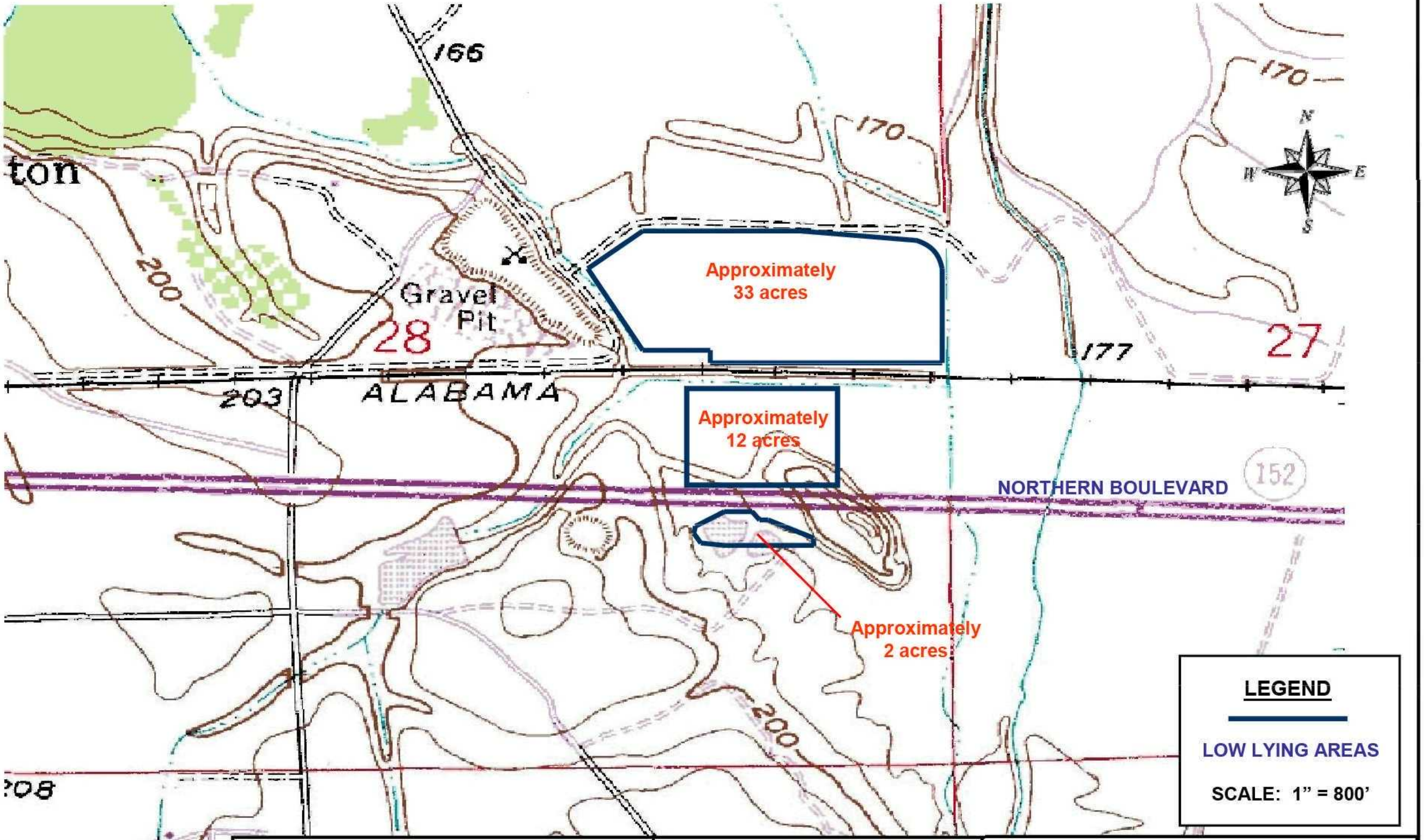
As shown in Table 3c, the maximum detected concentrations of all COPCs in sediment are less than the PSVs derived for incidental ingestion and dermal contact by an adolescent trespasser. Therefore, there are no COCs in sediment in the Low-lying Areas for incidental ingestion and dermal contact by an adolescent trespasser, and human health risks from these exposure pathways are unlikely. As also shown in Table 2, the maximum detected concentrations of all COPCs in sediment are less than the USEPA, Region 5 ESLs for sediment. Therefore, there are no COCs in sediment in the Low-lying Areas for ecological receptors, and ecological risk is unlikely.

No maximum concentrations from this sampling event exceeded the soil and surface water ecological screening values.

Recommendations

The ALDOT recommends continued monitoring of the Low-Lying Areas.

FIGURES



LEGEND

LOW LYING AREAS

SCALE: 1” = 800’

ALABAMA DEPARTMENT OF TRANSPORTATION
MONTGOMERY, ALABAMA

Source: Montgomery North, Alabama USGS
7.5 Minute Topographic Map [1958 (Photorevised 1988)]

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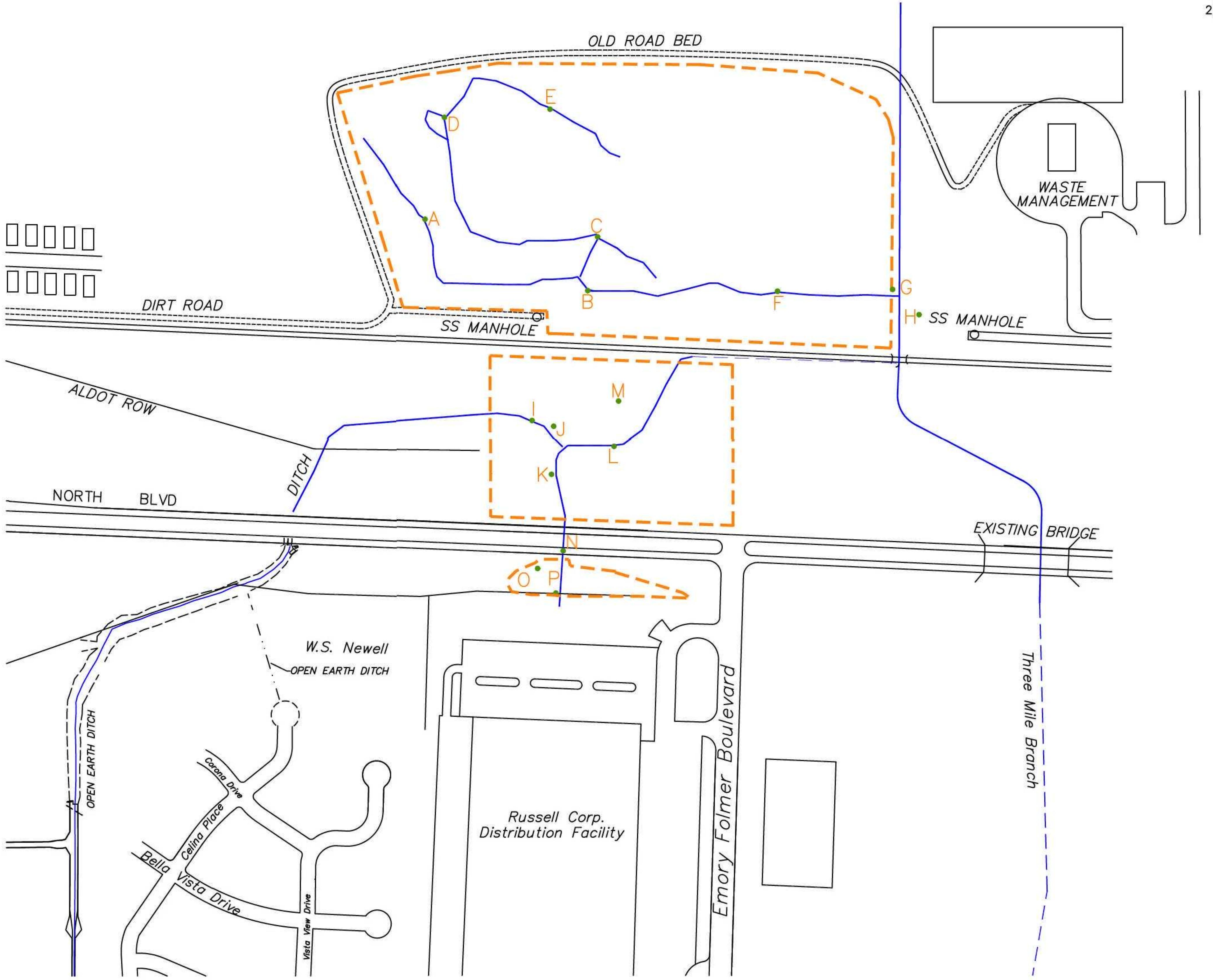
FIGURE 1
TOPOGRAPHIC LOCATIONS OF LOW LYING AREAS
COLISEUM BOULEVARD PLUME INVESTIGATION
MONTGOMERY, ALABAMA
SESI JOB #C-06-401

NOTE: 1) ALL UNITS LISTED ARE IN MICROGRAMS PER KILOGRAM (UG/KG) OR PARTS PER BILLION EQUIVALENT.
2) ONLY DETECTED CONSTITUENT ARE ILLUSTRATED.



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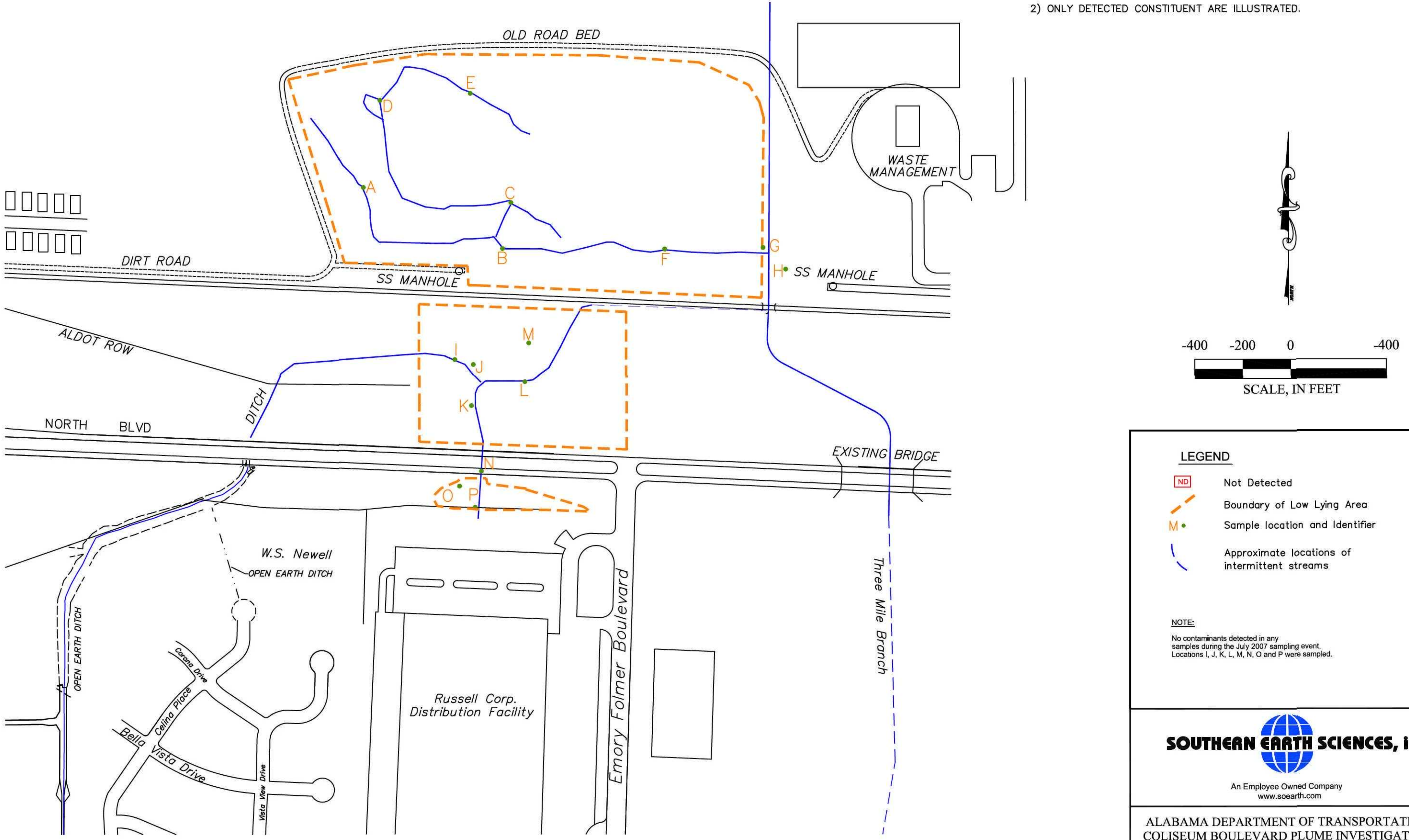
ALABAMA DEPARTMENT OF TRANSPORTATION
COLISEUM BOULEVARD PLUME INVESTIGATION

FIGURE 2 - SAMPLE LOCATIONS AND IDENTIFIERS
LOW-LYING AREAS
JULY 2007 SAMPLING EVENT
SESI JOB # C-06-401

NOTE: 1) ALL UNITS LISTED ARE IN MICROGRAMS PER KILOGRAM (UG/KG) OR PARTS PER BILLION EQUIVALENT.
2) ONLY DETECTED CONSTITUENT ARE ILLUSTRATED.



LEGEND

ND	Not Detected
╱ ╱	Boundary of Low Lying Area
M ●	Sample location and Identifier
╲	Approximate locations of intermittent streams

NOTE:

No contaminants detected in any samples during the July 2007 sampling event. Locations I, J, K, L, M, N, O and P were sampled.

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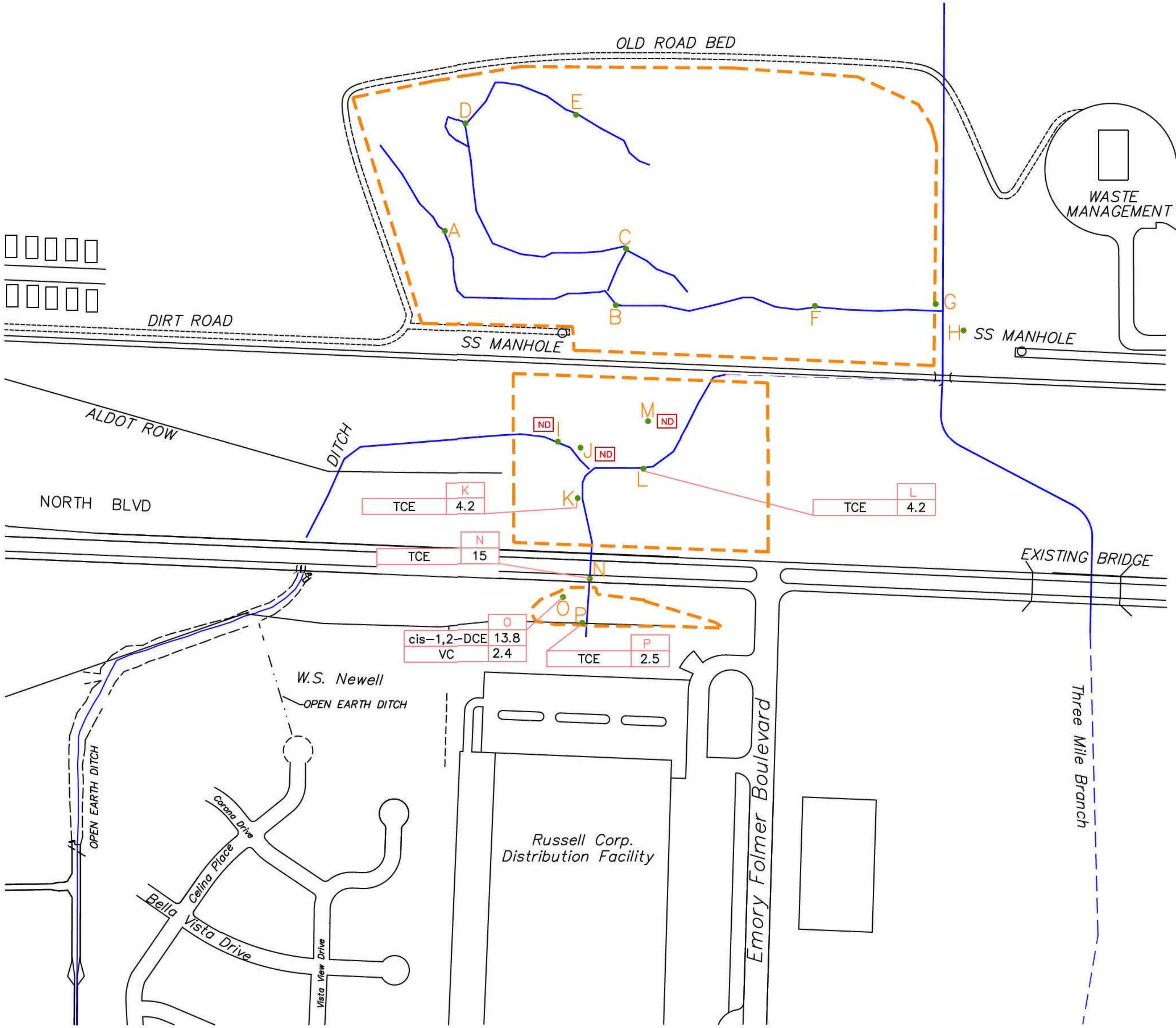
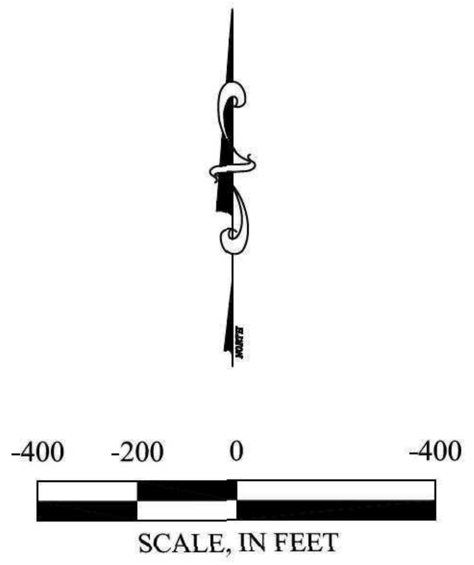
ALABAMA DEPARTMENT OF TRANSPORTATION
COLISEUM BOULEVARD PLUME INVESTIGATION

FIGURE 3 - SEDIMENT SAMPLES
COLLECTED FROM LOW LYING AREAS
APRIL 2007 SAMPLING EVENT
SESI JOB # C-06-401

NOTE: 1) ALL UNITS LISTED ARE IN MICROGRAMS PER LITER (UG/L) OR PARTS PER BILLION EQUIVALENT.
2) ONLY DETECTED CONSTITUENT ARE ILLUSTRATED.





LEGEND

ND	Not Detected
▬ ▬	Boundary of Low Lying Area
X •	Sample location and Identifier
(	Approximate locations of intermittent streams

O	SAMPLE LOCATION
— —	TRICHLOROETHENE in ug/L (TCE)
— —	VINYL CHLORIDE in ug/L (VC)
— —	cis–1,2–DICHLOROETHENE in ug/L (cis–1,2–DCE)
— —	TOLUENE in ug/L (TOL)

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ALABAMA DEPARTMENT OF TRANSPORTATION
COLISEUM BOULEVARD PLUME INVESTIGATION

FIGURE 4 - SURFICIAL WATER SAMPLES
COLLECTED FROM LOW LYING AREAS
JULY 2007 SAMPLING EVENT
SESI JOB # C-06-401

TABLES

TABLE 1.

Sediment and Surface-Water Sample Locations in Low-Lying Area
Coliseum Boulevard Plume Investigation Site
Montgomery, Montgomery County, Alabama

Sample Location Identifier	Description
A	Seep
B	Low point of a multi-branching channel. Water flows in from a single channel and pools until it overflows into other channels.
C	Low point of an interconnecting channel between two intermittent streams.
D	Low point of branching channels.
E	Low point of a channel (ground water seep).
F	Same as B (The pooled water empties into a single channel).
G	Confluence of intermittent stream with Three Mile Branch.
H	Depositional area (sand bar).
I	Depositional area (sand bar).
J	Depositional area (mud flat).
K	Low point (water pools).
L	Depositional area (sand bar).
M	A low point in the grassy field.
N	Culvert (water outflow).
O	Low point at bottom of hill.
P	Culvert (water inflow).

Table 2a. Concentrations of detected volatile organic compounds (VOCs)[1] in samples of sediment from the "Low-Lying Areas"; April 2007 Status Report; Coliseum Boulevard Plume Investigation; Montgomery, Alabama. [Distributions of VOCs in sediment/soil samples are shown on Figure 3.]

			Sediment Lab Results									
			Trichloroethylene	Cis-1,2-Dichloroethene	Vinyl Chloride	Benzene	Cis-1,3-Dichloropropene	M,P,O-Xylenes	Methylene Chloride[2]	Toluene	Trichlorofluoromethane	Ethyl Benzene
Sample Location Identifier	Sample Date	Approximate Sample Depth (inches)	[Concentrations are in micrograms per kilogram (µg/kg)]									
			3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]
A	11/15/01	6	ND[4]	ND	ND	ND	ND	ND	4.3J[5]	ND	ND	ND
	2/13/02	12	ND	ND	ND	ND	ND	ND	ND	ND	6.3	ND
	5/22/02	-	NC[6]	NC	NC	NC	NC	NC	NC	NC	NC	NC
	1/29/04	8	ND	ND	ND	ND	ND	18.9J	ND	8.4J	ND	3.1J
	1/31/05	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/26/06	8	ND	ND	ND	ND	ND	ND	ND	28.1	ND	ND
	1/16/2007	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
B	11/15/01	5	ND	ND	ND	ND	ND	ND	3.6J	ND	ND	ND
	2/13/02	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B - dup[7]	2/13/02	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B	5/22/02	-	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	1/29/04	8	ND	ND	ND	ND	ND	7.3J	ND	4.0J	ND	ND
	1/31/05	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/26/06	8	ND	ND	ND	ND	ND	ND	ND	16.4J	ND	ND
	1/16/2007	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
C	11/15/01	8	ND	ND	ND	ND	ND	ND	5.7J	ND	ND	ND
	2/13/02	8	NR[8]	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5/22/02	-	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	1/29/04	8	ND	ND	ND	ND	ND	ND	ND	20.6J	ND	ND
	1/31/05	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/26/06	8	ND	ND	ND	ND	ND	ND	ND	20.6J	ND	ND
	1/16/2007	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
C-dup	1/16/2007	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
D	11/15/01	8	ND	ND	ND	ND	ND	ND	ND	3.3J	ND	ND
D-dup	11/15/01	8	ND	ND	ND	ND	ND	ND	ND	12.4J	ND	ND
D	2/13/02	8	ND	ND	ND	5.0	ND	ND	ND	ND	ND	ND
	5/22/02	-	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	1/29/04	8	ND	ND	ND	ND	ND	5.5J	ND	3.2J	ND	ND
	1/31/05	10	ND	ND	ND	ND	ND	ND	ND	10.0J	ND	ND
	1/26/06	8	ND	ND	ND	ND	ND	ND	ND	12.7J	ND	ND
	1/16/2007	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
E	11/15/01	4	ND	ND	ND	ND	ND	ND	3.9J	25.5J	ND	ND
	2/13/02	7	ND	ND	ND	ND	ND	ND	ND	9.5	ND	ND
	5/22/02	-	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	1/29/04	8	ND	ND	ND	ND	ND	16.6J	ND	8.0J	ND	ND
	1/31/05	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/26/06	8	ND	ND	ND	ND	ND	ND	ND	21.4J	ND	ND
E-dup	1/26/06	8	ND	ND	ND	ND	ND	ND	ND	12.7J	ND	ND
E	1/16/2007	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
F	11/15/01	6	ND	ND	ND	ND	ND	ND	10.6J	8.8J	ND	ND
	2/13/02	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	5/22/02	-	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	1/29/04	8	ND	ND	ND	ND	ND	6.0J	ND	3.5J	ND	ND
	1/31/05	10	ND	ND	ND	ND	ND	ND	ND	6.1J	ND	ND
	1/26/06	8	ND	ND	ND	ND	ND	ND	ND	12.8J	ND	ND
	1/16/2007	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

Table continued on next page

Table 2a. Concentrations of detected volatile organic compounds (VOCs)[1] in samples of sediment from the "Low-Lying Areas"; April 2007 Status Report; Coliseum Boulevard Plume Investigation; Montgomery, Alabama. [Distributions of VOCs in sediment/soil samples are shown on Figure 3.]

Sample Location Identifier	Sample Date	Approximate Sample Depth (inches)	Sediment Lab Results									
			Trichloroethylene	Cis-1,2-Dichloroethene	Vinyl Chloride	Benzene	Cis-1,3-Dichloropropene	M,P,O-Xylenes	Methylene Chloride[2]	Toluene	Trichlorofluoromethane	Ethyl Benzene
			[Concentrations are in micrograms per kilogram (µg/kg)]									
			3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]
G	11/15/01	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	2/13/02	7	ND	ND	ND	ND	ND	ND	ND	ND	14.4	ND
	5/22/02	-	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	1/29/04	8	ND	ND	ND	ND	ND	5.5J	ND	3.3J	ND	ND
	1/31/05	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/26/06	8	ND	ND	ND	ND	ND	ND	ND	6.5J	ND	ND
	1/15/2007	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
H	11/15/01	6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	2/13/02	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	5/22/02	-	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	1/29/04	8	ND	ND	ND	ND	ND	7.1J	ND	4.1J	ND	ND
	1/31/05	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/26/06	8	ND	ND	ND	ND	ND	ND	ND	4.9J	ND	ND
	2/7/2007	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
I	11/16/01	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	2/14/02	5	12.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
	5/22/02	5	6.8J	ND	ND	ND	ND	1.9J	4.2J	4.7J	ND	ND
	9/17/02	6	ND[9]	ND	ND	ND	ND	ND	ND	ND	ND	ND
	10/31/02	6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/14/03[10]	8	ND (<2.6)	ND (<2.6)	ND (<2.6)	ND (<2.6)	ND (<2.6)	ND (<2.6)	ND (<2.6)	ND (<2.6)	ND (<2.6)	ND (<2.6)
	7/21/03	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
I-dup	7/21/03	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
I	1/29/04	8	ND	ND	ND	ND	ND	5.2J	ND	4.1J	ND	ND
	1/31/05	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/26/06	8	ND	ND	ND	ND	ND	ND	ND	4.3J	ND	ND
	7/25/06	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/17/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	8/1/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
J	11/16/01	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	2/14/02	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	5/22/02	8	ND	ND	ND	ND	ND	ND	7.5J	4.1J	ND	ND
	9/17/02	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	10/31/02	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/14/03[10]	8	ND (<2.4)	ND (<2.4)	ND (<2.4)	ND (<2.4)	ND (<2.4)	ND (<2.4)	ND (<2.4)	ND (<2.4)	ND (<2.4)	ND (<2.4)
	7/21/03	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/29/04	8	ND	ND	ND	ND	ND	5.0J	ND	5.7J	ND	ND
	1/31/05	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/26/06	8	ND	ND	ND	ND	ND	ND	ND	4.9J	ND	ND
	7/25/06	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/17/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	8/1/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

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Table 2a. Concentrations of detected volatile organic compounds (VOCs)[1] in samples of sediment from the "Low-Lying Areas"; April 2007 Status Report; Coliseum Boulevard Plume Investigation; Montgomery, Alabama. [Distributions of VOCs in sediment/soil samples are shown on Figure 3.]

			Sediment Lab Results									
			Trichloroethylene	**Cis-1,2-Dichloroethene**	**Vinyl Chloride**	**Benzene**	**Cis-1,3-Dichloropropene**	**M,P,O-Xylenes**	**Methylene Chloride[2]**	**Toluene**	**Trichlorofluoromethane**	**Ethyl Benzene**
Sample Location Identifier	**Sample Date**	**Approximate Sample Depth (inches)**	**[Concentrations are in micrograms per kilogram (µg/kg)]**									
			3.0 µg/kg[3]	**3.0 µg/kg[3]**	**3.0 µg/kg[3]**	**3.0 µg/kg[3]**	**3.0 µg/kg[3]**	**3.0 µg/kg[3]**	**3.0 µg/kg[3]**	**3.0 µg/kg[3]**	**3.0 µg/kg[3]**	**3.0 µg/kg[3]**
K	11/16/01	8	ND	ND	ND	ND	ND	ND	3.1J	ND	ND	ND
K-dup	11/16/01	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
K	2/14/02	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
K-dup	2/14/02	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
K	5/22/02	12	ND	ND	ND	ND	ND	ND	3.2J	6.0J	ND	ND
	9/17/02	12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	10/31/02	12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/14/03[10]	10	ND (<1.6)	ND (<1.6)	ND (<1.6)	ND (<1.6)	ND (<1.6)	ND (<1.6)	ND (<1.6)	ND (<1.6)	ND (<1.6)	ND (<1.6)
	7/21/03	6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/29/04	8	ND	ND	ND	ND	ND	5.2J	ND	3.4J	ND	ND
	1/31/05	9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
K-dup	1/31/05	9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
K	1/26/06	8	ND	ND	ND	ND	ND	ND	ND	4.3J	ND	ND
	7/25/06	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/17/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	8/1/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
L	11/16/01	10	3.9J	ND	ND	ND	ND	ND	3.1J	ND	ND	ND
	2/14/02	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	5/22/02	10	ND	ND	ND	ND	ND	ND	4.8J	ND	ND	ND
L-dup	5/22/02	10	ND	ND	ND	ND	ND	ND	4.8J	ND	ND	ND
L	9/17/02	8	26.4J	6.3J	ND	ND	ND	ND	ND	ND	ND	ND
	10/31/02	12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/14/03[10]	9	ND (<1.2)	ND (<1.2)	ND (<1.2)	ND (<1.2)	ND (<1.2)	ND (<1.2)	ND (<1.2)	ND (<1.2)	ND (<1.2)	ND (<1.2)
	7/21/03	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/29/04	8	ND	ND	ND	ND	ND	3.3J	ND	3.5J	ND	ND
	1/31/05	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/26/06	8	ND	ND	ND	ND	ND	ND	ND	6.1J	ND	ND
	7/25/06	8	ND	3.9J	ND	ND	ND	ND	ND	ND	ND	ND
	1/17/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	8/1/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
L-dup	1/17/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
M	11/16/01	10	ND	ND	ND	ND	ND	ND	4.8J	ND	ND	ND
	2/14/02	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	5/22/02	8	ND	ND	ND	ND	ND	ND	3.3J	3.0J	ND	ND
	9/17/02	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	10/31/02	6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/14/03[10]	9	ND (<1.3)	ND (<1.3)	ND (<1.3)	ND (<1.3)	ND (<1.3)	ND (<1.3)	ND (<1.3)	ND (<1.3)	ND (<1.3)	ND (<1.3)
	7/29/03[11]	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/29/04	8	ND	ND	ND	ND	ND	6.7J	ND	4.2J	ND	ND
	1/31/05	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/26/06	8	ND	ND	ND	ND	ND	ND	ND	5.6J	ND	ND
	7/25/06	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/17/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	8/1/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

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Table 2a. Concentrations of detected volatile organic compounds (VOCs)[1] in samples of sediment from the "Low-Lying Areas"; April 2007 Status Report; Coliseum Boulevard Plume Investigation; Montgomery, Alabama. [Distributions of VOCs in sediment/soil samples are shown on Figure 3.]

Sample Location Identifier	Sample Date	Approximate Sample Depth (inches)	Trichloroethylene	Cis-1,2-Dichloroethene	Vinyl Chloride	Benzene	Cis-1,3-Dichloropropene	M,P,O-Xylenes	Methylene Chloride[2]	Toluene	Trichlorofluoromethane	Ethyl Benzene
			Sediment Lab Results									
			[Concentrations are in micrograms per kilogram (µg/kg)]									
			3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]
N	11/15/01	3	50.6J[4]	ND[5]	ND	ND	ND	ND	6.6J	16.4J	ND	ND
	2/13/02	9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	5/22/02	10	ND	ND	ND	ND	ND	ND	3.3J	ND	ND	ND
	9/17/02[6]	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-dup[7]	9/17/02[6]	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N	10/31/02	12	ND	ND	ND	ND	ND	ND	ND	3.2J	ND	ND
	1/14/03[8]	8	ND (<1.2)	ND (<1.2)	ND (<1.2)	ND (<1.2)	ND (<1.2)	ND (<1.2)	ND (<1.2)	ND (<1.2)	ND (<1.2)	ND (<1.2)
	7/21/03	2	3.6J	ND	3.0J	ND	ND	ND	ND	ND	ND	ND
	1/29/04	8	ND	ND	ND	ND	ND	5.3J	ND	3.2J	ND	ND
	7/26/04	8	ND	ND	ND	ND	ND	7.0J	ND	5.1J	ND	ND
	10/20/04	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-dup	10/20/04	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N	1/31/05	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N	5/4/05	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-dup	5/4/05	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N	7/21/05	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-dup	7/21/05	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N	10/27/05	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/26/06	8	ND	ND	ND	ND	ND	ND	ND	7.1J	ND	ND
	4/19/06	9	ND	ND	ND	ND	ND	ND	ND	11.8J	ND	ND
N-dup	4/19/06	9	ND	ND	ND	ND	ND	ND	ND	14.7J	ND	ND
N	7/25/06	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-dup	7/25/06	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N	10/4/06	9	<5	<5	<5	<5	<5	<5	32 B[2]	<5	<5	<5
	2/7/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	4/13/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	8/1/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
O	11/15/01	3	ND	ND	ND	ND	ND	ND	3.1J	3.3J	ND	ND
	2/13/02	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	5/22/02	8	ND	ND	ND	ND	ND	ND	4.8J	4.0J	5.7J	ND
	9/17/02[6]	12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	10/31/02	12	ND	ND	35.1	ND	ND	ND	ND	7.1J	ND	ND
	1/14/03[8]	11	ND (<1.6)	ND (<1.6)	ND (<1.6)	ND (<1.6)	ND (<1.6)	ND (<1.6)	ND (<1.6)	ND (<1.6)	ND (<1.6)	ND (<1.6)
	7/21/03	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/29/04	8	750	18.8J	ND	ND	ND	31.2J	ND	15.9J	ND	5.2J
	3/9/04[9]	15	104	35.4J	6.3J	ND	ND	ND	ND	5.5J	ND	ND
	4/14/04[10]	8-12	ND	3.4J	3.9J	ND	ND	ND	ND	6.1J	ND	ND
	7/26/04	12	ND	3.9J	ND	ND	ND	31.4J	ND	12.1J	ND	6.8J
	10/20/04	10	54.4	5.6J	ND	ND	ND	ND	ND	4.5J	ND	ND
	1/31/05	10	ND	3.9J	ND	ND	ND	ND	ND	ND	ND	ND
	5/4/05	8	16.8J	370	5.9J	ND	ND	ND	3.1J	8.3J	ND	ND
	7/21/05	8	ND	4.1J	ND	ND	ND	ND	ND	4.0J	ND	ND
	10/27/05	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
O-dup	10/27/05	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
O	1/26/06	8	ND	50.6J	51.0J	5.6J	ND	ND	5.7J	37.5J	ND	ND
	4/19/06	10	ND	ND	ND	ND	ND	ND	ND	6.1J	ND	ND
	7/25/06	8	10.1J	174	ND	ND	ND	ND	ND	ND	ND	ND
	10/4/06	9	<5	<5	<5	<5	<5	<5	29 B[2]	<5	<5	<5
O-dup	10/4/06	8	<5	<5	<5	<5	<5	<5	26 B[2]	<5	<5	<5
O	2/7/07	9	<5	96	7	<5	<5	<5	<5	<5	<5	<5
	4/13/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	8/1/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

Table continued on next page

Table 2a. Concentrations of detected volatile organic compounds (VOCs) [1] in samples of sediment from the "Low-Lying Areas"; April 2007 Status Report; Coliseum Boulevard Plume Investigation; Montgomery, Alabama. [Distributions of VOCs in sediment/soil samples are shown on Figure 3.]

Sample Location Identifier	Sample Date	Approximate Sample Depth (inches)	Sediment Lab Results									
			Trichloroethylene	Cis-1,2-Dichloroethene	Vinyl Chloride	Benzene	Cis-1,3-Dichloropropene	M,P,O-Xylenes	Methylene Chloride[2]	Toluene	Trichlorofluoromethane	Ethyl Benzene
			[Concentrations are in micrograms per kilogram (µg/kg)]									
			3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]	3.0 µg/kg[3]
P	11/15/01	2	ND	ND	ND	ND	ND	ND	ND	ND	7.1J	ND
	2/13/02	9	10.6	ND	ND	ND	ND	ND	ND	ND	ND	ND
	5/22/02	11	7.0J	ND	ND	ND	ND	ND	6.7J	ND	ND	ND
	9/17/02[6]	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	10/31/02	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/14/03[8]	10	11.0	ND (<1.1)	ND (<1.1)	ND (<1.1)	ND (<1.1)	ND (<1.1)	ND (<1.1)	ND (<1.1)	ND (<1.1)	ND (<1.1)
	7/21/03	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/29/04	8	12.2J	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7/26/04	12	ND	ND	ND	ND	ND	5.5J	ND	3.9J	ND	ND
	10/20/04	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/31/05	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	5/4/05	8	ND	ND	ND	ND	ND	ND	ND	4.6J	ND	ND
	7/21/05	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	10/27/05	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1/26/06	8	ND	ND	ND	ND	ND	ND	ND	3.9J	ND	ND
	4/19/06	10	ND	ND	ND	ND	ND	ND	ND	9.6J	ND	ND
	7/25/06	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	10/4/06	9	<5	<5	<5	<5	<5	<5	41 B [2]	<5	<5	<5
	2/7/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	4/13/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	8/1/07	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

Notes:

[1] Samples were analyzed in accordance with Method 8260 outlined in Test Methods for Evaluating Solid Waste Physical/Chemical Methods , EPA, SW-846.

[2] Methylene Chloride is considered to have been present in the laboratory during analysis of the samples.

[3] MDL - Method Detection Limit of 3.0 micrograms per kilogram (µg/kg) for the soil laboratory analyses

[4] J - Concentration below calibration curve but above detection limit. In July 2005, the definition of a "J" flag was modified to flag samples with concentrations below the practical quantitation level, rather than the calibration curve values.

[5] ND - Not Detected

[6] Results on September 17, 2002, are reported on "wet-weight" basis.

[7] dup - Duplicate sample collected for quality assurance/quality control purposes.

[8] Sediment samples collected on 1/14/03 were analyzed by STL Laboratories because **TTL**'s laboratory equipment malfunctioned. STL's method detection limits varied for some samples and are indicated in parentheses ( ).

[9] In the sediment sample collected at location O on January 29, 2004, low mass and low percent solids present in the sample possibly resulted in an ambiguous level of TCE; therefore another sample was collected on March 9, 2004.

[10] On April 14, 2004, location O was sampled for verification and delineation of TCE detected in the sediment samples collected on January 29 and March 9, 2004.

Table 2b. Concentrations of detected volatile organic compounds (VOCs)[1] in samples of surface water from the "Low-Lying Areas"; April 2007 Status Report; Coliseum Boulevard Plume Investigation; Montgomery, Alabama. [Distributions of VOCs in surface-water samples are shown on Figure 4.]

		Surface Water Lab Results					
		Trichloroethylene	**Cis-1,2-Dichloroethene**	**Vinyl Chloride**	**Chloromethane**	**Methylene Chloride[2]**	**Toluene**
Sample Identifier	**Sample Date**	**[Concentrations are in micrograms per liter (μg/l)]**					
		1.0 μg/l [3]	**1.0 μg/l [3]**	**1.0 μg/l [3]**	**1.0 μg/l [3]**	**1.0 μg/l [3]**	**1.0 μg/l [3]**
A	11/15/2001	ND[4]	ND	ND	ND	ND	ND
	2/13/2002	ND	ND	ND	ND	ND	ND
	5/22/2002	NC[5]	NC	NC	NC	NC	NC
	1/29/2004	ND	ND	ND	ND	ND	ND
	1/31/2005	ND	ND	ND	ND	ND	ND
	1/26/2006	ND	ND	ND	ND	ND	ND
	1/16/2007	<1	<1	<1	<1	<1	7
B	11/15/2001	NC	NC	NC	NC	NC	NC
	2/13/2002	ND	ND	ND	ND	ND	ND
B-dup[6]	2/13/2002	ND	ND	ND	ND	ND	ND
B	5/22/2002	NC	NC	NC	NC	NC	NC
	1/29/2004	ND	ND	ND	ND	ND	ND
	1/31/2005	ND	ND	ND	ND	ND	ND
	1/26/2006	ND	ND	ND	ND	ND	ND
	1/23/2007	<1	<1	<1	<1	<1	2
C	11/15/2001	NC	NC	NC	NC	NC	NC
	2/13/2002	ND	ND	ND	ND	ND	ND
	5/22/2002	NC	NC	NC	NC	NC	3
	1/29/2004	ND	ND	ND	ND	ND	ND
	1/31/2005	ND	ND	ND	ND	ND	ND
	1/26/2006	NS[9]	NS	NS	NS	NS	NS
	1/16/2007	<1	<1	<1	<1	<1	<1
C-dup	1/16/2007	<1	<1	<1	<1	<1	<1
D	11/15/2001	NC	NC	NC	NC	NC	NC
D-dup	11/15/2001	NC	NC	NC	NC	NC	NC
D	2/13/2002	ND	ND	ND	ND	ND	ND
	5/22/2002	NC	NC	NC	NC	NC	NC
	1/29/2004	ND	ND	ND	ND	ND	ND
	1/31/2005	ND	ND	ND	ND	ND	ND
	1/26/2006	ND	ND	ND	ND	ND	ND
	1/16/2007	<1	<1	<1	<1	<1	5
E	11/15/2001	NC	NC	NC	NC	NC	NC
	2/13/2002	ND	ND	ND	ND	ND	ND
	5/22/2002	NC	NC	NC	NC	NC	NC
	1/29/2004	ND	ND	ND	ND	ND	ND
	1/31/2005	ND	ND	ND	ND	ND	ND
	1/26/2006	NS	NS	NS	NS	NS	NS
	1/16/2007	<1	<1	<1	<1	<1	<1
F	11/15/2001	NC	NC	NC	NC	NC	NC
	2/13/2002	ND	ND	ND	ND	ND	1.1J[7]
	5/22/2002	NC	NC	NC	NC	NC	NC
	1/29/2004	ND	ND	ND	ND	ND	ND
	1/31/2005	ND	ND	ND	ND	ND	1.1J
	1/26/2006	ND	ND	ND	ND	ND	ND
	1/16/2007	<1	<1	<1	<1	<1	<1

Table Continued on next page

Table 2b. Concentrations of detected volatile organic compounds (VOCs)[1] in samples of surface water from the "Low-Lying Areas"; April 2007 Status Report; Coliseum Boulevard Plume Investigation; Montgomery, Alabama. [Distributions of VOCs in surface-water samples are shown on Figure 4.]

		Surface Water Lab Results					
		Trichloroethylene	**Cis-1,2-Dichloroethene**	**Vinyl Chloride**	**Chloromethane**	**Methylene Chloride[2]**	**Toluene**
Sample Identifier	**Sample Date**	**[Concentrations are in micrograms per liter (μg/l)]**					
		1.0 μg/l [3]	**1.0 μg/l [3]**	**1.0 μg/l [3]**	**1.0 μg/l [3]**	**1.0 μg/l [3]**	**1.0 μg/l [3]**
G	11/15/2001	NC	NC	NC	NC	NC	NC
	2/13/2002	ND	ND	ND	ND	ND	ND
	5/22/2002	NC	NC	NC	NC	NC	NC
	1/29/2004	ND	ND	ND	ND	ND	ND
	1/31/2005	ND	ND	ND	ND	ND	ND
	1/26/2006	ND	ND	ND	ND	ND	ND
	1/15/2007	<1	<1	<1	<1	<1	<1
H	11/15/2001	ND	ND	ND	ND	ND	ND
	2/13/2002	ND	ND	ND	ND	ND	ND
	5/22/2002	NC	NC	NC	NC	NC	NC
	1/29/2004	1.1J	ND	ND	ND	ND	ND
	1/31/2005	1.0J	ND	ND	ND	ND	ND
	1/26/2006	ND	ND	ND	ND	ND	ND
	1/15/2007	<1	<1	<1	<1	<1	<1
I	11/16/01	4.6J[4]	ND[5]	ND	ND	ND	ND
	02/14/02	5.0J	ND	ND	ND	ND	ND
	05/22/02	2.3J	ND	ND	ND	ND	ND
	09/17/02	ND	ND	ND	ND	ND	ND
	10/31/02	4.2J	ND	ND	ND	ND	ND
	01/14/03	4.3J	ND	ND	ND	ND	ND
	07/21/03	7.5J	ND	ND	ND	ND	ND
I-dup[6]	07/21/03	7.5J	ND	ND	ND	ND	ND
I	01/29/04	2.4J	ND	ND	ND	ND	ND
	01/31/05	2.6J	ND	ND	ND	ND	ND
	01/26/06	3.1J	ND	ND	ND	ND	ND
	07/25/06	2.1J	ND	ND	ND	ND	ND
	01/17/07	2	<1	<1	<1	<1	<1
	08/01/07	ND	ND	ND	ND	ND	ND
J	11/16/01	2.8J	ND	ND	ND	ND	ND
	02/14/02	3.9J	ND	ND	ND	ND	ND
	05/22/02	1.9J	ND	ND	ND	ND	ND
	09/17/02	ND	ND	ND	ND	ND	ND
	10/31/02	3.9J	ND	ND	ND	ND	ND
	01/14/03	2.9J	ND	ND	ND	ND	ND
	07/21/03	8.3J	ND	ND	ND	ND	ND
	01/29/04	ND	ND	ND	1.2J	ND	ND
	01/31/05	1.6J	ND	ND	ND	ND	ND
	01/26/06	ND	ND	ND	ND	ND	ND
	07/25/06	NS[7]	NS	NS	NS	NS	NS
	01/17/07	<1	<1	<1	<1	<1	<1
	08/01/07	ND	ND	ND	ND	ND	ND

Table continued on next page

Table 2b. Concentrations of detected volatile organic compounds (VOCs)[1] in samples of surface water from the "Low-Lying Areas"; April 2007 Status Report; Coliseum Boulevard Plume Investigation; Montgomery, Alabama. [Distributions of VOCs in surface-water samples are shown on Figure 4.]

		Surface Water Lab Results					
		Trichloroethylene	**Cis-1,2-Dichloroethene**	**Vinyl Chloride**	**Chloromethane**	**Methylene Chloride[2]**	**Toluene**
Sample Identifier	**Sample Date**	**[Concentrations are in micrograms per liter (µg/l)]**					
		1.0 µg/l [3]	**1.0 µg/l [3]**	**1.0 µg/l [3]**	**1.0 µg/l [3]**	**1.0 µg/l [3]**	**1.0 µg/l [3]**
K	11/16/01	4.9J	ND	ND	ND	ND	ND
K-dup	11/16/01	4.9J	ND	ND	ND	ND	ND
K	02/14/02	16.4J	ND	ND	ND	ND	ND
K-dup	02/14/03	16.2J	ND	ND	ND	ND	ND
K	05/22/02	5.5J	ND	ND	ND	ND	ND
	09/17/02	2.2J	ND	ND	ND	ND	1.4J
	10/31/02	5.5J	ND	ND	ND	ND	ND
	01/14/03	13.9J	ND	ND	ND	ND	ND
	07/21/03	20.3	ND	ND	ND	ND	ND
	01/29/04	10.7J	ND	ND	1.0J	ND	ND
	01/31/05	7.9J	ND	ND	ND	ND	ND
K-dup	01/31/05	8.1J	ND	ND	ND	ND	ND
K	01/26/06	6.6J	ND	ND	ND	ND	ND
	07/25/06	3.9J	ND	ND	ND	ND	ND
	01/17/07	8	<1	<1	<1	<1	<1
	08/01/07	4.2	ND	ND	ND	ND	ND
L	11/16/01	2.9J	ND	ND	ND	ND	ND
	02/14/02	7.9J	ND	ND	ND	ND	ND
	05/22/02	2.7J	ND	ND	ND	ND	ND
L-dup	05/22/02	2.6J	ND	ND	ND	ND	ND
L	09/17/02	1.4J	ND	ND	ND	ND	ND
	10/31/02	3.4J	ND	ND	ND	ND	ND
	01/14/03	6.0J	ND	ND	ND	ND	ND
	07/21/03	4.3J	ND	ND	ND	ND	ND
	01/29/04	4.6J	ND	ND	ND	ND	ND
	01/31/05	4.2J	ND	ND	ND	ND	ND
	01/26/06	3.3J	ND	ND	ND	ND	ND
	07/25/06	1.9J	ND	ND	ND	ND	ND
	01/17/07	<1	<1	<1	<1	<1	<1
L-dup	01/17/07	<1	<1	<1	<1	<1	<1
L	08/01/07	1.4	ND	ND	ND	ND	ND
M	11/16/01	ND	ND	ND	ND	ND	ND
	02/14/02	ND	ND	ND	ND	ND	ND
	05/22/02	NC[8]	NC	NC	NC	NC	NC
	09/17/02	NC	NC	NC	NC	NC	NC
	10/31/02	NC	NC	NC	NC	NC	NC
	01/14/03	ND	ND	ND	ND	ND	ND
	7/29/03[9]	ND	ND	ND	ND	ND	5.0J
	01/29/04	ND	ND	ND	ND	ND	ND
	01/31/05	ND	ND	ND	ND	ND	ND
	01/26/06	ND	ND	ND	ND	ND	ND
	07/25/06	ND	ND	ND	ND	ND	ND
	01/17/07	<1	<1	<1	<1	<1	<1
	08/01/07	ND	ND	ND	ND	ND	ND

Table continued on next page

Table 2b. Concentrations of detected volatile organic compounds (VOCs)[1] in samples of surface water from the "Low-Lying Areas"; April 2007 Status Report; Coliseum Boulevard Plume Investigation; Montgomery, Alabama. [Distributions of VOCs in surface-water samples are shown on Figure 4.]

		Surface Water Lab Results					
		Trichloroethylene	**Cis-1,2-Dichloroethene**	**Vinyl Chloride**	**Chloromethane**	**Methylene Chloride[2]**	**Toluene**
Sample Identifier	**Sample Date**	**[Concentrations are in micrograms per liter (µg/l)]**					
		1.0 µg/l [3]	**1.0 µg/l [3]**	**1.0 µg/l [3]**	**1.0 µg/l [3]**	**1.0 µg/l [3]**	**1.0 µg/l [3]**
N	11/15/01	7.0J	ND	ND	ND	ND	ND
	02/13/02	16.8J	ND	ND	ND	ND	ND
	05/22/02	7.6J	ND	ND	ND	ND	ND
	09/17/02	3.7J	ND	ND	ND	ND	ND
N-dup	09/17/02	3.7J	ND	ND	ND	ND	ND
N	10/31/02	10.0J	ND	ND	ND	ND	ND
	01/14/03	15.2J	ND	ND	ND	ND	ND
	07/21/03	28.0	ND	ND	ND	ND	ND
	01/29/04	15.2J	ND	ND	3.2J	ND	ND
	07/26/04	11.9J	ND	ND	ND	ND	ND
	10/20/04	10.7J	ND	ND	ND	ND	ND
N-dup	10/20/04	10.4J	ND	ND	ND	ND	ND
N	01/31/05	11.2J	ND	ND	ND	ND	ND
	05/04/05	16.7J	ND	ND	ND	ND	ND
N-dup	05/04/05	16.5J	ND	ND	ND	ND	ND
N	07/21/05	18.1J	ND	ND	ND	ND	ND
N-dup	07/21/05	18.1J	ND	ND	ND	ND	ND
N	10/27/05	7.1J	ND	ND	ND	ND	ND
	01/26/06	10.4J	ND	ND	ND	ND	ND
	04/19/06	14.9J	ND	ND	ND	ND	ND
N-dup	04/19/06	14.8J	ND	ND	ND	ND	ND
N	07/25/06	6.9J	ND	ND	ND	ND	ND
N-dup	07/25/06	6.6J	ND	ND	ND	ND	ND
N	10/04/06	3	<1	<1	<1	<1	<1
	01/15/07	14	<1	<1	<1	<1	<1
	04/13/07	16	\	<1	<1	<1	<1
	08/01/07	15	ND	ND	ND	ND	ND
O	11/15/01	NC	NC	NC	NC	NC	NC
	02/13/02	ND	ND	ND	ND	ND	ND
	05/22/02	NC	NC	NC	NC	NC	NC
	09/17/02	ND	ND	ND	1.0J	ND	ND
	10/31/02	2.5J	15.3J	4.8J	ND	ND	ND
	01/14/03	4.8J	14.4J	ND	ND	ND	ND
	07/21/03	NS	NS	NS	NS	NS	NS
	01/29/04	31.8	6.9J	ND	4.5J	ND	ND
	07/26/04	ND	5.4J	1.3J	ND	ND	ND
	10/20/04	ND	10.2J	1.7J	ND	ND	ND
	01/31/05	14.6J	18.2J	1.0J	ND	ND	ND
	05/04/05	3.1J	14.7J	1.0J	ND	ND	ND
	07/21/05	ND	1.9J	ND	ND	ND	1.6J
	10/27/05	ND	3.3J	ND	ND	ND	ND
O-dup	10/27/05	ND	2.8J	ND	ND	ND	ND
O	01/26/06	17.3J	16.3J	1.8J	ND	ND	ND
	04/19/06	NS	NS	NS	NS	NS	NS
	07/25/06	ND	5.9J	ND	ND	ND	ND
	10/04/06	<1	15.0	2	<1	<1	<1
O-dup	10/04/06	<1	12.0	3	<1	<1	<1
O	01/15/07	<1	28	7	<1	<1	<1
	04/13/07	4	24	<1	<1	<1	<1
	08/01/07	ND	13.8	2.4	ND	ND	ND

Table 2b. Concentrations of detected volatile organic compounds (VOCs)[1] in samples of surface water from the "Low-Lying Areas"; April 2007 Status Report; Coliseum Boulevard Plume Investigation; Montgomery, Alabama. [Distributions of VOCs in surface-water samples are shown on Figure 4.]

		Surface Water Lab Results					
		Trichloroethylene	Cis-1,2-Dichloroethene	Vinyl Chloride	Chloromethane	Methylene Chloride[2]	Toluene
Sample Identifier	Sample Date	[Concentrations are in micrograms per liter (µg/l)]					
		1.0 µg/l [3]	1.0 µg/l [3]	1.0 µg/l [3]	1.0 µg/l [3]	1.0 µg/l [3]	1.0 µg/l [3]

Table continued on next page

Table 2b. Concentrations of detected volatile organic compounds (VOCs)[1] in samples of surface water from the "Low-Lying Areas"; April 2007 Status Report; Coliseum Boulevard Plume Investigation; Montgomery, Alabama. [Distributions of VOCs in surface-water samples are shown on Figure 4.]

		Surface Water Lab Results					
		Trichloroethylene	**Cis-1,2-Dichloroethene**	**Vinyl Chloride**	**Chloromethane**	**Methylene Chloride[2]**	**Toluene**
Sample Identifier	**Sample Date**	**[Concentrations are in micrograms per liter (μg/l)]**					
		1.0 μg/l [3]	**1.0 μg/l [3]**	**1.0 μg/l [3]**	**1.0 μg/l [3]**	**1.0 μg/l [3]**	**1.0 μg/l [3]**
P	11/15/01	16.8J	ND	ND	ND	ND	ND
	02/13/02	41.2	ND	ND	ND	ND	ND
	05/22/02	22.4	ND	ND	ND	ND	ND
	09/17/02	10.5J	ND	ND	ND	ND	ND
	10/31/02	25.1	ND	ND	ND	ND	ND
	01/14/03	43.2	ND	ND	ND	ND	ND
	07/21/03	42.2	ND	ND	ND	ND	ND
	01/29/04	25.0	ND	ND	2.3J	ND	ND
	07/26/04	23.4	ND	ND	ND	ND	ND
	10/20/04	22.5	ND	ND	ND	ND	ND
	01/31/05	27.5	ND	ND	ND	ND	ND
	05/04/05	20.9	ND	ND	ND	ND	ND
	07/21/05	21.1	ND	ND	ND	ND	ND
	10/27/05	9.8J	ND	ND	ND	ND	ND
	01/26/06	20.2	ND	ND	ND	ND	ND
	04/19/06	14.3J	ND	ND	ND	ND	ND
	07/25/06	12.6J	ND	ND	ND	ND	ND
	10/04/06	6	<1	<1	<1	<1	<1
	01/15/07	31	<1	<1	<1	<1	<1
	04/13/07	<1	<1	<1	<1	<1	<1
	08/01/07	25	ND	ND	ND	ND	ND

Notes:

[1] Samples were analyzed by **TTL, Inc.** in accordance with Method 8260 outlined in Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA, SW-846.

[2] Methylene Chloride is considered to have been present in the laboratory during analysis of the samples.

[3] MDL - Method Detection Limit of 1.0 microgram per liter (μg/l) for the aqueous laboratory analyses

[4] J - Concentration below calibration curve but above detection limit. In July 2005, the definition of a "J" flag was modified to flag samples with concentrations below the practical quantitation level, rather than the calibration curve values.

[5] ND - Not Detected

[6] dup - Duplicate sample collected for quality assurance/quality control purposes.

[7] NS - Not sampled; sample location was not sampled because of insufficient water for analyses

[8] NC - Not Collected; sampling location was not scheduled to be sampled.

[9] Sample location M was not located on 7/21/03, but was located and sampled on 7/29/03.

Table 3a
Preliminary Screening Level Evaluation for Surface Water in Kilby Ditch and the Low-lying Areas: Human Receptors
Coliseum Boulevard Plume Site

Chemical of Potential Concern	Surface Water PSV[(1)] for Trespasser Exposure		ADEM Water Quality Criterion[(2)]		Kilby Ditch				Low-Lying Areas			
					Frequency of Detection	Range of Detected Concentrations[(3)]	Location and Date of Maximum Concentration [(4)]		Frequency of Detection	Range of Detected Concentrations[(3)]	Location and Date of Maximum Concentration [(4)]	
	(ug/L)	basis	(ug/L)	basis		(ug/L)				(ug/L)		
Chloroform	2,851	nc	1,020	ca	4 / 41	1.2 J - 4.9 J	MP-1	Oct 05	0 / 56	< 1	--	--
1,1-Dichloroethene	9,178	nc	20,833	nc	2 / 41	1.6 J - 1.7 J	MP-1	Jan 05	0 / 56	< 1	--	--
cis-1,2-Dichloroethene	1,947	nc	2,881	nc	11 / 41	1 J - 8.3 J	MP-1	Jan 05	7 / 56	1.9 J - 18.2 J	O	Jan 05
Toluene	14,449	nc	43,614	nc	4 / 41	1.6 J - 62	MP-1	Oct 06	2 / 56	1.1 J - 1.6 J	O	Jul 05
Trichloroethene	853	ca	175	ca	36 / 41	1.9 J - 78.7	MP-1	Jan 05	34 / 56	1.0 J - 27.5	P	Jan 05
Vinyl chloride	41	ca	1,146	ca	0 / 41	< 1	--		4 / 56	1.0 J 2.5	O	Oct 06

Notes

µg/L = micrograms per liter

(1) Derived preliminary screening value for a target noncancer (nc) hazard quotient = 0.1 or a target cancer (ca) risk = 1×10^{-6} (See Attachment A, Table A-3)

(2) From ADEM Admin. Code R.335-6-10-.07 Toxic Pollutant Criteria Applicable to State Waters; for fish consumption only (See Attachment A, Table A-5)

(3) For January 2005 - October 2006. Data for Kilby Ditch are for MP-1, MP-2, CP-1, CP-2, and CP-3

(4) The locations are shown on Figure 2.

J = estimated concentration

Table 3b
Preliminary Screening Level Evaluation for Surface Water in Kilby Ditch and the Low-lying Areas: Ecological Receptors
Coliseum Boulevard Plume Site

Chemical of Potential Concern	USEPA Region 4 ESL (1) (ug/L)	USEPA Region 5 ESL (2) (ug/L)	Kilby Ditch			Low-Lying Areas		
			Frequency of Detection	Range of Detected Concentrations(3) (ug/L)	Location and Date of Maximum Concentration (4)	Frequency of Detection	Range of Detected Concentrations(3) (ug/L)	Location and Date of Maximum Concentration (4)
Chloroform	289 *	--	1 / 24	1.4 J	CP-2 1/27/06	0 / 56	< 1	-- --
1,1-Dichlor	303 *	--	0 / 24	< 1	--	0 / 56	< 1	-- --
cis-1,2-Dic	1,350 *^	NA	2 / 24	1.0 J - 1.3 J	CP-1 7/25/06	7 / 56	1.9 J - 18.2 J	O Jan 05
Toluene	175 *	--	0 / 24	< 1	--	2 / 56	1.1 J - 1.6 J	O Jul 05
Trichloroet	NA	47	21 / 24	1.9 J - 28.9	CP-1 1/26/05	34 / 56	1.0 J - 27.5	P Jan 05
Vinyl chlori	NA	930	0 / 24	< 1	--	4 / 56	1.0 J 2.5	O Oct 06

Notes

µg/L = micrograms per liter

(1) USEPA Region 4 Ecological Screening Levels (ESLs) accessed at www.epa.gov/region04/waste/ots/ecolbul.htm

(2) USEPA Region 5 ESLs accessed at www.epa.gov/RCRIS-Region-5/ca/edql.htm

(3) For January 2005 - October 2006. Data for Kilby Ditch are from CP-1, CP-2, and CP-3 only.

(4) The locations are shown on Figure 2.

NA = Not Available

J = estimated concentration

* Screening level is equivalent to acute toxicity level with an uncertainty factor of 10 applied.

^ Since no ESLs are available for cis-1,2-dichloroethene, the ESL for trans-1,2-dichloroethene is used to approximate the potential for ecological risk.

Table 3c
Preliminary Screening Level Evaluation for Sediment in Low-lying Areas: Human and Ecological Receptors
Coliseum Boulevard Plume Site

Chemical of Potential Concern	Sediment PSV(1) for Trespasser Exposure (ug/kg)	basis	USEPA Region 5 Sediment ESL(2) (µg/kg)	Low-lying Areas			
				Frequency of Detection	Range of Detected Concentrations(3) (ug/kg)	Location and Date of Maximum Concentration (4)	
Benzene	208,451	ca	142	1 / 59	5.6 J	O	Jan 06
cis-1,2-Dichloroethene	1,637,832	nc	654 ^	6 / 59	3.9 J - 370	O	May 05
trans-1,2-Dichloroethene	3,275,664	nc	654	2 / 59	6.2 J - 7.8 J	O	May 05
Methylene chloride	1,528,643	ca	159	2 / 59	3.1 J - 41 B	P	Oct 06
Toluene	28,052,946	nc	1,220	5 / 59	3.9 J - 37.5 J	O	Jan 06
Trichloroethene	755,272	ca	112	2 / 59	10.1 J - 16.8 J	O	May 05
Vinyl chloride	15,923	ca	202	2 / 59	5.9 J - 51 J	O	Jan 06

Notes

µg/kg = micrograms per kilogram

(1) Derived preliminary screening value for a target noncancer (nc) hazard quotient = 0.1 or a target cancer (ca) risk = 1×10^{-6} (See Attachment A, Table A-7)

(2) USEPA Region 5 ESLs accessed at www.epa.gov/RCRIS-Region-5/ca/edql.htm

(3) For January 2005 to October 2006

(4) The locations are shown on Figure 2.

J = estimated concentration

^ Since no ESL is available for cis-1,2-dichloroethene, the ESL for trans-1,2-dichloroethene is used to approximate the potential for ecological risk.

ATTACHMENT

ALDOT - CBP
Semi-Annual Groundwater Sample Form

Month July Year 2007

Well Location	Duplicate Sample	Sample Parameters			Sample Date	Sampled By	Pump #	Time
		Volatiles	Inorganics	TOC				
CP-2		X			08/01/07	BN, DM, WM	—	1507
CP-3		X			08/01/07	BN/DM, WM	—	1330
ZP-1		X			08/02/07	BN, WM	—	1050
ZD-1		X			08/02/07	BN, WM	—	1020
Low-lying Areas I thru P		X			08/01/07	BN/DM W/M	—	↓
							I	1040
							J	1050
							K	1010
							L	0930
							M	0955
							N	1150
							O	1300
							P	1215

XX- ethane, ethene, methane only

#- Sampling schedule must be coordinated with Goodwyn, Mills, and Cawood

SOUTHERN EARTH SCIENCES, Inc.

July 2007
Semi-Annual Event

ENVIROCHEM
Environmental Laboratories

Facility Name: ALDOT/Coliseum Blvd Plume **Job No:** 06-401 **Ditch ID:** ZD-1

Sampling Method: 07H0077-07F

Date: 08/02/07 **Personnel:** BN, WM

Parameter	Time	Reading
pH, s.u.	1020	7.92
Conductivity, umhos/cm		106
Turbidity, ntu		3.96 ntu
Temperature, C°		28.84
ORP, mV		-101.3
DO, mg/L		7.69

8260

T 31.59
ORP -131.6
DO 6.60
Ph 8.31
Cond 107
Turb 18.9
Time 10:50

I-Water

Facility Name: ALDOT/Coliseum Blvd Plume **Job No:** 06-401 **Low Lying Area:** I-Sediment

Sampling Method:

Date/Time 08/01/07 1040 **Personnel:** BN, DM, WM **GPS Lat/Lon:**

3-Volatile Vials (water) 2-Encores 1-4oz. (soil)

8260

J-Water

Facility Name: ALDOT/Coliseum Blvd Plume **Job No:** 06-401 **Low Lying Area:** J-Sediment

Sampling Method:

Date/Time: 08/01/07 1050 **Personnel:** BN, DM, WM **GPS Lat/Lon:**

3-Volatile Vials (water) 2-Encores 1-4oz. (soil)

8260

K-Water
Facility Name: ALDOT/Coliseum Blvd Plume **Job No:** 06-401 **Low Lying Area:** K-Sediment
Sampling Method:
Date/Time: 08/01/07 1010 **Personnel:** BN, DM, WM **GPS Lat/Lon:**
3-Volatile Vials (water) 2-Encores 1-4oz. (soil)

L-Water
Facility Name: ALDOT/Coliseum Blvd Plume **Job No:** 06-401 **Low Lying Area:** L-Sediment
Sampling Method:
Date/Time: 08/01/07 0930 **Personnel:** BN, DM, WM **GPS Lat/Lon:**
3-Volatile Vials (water) 2-Encores 1-4oz. (soil)

M-Water
Facility Name: ALDOT/Coliseum Blvd Plume **Job No:** 06-401 **Low Lying Area:** M-Sediment
Sampling Method:
Date/Time: 08/01/07 0955 **Personnel:** BN, DM, WM **GPS Lat/Lon:**
3-Volatile Vials (water) 2-Encores 1-4oz. (soil)

N-Water
Facility Name: ALDOT/Coliseum Blvd Plume **Job No:** 06-401 **Low Lying Area:** N-Sediment
Sampling Method:
Date/Time: 08/01/07 1150 **Personnel:** BN, DM, WM **GPS Lat/Lon:**
3-Volatile Vials (water) 2-Encores 1-4oz. (soil)

O-Water
Facility Name: ALDOT/Coliseum Blvd Plume **Job No:** 06-401 **Low Lying Area:** O-Sediment
Sampling Method:
Date/Time: 08/01/07 1300 **Personnel:** BN, DM, **GPS Lat/Lon:**
3-Volatile Vials (water) 2-Encores 1-4oz. (soil)

P-Water
Facility Name: ALDOT/Coliseum Blvd Plume **Job No:** 06-401 **Low Lying Area:** P-Sediment
Sampling Method:
Date/Time: 08/01/07 1215 **Personnel:** BN, DM, WM **GPS Lat/Lon:**
3-Volatile Vials (water) 2-Encores 1-4oz. (soil)

PROJ	SAMPLE ID	LAB ID	MATRIX	SAMPLED	ANALYZED	BATCH	ANALYTE	RL	UNITS	DIL	INI	RESULTS	FLAG
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	1,1,1,2-Tetrachloroethane	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	1,1,1-Trichloroethane	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	1,1,2,2-Tetrachloroethane	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	1,1,2-Trichloroethane	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	1,1-Dichloroethane	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	1,1-Dichloroethene	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichlorobenzene	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichloroethane	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichloropropane	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	1,3-Dichlorobenzene	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	1,4-Dichlorobenzene	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	Benzene	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	Bromodichloromethane	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	Bromoform	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	Carbon Tetrachloride	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	Chlorobenzene	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	Chloroethane	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	Chloroform	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	Chloromethane	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	cis-1,2-Dichloroethene	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	cis-1,3-Dichloropropene	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	Dibromochloromethane	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	Ethylbenzene	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	m,p-Xylene	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	Methylene Chloride	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	o-Xylene	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	Tetrachloroethylene	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	Toluene	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	trans-1,2-Dichloroethene	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	trans-1,3-Dichloropropene	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	Trichloroethylene	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	Trichlorofluoromethane	1.0	ug/L	1	JD	ND	
06-401	DRAFT: I	07H0058-04	Water	8/1/2007	8/10/2007	7H13007	Vinyl chloride	1.0	ug/L	1	JD	ND	

06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	1,1,1,2-Tetrachloroethane	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	1,1,1-Trichloroethane	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	1,1,2,2-Tetrachloroethane	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	1,1,2-Trichloroethane	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	1,1-Dichloroethane	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	1,1-Dichloroethene	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	1,2-Dichlorobenzene	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	1,2-Dichloroethane	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	1,2-Dichloropropane	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	1,3-Dichlorobenzene	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	1,4-Dichlorobenzene	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	Benzene	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	Bromodichloromethane	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	Bromoform	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	Carbon Tetrachloride	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	Chlorobenzene	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	Chloroethane	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	Chloroform	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	Chloromethane	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	cis-1,2-Dichloroethene	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	cis-1,3-Dichloropropene	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	Dibromochloromethane	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	Ethylbenzene	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	m,p-Xylene	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	Methylene Chloride	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/8/2007	7H10015	Moisture	0.1	% by Weight	1	ES	28.2
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	o-Xylene	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	Tetrachloroethylene	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	Toluene	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	trans-1,2-Dichloroethene	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	trans-1,3-Dichloropropene	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	Trichloroethylene	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	Trichlorofluoromethane	4.6	ug/kg	1	JD	ND
06-401	DRAFT: I	07H0058-05	Solid	8/1/2007	8/9/2007	7H10006	Vinyl chloride	4.6	ug/kg	1	JD	ND

06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	1,1,1,2-Tetrachloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	1,1,1-Trichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	1,1,2,2-Tetrachloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	1,1,2-Trichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	1,1-Dichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	1,1-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichloropropane	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	1,3-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	1,4-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	Benzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	Bromodichloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	Bromoform	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	Carbon Tetrachloride	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	Chlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	Chloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	Chloroform	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	Chloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	cis-1,2-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	cis-1,3-Dichloropropene	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	Dibromochloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	Ethylbenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	m,p-Xylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	Methylene Chloride	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	o-Xylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	Tetrachloroethylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	Toluene	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	trans-1,2-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	trans-1,3-Dichloropropene	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	Trichloroethylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	Trichlorofluoromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: J	07H0058-06	Water	8/1/2007	8/10/2007	7H13007	Vinyl chloride	1.0	ug/L	1	JD	ND

06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	1,1,1,2-Tetrachloroethane	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	1,1,1-Trichloroethane	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	1,1,2,2-Tetrachloroethane	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	1,1,2-Trichloroethane	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	1,1-Dichloroethane	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	1,1-Dichloroethene	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	1,2-Dichlorobenzene	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	1,2-Dichloroethane	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	1,2-Dichloropropane	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	1,3-Dichlorobenzene	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	1,4-Dichlorobenzene	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	Benzene	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	Bromodichloromethane	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	Bromoform	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	Carbon Tetrachloride	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	Chlorobenzene	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	Chloroethane	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	Chloroform	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	Chloromethane	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	cis-1,2-Dichloroethene	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	cis-1,3-Dichloropropene	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	Dibromochloromethane	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	Ethylbenzene	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	m,p-Xylene	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	Methylene Chloride	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/8/2007	7H10015	Moisture	0.1	% by Weight	1	ES	21.3
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	o-Xylene	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	Tetrachloroethylene	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	Toluene	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	trans-1,2-Dichloroethene	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	trans-1,3-Dichloropropene	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	Trichloroethylene	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	Trichlorofluoromethane	4.4	ug/kg	1	JD	ND
06-401	DRAFT: J	07H0058-07	Solid	8/1/2007	8/12/2007	7H13010	Vinyl chloride	4.4	ug/kg	1	JD	ND

06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	1,1,1,2-Tetrachloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	1,1,1-Trichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	1,1,2,2-Tetrachloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	1,1,2-Trichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	1,1-Dichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	1,1-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichloropropane	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	1,3-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	1,4-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	Benzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	Bromodichloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	Bromoform	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	Carbon Tetrachloride	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	Chlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	Chloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	Chloroform	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	Chloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	cis-1,2-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	cis-1,3-Dichloropropene	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	Dibromochloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	Ethylbenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	m,p-Xylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	Methylene Chloride	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	o-Xylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	Tetrachloroethylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	Toluene	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	trans-1,2-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	trans-1,3-Dichloropropene	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	Trichloroethylene	1.0	ug/L	1	JD	4.2
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	Trichlorofluoromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: K	07H0058-08	Water	8/1/2007	8/10/2007	7H13007	Vinyl chloride	1.0	ug/L	1	JD	ND

06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	1,1,1,2-Tetrachloroethane	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	1,1,1-Trichloroethane	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	1,1,2,2-Tetrachloroethane	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	1,1,2-Trichloroethane	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	1,1-Dichloroethane	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	1,1-Dichloroethene	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	1,2-Dichlorobenzene	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	1,2-Dichloroethane	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	1,2-Dichloropropane	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	1,3-Dichlorobenzene	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	1,4-Dichlorobenzene	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	Benzene	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	Bromodichloromethane	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	Bromoform	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	Carbon Tetrachloride	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	Chlorobenzene	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	Chloroethane	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	Chloroform	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	Chloromethane	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	cis-1,2-Dichloroethene	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	cis-1,3-Dichloropropene	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	Dibromochloromethane	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	Ethylbenzene	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	m,p-Xylene	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	Methylene Chloride	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/8/2007	7H10015	Moisture	0.1	% by Weight	1	ES	42.2
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	o-Xylene	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	Tetrachloroethylene	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	Toluene	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	trans-1,2-Dichloroethene	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	trans-1,3-Dichloropropene	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	Trichloroethylene	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	Trichlorofluoromethane	5.0	ug/kg	1	JD	ND
06-401	DRAFT: K	07H0058-09	Solid	8/1/2007	8/12/2007	7H13010	Vinyl chloride	5.0	ug/kg	1	JD	ND

06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	1,1,1,2-Tetrachloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	1,1,1-Trichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	1,1,2,2-Tetrachloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	1,1,2-Trichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	1,1-Dichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	1,1-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichloropropane	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	1,3-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	1,4-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	Benzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	Bromodichloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	Bromoform	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	Carbon Tetrachloride	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	Chlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	Chloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	Chloroform	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	Chloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	cis-1,2-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	cis-1,3-Dichloropropene	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	Dibromochloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	Ethylbenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	m,p-Xylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	Methylene Chloride	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	o-Xylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	Tetrachloroethylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	Toluene	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	trans-1,2-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	trans-1,3-Dichloropropene	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	Trichloroethylene	1.0	ug/L	1	JD	1.4
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	Trichlorofluoromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: L	07H0058-10	Water	8/1/2007	8/10/2007	7H13007	Vinyl chloride	1.0	ug/L	1	JD	ND

06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	1,1,1,2-Tetrachloroethane	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	1,1,1-Trichloroethane	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	1,1,2,2-Tetrachloroethane	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	1,1,2-Trichloroethane	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	1,1-Dichloroethane	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	1,1-Dichloroethene	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	1,2-Dichlorobenzene	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	1,2-Dichloroethane	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	1,2-Dichloropropane	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	1,3-Dichlorobenzene	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	1,4-Dichlorobenzene	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	Benzene	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	Bromodichloromethane	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	Bromoform	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	Carbon Tetrachloride	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	Chlorobenzene	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	Chloroethane	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	Chloroform	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	Chloromethane	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	cis-1,2-Dichloroethene	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	cis-1,3-Dichloropropene	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	Dibromochloromethane	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	Ethylbenzene	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	m,p-Xylene	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	Methylene Chloride	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/8/2007	7H10015	Moisture	0.1	% by Weight	1	ES	22.2
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	o-Xylene	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	Tetrachloroethylene	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	Toluene	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	trans-1,2-Dichloroethene	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	trans-1,3-Dichloropropene	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	Trichloroethylene	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	Trichlorofluoromethane	4.2	ug/kg	1	JD	ND
06-401	DRAFT: L	07H0058-11	Solid	8/1/2007	8/12/2007	7H13010	Vinyl chloride	4.2	ug/kg	1	JD	ND

06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	1,1,1,2-Tetrachloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	1,1,1-Trichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	1,1,2,2-Tetrachloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	1,1,2-Trichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	1,1-Dichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	1,1-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichloropropane	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	1,3-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	1,4-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	Benzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	Bromodichloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	Bromoform	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	Carbon Tetrachloride	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	Chlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	Chloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	Chloroform	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	Chloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	cis-1,2-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	cis-1,3-Dichloropropene	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	Dibromochloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	Ethylbenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	m,p-Xylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	Methylene Chloride	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	o-Xylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	Tetrachloroethylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	Toluene	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	trans-1,2-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	trans-1,3-Dichloropropene	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	Trichloroethylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	Trichlorofluoromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: M	07H0058-12	Water	8/1/2007	8/10/2007	7H13007	Vinyl chloride	1.0	ug/L	1	JD	ND

06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	1,1,1,2-Tetrachloroethane	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	1,1,1-Trichloroethane	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	1,1,2,2-Tetrachloroethane	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	1,1,2-Trichloroethane	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	1,1-Dichloroethane	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	1,1-Dichloroethene	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	1,2-Dichlorobenzene	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	1,2-Dichloroethane	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	1,2-Dichloropropane	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	1,3-Dichlorobenzene	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	1,4-Dichlorobenzene	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	Benzene	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	Bromodichloromethane	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	Bromoform	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	Carbon Tetrachloride	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	Chlorobenzene	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	Chloroethane	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	Chloroform	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	Chloromethane	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	cis-1,2-Dichloroethene	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	cis-1,3-Dichloropropene	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	Dibromochloromethane	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	Ethylbenzene	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	m,p-Xylene	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	Methylene Chloride	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/8/2007	7H10015	Moisture	0.1	% by Weight	1	ES	15.7
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	o-Xylene	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	Tetrachloroethylene	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	Toluene	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	trans-1,2-Dichloroethene	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	trans-1,3-Dichloropropene	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	Trichloroethylene	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	Trichlorofluoromethane	3.9	ug/kg	1	JD	ND
06-401	DRAFT: M	07H0058-13	Solid	8/1/2007	8/9/2007	7H10006	Vinyl chloride	3.9	ug/kg	1	JD	ND

06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	1,1,1,2-Tetrachloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	1,1,1-Trichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	1,1,2,2-Tetrachloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	1,1,2-Trichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	1,1-Dichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	1,1-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichloropropane	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	1,3-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	1,4-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	Benzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	Bromodichloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	Bromoform	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	Carbon Tetrachloride	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	Chlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	Chloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	Chloroform	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	Chloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	cis-1,2-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	cis-1,3-Dichloropropene	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	Dibromochloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	Ethylbenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	m,p-Xylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	Methylene Chloride	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	o-Xylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	Tetrachloroethylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	Toluene	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	trans-1,2-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	trans-1,3-Dichloropropene	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	Trichloroethylene	1.0	ug/L	1	JD	14.9
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	Trichlorofluoromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: N	07H0058-14	Water	8/1/2007	8/10/2007	7H13007	Vinyl chloride	1.0	ug/L	1	JD	ND

06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	1,1,1,2-Tetrachloroethane	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	1,1,1-Trichloroethane	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	1,1,2,2-Tetrachloroethane	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	1,1,2-Trichloroethane	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	1,1-Dichloroethane	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	1,1-Dichloroethene	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	1,2-Dichlorobenzene	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	1,2-Dichloroethane	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	1,2-Dichloropropane	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	1,3-Dichlorobenzene	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	1,4-Dichlorobenzene	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	Benzene	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	Bromodichloromethane	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	Bromoform	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	Carbon Tetrachloride	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	Chlorobenzene	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	Chloroethane	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	Chloroform	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	Chloromethane	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	cis-1,2-Dichloroethene	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	cis-1,3-Dichloropropene	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	Dibromochloromethane	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	Ethylbenzene	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	m,p-Xylene	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	Methylene Chloride	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/8/2007	7H10015	Moisture	0.1	% by Weight	1	ES	25.0
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	o-Xylene	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	Tetrachloroethylene	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	Toluene	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	trans-1,2-Dichloroethene	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	trans-1,3-Dichloropropene	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	Trichloroethylene	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	Trichlorofluoromethane	5.2	ug/kg	1	JD	ND
06-401	DRAFT: N	07H0058-15	Solid	8/1/2007	8/9/2007	7H10006	Vinyl chloride	5.2	ug/kg	1	JD	ND

06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	1,1,1,2-Tetrachloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	1,1,1-Trichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	1,1,2,2-Tetrachloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	1,1,2-Trichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	1,1-Dichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	1,1-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichloropropane	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	1,3-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	1,4-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	Benzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	Bromodichloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	Bromoform	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	Carbon Tetrachloride	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	Chlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	Chloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	Chloroform	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	Chloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	cis-1,2-Dichloroethene	1.0	ug/L	1	JD	13.8
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	cis-1,3-Dichloropropene	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	Dibromochloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	Ethylbenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	m,p-Xylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	Methylene Chloride	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	o-Xylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	Tetrachloroethylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	Toluene	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	trans-1,2-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	trans-1,3-Dichloropropene	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	Trichloroethylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	Trichlorofluoromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: O	07H0058-16	Water	8/1/2007	8/10/2007	7H13007	Vinyl chloride	1.0	ug/L	1	JD	2.4

06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	1,1,1,2-Tetrachloroethane	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	1,1,1-Trichloroethane	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	1,1,2,2-Tetrachloroethane	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	1,1,2-Trichloroethane	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	1,1-Dichloroethane	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	1,1-Dichloroethene	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	1,2-Dichlorobenzene	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	1,2-Dichloroethane	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	1,2-Dichloropropane	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	1,3-Dichlorobenzene	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	1,4-Dichlorobenzene	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	Benzene	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	Bromodichloromethane	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	Bromoform	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	Carbon Tetrachloride	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	Chlorobenzene	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	Chloroethane	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	Chloroform	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	Chloromethane	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	cis-1,2-Dichloroethene	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	cis-1,3-Dichloropropene	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	Dibromochloromethane	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	Ethylbenzene	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	m,p-Xylene	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	Methylene Chloride	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/8/2007	7H10015	Moisture	0.1	% by Weight	1	ES	47.5
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	o-Xylene	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	Tetrachloroethylene	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	Toluene	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	trans-1,2-Dichloroethene	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	trans-1,3-Dichloropropene	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	Trichloroethylene	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	Trichlorofluoromethane	8.2	ug/kg	1	JD	ND
06-401	DRAFT: O	07H0058-17	Solid	8/1/2007	8/9/2007	7H10006	Vinyl chloride	8.2	ug/kg	1	JD	ND

06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	1,1,1,2-Tetrachloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	1,1,1-Trichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	1,1,2,2-Tetrachloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	1,1,2-Trichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	1,1-Dichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	1,1-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	1,2-Dichloropropane	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	1,3-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	1,4-Dichlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	Benzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	Bromodichloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	Bromoform	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	Carbon Tetrachloride	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	Chlorobenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	Chloroethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	Chloroform	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	Chloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	cis-1,2-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	cis-1,3-Dichloropropene	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	Dibromochloromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	Ethylbenzene	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	m,p-Xylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	Methylene Chloride	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	o-Xylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	Tetrachloroethylene	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	Toluene	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	trans-1,2-Dichloroethene	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	trans-1,3-Dichloropropene	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	Trichloroethylene	1.0	ug/L	1	JD	24.5
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	Trichlorofluoromethane	1.0	ug/L	1	JD	ND
06-401	DRAFT: P	07H0058-18	Water	8/1/2007	8/10/2007	7H13007	Vinyl chloride	1.0	ug/L	1	JD	ND

06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	1,1,1,2-Tetrachloroethane	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	1,1,1-Trichloroethane	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	1,1,2,2-Tetrachloroethane	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	1,1,2-Trichloroethane	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	1,1-Dichloroethane	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	1,1-Dichloroethene	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	1,2-Dichlorobenzene	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	1,2-Dichloroethane	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	1,2-Dichloropropane	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	1,3-Dichlorobenzene	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	1,4-Dichlorobenzene	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	Benzene	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	Bromodichloromethane	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	Bromoform	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	Carbon Tetrachloride	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	Chlorobenzene	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	Chloroethane	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	Chloroform	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	Chloromethane	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	cis-1,2-Dichloroethene	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	cis-1,3-Dichloropropene	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	Dibromochloromethane	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	Ethylbenzene	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	m,p-Xylene	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	Methylene Chloride	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/8/2007	7H10015	Moisture	0.1	% by Weight	1	ES	26.4
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	o-Xylene	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	Tetrachloroethylene	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	Toluene	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	trans-1,2-Dichloroethene	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	trans-1,3-Dichloropropene	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	Trichloroethylene	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	Trichlorofluoromethane	4.7	ug/kg	1	JD	ND
06-401	DRAFT: P	07H0058-19	Solid	8/1/2007	8/9/2007	7H10006	Vinyl chloride	4.7	ug/kg	1	JD	ND

ENVIROCHEM
Environmental Laboratories
4320 Midmost Drive Mobile, AL 36609 ☐
105 Hwy 59N Summerdale, AL 36560 ☐
Tel: 251/344-9106 Fax: 251/341-9492

Chain of Custody Record

Agreement to Perform Services

CLIENT SES MONT

ADDRESS

CITY/ST/ZIP

CONTACT HAL WOOD

PHONE

FAX

EMAIL

PROJECT COL PLUME

PO#

METHOD OF DELIVERY: ☐ UPS ☐ BUS ☐ AIRBORNE ☐ DROP OFF ☐ FED X ☐ ECI PICK-UP/SAMPLED ☐ USPS

SHIPPING TICKET NO.:

SUB SHIPPED TO:
SUB SHIPPED VIA:
DATE SHIPPED:

LAB NO: 07H0058

COMMENTS:
☆ 8260

REQUESTED TAT:
(FEES FOR RUSH TAT MAY APPLY)

*SPECIFY ANALYTE LIST AND/OR METHOD

Matrix Codes: A=Air B=Bulk S=Soil GW=Groundwater SW=Surface Water/Stormwater WW=Wastewater DW=Drinking Water P=Paint L=Liquid SLD= Solid

PRESERVATION/CONTAINERS FOR WATER SAMPLES

SHADED AREAS FOR LAB USE ONLY

					COLLECTION		PLASTIC NONE												PLASTIC H2SO4						P/G NaOH		P/G NONE		GLASS H2SO4			GLASS NONE		GLASS HCL				STERILE Na2S203					HNO3		MISC TEST/FIELD DATA
LAB USE ONLY	FIELD ID	COMPOSITE	GRAB	MATRIX	DATE	TIME	BOD 5-DAY	ALKALINITY	CHLORIDE	pH	SS	SULFATE	TDS	TSS	TURBIDITY	O-PHOS	NITRATE	NITRITE	NO3+NO2	AMMONIA-N	COD	TOTAL PHOS	TKN	TOC	CN, AMENABLE	CN, TOTAL	HW S/CN	FLASHPOINT	PHENOLS*	TPH*	OIL & GREASE	SEMI-VOL*	PAH's	BETX	BETXM	BETXN	VOLATILES*	FECAL COLI	COLIFORM, MF	COLIFORM, P/A	ENTERO	TCLP*	METALS*	ASBESTOS	% MOIST
04	LOW LYING AREA I		X	SW	08/01/07	1040																															3								
05	LOW LYING AREA I		X	SLD		1040																															2								1
06	LOW LYING AREA J		X	SW		1050																															3								
07	LOW LYING AREA J		X	SLD		1050																															2								1
08	LOW LYING AREA K		X	SW		1010																															3								
09	LOW LYING AREA K		X	SLD		1010																															2								1
10	LOW LYING AREA L		X	SW		0930																															3								
11	LOW LYING AREA L		X	SLD		0930																															2								1
12	LOW LYING AREA M		X	SW		0955																															3								

ENTER NO OF CONTAINERS:

SAMPLER(S) SIGNATURE(S)/COMPANY:
ECI

DEPARTMENT RECEIPT: INITIALS, DATE, TIME

1. RELINQUISHED BY: DATE TIME	2. RELINQUISHED BY: DATE TIME	3. RELINQUISHED BY: DATE TIME
SIGNATURE: 08/01/07 1700	SIGNATURE.	SIGNATURE.
COMPANY: ECI	COMPANY:	COMPANY:
1. RECEIVED BY: DATE TIME	2. RECEIVED BY: DATE TIME	3. RECEIVED BY: DATE TIME
SIGNATURE: MK Barron 8 2 07 1320	SIGNATURE.	SIGNATURE.
COMPANY:	COMPANY:	COMPANY:

COOLER TEMP: oC ICE PRESENT: Y N
AIR BUBBLES PRESENT IN VOA VIALS: Y N N/A
CUSTODY SEALS INTACT: Y N N/A
COOLER OPENED BY: DATE/TIME:

OF BROKEN CONTAINERS: SAMPLE
HOLD TIMES EXCEEDED: Y N SAMPLE #/TEST
CORRECT CONT/PRES: Y N SAMPLE #/TEST
OF ID DISCREPENCIES: SAMPLE

CORRECTIVE ACTION TAKEN: Y N IF YES, COMPLETE
PERSON CONTACTED: BY WHOM:
RESOLUTION: DATE/TIME:

ENVIROCHEM
Environmental Laboratories
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Chain of Custody Record

Agreement to Perform Services

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METHOD OF DELIVERY: ☐ UPS ☐ BUS ☐ AIRBORNE ☐ DROP OFF ☐ FED X ☐ ECI PICK-UP/SAMPLED ☐ USPS
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☆ 8260
*SPECIFY ANALYTE LIST AND/OR METHOD

Matrix Codes: A=Air B=Bulk S=Soil GW=Groundwater
SW=Surface Water/Stormwater WW=Wastewater
DW=Drinking Water P=Paint L=Liquid SLD= Solid

PRESERVATION/CONTAINERS FOR WATER SAMPLES
SHADED AREAS FOR LAB USE ONLY

							PLASTIC												PLASTIC						P/G		P/G		GLASS			GLASS						STERILE							MISC TEST/FIELD DATA						
							NONE												H2SO4						NaOH		NONE		H2SO4			NONE		HCL				Na2S203					HNO3								
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DEPARTMENT RECEIPT: INITIALS, DATE, TIME

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COOLER OPENED BY: DATE/TIME:

OF BROKEN CONTAINERS: SAMPLE
HOLD TIMES EXCEEDED: Y N SAMPLE #/TEST
CORRECT CONT/PRES: Y N SAMPLE #/TEST
OF ID DISCREPENCIES: SAMPLE

CORRECTIVE ACTION TAKEN: Y N IF YES, COMPLETE
PERSON CONTACTED: BY WHOM:
RESOLUTION: DATE/TIME:

EVALUATION OF SITE-WIDE CORRECTIVE MEASURES

Coliseum Boulevard Plume Site
Montgomery, Alabama

Submitted By:

Alabama Department of Transportation
1409 Coliseum Boulevard
Montgomery, Alabama

April 2006

EVALUATION OF SITE-WIDE CORRECTIVE MEASURES

COLISEUM BOULEVARD PLUME SITE
MONTGOMERY, ALABAMA

SUBMITTED BY:

ALABAMA DEPARTMENT OF TRANSPORTATION
1409 COLISEUM BOULEVARD
MONGOMERY, ALABAMA

April 30, 2006

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1.1 OVERVIEW

Since 1999, the Alabama Department of Transportation (ALDOT), with oversight by the Alabama Department of Environmental Management (ADEM), has investigated the nature and extent of chlorinated volatile organic compounds (VOCs), including trichloroethene (TCE) in groundwater, surface water, soil, and air within the Coliseum Boulevard Plume (CBP), in Montgomery, Alabama. The CBP, shown on Figure 1-1, encompasses approximately 770 acres. These investigations have resulted in an enhanced understanding of the site, and development of a site-wide model to predict future behavior of the plume.

Four major study areas have been established at the CBP site: Kilby Ditch, Probehole 12 Area (PH12 Area), Low-lying Areas, and Southwestern Area (Figure 1-1). The occurrences of TCE within the Kilby Ditch Area were investigated extensively during the very early parts of the CBP investigations because of potential exposure pathways from seepage of TCE-containing groundwater into two branches of the Kilby Ditch. ALDOT implemented an interim corrective measure (ICM) at the Ditch after conferring with ADEM and the Alabama Department of Health. During the Kilby Ditch investigations, ADEM established an action level of 0.175 mg/L for TCE in the surface water within Kilby Ditch. Quarterly surface water samples are collected from Kilby Ditch and the Low-lying Areas, which receive the discharge from Kilby Ditch.

The PH12 Area contains the greatest concentrations of TCE and, as a consequence, much of the mass of dissolved TCE. A groundwater divide is present at the PH12 area, which limits the rate of movement of the TCE plume from this area. Review of the results of a preliminary groundwater flow and transport model indicated that corrective measures could reduce the TCE concentrations within the PH12 Area, but not reduce the TCE concentrations at the distal parts of the CBP. The results of the investigations of the PH12 Area were compiled in a "Site Characterization and Technology Screening Report" and a "Report in Support of Corrective Measures Development" (PH12 Area Status Report), which were submitted to the ADEM in June 2003 and September 2005, respectively. The 2005 report contained the substantive finding that the evaluation of corrective measures for the PH12 Area should be deferred and integrated into a comprehensive, Site-wide, corrective-measures study (CMS). The Site-wide evaluation concluded that the chlorinated VOCs within the PH-12 Area do not affect the distal portions of the CBP, where potential exposure pathways are present. Therefore, resources should be focused on eliminating exposure pathways, rather than treating the PH-12 area.

The most recent investigations have been focused in the Southwestern Area where there are two large sand and gravel borrow pits. Sand and gravel are excavated from these pits, which are dewatered through the cumulative pumping of about 7,000 gallons of groundwater per minute. This pumping affects the southwestward migration of the dissolved TCE plume.

As discussed in Section 2 of this Report, groundwater samples have been collected from 118 groundwater monitoring wells. Pursuant to an agreement with ADEM, ALDOT currently conducts quarterly sampling of selected wells within, on the margins of, and outside of the CBP to monitor, possible plume expansion, groundwater flow directions, and groundwater quality. Additionally, samples of surface water and sediment are collected quarterly in areas at the northeastern perimeter of the CBP area where groundwater reaches the surface. These areas are described as the Low-lying Areas.

Groundwater and surface water monitoring will be part of any corrective measures for the CBP. The monitoring program will allow ALDOT to modify corrective measures at the site as site conditions change.

Early in the investigations, ALDOT undertook a program of affirmative community involvement and outreach activities focusing on communicating two key facts:

1. Potable (drinking) water in the CBP Area is provided by the Montgomery Water Works & Sanitary Sewer Board and is not affected by the TCE in the groundwater at the CBP Site, and
2. The shallow groundwater under the impacted neighborhoods contains TCE and should not be utilized as a water supply source.

To provide this information to the public, ALDOT has conducted five public meetings, held numerous news conferences, and established and regularly meets with a Community Outreach Group made up of residents and business owners in the impacted area. Throughout this investigation and evaluation of corrective measures alternatives, major focus has been placed on the protection of public health and elimination, minimization, and management of potential exposure pathways.

1.2 PURPOSE

After submittal of the PH12 Area Status Report on October 3, 2005, ALDOT conducted additional investigations to evaluate further the extent of TCE in northern and southwestern areas of the CBP Site. Data from these investigations were used to finalize a site-wide groundwater flow and contaminant fate and transport model that was used to evaluate corrective measures alternatives for the CBP,, with emphasis on the evaluation of those CBP areas where TCE-containing groundwater could seep into to surface water. The purpose of this CMS is to present these evaluations and recommend a corrective measures approach for the CBP Site, focused on the long-term protection of public health and management of potential exposure pathways.

1.3 CORRECTIVE MEASURES OBJECTIVES

The basis for evaluating Site-wide Area corrective measures for the CBP is minimization of potential human exposure to TCE at the CBP Site. As discussed in the PH12 Area Status Report, potential exposure pathways have been investigated throughout the CBP Site through groundwater, surface water, soil, soil vapor, and air sampling. Results from these investigations indicated that some potential pathways could be eliminated from further consideration due to existing natural conditions. Other pathways were determined to be controllable through legal or institutional methods. Investigations focused on evaluation of corrective measures to eliminate the remaining exposure pathways.

Analytical results from samples collected in shallow and deep soil vapor implants indicated that a soil vapor intrusion pathway is most likely not present. This conclusion was supported by analytical results for soil vapor samples from beneath residential structures and within crawl spaces beneath residential structures, which indicated that soil vapors containing chlorinated VOCs were not migrating into these areas. Groundwater sampling at the CBP Site shows that chlorinated VOCs are generally not present, or are at low concentrations, in the upper portion of the shallow saturated zone. This reduces the potential for chlorinated VOCs to occur in soil vapor. Furthermore, a sandy, surficial clay is present in most of the CBP Site which limits the vertical migration of chlorinated VOC vapors where they are present.

The most likely potential exposure pathway to chlorinated VOCs at the CBP Site is seepage of TCE-containing groundwater into accessible surface waters. Therefore, this CMS evaluates potential corrective measures that focus on Kilby Ditch and the Low-lying Areas to the northeast, the two areas of the CBP site where chlorinated VOCs currently discharge to the surface water. Pursuant to the United States Environmental Protection Agency (USEPA) guidance for detailed analysis of alternatives (USEPA, 1988), the performance and estimated costs of corrective measures alternatives were evaluated over a 30-year performance period for the purposes of this CMS.

As an agency of the State of Alabama, ALDOT can meet the technical and financial requirements to implement, operate, maintain, and monitor the corrective measures that are recommended for the CBP.

This CMS is based on a review of available technologies to address the CBP. As new or modified technologies are developed and their effectiveness demonstrated, this CMS may be updated to include evaluation of the new or modified technologies for applicability to the CBP Site.

2.1 SITE DESCRIPTION

The CBP site is within the City of Montgomery, Alabama. Most of the CBP is north of the CSX Railroad, east of Lower Wetumpka Road, south of North Boulevard, and west of Three-Mile Branch (Figure 1-1).

The western part of the 71-acre ALDOT Central Complex is within the CBP site. Parts of the following four residential neighborhoods are within the CBP Site: Chisholm and Highland Gardens in the southwestern part, Eastern Meadows in the central part, and Vista View in the northeastern part. The Montgomery Zoo and Chisholm Elementary School are in the northwestern part of the Site.

Major topographical features in the area of the Site are the Alabama River to the west, Three-Mile Branch to the east, and Galbraith Mill Creek to the north. These natural features are important because of their effects on groundwater flow within the area that encompasses the CPB Site.

There are three principal Ditches (Main Kilby, West Kilby, and the Children's Zoo Ditch) that convey surface-water runoff at the CBP site. Main Kilby Ditch is generally north-south and extends from the ADEM to North Boulevard (Figure 1-1). The intersection of Main Kilby Ditch with North Boulevard is about 500 feet east of Coliseum Boulevard. Main Kilby Ditch is open and is intermittently earthen and lined with concrete. West Kilby Ditch is open and earthen to the west of Coliseum Parkway and is concrete lined from the east side of Coliseum Boulevard to its intersection with Main Kilby Ditch.

Surface water infiltrates in the earthen parts of the Ditches and recharges ground water. Periodically (based on seasonal variations of rainfall), ground water is in contact with parts of the bottoms of Main and West Kilby Ditches. Trichloroethylene (TCE) has been detected in water samples collected from the northern part of Kilby Ditch and the part of West Kilby Ditch that is east of Coliseum Boulevard. Based on the TCE in the surface water in parts of the Ditches, barrier fences were erected around parts of West Kilby Ditch and Main Kilby Ditch. These fences eliminate casual and unintentional entry into West Kilby Ditch where it is east of Coliseum Boulevard and into Main Kilby Ditch from its confluence with West Kilby Ditch to its intersection with North Boulevard.

2.2 REGIONAL GEOLOGY AND HYDROGEOLOGY

2.2.1 REGIONAL GEOLOGY

Knowles, and others (1963) described the geology and groundwater resources in Montgomery County. Their hydrogeologic descriptions were updated in the wellhead-protection plan for the City of Montgomery (CH2MHill, 1997). The hydrogeology at the nearby Gunter Air Force Station Annex (formerly Gunter Air Force Base) has been reported by Radian (1999). These reports and geologic logs for probeholes, piezometers, and monitoring wells were reviewed to develop the conceptual geology and hydrogeology of the CBP Site.

The ALDOT Complex, Vista View residential area, the Northeast Montgomery Industrial Park, and the Gunter Annex are within the Alluvial-Deltaic Plain District of the East Gulf Coastal Plain physiographic section (Sapp and Emplaincourt, 1975).

Northeastern Montgomery is underlain by Quaternary and Cretaceous sedimentary deposits (Figure 2-1). The Cretaceous sediments strike generally eastward and dip southward at about 30 to 40 feet per mile. Beneath these sedimentary deposits are pre-Cretaceous igneous and metamorphic rocks.

Quaternary alluvial and terrace deposits overlie the Cretaceous sediments throughout the northeastern sector of Montgomery except for the hilly areas of southern Chisholm, Capitol Heights, and Dalraida (Figure 2-1) where the Eutaw Formation crops out. The alluvial deposits crop out along the flood plains of the Alabama and Tallapoosa Rivers. Terrace deposits (alluvial deposits of an old flood plain) crop out from Chisholm through the ALDOT Complex, Vista View area, to the Gunter Annex area. The alluvial deposits typically are 40 to 85 feet thick and the terrace deposits typically are 40 to 55 feet thick. The alluvial and terrace deposits comprise lenses of gravel and pale-yellow-orange, medium- to coarse-grained, poorly sorted sands that commonly are interbedded with dark-reddish-brown sandy clay (Knowles, and others, 1963). The CBP Site is on a river terrace that is about 175 to 220 feet above mean sea level (AMSL).

Beneath the alluvial and terrace deposits is the Cretaceous Eutaw Formation, which crops out from the southern part of Chisholm through

Capitol Heights and Dalraida (Figure 2-1). The Eutaw Formation comprises marine glauconitic sand that is interbedded with clay and sandy clay. Review of sample logs indicates that the Eutaw Formation is about 200 feet thick in eastern Montgomery. However, only the basal 50 to 60 feet of the Eutaw Formation underlies the Chisholm-Vista View-Gunter Annex area. The occurrence of only basal Eutaw Formation at the CBP Site agrees with the findings of CH2MHill (1997) in the wellhead-protection plan for the City of Montgomery. Radian (1999) reported that the Eutaw Formation pinches out on the Gunter Annex, which is southeast of the CBP Site.

Beneath the Eutaw Formation is the Gordo Formation. The Gordo Formation comprises a basal zone of non-marine sand and gravel that is overlain by alternating beds of sand and varicolored mottled clay from the western part of Alabama through Montgomery County. Review of drillers' logs, geologists' sample logs, and geophysical logs for wells and test wells indicates that this clay is 10 to 50 feet thick in the Montgomery area. This varicolored clay is about 60 to 100 feet below land surface (BLS) in the Chisholm-ALDOT Complex-Vista View-Gunter Annex area. The Gordo Formation is about 300 to 340 feet thick in northeastern Montgomery.

Beneath the Gordo Formation is the Coker Formation. The Coker Formation comprises a basal non-marine zone of deltaic sand, gravel, and clay. The basal zone is overlain by marine sand, clay, and thin beds of calcareous sandstone. Review of drillers' logs, geologists' sample logs, and geophysical logs indicates that the Coker Formation is 350 to 400 feet thick in northeastern Montgomery. Beneath the Coker Formation are pre-Cretaceous Rocks.

2.2.2 REGIONAL HYDROGEOLOGY

The Coker, Gordo, and Eutaw Formations are the major aquifers in the Montgomery area. These aquifers comprise sand and gravelly sand beds. Water in the Coker, Gordo, and Eutaw aquifers generally moves downdip from the recharge areas. These aquifers are confined downdip from their recharge areas. Downdip, the upper confining layer for the Eutaw aquifer is the Mooreville Chalk. This upper confining Chalk is absent at the CBP Site. The upper confining layer for the Gordo aquifer is the varicolored mottled clay that marks the top of the Gordo Formation. The upper confining layer for the Coker aquifer is a bed of marine clay at the top of the Coker Formation. These confining layers occur consistently from western Alabama throughout Montgomery County.

2.3 GROUNDWATER USE

2.3.1 WELLS

2.3.1.1 Active Wells <u>(Within one mile)</u>

The Coker and Gordo Formations are sources of water supply for the Montgomery Water Works "North Well" and "West Well" Fields. According to personnel of the City of Montgomery Water and Sewer Board, there are seven public-supply wells currently active within the North Well Field. All of the active wells are screened within the Gordo and/or Coker Formations. The nearest active public-supply well is about 2700 feet southwest of the southwestern extent of the CBP. None of the wells that are completed within the shallow aquifer (alluvial deposits/Eutaw Formation) within the North Well Field are used.

The easternmost wells of the West Well Field are about three miles southwest of the southwestern extent of the CBP. The Water and Sewer Board intends to begin pumping from a new "Southwest Well Field" by March 2006 and to abandon all of the wells within the North Well Field in 2007. This new Southwest Well Field is about 11 miles southwest of the southwestern extent of the CBP.

Based on file reviews at the ADEM, the Alabama Geological Survey, the Plumbing Gas and Mechanical Permit and Inspection Department of the City of Montgomery, and personal interviews, the following information was obtained about active wells that are within one mile of the CBP Site:

Location: Resurrection Catholic Church
Address: 2815 Forbes Drive (about 100 yards north of the North Boulevard: about 2500 feet northwest of the northwest extent of the CBP).
Date Drilled: June 2003
Well Use: Irrigation
Depth: 193 feet

Location: Bonnie Crest Golf Course
Address: 1410 Federal Drive (about 4000 feet southeast of the south central extent of the CBP).
Date Drilled: June 2001
Well Use: Irrigation
Depth: 451 feet
Screened intervals: 90-100 feet; 170-290 feet;
310-330 feet; 350-390 feet

Location: J.B Crosby
Address: 3609 Lower Wetumpka Road (about 2500 feet northwest of the northwest extent of the CBP).
Date Drilled: August 2005
Well Use: Irrigation
Depth: 349 feet
Screened interval: 209-349 feet

Location: Circle J Roll Offs
Address: 4040 North Boulevard (about 2000 feet east of the northeastern extent of the CBP; east of Three Mile Branch)
Date Drilled: ?
Water Use: Water animals
Depth: Reportedly "shallow"

Location: Cooks Pest Control
Address: 1861 Congressman W.L. Dickinson Drive (about 2000 feet southeast of the eastern extent of the CBP)
Date Drilled: 2004
Well Use: Irrigation
Depth: 200 feet (probably taps Gordo Formation)

2.3.1.2 Inactive Wells (Within 1000 feet)

Three domestic wells have been observed during the investigations within the CBP Site. Two of the domestic wells are dug wells that are adjacent to Houser Street. The first dug well is about 3 feet in diameter. According to an interview with the well owner on June 6, 2002, the well was dug in 1952 or 1953 and is about 35 feet deep. The water from the well was used to water the grass until about 1962 when the pump and piping of the well were removed. On June 6, 2002, the well was found to have caved to about 20 feet BLS.

The second domestic dug well that was observed had a concrete cover. The well was not examined because the concrete cover could not be removed manually. The owner of the property on which the well is located reported that the well was at least 70 years old but had not been used for years. The owner was not certain that the electrical supply to the well had been disconnected.

The third domestic well that was observed is about 400 feet southwest of the intersection of Lower Wetumpka Road with the CSX Railroad. This well has a four-inch diameter casing and is about 28 feet deep. The owner reported that the well was used to water his garden and flowers. However, the well had not been used since 2000 because the pump was inoperable and parts were not available. On June 20, 2002, a sample of water was collected from the well and analyzed for volatile organic compounds (VOCs). The depth to water in the well was about 15 feet BLS. No VOCs were detected in the water sample (analytical detection limit of 0.001 mg/L [milligram per Liter]).

"Notification of intent to drill a water well and certification of completion" forms were reviewed at the Alabama Geological Survey to identify wells that might be within the CBP; no domestic wells were identified. Publications of the Alabama Geological Survey also were reviewed to identify wells. Five wells that might be within or near the CBP Site were found in a 1960 report of the Survey (Knowles and others, 1960). Based on review of Plate 1 in this 1960 report, the approximate locations of the five wells were transposed to a topographic map onto which had been plotted the extent of the CBP. Three of the five wells would have been within the CBP. One of the wells was at the former Kilby Prison (currently the Vista View Subdivision). This well, which has probably been destroyed, was 80 feet deep and tapped the Eutaw Formation. The second well was near the intersection of Lower Wetumpka Road and Rigby Street, which is at the southwestern most extent of the CBP. This well was reported as being a 27-foot deep dug well that tapped terrace deposits. The third well was near the intersection of Crouson and Broadway Streets, which is near the south edge of the southwest part of the CBP. This well was reported as being 60 feet deep, tapping, the Eutaw Formation, and not used.

The remaining two of the five wells that were identified within the 1960 report were within about 1,000 feet of the south edge of the southwest part of the CBP. The first of these wells was near the intersection of Rigby Street and Texas Street. This well was 100 feet deep and was used as a domestic/stock well and to supply a "fish-bait" farm. Glenwood Nurseries was listed as owning the second well, which was near the intersection of Rigby Street and Fairgrounds Road. The well was 355 feet deep, tapped the Gordo Formation, and was reported as not used.

The above five wells probably are either destroyed or not in use. The ALDOT completed a vehicular reconnaissance of parcels encompassing the probable locations of these historical wells. There was no evidence of the wells.

A well to provide water to the elephant moat was constructed by the City of Montgomery Zoo in August 2004. The well was discovered during the review of the certification of completion forms that are routinely filed, as a regulatory requirement, with the ADEM and that are filed also with the Alabama Geological Survey. The well was screened within the shallow-zone aquifer and also within the upper part of the Gordo Formation. Use of the well, which yielded about 100 gallons per minute, began in August 2005. With the cooperation of the City of Montgomery, the ALDOT plugged and abandoned the well in March 2006.

2.3.2 SAND AND GRAVEL OPERATIONS (BORROW PITS)

There are two active sand and gravel (borrow) pits southwest of the CBP Site. These two borrow pits pump a total of about 7,000 gallons per minute (GPM) of water.

2.4 SYNOPSES OF INVESTIGATIONS

The lateral and vertical extents of TCE in the sediments and groundwater at the CBP Site have been delineated through a series of investigations. Reports of these investigations have been submitted previously to the ADEM. Two saturated "zones" have been investigated to determine the horizontal and vertical extents of TCE in the groundwater at the CBP Site. The "shallow zone" is the saturated zone from the water table to the first distinct clay beneath the water table. One hundred ten (110) monitoring wells are currently installed in the shallow zone. The "deep zone" is the saturated zone immediately beneath the first distinct clay. Seven (7) monitoring wells have been installed in this deep zone. One additional well has been installed in the Gordo aquifer. Thus, the current ground-water monitoring system throughout the CBP Site comprises a total of 118 monitoring wells.

The following discussions outline the efforts to investigate the horizontal and vertical extents of TCE within the shallow saturated zone and to determine if there is TCE within the deep saturated zone within the CBP Site. Also discussed are descriptions of the wells that were constructed for long-term monitoring of the groundwater within the CBP Site.

2.4.1 SHALLOW ZONE

Direct-push technology (DPT) methods, including membrane interface probe (MIP) technology, were used to collect sediment and groundwater samples from over 200 probeholes to delineate the extent of the TCE within the shallow saturated zone. Samples were analyzed by using either a mobile laboratory at the project Site or expedited turn-around time at a fixed laboratory. The results of these analyses were used to develop a network of monitoring wells to monitor the shallow saturated zone throughout the CBP Site (see Plate 1).

2.4.1.1 Shallow-Zone Monitoring Wells/Piezometers

Investigation of the CBP Site began in October 1999 in response to the discovery of TCE in the groundwater beneath Alfa Insurance Company property that is north of the ALDOT Central Complex (Goodwyn, Mills, and Cawood, 1999). Goodwyn, Mills & Cawood, a local consulting company, constructed five (5) monitoring wells during a Phase II Environmental Site Assessment. Nine monitoring wells then were constructed, by TTL, Inc., near the ALDOT Central Complex to provide groundwater samples for VOC analyses (particularly, TCE). These nine monitoring wells were screened from the water table to the first distinct clay beneath the water table (TTL, 1999a).

Since the discovery of the TCE on the Alfa property, 105 monitoring wells, 25 piezometers, and 7 continuous multi-tubing (CMT) monitoring wells have been constructed at the CBP Site to investigate and to verify the extent of TCE within the shallow saturated zone. The locations of these wells and piezometers are shown on Plate 2-1. The screens of the cluster wells are 5 to 10 feet long and were constructed to monitor the upper, middle or lower parts of the shallow saturated zone. The CMT wells were constructed to refine information about the vertical distribution of VOCs within the PH12 Area.

2.4.1.2 Shallow-Zone Monitoring

Quarterly groundwater monitoring events have been conducted since

April 2002. Groundwater samples are collected from the shallow-zone monitoring wells and the CMT wells and analyzed for VOCs. (Subsection 2.8 for the distribution of TCE within the groundwater.)

VOCs, other than TCE, have been detected in the quarterly groundwater samples that have been collected at the CBP Site. These other VOCs are: carbon tetrachloride; cis-1,2-dichloroethene (cis-1,2-DCE); 1,1-dichloroethene (1,1-DCE); vinyl chloride, and chloroform. Plots of the concentrations of carbon tetrachloride; cis-1,2-DCE; 1,1-DCE, and chloroform that have been detected in the water samples are shown in Figures 2-2, 2-3, 2-4, and 2-5, respectively. These figures depict the maximum concentrations within groundwater samples collected through January 2006. The concentrations of vinyl chloride were not plotted because vinyl chloride has been detected only in the quarterly samples from three CMT monitoring wells. These three CMT wells (CMT-1, -2, and -4) are within the PH12 Area. Vinyl chloride was detected first in the July 2005 samples from well CMT-4. The first detections of vinyl chloride in samples from wells CMT-1 and CMT-2 occurred in the January 2006 samples.

The maximum concentrations for these other VOCs were in groundwater samples from the PH12 Area. The occurrences of the maximum concentrations of these other VOCs coincided predominately with the occurrences of the maximum concentrations of TCE in groundwater samples. Occurrences of chloroform within the water samples probably reflect the effects of the infiltration of water that originated from a public supply because chloroform is a byproduct of the disinfection process.

Groundwater samples have been collected from 110 monitoring wells and analyzed for the inorganic compounds: total alkalinity, chloride, nitrate, nitrite, sulfate, ferrous iron, total iron, methane, ethane, and ethene. The number of monitoring wells that have been sampled is greater than the number of locations because some of the wells are in "clusters" and a few are CMT wells.

The distributions of these inorganic constituents in the groundwater samples from the CBP Site are depicted in Figures 2-6 (total alkalinity), 2-7 (chloride), 2-8 (nitrate), 2-9 (sulfate), 2-10 (total iron), 2-11 (ferrous iron), and 2-12 (methane). These figures depict the maximum concentrations within groundwater samples collected through January 2006. Review of these plots indicates that the groundwater at the CBP Site is typically low in alkalinity and chloride, sulfate, and nitrate concentrations. There were elevated concentrations of sulfate and elevated total alkalinity values in a few of the groundwater samples. These elevated values in the groundwater samples were concluded to be the residual effects of grout used during construction of the CMT wells.

Most of the water samples contained less than 5 mg/L of nitrate (Figure 2-8). The higher concentrations of nitrate probably result from the fertilizing of lawns or leakage from sanitary sewers. Most of the iron in the water samples (Figures 2-10 and 2-11) was ferrous iron rather than ferric iron.

Review of Figure 2-12 indicates that there are two areas where the groundwater contains the higher, relative to the rest of the Site, concentrations of methane: the PH12 Area and the northern part of Main Kilby Ditch. The higher concentrations of methane in samples of groundwater from within the PH12 Area probably result from leakage from the sanitary sewers prior to the relining of the sewers by the Montgomery Water Works and Sanitary Sewer Board. The degradation of the TCE at the Site is probably not the source of the elevated methane concentrations because two groundwater samples, collected in 2003, from the PH12 Area did not contain the bacterial strain (*dehalococcoides ethenogenes*) necessary to degrade the TCE. The higher concentrations of methane in water samples at the north part of Main Kilby Ditch probably are due to the marshy, anaerobic conditions that are common in that part of the Ditch and the downstream low-lying areas.

Review of the occurrences of other VOCs in groundwater samples from the PH12 Area indicates that there has been limited natural degradation of TCE. The absence of the necessary bacterial strain, the predominance of ferrous iron, the occurrences of only limited amounts of compounds that are degradation products, and the aerobic characteristics of the shallow-zone aquifer indicate that substantial effort would be required to dehalogenate the TCE that is within the PH12 Area. The aquifer would have to be converted from aerobic to anaerobic conditions, the appropriate bacterial strain would have to be injected into the aquifer, and the inorganic chemistry would have to be augmented and maintained to support the bacteria.

2.4.2 DEEP-ZONE

The "deep zone" at the CBP Site refers to the saturated zone that is immediately beneath the first distinct clay beneath the water table. Investigations to determine whether TCE had migrated to the deep zone began in May 2001 with the drilling, by the Rotasonic method, of an exploratory boring adjacent to ALDOT monitoring well MW-1. A borehole for a deep-zone monitoring well (MW-304) also was drilled in the east part of the ALDOT Central Complex (see Plate 1).

The Rotasonic method was used to drill eight exploratory borings to the top of the Gordo Formation. The locations of these borings (DZ1 through DZ8) are shown on Plate 2-1. The sites for these deep exploratory borings were placed outside the PH12 Area to avoid drilling within areas that contained elevated concentrations of TCE. Three of the borings were in the southwest part of the Site, two were in the east part of the Site, and two were in the north part of the Site. The eighth boring was on the Garrett Coliseum Property, which is south of the CBP Site.

Groundwater samples were collected from four of the deep-zone borings and analyzed for VOCs. TCE was not detected in the groundwater samples from these borings (TTL, 2002c)

2.4.2.1 Deep-Zone Monitoring Wells

Information obtained from deep-zone monitoring well MW-304 and the exploratory borings were reviewed and used to construct five additional deep-zone monitoring wells to monitor for TCE, if any, within the deep zone. Each of the deep-zone wells was terminated at the top of the Gordo Formation. Four (MW339 through MW342) of these five deep-zone monitoring wells were constructed adjacent to the PH12 Area. The fifth deep well (MW311) is within the extreme southwest part of the CBP. The locations of the deep-zone monitoring wells are shown on Plate 2-1. Sediment samples from the borings for the four wells were collected in FLUTe sleeves. There was no evidence of staining or color changes on any of the FLUTe sleeves that would indicate TCE DNAPL (TTL, 2002b).

As described in Section 2.3.1.2, the ALDOT plugged and abandoned a production well at the City of Montgomery Zoo. The production well had been screened in both the shallow saturated zone and the upper Gordo Formation. Two monitoring wells were constructed within 30 feet of the production-well site. One of the monitoring wells (MW357) was constructed with the screened interval within the deep saturated zone (the saturated zone beneath the first distinct clay at the site but above the Gordo Formation). The second monitoring well (MW457) was constructed within the upper Gordo Formation. The top and bottom of the screen of this second monitoring well correspond approximately to the depths of the top of the screen and the pump intake of the former production well. Both monitoring wells were constructed to determine whether the dual screening of the production well might have provided a conduit for the downward movement of water from the shallow-zone aquifer into the deep saturated zone and/or the upper Gordo Formation.

2.4.2.2 Deep-Zone Monitoring

During quarterly groundwater monitoring, groundwater samples are collected from monitoring wells screened within the deep zone and analyzed for VOCs. Ground-water samples collected from deep zone monitoring well MW 341 on February 7, 2003 and during the most recent sampling event (January 16, 2006) contained 1.2J and 1.6J ug/l of TCE, respectively. ("J" indicates an estimated concentration which is less than the lowest concentration of the instrument calibration curve but above the detection limit.) Monitoring well MW341 is on East Park Avenue about 650 feet west of the intersection with Fairgrounds Road.

TCE was not detected (detection limit of 1.0 μg/L) in a groundwater sample that was collected on March 30, 2006 from monitoring well MW357, which is completed within the saturated zone that is immediately beneath the first distinct clay. TCE also was not detected in a groundwater sample that was collected on March 28, 2006 from monitoring well MW457, which is completed within the upper Gordo Formation. Samples of groundwater will be collected from these two monitoring wells during the next three calendar quarters and analyzed for VOCs. The monitoring wells then will be plugged and abandoned if TCE is not detected in these three additional groundwater samples.

2.5 GEOLOGY OF THE COLISEUM BOULEVARD PLUME SITE

2.5.1 SITE-WIDE GEOLOGY

The following summary of the geology of the CBP Site was based on published and unpublished reports and review of the vertical and horizontal distributions of stratigraphic layers at the Site. Soil/sediment samples that were retrieved during the investigations to delineate the vertical and horizontal extents of the TCE and during construction of the shallow- and deep-zone monitoring wells were described by an on-Site geologist. These on-Site descriptions provided lithologic "controls" for interpreting the geology at the Site.

Probeholes have been driven to maximum depths of about 100 feet BLS (about 120 feet AMSL) and boreholes for monitoring wells have been drilled to a maximum depth of about 120 feet BLS (about 100 feet AMSL).

Sediments at the CBP Site were classified into the following three lithofacies: (1) a sandy clay (consisting of the surficial clay and first distinct clay), (2) a fine-to-coarse-grained sand with gravel, and (3) a graded sand (fine- to coarse-grained) that is glauconitic, silty and/or clayey (TTL, 2001b). The three lithofacies were classified into five hydrostratigraphic units to develop the groundwater flow and transport model for the CBP Site.

The CBP Site is on 20 to 45 feet of terrace and alluvial deposits of the Alabama River and Catoma Creek. The terrace deposits are of fluvial origin and comprise primarily sands with gravel, silt, and clay.
Four geologic cross-sections (Figures 2-13, 2-14, 2-15, and 2-16) were prepared by examining the lithologic descriptions of samples recovered from probeholes and boreholes at the Site. The locations of these cross-sections are shown on Plate 2-1. As shown on Figures 2-13 and 2-16 (cross-sections A-A' and D-D'), the majority of the CBP Site is capped by a 2-to 20-foot-thick sandy clay. Beneath the clay are 1 to 10 feet of fine- to coarse-grained sand that is underlain by a 5- to 20-foot-thick layer of sand and gravel. The gravels are well-rounded, quartz, and pebble- to cobble-sized and are typically 10 percent to 50 percent, by weight, within this layer of sand and gravel.

The alluvial and terrace deposits are underlain by 30 to 60 feet of the Eutaw Formation, which comprises fine- to coarse- grained glauconitic sands with interbedded clay. The glauconitic sands may be the contact between the terrace deposits and the lower Eutaw Formation. This contact may not be distinct because the Eutaw Formation could have been reworked by alluvial processes. The shallow-zone and deep-zone monitoring wells and CMT wells that have been constructed during investigations of the CBP Site have been completed within the alluvial and low-terrace deposits and/or underlying Eutaw Formation.

Beneath the glauconitic sand is clay that has been referred to in investigations of the CBP Site as "the first distinct clay beneath the water table". The first distinct clay separates the "shallow zone" (saturated zone above the first distinct clay) and the "deep zone" (saturated zone immediately beneath the first distinct clay). As shown on Figure 2-13 (cross-section A-A'), the first distinct clay ranges from about 40 to 60 feet BLS, is generally 1 to 3 feet thick, brownish-yellow and light-brownish-gray and/or light gray in color, and slightly sandy throughout most of the CBP Site. Most of the probeholes and boreholes for the shallow-zone monitoring wells were terminated at the first distinct clay. The depths to groundwater within the shallow saturated zone range from about 10 to about 65 feet BLS within the CBP Site.

The Eutaw Formation is underlain by the Gordo Formation. The top of the Gordo Formation at the Site is a reddish-brown and bluish-gray to greenish-gray mottled clay. The Gordo aquifer is confined by this mottled clay, which ranges in thickness from 10 to 50 feet throughout Montgomery County (Scott, written communication, 2001). The Gordo Formation is about 300 feet thick at the CBP Site (CH2MHill, 1997).

Gravels of the terrace and alluvial deposits have been the target of gravel-mining operations in areas southwest, northwest and northeast of the CBP Site. The bottoms of borrow pits that are southwest of the CBP Site are about 50 feet BLS. Review of Figure 2-13 indicates that the glauconitic sand thickens southwestward. There is, however, a distinct change in the stratigraphy southwest and southeast of Amanda Lane. There is a much greater thickness of gravelly sand and the stratigraphic sequence is interrupted by a 20-foot-thick greenish-gray, organic clay about 1200 feet southwest of piezometer PZ19. The surficial sandy clay, the fine to coarse-grained sand, and the majority of the gravelly sand interval probably have been removed by the excavating at the borrow-pit (sand and gravel) operations.

2.5.2 GEOLOGY OF THE PH12 AREA

The PH12 Area is capped by about 7 to 15 feet of surficial sandy clay except for isolated areas where the upper few feet of this clay has been disturbed or has been removed and replaced with fill (Figure 2-14). The surficial sandy clay is underlain by about 5 to 10 feet of fine- to coarse-grained sand; this sand is underlain by 10 to 20 feet of fine- to coarse-grained sand and gravel. Beneath the sand and gravel is the fine to coarse-grained glauconitic sand. Within the PH12 Area, this glauconitic sand contains multiple 1/8 to 1/2-inch thick clay lenses.

In general, the average depth to the first distinct clay is 50 to 60 feet BLS within the PH12 Area. As shown on Figure 2-14 (cross-section B-B'), which extends north-south along the east part of the PH12 Area, the first distinct clay is the brownish-yellow and light-brownish-gray and/or light-gray sandy clay penetrated throughout the majority of the CBP site. Review of stratigraphic information from boreholes and probeholes east and west of the PH12 Area indicates that there is a transition such that the first distinct clay is a thick, dark gray to greenish-gray clay with fine sand laminae within parts of the PH12 Area. This dark gray clay, which is depicted on Figure 2-15 (cross section C-C'), is as much as 25 feet thick at the ALDOT Materials and Testing Laboratory and is probably continuous beneath the PH12 Area.

Immediately beneath the dark-gray to greenish-gray clay within the PH12 Area is the deep saturated zone. This deep saturated zone consists of approximately 5 to 20 feet of silty fine- to medium-grained glauconitic sand and/or silt (Figure 2-15).

2.6 HYDROGEOLOGY OF THE COLISEUM BOULEVARD PLUME SITE

The Site geology is used in this subsection to develop the hydrogeology for groundwater modeling of the shallow saturated zone. The hydrogeologic characteristics of the PH12 Area were developed initially by reviewing existing reports and information that were collected as part of the investigations conducted within the CBP Site. Substantial knowledge about the hydrogeologic characteristics for the PH12 Area also was gained from compiling the groundwater elevations of wells and piezometers that are screened within the shallow saturated zone.

Review of the geology of the shallow saturated zone indicates that it is a distinctly heterogeneous zone. Because of this heterogeneity, slug and bail tests and laboratory permeability tests were used to characterize the hydrology of each partially saturated or saturated hydrostratigraphic unit. Five, three-day, aquifer tests were used to obtain composite hydrologic information for the shallow saturated zone. The information from the slug/bail and laboratory tests and from the aquifer tests were used as "starting" hydrologic characteristics from which to develop groundwater-flow and transport models by dividing the three lithofacies described in the Geology Section into five hydrostratigraphic units. Although not all of the five units are saturated, they are termed "hydrostratigraphic" because of their link to the groundwater model.

Slug/bail tests (*in situ* hydraulic-conductivity tests) have been conducted in 98 wells within the CBP Site and in 8 piezometers beyond the boundary of the CBP Site. The hydraulic conductivity was determined only from the bail test at the location when the static water level was within the screen of the well or piezometer. The hydraulic conductivity at a location was determined from both the bail and slug test when the water level was above the screen of the well or piezometer. The hydraulic conductivities were estimated by analyzing the data from the tests by the Bouwer and Rice Method (1976).

Two of the five aquifer tests were at Kilby Ditch. The results of these two aquifer tests were interpreted and used as baseline hydrogeologic information for a groundwater model that was used to evaluate interim corrective measures for the Kilby Ditch Area. The third and fourth aquifer tests were immediately adjacent to the PH12 Area and the fifth aquifer test was in the extreme southwestern part of the CBP Site. The results from these latter three aquifer tests were used as baseline hydrogeologic information for a groundwater model that was used to evaluate corrective measures for the entire CBP Site.

2.6.1 HYDROGEOLOGIC CHARACTERISTICS

The uppermost aquifer is within the sediments that overlay the first distinct clay beneath the water table. These sediments have been divided into five general hydrostratigraphic units based on their occurrence within the stratigraphic sequence and their general hydrologic characteristics. From the land surface to the first distinct clay, these hydrostratigraphic units are:

Layer 1 – Surficial Sandy Clay (unsaturated)
Layer 2 – Fine- to Coarse-Grained Sand (primarily unsaturated; vertical permeability ranged from 0.17 ft/day to 1.8 ft/day)
Layer 3 – Fine to Very Coarse Sand with Fine to Coarse Gravel (partially to fully saturated; average conductivity based on the slug/bail tests is 11 ft/day with a range of 0.4 ft/day to 103 ft/day)
Layer 4 – Fine- to Medium-Grained Glauconitic Sand (comprises the majority of the saturated thickness of the shallow saturated zone; hydraulic conductivity based on the slug/bail tests ranges of 0.4 ft/day to 34 ft/day with an average of 11 ft/day; subdivided into Layer 5 based on basal medium to coarse sand)
Layer 5 – Medium- to Coarse-Grained Glauconitic Sand (hydraulic conductivities based on the slug/bail tests ranged from 10 to 100 ft/day with an average of 34 ft/day).

The two aquifer tests immediately adjacent to the PH12 Area resulted in average transmissivities from the pumping and recovery data of 5,700 to 5,800 feet squared per day (ft^2/day) and storage coefficients of 0.02 to 0.04. The average transmissivity from the pumping and recovery data for the aquifer test in the southwestern part of the CBP Site was 1,600 ft^2/day. Storage coefficients ranged between 0.01 to 0.3. The average transmissivity from the pumping and recovery data for the two aquifer tests at Kilby Ditch were 800 and 100 ft^2/day. The respective storage coefficients for these latter two tests were 0.01 and 0.06.

2.7 GROUNDWATER FLOW

2.7.1 SITE-WIDE GROUNDWATER FLOW

Groundwater flow in the CBP Site is controlled largely by topography, surface-water features, and groundwater withdrawals. Groundwater at the CBP Site flows toward the Alabama River to the west, Three Mile Branch to the east, and Galbraith Mill Creek to the north (Figure 2-17).

Based on the USGS Topographic Map, the stage of the Alabama River is 110 feet AMSL. To the east, the land-surface at Three Mile Branch is approximately 180 feet AMSL and, to the north, is approximately 150 feet AMSL at Galbraith Mill Creek. Other notable features that affect groundwater flow are the Kilby Ditch network and the Montgomery Zoo pond.

The Kilby Ditch network drains a significant part of the stormwater at the CBP Site. In the PH12 Area, the base of West Kilby Ditch is generally above the top of the water table and is predominately dry between precipitation events. Perennial flow in West Kilby Ditch begins at the intersection of the Ditch with Coliseum Boulevard.

Prior to establishment of the Montgomery Zoo at its current location, the Zoo pond was a borrow pit for sand and gravel. This pond is now an alternating groundwater "source and sink" because surface water flows from the pond to the shallow saturated zone during and after significant precipitation events and groundwater flows into the pond during the intervening periods. The pond is predominantly a groundwater sink.

In addition to flow toward the adjacent rivers, creeks, ditches, and ponds, there are a series of active borrow pits southwest of the CBP Site. Significant quantities of groundwater are pumped from these pits as part of routine dewatering operations.

2.7.2 GROUNDWATER FLOW IN THE PH12 AREA

The PH12 Area is on a northwest-southeast groundwater divide (Figure 2-18). Groundwater to the east of the divide flows toward Kilby Ditch and Three Mile Branch. Groundwater to the west of the divide flows toward the Alabama River and the active borrow pits. The axis of the divide dips to the north toward the Montgomery Zoo pond and Galbraith Mill Creek. The majority of the TCE within the PH12 Area is west of the divide (Figure 2-18). The gradient in the PH12 Area is relatively slight (0.001 ft/ft) but steepens largely to the southwest (toward the borrow pits) where the gradient near the southwestern border of the CBP Site increases to approximately 0.01 ft/ft.

The depths to groundwater within the PH12 Area are greatest (that is, 30 feet) near the center of the TCE plume. The depths to groundwater are approximately 24 feet at the northern and southern edges of the

PH12 Area. The depths to groundwater decrease to less than 10 feet BLS to the north and east (toward the Montgomery Zoo pond and Kilby Ditch, respectively).

2.8 DISTRIBUTION OF TCE

2.8.1 GROUNDWATER

2.8.1.1 Site-Wide

Figure 2-18 shows the maximum concentrations of TCE, through January 2006, within the groundwater at the CBP Site. The plume of TCE encompasses about 770 acres, based on a 0.005 mg/L level. The plume of TCE is about 10,000 feet long and about 4,000 feet wide. The orientation of the plume, northeast-southwest, coincides with the general patterns of groundwater flow at the CBP Site.

The areas of greatest TCE concentrations are immediately west of Fairground Road (the PH12 Area); areas of the Eastern Meadows Subdivision; and the Kilby Ditch Area. The concentrations of TCE exceed 10 mg/L within the PH12 Area. The concentrations of TCE within the Eastern Meadows area range from about 1 to about 5 mg/L. The concentrations in the Kilby Ditch Area range from about 0.1 to about 1 mg/L.

2.8.1.2 PH12 Area

The PH12 Area is a north-south area of about 9 acres where the groundwater contains greater than 10 mg/L of TCE (Figure 2-18). The southern border of the Area is between Houser Street and Broadway Street, the northern border is between Gardendale Drive and Park Avenue, the eastern border is along Fairground Road, and the western border is about 600 feet west of Fairground Road.

DNAPL Investigation

The PH12 Area was searched for TCE DNAPL with a combined MIP and soil-conductivity (SC) direct-push tool. The data from this intensive search for DNAPL were used to map the distribution of dissolved TCE within the PH12 Area. Eighty-one probeholes (Plate 2-2) were completed during this investigation.

Sediment samples were collected at 27 probehole sites and groundwater samples were collected at 19 of these 27 sites to verify the MIP results. The computerized algorithm NAPLANAL (Mariner, and others, 1997) was used as an additional analytical tool to evaluate the sediment and groundwater data for the presence of TCE DNAPL.

Review of the results from the DNAPL investigation and previous investigations within the PH12 Area indicates that:

- There is no TCE DNAPL within the sampled parts of the PH12 Area.
- The majority of dissolved TCE that is within the PH12 Area is within a zone that is 30 to 60 feet below ground surface.
- The sediments within the 30- to 60-foot zone contain many clay lenses/stringers; the greater concentrations of dissolved TCE probably are proximate to the many clay lenses/stringers that are within the 30- to 60-foot zone.

TCE concentrations within hydrostratigraphic layers 1 through 5 are illustrated on Figures 2-19 through 2-23. The greatest concentrations of TCE have been in samples collected from groundwater within the glauconitic sands (hydrostratigraphic Layers 4 and 5) within the area immediately west of Fairground Road. With the exception of the area around Chisholm Street, TCE concentrations that exceed 10 mg/L are constrained to the fine-grained glauconitic sand (hydrostratigraphic Layer 4), which is the hydrostratigraphic unit with the lowest hydraulic conductivity. Near the intersection of Chisholm Street and Fairground Road, TCE concentrations that exceed 10 mg/L extend into the medium to coarse-grained glauconitic sand (hydrostratigraphic Layer 5).

2.8.2 TCE IN SOILS/SEDIMENTS

To date, more than 700 soil/sediment samples have been collected from various depths throughout the CBP Site and analyzed for VOCs. The majority of the soil/sediment samples that contained TCE were immediately above the water table or within the saturated zone. Very few soil/sediment samples from the unsaturated zone have contained TCE.

2.8.3 TCE IN SOIL VAPOR / AMBIENT AIR

Four sets of vapor implants were constructed within the PH12 Area in March 2000. The implants were constructed to investigate the effectiveness of the surficial sandy clay as a barrier to vertical migration of vapors from chlorinated hydrocarbons, particularly TCE, in the shallow saturated zone. A shallow and a deep vapor implant were constructed at each site so that the concentrations, if any, of TCE within the unsaturated parts of the fine- to coarse-grained sand could be compared to the concentrations of TCE within the overlying surficial sandy clay. The surficial sandy clay in the PH12 Area was determined to be a barrier that inhibits the migration of vapors that might be emitted from elevated concentrations of TCE within the shallow groundwater in the PH12 Area.

Summa canisters were used to collect soil-vapor, crawlspace air, and ambient-air samples at 30 houses or structures in June and November, 2002 and February through March 2003. The majority of these sites were within the PH12 Area. The soil-vapor samples were collected from beneath the slab or foundation of the house. The crawl-space samples were collected from about midway between the floor and the ground. Breathing-zone samples were collected at the "porch" at each of two houses within the PH12 Area. The intakes for the breathing-zone samples were placed at the heights of the occupants breathing zones, based on on-sight observations. Background air samples also were collected during each sampling event. The background air samples were collected immediately north, east, south, and west of the probable extents of the dissolved TCE within the CBP Site.

Review of the results of the soil-vapor and ambient-air samples indicated that the surficial sandy clay that extends from the land surface to about 7 to 15 feet BLS within the PH12 Area inhibits the migration of VOCs through the shallow unsaturated zone.

2.9 SURFACE-WATER MONITORING

2.9.1 KILBY DITCHES

Surface-water samples have been collected from West and Main Kilby Ditches since the discovery of TCE in the Ditches in March and May 2000. Surface-water samples are collected from West and Main Kilby Ditches at five locations and from one location east of the Montgomery Zoo (Figure 2-24). The TCE, when detected in one of the water samples from the five locations, has been consistently less than the action-level concentration of 0.175 mg/L for TCE in surface water. TCE has not been detected in samples of water from the Montgomery Zoo Ditch.

2.9.2 LOW-LYING AREAS

Since November 2001, samples of sediment and surface water have been collected from the Low-lying Areas within the CBP Site and analyzed for VOCs (Figure 2-25). The construction of paved and dirt roads, a railroad, and other human and natural activities have resulted in the impoundment of water in these Low-Lying Areas.

The largest of the Low-Lying areas (about 33 acres) adjoins the northern side of the Western Railway of Alabama, which is about 600 feet north of North Boulevard. There are mixed hardwood trees, shrubs, and herbaceous vegetation throughout this largest of the Low-Lying Areas. The known sources of water within this largest Area are: streams, stormwater runoff, and springs. The second Low-Lying Area is between North Boulevard and Western Railway and encompasses 12 acres. There is mostly herbaceous vegetation in the center of this second Area. The mixed hardwood trees that are within this second Area are mostly adjacent to the main drainageway that meanders northward and eastward through the Area before it empties into Three Mile Branch. Known sources of the water within this second Area are Kilby Ditch and the drainageway that empties the third Low-Lying Area.

The third Low-Lying Area, which is the smallest of the three Low-Lying Areas is between North Boulevard and Russell Corporation. The vegetation within this third area which encompasses about 2 acres, is mostly herbaceous although there are a few small trees adjacent to the drainageway before it drains beneath North Boulevard. This drainage then reemerges on the north side of North Boulevard where it empties into the second of the Low-Lying Areas. The sources of the surface water within this third, small Low-Lying Area are: part of the flow of Kilby Ditch (via a concrete flume that adjoins the immediate south side of North Boulevard), stormwater runoff, an outfall from Russell Corporation, and shallow groundwater.

The sediment samples have been collected from about 3 to 12 inches BLS. The corrective measures that were evaluated for the CBP Site included consideration of their effects on the Low-Lying areas because some of the sediment and surface-water samples from these areas have contained TCE.

3.1 OBJECTIVE

To facilitate the corrective measures technology evaluation presented in Section 6 of this report, the existing numerical Site-wide groundwater flow and contaminant fate and transport model developed for previous CBP Site investigations was updated and re-calibrated. The resultant numerical model was applied to the site-wide CBP Area for use in evaluating the effects of selected passive (no hydraulic control) and active (with hydraulic control) potential corrective measures on contaminant migration. The results of the contaminant fate and transport simulations for the potential corrective measures were compared to a baseline simulation showing fate and transport of the TCE plume without corrective measures to evaluate their effect on the CBP plume over a 30-year evaluation period.

The numerical model was based on the geologic and hydrogeologic framework discussed in Section 2 and was updated with new information from Site investigations conducted between September 2003 and November 2005. The updates included revisions based on information on groundwater withdrawals from existing sand and gravel borrow pits located to the southwest of the CBP Site, projected expansion of the existing pits, and future anticipated borrow pits to the northwest of the CBP Site.

3.2 MODEL SUMMARY

The groundwater flow and contaminant fate and transport models summarized below were based on previous models created for the PH12 Area. The model was modified to incorporate new data regarding floodplain stratigraphy and reevaluation of model inputs and withdrawals, including recharge and borrow pit dewatering, as discussed below.

3.2.1 MODEL SELECTION

The USGS modular, three-dimensional finite-difference groundwater model MODFLOW (McDonald and Harbaugh, 1988) was used to simulate hydraulic heads in the model domain. The USGS particle-tracking post-processor MODPATH (Pollack, 1989) was used to track the groundwater flow paths within the model. The USEPA/USACE Modular Three-Dimensional Multi-species Transport Model MT3DMS was used to simulate movement of the TCE in the groundwater. The input and output files for these models were managed in Groundwater Modeling System (GMS), a pre- and post-processing software program developed by Brigham Young University for the United States Department of Defense, and in ArcGIS, a geographic information system software package developed by ESRI.

3.2.2 MODEL DESIGN

3.2.2.1 Model Domain and Boundary Conditions

The model domain was based on regional hydrologic and hydrogeologic characteristics including groundwater flow, groundwater flow divides, aquifer recharge, surface drainage, and groundwater withdrawals.

Areas of the southwestern and southern boundaries of the model were assigned zero-flux (or no-flow) cells, which coincided with groundwater flow divide areas that represent the local watershed boundary as inferred from topographic data. No-flow cells were also assigned along the lateral boundaries parallel to assumed regional groundwater flow. General head cells were used to simulate the downgradient boundary of the model at the Alabama River. The specified head assigned to the cells representing the Alabama River approximated the average annual river stage (surface elevation). General head boundaries are specified head boundaries where the flux through the cell is controlled using a conductance value, which is based on the cell dimensions and hydraulic conductivity.

3.2.2.2 Model Grid and Layer Discretization

The model grid was oriented parallel to the regional groundwater flow direction toward the Alabama River. Grid cells in the vicinity of the CBP Site were refined to approximately 50 feet by 50 feet. Outside of this area, the grid cell size was increased incrementally by a factor of 1.5 to a maximum of 250 by 250 feet. The refined grid in the vicinity of the CBP Site provided more detailed model results in the area where corrective measures are being considered and was supported by the Site-specific geologic and water level data.

As described in Section 2, the water-bearing soils in the vicinity of the CBP Site represent sand and gravelly sand terrace deposits and fine to coarse-grained silty sands of the Eutaw Formation (the shallow zone). These deposits in the shallow aquifer above the first distinct clay were divided into five general hydrostratigraphic units (layers) based on their occurrence within the stratigraphic sequence and their general hydrologic characteristics: surficial sandy clay (Layer 1), fine- to coarse-grained silty sand (Layer 2), fine to coarse sand with fine to coarse gravel (Layer 3), fine- to medium-grained glauconitic Sand (Layer 4), and medium- to coarse-grained glauconitic sand (Layer 5). The uppermost hydrostratigraphic unit, the surficial sandy clay, is unsaturated throughout much of the model domain and within the CBP Site. Underlying the surficial sandy clay is the silty sand, which is also unsaturated over most of the CBP Site. The sand and gravel unit is the first hydrostratigraphic unit that is partially to fully saturated throughout the CBP Site. The model was vertically discretized into five layers from the ground surface to the first distinct clay, based on the hydrostratigraphic units as described above:

- Model Layer 1 - surficial sandy clay unit.
- Model Layer 2 – upper sandy clay unit.
- Model Layer 3 – sand and gravel unit.
- Model Layer 4 – fine-grained silty glauconitic sand unit.
- Model Layer 5 – coarse-grained glauconitic sand unit.

The top of the clay that underlies the lower coarse-grained glauconitic sand unit (Layer 5) defines the base of the groundwater model. The layers were constructed in MODFLOW using all available boring data from the Site investigations.

As discussed in Section 2, stratigraphy outside of the terrace areas is representative of a floodplain sequence related to deposition from the Alabama River and Three Mile Branch. These floodplain areas were segregated laterally within the model domain into depositional zones based on assumed areas of related floodplain deposition:

- Western floodplain area based on flood plain deposition from the Alabama River.
- Low-lying Areas, north of Kilby Ditch, based on deposition from Three Mile Branch
- Transitional area, north of the CBP Site between the western floodplain area and the Low-lying Areas.
- Borrow pit areas, based on boring logs from borings within that area and the stratigraphic sequence observed in the borrow pits.

The deposits in the floodplain areas above the first distinct clay were also divided into five general hydrostratigraphic units (layers) in each depositional zone, based on their occurrence within the stratigraphic sequence and their general hydrologic characteristics. At the edge of the terrace area, the hydrologic properties representing the terrace deposits assigned to each layer transitioned into the hydraulic properties for the floodplain deposits as illustrated on the figure in Appendix A.

3.2.2.3 Aquifer Parameters

Critical hydrologic inputs to the model consisted of hydraulic conductivity and porosity of each of the five stratigraphic layers, recharge from precipitation, recharge/discharge from surface water bodies (lakes/ponds, rivers/streams, and ditches), and groundwater withdrawals.

Hydraulic conductivities for Layers 1 and 2 were estimated based on the geologic characteristics of each layer. The initial spatial distribution of hydraulic conductivities for Layers 3 through 5 was based on slug tests conducted on monitoring wells throughout the CBP Site. The initial hydraulic conductivity values were adjusted during the model calibration process, as the results of the slug and bail tests and grain size analyses are approximate only and the results of the pumping tests were based on wells screened across all of the saturated layers of the model. Thus, estimates of hydraulic conductivity and storativity from the pumping test analysis were not specific to the layers defined in the model.

Vertical hydraulic conductivity was based on an assumed ratio of horizontal to vertical hydraulic conductivity of 10 to 1 and adjusted during model calibration. In general, the ratios of horizontal to vertical hydraulic conductivity of the sandy clay layers were lower than those of the more uniform sand and gravel layers.

The porosity for each of the five layers was assigned a constant value of 30 percent (0.3 parameter value), which was estimated based on the porosity for sand (25-40 percent) and silt (35-50 percent) (Driscoll, 1995).

3.2.2.4 Surface Water

Surface water features, such as the ponds, ditches, creeks, and rivers, were modeled using either the MODFLOW river or drain package. The Alabama River, a regional groundwater discharge boundary, was represented as a general head boundary. The ponds and creeks were simulated using the MODFLOW river package, with the stage level and bottom elevations based on topographic information. This allowed water to be removed from the aquifer or released to the aquifer by the river cell based on adjacent head conditions. Lakebed elevation and lake stage data for the City of Montgomery Zoo Pond, located north-northwest of the PH12 Area within the CBP Site, were established from peizometers located adjacent to the ponds (PZ-5, PZ-12, PZ-14, and PZ-17) and the Zoo Pond gage located near the shoreline to measure the lake stage. The streambed/lakebed conductance was initially set equal to the conductivity of the adjacent sediments and adjusted during the calibration process.

The MODFLOW drain package was used to simulate flow into ditches, including West Kilby Ditch, and small drainage channels north of the CBP Site. Drain cells only remove water from the aquifer if the head in adjacent cells is higher than the stage elevation assigned to the drain cell. As with the river package, the initial ditch conductance was set equal to the surrounding sediment and adjusted during model calibration. The base elevation and stage for the surface water bodies represented in the model were obtained from site surveys and USGS topographic maps.

3.2.2.5 Aquifer Recharge and Evapotranspiration

Areal recharge was varied spatially based on land cover, with higher recharge in areas with little impervious surfaces (open fields) and lower recharge in areas with significant development and/or storm water controls. Recharge to the aquifer was applied to the uppermost active layer of model at an initial rate between 6 and 12 inches per year, and reduced by a factor of 0.3 to 1.0 depending on the land use, as determined from available land use mapping, aerial photography, and recent development in the area of the CBP Site. This recharge rate accounts for precipitation reaching the groundwater table after accounting for losses through surface water runoff and interception. The initial recharge rate and land use reduction factors were adjusted during model calibration.

As illustrated on the figure in Appendix A, evapotranspiration (ET) was applied to the surface of the model domain based on land cover type. The extinction depth used to simulate evapotranspiration in the model was four feet BLS. The maximum ET rate was set at approximately 65 percent of the total recharge for each cell in the model domain.

3.2.2.6 Groundwater Withdrawals

The bottom of the borrow pits located southwest of the Site is about 50 feet BLS, and the maintained groundwater level is estimated to be 35 feet BLS. The dewatering pumps operated by Asphalt Contractors run seven days a week for eight hours each night, with the pumps set at 4,000 GPM. The Asphalt Contractors borrow pit is pumped down to approximately 45-50 feet BLS to allow excavation of the source material. The total size of the Asphalt Contractors borrow pit site is about 120 acres with about 75 additional acres capable of being mined. The life of this pit is estimated to be approximately another 7 to 10 years. North Montgomery Materials (NMM) uses the same type of pit operation and their borrow pit is dewatered by pumping from the bottom of the pit at an estimated rate of approximately 3,000 gpm. NMM is expected to continue operations that require dewatering for approximately another 30 years, and will extend their mining operation to the north and east of the present excavation area.

In addition to the southwest borrow pits, a new borrow pit to the northwest is anticipated. This borrow pit is expected to begin operation within the next 10 years and is expected to continue operations beyond 2036. For the purpose of this CMS, it was assumed that in the northwest pit the sandy floodplain deposits down to the top of the first distinct clay would be removed and the pit area dewatered to that depth.

The MODFLOW drain package was used to simulate dewatering in the borrow pits by setting drain elevations to match the borrow pit stage detailed above. As with the river package, the initial drain conductance was set equal to the surrounding sediment and adjusted during model calibration.

3.2.3 MODEL CALIBRATION

Model calibration included running steady-state and transient simulations and comparing the resulting simulated hydraulic heads to measured water levels. Steady state and transient calibration figures are provided in Appendix A. In general, an iterative approach was used to calibrate the model by adjusting individual input parameters within the range of material-specific values. For each model run, the simulated heads were compared to the measured heads at each well location, and qualitative differences between simulated potentiometric contours and potentiometric contours interpolated from observed heads were reviewed. Additionally, the mean, absolute mean, and root-mean-squared errors were calculated for each model run. This iterative method was repeated until the calculated errors and disparity between simulated and observed heads were minimized. The potentiometric contours of simulated heads from the uppermost active layer in the steady-state calibrated model and the areal distribution of differences between modeled and measured heads, and the calibration error summary, are shown in Appendix A.

The aquifer parameters used in the initial steady-state calibrated model were used for the transient calibration and then modified using the trial-and-error method discussed above. A transient test of the model was conducted by simulating the 72-hour aquifer test performed at PW-3 in the Kilby Ditch Area of the CBP Site and PW-4 in the southwestern area of the CBP Site in August 2005. Specific storage and specific yield values were estimated from the aquifer test results. Drawdown measured in monitoring wells surrounding the test wells during the aquifer tests was compared to drawdown simulated in the transient pumping model, at observation points used in the model to approximate the observation wells. Resultant adjustments to aquifer parameters made during the transient calibration were incorporated into the steady-state model for confirmation.

3.2.4 TRANSIENT FLOW MODEL

Based on the results of the steady-state and transient groundwater flow calibration process, a transient flow model was developed to provide a groundwater flow solution for application to the contaminant fate and transport model. The transient model was used to simulate changes in borrow pit operations in both the southwestern and northwestern areas of the model domain during the 30-year period simulated by the model.

3.2.4.1 Simulation of Future Borrow Pit Dewatering

The transient groundwater flow model was assigned different stress periods to simulate changes in dewatering in the borrow pit areas over the 30 year evaluation period:

- Current dewatering of the southwestern Asphalt Contractors and NMM borrow pit areas from present until 2011 were maintained. Beginning in 2006 and extending through 2016, a gradually increasing stage was simulated in the existing borrow pits to represent a shift in production to the immediately adjacent property to the north (borrow pit expansion area as shown on Figure 1-1).
- Beginning in 2006 and extending through 2016, a gradually decreasing stage was simulated in the expansion area for the southwest borrow pits. From 2016 through 2036 stage levels were maintained at the same level for the southwest pits.

- The northwestern borrow pit areas were assumed to be inactive until 2016. Beginning 2016 and extending through 2026, a gradually decreasing stage was simulated to a maximum depth of approximately 130 feet AMSL, and maintained through the remainder of the model run.
- Dewatering of the existing southwestern borrow pit areas until 2036, with dewatering in the southwestern extension area. The northwestern borrow pit areas become active in 2016, and dewatering activities in the existing southwestern pits are diminishing.

Elevations for the drain cells used to simulate dewatering in the borrow pit areas were taken from survey information from the existing borrow pits. The timing of the stress periods for the transient model correspond to the currently anticipated operational plans for the borrow pits. For the purposes of the simulation, the post-dewatering drain elevations were adjusted to return the southwestern borrow pits to the groundwater level that corresponds to pre-mining groundwater levels along the western border of the borrow pits. The pre-mining groundwater levels were estimated using the groundwater flow model with no active borrow pit dewatering.

3.2.5 CONTAMINANT FATE AND TRANSPORT MODEL

The calibrated transient MODFLOW model summarized above was used in conjunction with MT3DMS to simulate the fate and transport of TCE in the groundwater during the varying groundwater withdrawal regimes created by changing dewatering operations in the borrow pit areas over time.

The initial distribution of TCE was based on all samples collected from the CBP Site through November 2005 with initial concentrations applied to the model by sample depth into the respective model layer. Where multiple results were available within a single model cell (e.g., time series concentrations) or at a single point with a model layer (e.g., multiple vertically stratified samples from the same hydrostratigraphic unit), the maximum TCE measured for that cell was used in the model. By using the maximum concentration, under prediction of TCE concentrations in the groundwater is avoided. Dispersivity was based on the length of the 10 mg/L TCE isopleth, and set to a constant value for all model layers. Longitudinal dispersivity was set to a value of 30, transverse dispersivity to 3, and vertical dispersivity to 0.3.

While investigations within the CBP Site have not identified the presence of any TCE DNAPL, the potential presence of residual TCE associated with an immobile phase in the soils was incorporated in the model to be conservative for the purposes of modeling. A rate-limited sorption was used to model kinetic mass transfer between mobile and immobile zones in a dual-domain (dual porosity) mass transfer model with sorption. Transport through the mobile zone (through zones of high hydraulic conductivity) primarily occurs by advection whereas transport through zones of low hydraulic conductivity (immobile zone) primarily occurs by diffusion.

The model allows the use of mass and concentration to introduce constituents in the immobile phase. To better simulate the TCE plume, TCE in the immobile phase was introduced to represent residual TCE existing within the CBP Site. To conservatively predict the effect of residual TCE in the CBP Site, the dissolved phase TCE within the CBP Site was replicated as an immobile phase. A relatively high mobile phase porosity of 0.05 was used for all model layers, which will tend to conservatively predict residual TCE mass in the CBP Site. Overall, the conservative introduction of the immobile phase TCE in the model effectively increased TCE mass in the CBP Site by approximately 17 percent.

A diffusive mass transfer rate equivalent to the molecular diffusion coefficient of TCE was used in all layers of the model. Additionally, a soil sorption coefficient was used for the dissolved phase. Initially, a value equivalent to the soil/water partition coefficient for TCE was used for the soil sorption coefficient and then this value was adjusted to match observed changes of TCE concentration with time as a model calibration to the TCE movement in the CBP Site. Also, a bulk density of 1.55 g/m^3 was used from measurements obtained on undisturbed sediments collected from the CBP Site.

3.3 BASELINE SIMULATION

3.3.1 BASELINE (ASSUMING NO CORRECTIVE MEASURES)

The baseline fate and transport model simulated the movement of TCE in the groundwater with no corrective measures in the CBP Site. Only the effects of advective transport, diffusion, sorption, and dual domain transfer were considered (i.e., no biological degradation). Transport for the baseline scenario was simulated under transient conditions (advective transport changed over time) to evaluate the effect of dewatering from borrow pits to the west. The following flow regimes were considered:

- Dewatering the borrow pits to the southwest only, from 2006 through 2016
- Dewatering the borrow pits to the southwest and northwest from 2016 to 2036

Maximum depth for the borrow pits was set to 130 feet AMSL based on surveyed elevations for the bottom of the existing pit. The southwest borrowing pit pumping was initiated in the existing borrow pit area beginning in simulation year 2006, expanding at a linear rate to the north in the southwest expansion area from 2006 through 2016. From 2016 through 2026, pumping was assumed to gradually cease in the existing borrow pit area while the future expansion area for the southwest borrow pits continued to operate through 2036. The northwest borrow pits were assumed to operate from 2016 through 2036.

In addition to the borrow pit operations, development was assumed to continue to occur within the CBP area. Currently privately-owned undeveloped properties, in particular the area around Kilby Ditch, were assumed to build out in a manner consistent with their current zoning designation over the next 20 years. For instance, undeveloped properties zoned for residential use were assumed to build out at a similar density as adjacent like zoned residential properties. Recharge rates over the period of 2006 to 2026 were adjusted down for these areas to represent a greater impervious area and stormwater drainage.

3.3.2 BASELINE MODEL RESULTS

The dominant advective forces that currently influence movement of the plume are expected to remain constant over the next 10 years. As a consequence, movement of TCE in the CBP Site continues to follow the current direction of flow over this period (2006 through 2016). That is, the southwest extension of the plume continues to move toward the active borrow pits located to the southwest and the northeast extension of the plume continues to slowly move in the direction of the Low-lying Areas and Three Mile Branch. Based on extrapolating current conditions over the next 10 years (e.g., assuming no significant meteorological or land use changes), the leading edge of the TCE plume to the southwest is expected to reach the borrow pits between 2011 and 2016 (Figures 3-1 through Figure 3-3). TCE concentrations in groundwater in the Kilby Ditch Area are expected to gradually increase over the next 10 years, exceeding 1.0 mg/L in groundwater in the vicinity of the West Kilby Ditch and exceeding 0.5 mg/L over an appreciable portion of the Main Kilby Ditch. The 0.1 mg/L area continues to slowly expand, extending into the Low-lying Areas by 2036.

The PH12 Area itself continues to remain relatively stable, with only a slight decrease in concentration over the next 10 years. The PH12 area coincides with the groundwater divide, with flow from the PH12 Area to the northeast toward Three Mile Branch and toward the west-southwest toward the borrow pits and the Alabama River. Rather than representing a "source area", the PH12 Area represents a largely stagnant area straddling the groundwater divide where advective transport is very low. The very low advective flow greatly reduces the rate of TCE transport within this area. Once outside the divide area, advective transport dominates, with TCE transport occurring at correspondingly higher rates.

From 2026 through 2036 (Figure 3-4 and Figure 3-5), the southwest extension of the plume is entirely captured by the southwest borrow pits. The effects of pumping required for borrow pit operations were used to predict concentrations of TCE in the surface water. Due to the radial groundwater flow into the pits (from the west and south was well as the north and east) caused by this pumping, TCE concentrations are not predicted to exceed 0.005 mg/L, which is well below the ADEM-specified action level of 0.175 mg/L in surface water.

3.4 MODEL USES

The calibrated model was used to screen potential corrective measures described in Section 5 of this report. The potential effectiveness of these corrective measures was compared to the baseline scenario.

For each remedial scenario, multiple configurations were initially evaluated to determine the most effective and feasible configuration. The remedial scenarios were then evaluated individually, and in conjunction with each other to devise overall remedial alternatives that best meet the technical performance standards and evaluation criteria outlined in Section 7 of this report.

This section analyzes the potential for human exposure to TCE and its degradation products (hereinafter referred to as "constituents") in the groundwater that underlies or migrates from the CBP Site. Consistent with ADEM (2005) and USEPA (1989) guidance, the analysis links the sources, locations, and types of environmental releases with population locations and activity patterns to evaluate whether there are pathways of exposure at the CBP Site. The analysis is based on a site conceptual exposure model (SCEM) that considers:

- Constituent source areas
- Constituent release and transport mechanisms
- Environmental media (e.g., groundwater) that are currently impacted or may in the future be impacted by these constituents
- Possible exposure pathways
- Current and likely future site conditions and surrounding land use
- Potentially-exposed human populations
- Possible exposure routes

The SCEM for the CBP Site, which is provided as Figure 4-1, presents the hypotheses that are analyzed.

A complete exposure pathway generally comprises the following four elements (USEPA, 1989):

- A source and mechanism of constituent release
- Retention or transport media
- A potential contact point with an affected medium
- An exposure route (i.e., ingestion, dermal contact, inhalation) at the contact point

The exposure pathway is incomplete, and there is no potential for exposure or health risk, if any of the elements are or will be missing.

4.1 POTENTIAL EXPOSURE PATHWAYS

The following are potential exposure pathways at the CBP Site (see also Figure 4-1):

- Air - volatile constituents in the shallow-zone groundwater may migrate to ambient and/or indoor air
- Groundwater - groundwater may be used for potable and/or non-potable purposes and contact with the relatively high water table could occur in some areas of the CBP Site

- Surface water - dissolved constituents may be transported in the shallow-zone groundwater and discharged to surface water

Potential receptor populations for these pathways within the CBP Site include:

- Current and future residents
- Current and future workers
- Construction/utility personnel who may excavate within the Northeast Area
- Trespassers who may have occasional, casual contact with surface water within or downgradient of the CBP Site.

4.1.1 AIR PATHWAYS

Potential Pathways: Analysis of the air pathway is based on consideration of existing and projected VOC concentrations that could volatize from soil or groundwater, migrate as vapors through unsaturated subsurface soils/sediments, and enter the ambient air or the indoor air of overlying buildings. The exposure concern is the potential for inhalation of those VOCs by residents and workers within the CBP Area. Vapor intrusion is a potential concern for buildings with basements and ordinary slab-on-grade constructions. There is generally less concern for buildings with crawl spaces because the crawl space interrupts the pathway between the subsurface and the building foundation and, depending on the construction, provides for dispersion of vapors into ambient air.

The potential for vapor migration into ambient air and/or vapor intrusion into indoor air was evaluated through extensive collection and analyses of samples of soil vapor, ambient air, breathing-zone air, and crawl space air at 30 representative residential properties throughout the CBP Site (ALDOT, 2003). Samples were collected during three events to evaluate seasonal variations: June 2002, November-December 2002, and February-April 2003. The conclusion from these investigations was that the surficial sandy clay present at most of the CBP Site inhibits the migration of VOCs from the shallow unsaturated zone to the land surface (ALDOT, 2003). No ambient air, breathing zone air, or crawl space air sample from any residential property, and no background ambient air sample from any location, contained TCE at a concentration that exceeded the 20 parts per billion by volume (ppbv) screening level set by ADEM.

Finding: Based on the information available from 2002 and 2003 soil vapor and air studies, there is no current exposure via the vapor intrusion pathway for residential or commercial/industrial properties. Since the release occurred in the mid 1960s to 1970s, and a current exposure pathway does not exist, it is believed that as long as land use does not change there will be no exposure pathway in the future.

4.1.2 GROUNDWATER PATHWAYS

Potential Pathways: Analysis of the groundwater pathways is based on consideration of the potential for contact, by individuals of all ages, with dissolved constituents during either potable or non-potable use of the groundwater throughout the CBP Site. Potable use of the groundwater provides for the potential ingestion of dissolved constituents and the inhalation of and dermal contact with those constituents during routine household uses (e.g., bathing, cleaning).

Non-potable use of the groundwater provides for the potential dermal contact with, inhalation of, or ingestion of dissolved constituents during use of the water for sanitary, process, irrigation, or other purposes. There is also the potential for dermal and inhalation exposure whereby construction/utility personnel excavate into the shallow-zone groundwater in the Northeast Area of the CBP Site (for example: east of Coliseum Boulevard, the ALFA property, and the Low-lying Areas). The water table is less than 6 feet BLS in these areas and TCE concentrations in groundwater are expected to gradually increase in the Kilby Ditch Area over the next 10 years and to slowly expand up to the Low-lying Areas in the next 30 years.

Finding: There is minimal potential for exposure to constituents in the groundwater due to potable use of the groundwater because:

- The CBP Site is supplied with water by the Montgomery Water Works and Sanitary Sewer Board, which draws water from a surface-water source and from a deeper aquifer that is distant from the CBP Site.
- Institutional Controls, which will be detailed in a future Amendment to this CMS, will be implemented.
- An aggressive public notification process has been implemented through public meetings, media stories (newspaper and broadcast), direct mailings and door hangers, Community Outreach Group involvement, and availability of information through a Public Repository web-site and 24-hour information line.

Finding: There is minimal potential for exposure to dissolved constituents in the shallow-zone groundwater within the CBP Site due to non-potable use of that groundwater because:

- There is no non-potable use of the groundwater that would provide routine human contact.
- Institutional Controls, which will be detailed in a future Amendment to this CMS, will be implemented.

Finding: There is minimal potential for contact with shallow-zone groundwater within the northeast Area of the CBP Site because:

- Buildings are constructed without basements
- Buried utilities are shallow and above the water table
- Rights-of-way limit or prevent unapproved intrusion into the subsurface.

4.1.3 SURFACE WATER PATHWAYS

Potential Pathways: Analysis of the surface-water pathways includes consideration of the potential for contact with the shallow-zone groundwater via its discharges to Kilby Ditch, the Low-lying Areas downstream of Kilby Ditch, and eventually to the southwestern borrow pits.

Kilby Ditch discharges into a perennial stream, which is north of North Boulevard and which continues and divides into braided streams that generally flow to the east and north. The streams, stormwater runoff, and groundwater discharge provide water to the Low-lying Areas, which are north of North Boulevard and the railroad tracks. Human and natural activities, including the construction of roads and railroad tracks, have impounded water in these Low-lying Areas. The exposure concern is the potential for dermal contact with and inhalation of constituents that are within the surface waters during recreational activities. Potentially exposed receptors include all but very young children.

Currently, the CBP has not reached the active borrow pits in the Southwestern Area. However, the leading edge of the TCE plume is predicted to reach the borrow pits within about five years and the southwest part of the plume is predicted to be captured by the borrow pits within about 20 years. The effects of pumping required for borrow pit operations were used to predict concentrations of TCE in the surface water. These concentrations are not predicted to exceed 0.005 mg/L, which is well below the ADEM-specified action level of 0.175 mg/L in surface water.

Finding: There is minimal potential for exposure to elevated TCE concentrations in water that is currently being conveyed within Kilby Ditch because:

- Access to the Ditch is restricted by fencing, steep-sloped concrete sides, steep-sloped banks, or dense vegetation.
- None of the water samples that have been collected, since April 2003, from the West and Main Branches of Kilby Ditch had TCE concentrations above the ADEM-specified action level of 0.175 mg/L of TCE in surface water.

Finding: The water within Kilby Ditch will become an exposure pathway of potential concern without the implementation of an appropriate, preventive, remedial measure. This concern will result from the migration to and discharge into Kilby Ditch of groundwater that contains increasingly greater concentrations of TCE—concentrations that will exceed the ADEM-specified action criterion.

Finding: There is minimal potential for exposure to elevated TCE concentrations in water that is currently being conveyed to the Low-lying Areas because none of the samples of water that have been collected from the Low-lying Area have contained a TCE concentration that exceeded the ADEM-specified action level of 0.175 mg/L of TCE in surface water.

Finding: TCE concentrations in groundwater are expected to slowly expand northward toward the Low-lying Areas in the next 30 years. These areas are generally more accessible to potential receptors than are the West and Main Kilby Ditches because access from North Boulevard and the vicinity is unrestricted.

Finding: There currently is no exposure pathway at the southwestern borrow pits. However, such a pathway will develop when the leading edge of the TCE plume reaches the borrow pits within approximately five years. At that time, contact with surface water in the borrow pits may result in exposure via dermal contact with and/or inhalation of dissolved constituents in surface water. The effects of pumping required for borrow pit operations were used to predict concentrations of TCE in the surface water. These concentrations are not predicted to exceed 0.005 mg/L, which is well below the ADEM-specified action level of 0.175 mg/L in surface water.

These findings suggest that complete surface water exposure pathways could exist for trespassers in some areas of the CBP Site in the future (see also Figure 4-1). Because there may be potentially complete surface water exposure pathways in the future, this report evaluates corrective measures that minimize or eliminate these potential exposure pathways. These corrective measures include engineering and institutional controls to restrict trespassers and limit access to surface waters within the CBP Area, as discussed in future sections.

General response actions (GRAs) are those remedial actions that may satisfy the CM objectives of the study as discussed in Section 1. GRAs have been identified as technologies that may be appropriate for the CBP site. In this section the GRAs are described in general and not specifically evaluated for the CBP Site. Based on this screening, GRAs are retained or not retained for further consideration. General response actions considered herein include monitored natural attenuation (MNA), Institutional Controls, Hydraulic Control with *Ex-situ* Treatment, Permeable Reactive Barriers (PRBs), *In-situ* Chemical Oxidation, Enhanced Bioremediation, covering Kilby Ditch, Constructed Wetlands, or a combination of these. Technology types include such general categories as treatment or containment, whereas process options are specific processes within the general technology types (e.g., treatment - oxidation, or containment – treatment barrier). This section develops a list of potential technology types and process options for treatment or containment of groundwater and surface water potentially affected by TCE. The retained technologies and process options are subsequently used to develop Corrective Measures Alternatives discussed in Section 6 of this report.

General response actions and identified technologies for the CBP Site are:

- **No Further Action**
- **Monitored Natural Attenuation (MNA)**
- **Institutional Controls**
- **Hydraulic Control with *Ex-situ* Treatment**
- **Permeable Reactive Barriers (PRBs)**
- ***In-situ* Chemical Oxidation**
- **Enhanced Bioremediation**
- **Constructed Wetlands**
- **Covering Portions of Kilby Ditch and Channel Stabilization**

A description of these corrective action technologies is provided below.

5.1 NO ACTION

The "no action" option, by definition, involves no further institutional controls or remedial action at the CBP Site, and, therefore, has no technological barriers. The no action option differs from Monitored Natural Attenuation (MNA – see below) in that no-action option does not include groundwater monitoring to evaluate the effects of any natural attenuation processes at the CBP Site. However, monitoring of groundwater elevation and groundwater flow directions would be included as part of the no-action option to evaluate movement of the TCE plume over time. The no-action option is retained for further consideration as a comparison baseline.

5.2 MONITORED NATURAL ATTENUATION

MNA is a remedial approach where constituents of concern (COCs) degrade without enhancement down to concentrations acceptable to a regulatory agency. Natural attenuation processes such as biodegradation, hydrolysis, dispersion, dilution, sorption, and volatilization affect the fate and transport of organic contaminants in all hydrologic systems. The degree to which VOCs can biodegrade or otherwise attenuate under natural conditions can be evaluated by measuring the concentrations of several natural attenuation parameters and potential microbial energy sources and nutrients in the groundwater. Natural Attenuation parameters include dissolved oxygen (DO), oxidation/reduction potential (ORP), chloride, nitrite, nitrate, sulfate, ferrous iron, alkalinity, dissolved sulfide, dissolved organic carbon, carbon dioxide, dissolved hydrogen, methane, ethane, and ethene.

An MNA sampling program could be initiated to evaluate the effectiveness of natural attenuation at reducing the concentrations of VOCs in the CBP Site groundwater. The CBP Site would be monitored by sampling groundwater for natural attenuation parameters to assess the progress of natural processes (i.e., dispersion, dilution, biological degradation, and chemical transformation).

A monitoring program would be designed to evaluate if incomplete degradation of TCE is occurring at the CBP Site during the biodegradation process. Byproducts such as cis-1,2-DCE and VC could be produced and could require additional efforts to either control their migration or to complete the biodegradation process to inert end products. The complete degradation of chlorinated VOCs, such as TCE to ethene under anaerobic conditions has been shown to occur where the microorganism *dehalococcoides ethanogenes* (DHE) is present. Groundwater sampling at the CBP Site has not shown the presence of this key organism. Recent samples, however, have shown an increase in cis-1, 2-DCE and VC in the CMT wells. Additional sampling for DHE in the CMT wells is presently being conducted.

The most important process for the natural biodegradation of chlorinated compounds such as TCE is reductive dechlorination. Under anaerobic conditions, reductive dechlorination results in the sequential removal of chlorine atoms from to DCE to VC (Morrison, 2000). Depending upon the geochemical conditions and specific microorganisms responsible for degradation, the process may proceed to completely dechlorinated compounds or terminate after removal of only some of the chlorine atoms. Some partially dechlorinated compounds (i.e., DCE and VC) may be degraded under aerobic or iron-reducing conditions. Under the influence of biodegradation, cis-1,2-DCE is a more common intermediate than trans-1,2-DCE, and 1,1-DCE is the least prevalent of the three DCE isomers. The reductive dechlorination process, in which the chlorinated compounds serve as electron acceptors, requires the presence of electron donors.

Reductive dechlorination has been demonstrated under nitrate- and iron-reducing conditions, but the most rapid biodegradation rates, affecting the widest range of chlorinated compounds, occur under sulfate-reducing and methanogenic conditions. Because the chlorinated VOCs are used as electron acceptors during reductive dechlorination, an energy source (i.e., an electron donor) is needed for microbial growth to occur.

Because significant natural attenuation of the chlorinated VOCs in the groundwater is not occurring via biological processes at a significant rate, as shown by the relative absence of degradation products, MNA, by itself, will not be considered further in the development of the corrective measures alternatives for the CBP Site. However, the abiotic (without biological action) physical processes of natural attenuation (i.e., dispersion, sorption, and dilution) will have beneficial effects on all alternatives considered for the CBP Site.

5.3 INSTITUTIONAL CONTROLS

Institutional controls consist of legal and/or administrative restrictions on the use of a particular property or group of properties that protect the property users from exposure to environmental contaminants. Examples of these restrictions include prohibitions on the use of groundwater, establishment of areas where excavations are prohibited without prior notification and development of site-specific safety plans, or maintenance of engineered systems such as asphalt caps. For the CBP Site, such controls will be discussed in detail in a future amendment to this CMS Report.

5.4 HYDRAULIC CONTROL WITH EX-SITU TREATMENT

Conventional hydraulic control utilizes one or more wells to intercept, capture, or control the groundwater flow. These wells would extract water, containing TCE, for subsequent treatment and disposal. This water could be treated on site and re-injected to groundwater, conveyed to an off-site location for further treatment and discharge, or discharged to surface water. Groundwater extraction also would be accompanied by long-term groundwater monitoring to evaluate the removal of VOCs from the subsurface and to evaluate the rebound in VOC concentrations after the cessation of pumping.

Hydraulic control and treatment systems induce an artificial gradient within a specific radius of influence to reduce migration of contaminants and remove contaminant mass. The extracted groundwater is treated to a specific standard and could be discharged to a surface water body or re-injected below the land surface to control further groundwater flow. Re-injected groundwater could be modified to contain chemical oxidants and/or other amendments. A description of several ex-situ treatments is provided below:

5.4.1 ADVANCED OXIDATION PROCESSES

Advanced oxidation processes are similar to *in-situ* chemical oxidation in that oxidants are used to degrade contaminants to carbon dioxide, water, and simple organic and inorganic compounds. The process typically uses ozone, hydrogen peroxide, and ultraviolet light (UV) in some combination to form hydroxyl radicals (OH•). Hydroxyl radicals have the highest oxidation potential and readily breakdown contaminants such as TCE.

Advanced oxidation processes are available in many forms. The most widely used products are systems using hydrogen peroxide/UV, ozone/UV, and hydrogen peroxide/ozone. For evaluation purposes, the hydrogen peroxide/ozone system has been selected. This system is effective in treating VOCs and is not significantly affected by turbidity as are processes using UV due to the need to keep UV lamps clean. Ozone is readily mixed with groundwater in the controlled environment of the treatment piping.

5.4.2 AIR STRIPPING

Air stripping involves the mass transfer of VOCs from water to air. In the air stripping process, VOCs are partitioned from extracted groundwater by increasing the surface area of the water containing TCE exposed to air.

Aeration methods include packed towers, diffused aeration, tray aeration, venturi aeration, and spray aeration. For groundwater remediation, the most widely used process typically involves use of a packed tower or tray aeration. The typical packed tower air stripper includes a spray nozzle at the top of the tower to distribute water containing VOCs over the packing in the column, a fan to force air countercurrent to the water flow, and a sump at the bottom of the tower to collect treated water. Packed tower air strippers can be installed as either permanent structures on concrete pads or as temporary structures on a skid or trailer, mainly depending on the volume of water treated. Low-profile air strippers, or tray aerators, include a number of trays in a very small chamber to maximize air-water contact. These systems are easier to install and operate than other air strippers, but have a somewhat larger footprint. Air strippers commonly use vapor-phase activated carbon systems to capture VOCs in off-gases, especially in early stages of remediation when VOC concentrations are higher.

5.4.3 CARBON ADSORPTION

Liquid phase carbon adsorption typically involves pumping groundwater through one or more vessels in series containing activated carbon to which dissolved TCE adsorbs. When the concentration of contaminants in the effluent from the treatment vessel exceeds a certain level, the carbon is typically removed and regenerated off site or disposed. The most common reactor configuration for carbon adsorption systems involving groundwater is the fixed bed approach with two vessels in series. The fixed-bed configuration is the most widely used for adsorption from liquids. The duration of operation and maintenance (O&M) is dependent upon the contaminant type, concentration, mass treated, other organics or metals that occupy adsorption sites, and the clean-up requirements.

Hydraulic control and treatment systems have been shown to be minimally effective at reducing widespread groundwater contamination to default (non risk-based) regulatory standards. However, using pumping wells to control groundwater flow and slow or reverse the spread of contaminants can be useful in managing large areas of groundwater contamination. The advantage of this alternative is that a large volume of contaminated groundwater can be controlled. The disadvantage is that the contaminated water pumped from the wells would require treatment, which could take decades to lower TCE concentrations significantly. Additionally, the cost-effectiveness of a groundwater pumping system typically decreases as the concentration in the groundwater decreases. The installation of hydraulic control systems can be disruptive in developed or residential areas. Hydraulic control systems require frequent, long-term maintenance.

Hydraulic control is not retained for evaluation as part of potential corrective measures alternatives for the site-wide management strategy.

5.5 PERMEABLE REACTIVE BARRIERS (PRBS)

Permeable Reactive Barriers (PRBs) are vertical zones of materials that are installed to intercept groundwater flow. As groundwater flows through the permeable zone, interactions with the materials reduce the concentrations of groundwater contaminants. PRBs for groundwater that contains VOCs are commonly constructed with zero-valent iron. Such PRBs can be constructed as a wall beneath the ground surface either by open trenching or with minimal disturbance to above-ground structures and property using trenchless injection technology. The PRB material is more permeable than the surrounding soil matrix so groundwater readily flows through the PRB and VOCs are treated as they flow through the iron. PRBs are proven to be effective for treating groundwater containing TCE and related compounds, which are reduced to non-toxic components.

PRBs are installed in or down gradient of a contaminant plume. The contaminants in the plume are broken down into nontoxic by-products or immobilized by precipitation or sorption after reacting with the media inside the PRB. PRB systems have been used successfully to treat chlorinated organic compounds at numerous full-scale applications. The design concept for the use of a PRB to degrade TCE in groundwater is relatively simple. A trench is excavated across the path of a migrating VOC plume and filled with the appropriate reactive material (such as a mixture of sand and iron particles), or the reactive material is injected into the ground using direct push technology or injection wells. As the groundwater containing TCE flows through the reactive material, a number of reactions occur that indirectly or directly lead to the reduction of the chlorinated solvents. One mechanism is the reaction of iron filings with oxygen and water, which produces hydroxyl radicals. The hydroxyl radicals in turn oxidize the contaminants.

The use of reactive iron to treat chlorinated VOCs has been well documented. This technology utilizes zero-valent iron particles, typically in granular (macro-scale) form, to completely degrade chlorinated VOCs via abiotic reductive dehalogenation. As the iron is oxidized, a chlorine atom is removed from the compound using electrons supplied by the oxidation of iron. During this process, the chloride in the compound is replaced by hydrogen, resulting in the complete transformation of chlorinated VOCs to non-toxic byproducts (ethene, ethane, and chloride ions). Since degradation rates using the process are several orders of magnitude greater than under natural conditions, any intermediate degradation byproducts formed during treatment (e.g., VC) are also reduced to non-toxic byproducts in the treatment zone. The use of reactive iron to treat chlorinated VOCs is covered under several patents, depending on the application method.

A PRB is a passive remedial technology that requires no pumping, although the rate of groundwater treatment could be accelerated by groundwater withdrawal or injection in the vicinity of the PRB. A groundwater monitoring system would be put in place to monitor the effectiveness of a PRB over the long term.

The hydraulic gradient within some areas of the CBP Site is relatively low. As such, groundwater would not rapidly flow through the PRB unless a hydraulic gradient is induced via groundwater withdrawal or injection. This may include targeted pumping and, potentially, recirculation of groundwater in the aquifer. Combining these two technologies capitalizes on the benefits of each, controlling a large volume of contaminated groundwater while treating the groundwater *in-situ*, reducing the effort and cost of O&M. It would also decrease the amount of time necessary compared to passive remediation.

PRB longevity is dependent on contaminant concentration, groundwater flow velocity, and the geochemical makeup of the groundwater. The oldest full-scale PRB was installed in February 1995 at a site in Sunnyvale, California. This PRB has successfully reduced the concentrations of TCE, DCE, VC, and Freon throughout its 11 years of operation (ETI, 2006). Since the age of the oldest PRB is only 11 years, bench scale studies using reactive iron columns (from both cores obtained from emplaced reactive walls and from virgin reactive iron) have been conducted to evaluate long-term PRB longevity. These tests have shown that, although the reactivity of the iron declines with long-term exposure to groundwater, conditions promoting the dehalogenation of chlorinated solvents are maintained over the long term. Based on these studies, the expected life of a typical reactive wall (where life is defined as the period over which the reactivity of the iron declines by a factor of two) is approximately 30 years (ESTCP, 2003). However, these studies also indicated that groundwater geochemistry, specifically the concentration and resulting flux of natural organic matter (NOM), total dissolved solids (TDS), and carbonate, along with the distribution of VOC concentrations, greatly influences the lifetime of the reactive iron and should be considered in the reactive wall design process (Klausen et al., 2003).

Minimal disturbance to above-ground structures and property can be achieved with trenchless technology. However, a limitation to PRBs installed via the trenchless technology is that it may be difficult to configure the depth of the PRB to the top of the first distinct clay. As discussed in Section 2, the top of the first distinct clay layer beneath the CBP Site that underlies the upper saturated zone (in which TCE-containing groundwater is present) is undulating. The depth of a PRB can vary along the length of the PRB. However, to minimize the potential of breaching the first distinct clay layer, a PRB installed in an area where the depth to the first distinct clay varies would likely be designed so as to not penetrate the clay layer. Therefore in some areas there could be zones below the PRB's base and above the first distinct clay where groundwater would not be fully treated by the PRB.

PRBs can also be installed through open trenching. Open-trench installation of PRBs is generally limited to shallower depths, approximately less than 30 feet BLS. Open-trench installations at shallow depths are likely to more cost effective than trenchless technology.

PRBs are retained for evaluation as part of selected corrective measures alternatives for the site-wide management strategy.

5.6 *IN-SITU* CHEMICAL OXIDATION

In-situ chemical oxidation (ISCO) has been used since the early 1990s to treat environmental contaminants in groundwater, soil, and sediment. Many of these projects have focused on the treatment of chlorinated solvents and petroleum compounds, although several projects have also used the process to treat semi-volatile organic compounds such as pesticides and polycyclic aromatic hydrocarbons (USEPA, 1998). Many projects utilizing ISCO have focused on the treatment of chlorinated VOCs (i.e., TCE and PCE) and gasoline constituents (i.e., benzene, toluene, ethylbenzene, and xylene (BTEX) and MTBE) (Siegrist, 2001).

ISCO is defined as the delivery and distribution of oxidants and other amendments into the subsurface to transform contaminants of concern into innocuous end products such as carbon dioxide (CO_2), water, and inorganic compounds. A chemical oxidant is injected through wells screened in areas where a reduction in groundwater concentrations is desired. Injection locations can be either permanently installed wells or temporary injection points installed using direct-push methods. When oxidants come in contact with chlorinated compounds these compounds are broken down into non-toxic components. However, contact between the oxidant and contaminant is the most important technical aspect of this technology, as it can be difficult to accomplish.

Accordingly, this remedial approach generally includes several injections over time accompanied by groundwater monitoring. Numerous injection wells may be required to treat the entire contaminant plume. Many of these injection wells may need to be installed on residential properties. Site limitations can potentially require an injection spacing interval (estimated at 20 feet), which, due to the proximity of residences and utilities in the area, is impractical. More than one application is generally needed, depending on the final contaminant concentration desired, therefore the overall costs are medium to high relative to other technologies. Since the reaction with the contaminant and the chemical oxidant generally occurs over a relatively short period, treatment can be more rapid than other *in-situ* technologies. The technology does not generate large volumes of waste material that must be disposed and/or treated.

ISCO generally provides the greatest benefit for localized source areas since it is capable of treating very high concentrations of contaminants by adding more oxidants. ISCO typically becomes prohibitively expensive for large areas requiring treatment to low concentration endpoints.

The most common oxidants utilized for ISCO are hydrogen peroxide (Fenton's reagent), potassium and sodium permanganate, and sodium persulfate. A general summary of each of these oxidants is presented below.

5.6.1 FENTON'S REAGENT (HYDROGEN PEROXIDE)

Hydrogen peroxide-based *in-situ* chemical oxidation is driven by the formation of a hydroxyl free radical in the presence of a metal catalyst. This reaction, known as the Haber-Weiss mechanism, was first utilized for the treatment of organic compounds in wastewater in the 1890s by H.J.H Fenton using an iron catalyst (Fenton's reagent). The hydroxyl free radical is a powerful oxidizer of organic compounds, thus many organic compounds in the subsurface that contact the chemical oxidant are readily degraded to innocuous compounds (e.g., water and carbon dioxide). Any residual hydrogen peroxide remaining after the reaction has been completed decomposes to water and oxygen. Soluble iron (ferrous iron), the transition metal catalyst, added to the subsurface during injection of the oxidant mixture is precipitated out of solution during conversion to ferric iron.

Typical hydrogen peroxide concentrations utilized for treatment with Fenton's reagent range from five to 50 percent by weight, however, concentrations less than 15 percent are utilized at a majority of sites. The hydrogen peroxide concentration used in the injection fluid is based on contaminant concentrations, subsurface characteristics, and treatment volume. Acids are also typically added to the injection solution to lower the pH of the contaminated zone if the natural pH is not low enough to promote the Fenton's reaction.

5.6.2 SODIUM AND POTASSIUM PERMANGANATE

Permanganate is an oxidizing agent with a unique affinity for oxidizing organic compounds with carbon-carbon double bonds (e.g., TCE and PCE), aldehyde groups or hydroxyl groups (alcohols). There are two forms of permanganate that are used for ISCO, potassium permanganate ($KMnO_4$) and sodium permanganate ($NaMnO_4$). Potassium permanganate has been used in drinking water and wastewater treatment for several decades to oxidize raw water contaminants, typically for odor control. Potassium permanganate is available as a dry crystalline material, while sodium permanganate is a liquid. Permanganate turns bright purple when dissolved in water; this purple color acts as a built-in indicator for unreacted chemical. Reacted permanganate is black or brown, indicating the presence of a manganese dioxide (MnO_2) byproduct.

Sodium permanganate has a much higher solubility in water than potassium permanganate, allowing it to be used for ISCO at higher concentrations, compared to two to five percent for potassium permanganate. Since it is supplied in liquid form, the use of sodium permanganate commonly requires no on-site mixing. Sodium permanganate can also be used at sites where the potassium ion cannot be tolerated (i.e., sites where the potassium ions may interfere with background radiation monitoring).

5.6.3 SODIUM PERSULFATE

Sodium persulfate is a strong oxidant that derives its oxidizing potential through the persulfate anion ($S_2O_8^{2-}$). The persulfate anion is capable of oxidizing a wide range of contaminants, including chlorinated ethenes, BTEX, phenols, MTBE, and some PAHs. However, when catalyzed in the presence of heat (thermal catalyzation) or transition metals ions (i.e., ferrous iron), the persulfate ion is converted to the sulfate free radical ($SO_4^{2-}\bullet$), which is second only to Fenton's reagent in oxidizing potential. Sodium persulfate is supplied in an aqueous solution at concentrations up to 50 percent by weight. The use of sodium persulfate for the treatment of chlorinated VOCs is a relatively new process in the marketplace.

Advantages of ISCO typically include:

- relatively short remediation times in areas where groundwater flow does not introduce additional contaminants with time (typically one to two years)
- limited long-term O&M costs in such settings; and
- the breakdown of VOCs without the generation of potentially more toxic degradation products (although not all VOC mass may break down).

Disadvantages of ISCO include:

- its application to areas with only the highest contaminant concentrations is typically most cost effective;

- the need to inject large volumes of oxidant (especially in areas where groundwater flow introduces additional contaminants over a long period of time from upgradient directions);
- potential disruption to area residents;
- the need for multiple injections;
- the difficulty of contacting oxidants with groundwater contaminants intended for destruction when injecting into low permeability formations;
- health and safety issues associated with the handling and injection of oxidants and reagents; and
- relatively high costs per volume treated.

In-situ chemical oxidation is not retained for evaluation as part of potential corrective measures alternatives for the site-wide management strategy.

5.7 ENHANCED BIOREMEDIATION

Naturally occurring microorganisms in the subsurface can break down (degrade) organic compounds in the soil and groundwater. The rate of this degradation depends on the species of microorganisms already present in the subsurface, the environmental conditions in which they live, and the nutrients available for their growth and survival. Because of the natural subsurface conditions in some areas of the CBP Site, little to no degradation of the TCE plume is occurring. To increase the limited degradation processes occurring in these areas, amendments or nutrients could be injected into the groundwater to improve the environmental conditions for microbial growth and increase the rate of *biodegradation. Also, the existing population of microorganisms can be* augmented with microbes that specifically degrade TCE and/or its breakdown products.

Enhanced bioremediation technologies involve the controlled management of microbial subsurface processes by injecting amendments, including nutrients and microorganisms, into the groundwater. The injection of amendments into the subsurface creates the conditions necessary for biodegradation and also promotes and accelerates the ongoing biodegradation processes. Amendments enhance microbial activity, making the groundwater anaerobic (oxygen deficient). Under these conditions, naturally occurring microbes that degrade TCE can flourish.

Common amendments include molasses, lactase, Hydrogen Release Compound (HRC®), food-grade oil-based mixtures, and alcohols. The use of certain of these amendments for groundwater treatment is patented. Microorganisms, including KB-1® and other variants of dehalococcoides, the only known microorganism shown to convert chlorinated VOCs to non-toxic ethene, are also sometimes added with the amendments. If indigenous microorganisms are not present in sufficient quantities, and it is not anticipated that the low levels of organisms can be stimulated readily, the amendment can be augmented with microbes that can significantly degrade TCE and/or other chlorinated VOCs to non-toxic components.

Implementing these technologies presents many of the same challenges as chemical oxidation. If natural biodegradation (usually under anoxic or anaerobic conditions) of TCE is not occurring and the aquifer is aerobic, creating and maintaining suitable conditions for growth of microbes would typically require multiple amendment injections. Similar to ISCO, this remedial approach generally includes several injections over time at multiple locations accompanied by groundwater monitoring. As with ISCO, close spacing of injection points may be necessary, which would require access to any residential properties in the targeted treatment zone. The distribution of amendments in the saturated zone could be enhanced through the use of injection and extraction wells. Injections can be conducted through either permanent wells or temporary injection points installed using direct-push methods.

Biodegradation does not always result in a complete breakdown of chlorinated compounds. Breakdown products generated during biodegradation could include compounds that are more toxic and more mobile than the parent compound, such as VC, a known human carcinogen. As such, additional measures would need to be implemented to ensure complete breakdown of TCE under an enhanced bioremediation remedy. Control of potential soil vapors may require the installation and operation of a soil vapor extraction system.

The advantages of enhanced bioremediation typically include:

- Limited O&M costs;

- The use of non-toxic, non-hazardous materials for remediation.

The disadvantages of enhanced bioremediation could include:

- Disruption to residents during injections;
- The need to inject relatively large volumes of amendments;
- Difficulty injecting into low permeability formations;
- Incomplete degradation of chlorinated VOCs and the production of undesirable degradation compounds in groundwater or soil vapor; and
- The potential need to augment amendments with microorganisms that are capable of breaking down chlorinated VOCs (i.e., dehalococcoides).

Enhanced biodegradation is not retained for evaluation as part of potential corrective measures alternatives for the site-wide management strategy.

5.8 CONSTRUCTED WETLANDS

Because of their contaminant removal capabilities, natural wetlands have been used to treat water for at least 100 years in some locations. Studies have showed significant pollutant reduction in these systems (Kadlec and Knight, 1996).

Constructed wetlands improve water quality through numerous and often interrelated mechanisms, including:

- Adsorption and ion exchange on the surfaces of plants, substrate, sediment, and litter
- Aerobic and anaerobic processes
- Breakdown and transformation of pollutants by microorganisms and plants
- Chemical transformation
- Filtration and chemical precipitation through contact of the water with the substrate and litter
- Settling of suspended particulate matter
- Uptake and transformation of nutrients by microorganisms (bioremediation) and plants (phytoremediation)
- Volatilization

These mechanisms have been shown to reduce many families of contaminants, including: VOCs, TSS, hydrocarbons, nitrogenous compounds, phosphoric compounds, metals and pathogens (ITRC, 2003). The reducing conditions found in wetland sediments combined with the plant effects discussed above are two major benefits of using wetlands to attenuate and reduce TCE concentrations.

Constructed wetlands can use various types of plants and abiotic processes to remove, transfer, stabilize, and/or destroy contaminants in the soil, surface water, and groundwater. For instance, wetland systems, if irrigated by surface water or upflowing groundwater, may remove organic substances, nutrients, and pathogens from the water. This removal is accomplished by diverse mechanisms: sedimentation, filtration, chemical precipitation and adsorption, microbial biofilm interactions, and uptake by vegetation. Both natural and constructed wetlands have been used for waste water treatment, water purification, and nutrient removal. The advantage of phytoremediation through the use of wetland systems is the presence of reducing conditions in wetland sediments as well as the realized effects of plants discussed above. As discussed in Section 5.2 (MNA), reductive dechlorination has been demonstrated under nitrate- and iron-reducing conditions, but the most rapid biodegradation rates, affecting the widest range of chlorinated compounds, occur under sulfate-reducing and methanogenic conditions which can occur in wetlands.

Constructed wetlands can be designed as highly engineered systems or more natural systems. The engineered systems typically include impermeable multi-cell wetlands with hydraulic features to evenly distribute flow and control the discharge. These systems require significant maintenance. A natural constructed wetland does not have an impermeable liner, allowing groundwater to enter the system. A natural constructed wetland would be considered for this project. The wetlands would be constructed in the appropriate landscape position to capture as much of the discharged groundwater as feasible. Sizing of the wetland would be based on water budgets and account for direct precipitation, stormwater runoff, and evapotranspiration (water loss through plant respiration). Flow through the system would be controlled by earthen berms of varying heights and positioned to create a long flow path to impede hydraulic short-circuiting and increase retention time.

Geochemically, the greater concentration of carbon and other potential terminal electron receptors (e.g., sulfur) at the groundwater/wetland interface add to the VOC removal capabilities of wetlands (Mitsch and Gosselink, 1993). Based on numerous studies on various families of contaminants, constructed wetlands can remove up to 90 percent of the VOCs from groundwater entering the system. Work by Lorah and Olsen (1999) examined the natural attenuation of TCE and 1,1,2,2-tetrachloroethane (PCA) in a contaminant plume discharging from an aerobic aquifer through wetland sediments and showed that both contaminants were completely mineralized as a result of reductive dechlorination. TCE in groundwater has been observed to biodegrade in sediments from a site in Dallas, Texas. (Bradley and Chapelle, 1997). Dechlorination of other VOCs has also been observed in a Jacksonville, Florida stream (Bradley and Chapelle, 1997).

A constructed wetlands system could include the use of plants suited to conditions at the CBP Site to degrade the chlorinated VOCs. Vegetation may not need to be imported into the constructed wetland; native vegetation may be sufficient based on Site conditions. Previously existing wetlands could be altered into constructed wetlands to provide the desired treatment design.

The treatment of waters by constructed wetlands can be a low-cost, low energy process requiring only routine operational attention. However, to be effective, constructed wetlands must be properly designed, constructed, operated, and maintained. Once completed, a constructed wetland system requires regular monitoring to ensure proper operation. As with any remedial technology, based on monitoring results, these systems may require enhancements or modifications, in addition to routine management to maintain optimum performance.

Constructed wetlands are retained for evaluation as part of selected corrective measures alternatives for the site-wide management strategy.

5.9 PHYSICAL BARRIERS (COVERING KILBY DITCH AND CHANNEL STABILIZATION)

Physical barriers are used to prevent contact with contaminated, or potentially contaminated, media. Such barriers include engineered cap systems, covered or buried piping or channels, and security fencing. At the CBP Site, a physical barrier would be used to prevent contact with surface water containing chlorinated VOCs resulting from groundwater discharge in Kilby Ditch. This barrier would include the conversion of portions of Kilby Ditch from an open channel to a covered culvert system that would be designed to accommodate the flows in the Kilby Ditch Area that result from both groundwater discharge and precipitation events.

In addition to the installation of a culvert system to replace West Kilby Ditch, modifications to the Kilby Ditch channel, including grading the channel sides and installing rip-rap could also be made. The channel modification objective would be to install sufficient rip-rap in the bottom of the channel to reduce direct access to the base surface water elevation. This would also decrease the potential for direct contact with TCE in the surface water. The rip-rap installation would include proper installation of a geo-fabric designed for supporting rip-rap. Vegetation would be planted over the permanent turf reinforcement to aid in erosion control on channel side slopes.

Physical barriers such as security fencing can be used to restrict access. Fencing is commonly coupled with warning notices and periodic inspection and repair to maximize the effectiveness of this physical barrier. The visual impact of fencing is commonly mitigated by landscape plantings adjacent to the fencing.

Physical barriers are retained for evaluation as part of selected corrective measures alternatives for the site-wide management strategy.

6.1 INTRODUCTION

In this section, corrective measures technologies, based on the GRAs that were retained in Section 5, are identified for each area of the CBP Site for which a potentially complete exposure pathway was identified (Kilby Ditch Area, Southwestern Area, and Low-lying Areas). As described in Section 1, the corrective measures objectives are to minimize the potential for human exposure to chlorinated VOC-containing groundwater in the CBP Site and to control the seepage of chlorinated VOC-containing groundwater to surface water so that Site-wide surface water concentrations do not exceed 0.175 mg/L. Site-wide corrective measures alternatives were developed by combining corrective measures technologies that were selected for each area of the CBP Site for which a potentially complete exposure pathway was identified. The Site-wide Area alternatives address corrective measures in those areas of the CBP Site listed above to meet the corrective *measures objectives for the CBP Site.*

The results of the baseline simulation discussed in Section 3 predict that the southwestern extension of the CBP will continue to move toward the active borrow pits located to the southwest and the northeastern extension of the plume continues to slowly move to the north and northeast in the direction of the Low-lying Areas and Three Mile Branch. As a result, monitoring of the CBP expansion in these areas will be included as a component of any corrective measure selected for the CBP site. As an agency of the State of Alabama, ALDOT can meet the technical and financial requirements to implement and maintain groundwater and surface water monitoring at the CBP site.

To maintain borrow pit operations, dewatering is currently conducted in the borrow pit area, and will continue as long as operations are ongoing, which is estimated to be at least an additional 30 years. As discussed in Sections 3 and 4, the effects of pumping required for borrow pit operations were used to predict concentrations of TCE in the surface water. These concentrations are not predicted to exceed 0.005 mg/L, which is well below the ADEM-specified action level of 0.175 mg/L in surface water.

6.2 KILBY DITCH

6.2.1 OBJECTIVE

As discussed in Section 2, a northwest-southeast trending groundwater divide is present in the PH12 Area and is predicted to stay within the PH12 Area for decades given the current dewatering in the southwest borrow pits. The PH12 Area contains the highest concentrations of TCE. Dissolved-phase TCE has migrated over time toward Kilby Ditch, where it eventually emerges as surface water in this area. The significant distinction between the PH12 Area and Kilby Ditch Area is that the exposure pathway analysis has concluded that no route of exposure to TCE is present at the PH12 Area, whereas exposure to TCE in the surface water within Kilby Ditch is a potentially complete exposure pathway. To minimize potential exposure, GRAs from Section 5 were evaluated for their ability to restrict access to surface water in Kilby Ditch and minimize seepage of groundwater containing TCE into Kilby Ditch at concentrations that could potentially result in surface water TCE concentrations exceeding 0.175 mg/L.

Where applicable, the results of the contaminant fate and transport model simulations for the potential corrective measures technologies were compared against the baseline simulation (as discussed in Section 3) to evaluate the potential for remedial alternatives to reduce and/or control the TCE plume in the Kilby Ditch Area. The resultant corrective measures alternatives simulated for the Kilby Ditch Area are discussed in this Section. The results of contaminant fate and transport model simulations are illustrated on the figures included in Appendix A of this report.

6.2.2 POTENTIAL CORRECTIVE MEASURES TECHNOLOGIES

Potential corrective measures technologies for the Kilby Ditch Area include:

- A PRB using zero-valent iron to degrade chlorinated VOCs through abiotic reductive dechlorination
- Covering portions of Kilby Ditch to minimize access to TCE in surface water
- Stabilizing the northern section of the Kilby Ditch channel
- Restricting access to surface water using fencing

6.2.2.1 Permeable Reactive Barriers

PRBs were evaluated to determine their effectiveness in reducing groundwater concentrations upgradient of Kilby Ditch and thereby minimizing the potential for surface water TCE concentrations in the ditch to exceed 0.175 mg/L. A PRB was simulated west of Kilby Ditch, in the right-of-way of Coliseum Boulevard (Figure 6-1), and on the open, vacant property south of West Kilby Ditch (Figure 6-2). The PRBs were simulated under passive groundwater flow conditions.

The length and location of the PRBs in both scenarios were developed using the chemical fate and transport simulation developed in MT3DMS for the CBP Site (as discussed in Section 3). The PRBs were developed to intersect TCE concentrations of approximately 0.3 mg/L or greater within the part of the CBP that is migrating toward Kilby Ditch. A first-order reaction rate with a high reaction rate constant was used to simulate TCE decay as the TCE plume moved through the PRB.

Coliseum Boulevard Right of Way

An approximately 1500-foot long PRB was simulated along Coliseum Boulevard in the contaminant fate and transport model (Section 3) to evaluate the overall effectiveness of a PRB installed on publicly-owned land. The simulated PRB would extend along Coliseum Boulevard northward from the intersection of Coliseum Boulevard and Gardendale Drive (Figure 6-1). This location is the closest publicly-owned land in this area of the CBP where a PRB could be installed to limit the migration of the CBP toward the Kilby Ditch Area. For this scenario, the contaminant fate and transport model simulation results indicate that initially TCE concentrations in groundwater exceeding 1 mg/L within the area between Coliseum Boulevard and Kilby Ditch would not be treated by the PRB, and would discharge to Kilby Ditch throughout the 30-year evaluation period. However, greater concentrations of TCE in groundwater west of the PRB would be intercepted and reduced prior to reaching the Kilby Ditch Area, thus preventing concentrations of TCE much greater than 1mg/L from affecting surface water in Kilby Ditch. (Figures A-1 to A-4, Appendix A). .

PRB South of West Kilby Ditch

An approximately 1000-foot long PRB was simulated along the southern edge of West Kilby ditch in the contaminant fate and transport model (Section 3). The PRB would extend along West Kilby Ditch for approximately 350 feet and then angle southerly toward Main Kilby Ditch for approximately 650 feet (Figure 6-2). Based on the results of the model simulations, this PRB would limit TCE concentrations in the groundwater that discharges to West and Main Kilby Ditches to levels that would result in surface water concentrations below 0.175 mg/L during the 30-year evaluation period (Figures A-5 to A-8, Appendix A).

6.2.2.2 Covering West Kilby Ditch

As shown on Figure 1-1, West Kilby Ditch discharges to Main Kilby Ditch on the east side of Coliseum Boulevard. Based on the results of surface water monitoring in West Kilby Ditch, an ICM was completed for West Kilby Ditch Area in 2003. The ICM included sealing manholes and pipe joints to prevent and/or minimize the inflow of shallow groundwater into the underground storm drains. These measures have effectively reduced the TCE migration from the shallow groundwater table into Kilby Ditch. However, groundwater with higher TCE concentrations continues to flow toward the ditch, and this ICM alone is not likely to satisfy the corrective measures objective of preventing access to surface water contaminated with chlorinated VOCs over the 30-year evaluation period without applying additional corrective measures. The corrective measures evaluated for eliminating direct contact with TCE in surface water at West Kilby Ditch include physically covering the ditch to remove the potential for the public to come into contact with TCE-containing water.

An analysis of groundwater and surface water interaction at Kilby Ditch indicates that shallow groundwater seeps into the open channel. A chain-link fence surrounds the ditch to prevent the public from contacting the surface water. An underground culvert system would allow for the removal of a significant amount of fencing and eliminate the potential for direct contact with the surface water. A hydrologic analysis of the contributing watersheds was performed to derive the necessary data for the culvert designs. Digital elevation maps, aerial photographs, a National Resources Conservation Service Soil Survey Geographic (SSURGO) map, survey data, and field observations were used to delineate and model four contributing watersheds to determine peak stormwater discharges. The watersheds were modeled using the United States Army Corps of Engineers (USACOE) Hydrological Modeling System (HEC-HMS) v.2.2.2. HEC-HMS allowed for a hydrological analysis of each individual watershed as well as the system as a whole.

Based on the watershed model results, a stormwater system model was created in the computer program StormCad by using survey and existing stormwater structural data. StormCad allowed for the hydrological analyses of different culvert designs. Based on the analyses, one 10-foot by 4-foot concrete box culvert (approximately 520 feet in length) could replace the West Kilby Ditch.

6.2.2.3 Channel Stabilization of Main Kilby Ditch

Modifying and stabilizing the northern section of the Main Kilby Ditch channel is also evaluated as a means to minimize access to surface water in the Main Kilby Ditch channel. The channel modifications would begin at the north end of the existing concrete trapezoidal channel of the northern section of the Main Kilby Ditch and continue to North Boulevard. The channel modifications would include:

- Creating a uniform channel with a consistent bottom width and side slope.
- Lining the bottom and part of the side slopes with approximately 12 to 18 inches of rip-rap.
- Grading the side slopes of the channel to an approximate slope ratio of 2 to 1.
- Reinforcing the upper banks of the channel with a geo-textile material for reinforcement of permanent turf.

Sufficient rip-rap would be placed in the bottom of the channel to reduce direct access to the base surface water elevation.

A large scour hole is present immediately downstream of the concrete trapezoidal channel, and bank erosion is evident within the unlined channel. By reducing the side slopes and providing permanent turf reinforcement, the potential for bank erosion by high flow velocities can be reduced. Preventing erosion in this portion of the northern section of the Main Kilby Ditch would also result in less sedimentation downstream.

A geo-fabric would support the rip-rap. Vegetation would be planted over the permanent turf reinforcement to aid in erosion control. A hydraulic analysis would be performed to assess if these modifications would have a negative impact on the existing storm drainage hydraulics and surrounding area.

6.2.2.4 Access Restriction by Fencing

An alternative corrective measure for mitigating the potential surface water pathway within West and Main Kilby Ditches includes fencing to reduce the likelihood that the public could gain access to surface water containing TCE. This alternative would include retaining the 8-foot-high perimeter chain link fence around West Kilby Ditch and the northern section of Main Kilby Ditch, and display of appropriate warning signs. Locked gates would be installed in the perimeter fencing to allow access for site monitoring. Inspection and maintenance of the fencing would be performed to ensure the integrity of the barrier.

6.3 LOW-LYING AREAS

6.3.1 OBJECTIVE

The Low-lying Areas are in the path of migration of the northeast portion of the CBP plume and are a potential groundwater discharge point (Figures 1-1 and 2-25 in Sections 1 and 2, respectively). They also receive storm water discharge via the Kilby Ditch, which has a drainage area of approximately 1.2 square miles. The Site conditions within this area would support many of the pollutant reduction processes discussed in Section 5.9 (Constructed Wetlands). Strategic enhancement of existing wetlands in these areas to intercept discharging groundwater and surface water from the Kilby Ditch is a potential corrective measures alternative, as wetlands are capable of removing significant amounts of pollutants from groundwater and surface water because of their unique hydraulic, biologic, and chemical properties.

6.3.2 POTENTIAL CORRECTIVE MEASURES TECHNOLOGIES

Potential corrective measures technologies for the Low-lying Areas include:

- Constructed wetlands
- Access restriction by fencing

6.3.2.1 Constructed Wetlands

As discussed in Section 5, constructed wetlands can be designed as highly engineered systems or naturally constructed systems. The highly engineered systems typically include impermeable multi-cell wetlands with hydraulic features to distribute flow and control the discharge. A naturally constructed wetland does not have an impermeable liner, which allows groundwater to enter the system.

The wetlands would be constructed to maximize capture of the discharged groundwater. Sizing of the wetland would be based on water budgets to account for direct precipitation, stormwater runoff, groundwater inflow, and evapotranspiration (water loss through plant respiration).

Factors Affecting Treatment Efficiency

The primary parameter influencing the removal efficiency of wetland treatment systems is the reaction rate for the contaminants of concern. This is affected by retention time, variability in hydraulic and contaminant load, ambient temperature, and plant vigor. Actual contaminant loads will depend in large part on the technology that is selected for the Kilby Ditch Area.

Siting Considerations

Siting considerations are similar to many other construction projects. Site conditions that are not ideal can often be managed; however, project costs typically increase to address these sub-optimal conditions to an acceptable tolerance. The Low-lying Areas are suitable for wetland creation or enhancement due to their topographic position and because of the presence of the railroad tracks, which, due to the natural relief of the land to the west forms a preexisting berm that could be incorporated into the design. Discharge rates and water depths within the wetland would be controlled by additional earthen berms. Depending on the findings of a detailed topographic survey, the berms would be approximately two feet high. The berms would be positioned to create a long flow path to impede hydraulic short circuiting and to increase retention time.

Additional steps required to assess the proposed Low-lying Areas for a constructed wetland would include the following:

- A site investigation that characterizes the presence of existing wetlands and confirming local depths to groundwater and soils.
- A water budget, consisting of stormwater runoff, groundwater inflow, precipitation and associated runoff, evapotranspiration, and flow through.
- A site topographic survey
- Preliminary design
- Final design

Other than construction of low berms, limited site work would be anticipated because the Low-lying Areas are relatively flat. The existing microtopography will provide varying water depths that will improve habitat and induce a variety of redox conditions. Flow from the system would discharge over an armored weir and eventually flow to Three Mile Branch, which will constitute the compliance monitoring point for the Kilby Ditch and Constructed Wetland system.

6.3.2.2 Access Restriction by Fencing

An additional corrective measure for mitigating the potential surface water pathway within the Low-lying Areas includes fencing to reduce the likelihood that the public would come in direct contact with TCE-containing water. This would include the installation of an 8-foot-high perimeter chain link fence around the Low-lying Areas and display of appropriate warning signage. Locked gates would be installed in the perimeter fencing to allow access for site monitoring. Inspection and maintenance of the fencing would be performed to ensure the integrity of the barrier.

6.4 SITE-WIDE CORRECTIVE MEASURES ALTERNATIVES

Based on the evaluations discussed above, the following site-wide corrective measures alternatives have been developed for further evaluation. These alternatives are:

Alternative A:

- PRB at West Kilby Ditch;
- Retain fencing along West and Main Kilby Ditches;
- Construction of perimeter fencing in the Low-lying Areas;
- Groundwater and surface water monitoring; and
- Implementation of institutional controls to restrict access to and prevent use of groundwater.

Alternative B:

- PRB along Coliseum Boulevard;
- Retain fencing along West and Main Kilby Ditches;
- Construction of wetlands and perimeter fencing in the Low-lying Areas;
- Groundwater and surface water monitoring; and
- Implementation of institutional controls to restrict access to and prevent use of groundwater.

Alternative C:

- Covering of West Kilby Ditch and slope stabilization of the northern section of Main Kilby Ditch;
- Retain or reposition fencing along Main Kilby Ditch;
- Construction of wetlands and perimeter fencing in the Low-lying Areas;
- Groundwater and surface water monitoring; and
- Implementation of institutional controls to restrict access to and prevent use of groundwater.

Based on the predicted migration of the CBP toward the southwest, north, and northeast, long-term monitoring of the CBP expansion will be included as a component of any corrective measure selected for the CBP site. ALDOT would prepare a long-term groundwater monitoring program for the CBP Site for approval by ADEM. The groundwater monitoring plan would include installation of additional groundwater monitoring wells adjacent to the existing CBP to the north, northeast, and southwest of the plume, groundwater sampling and analysis on a semi-annual schedule, and reporting of monitoring results. Additional evaluation of the CBP and development of additional corrective measures for northern and southwestern areas of the CBP Site would be completed as necessary based on the monitoring results.

7.1 SITE-WIDE CORRECTIVE MEASURES ALTERNATIVES

Based on the evaluations conducted in Section 6, the following site-wide corrective measures alternatives have been developed for further evaluation. These alternatives are:

Alternative A:

- PRB at West Kilby Ditch;
- Retain fencing along West and Main Kilby Ditches;
- Construction of perimeter fencing in the Low-lying Areas;
- Groundwater and surface water monitoring; and
- Implementation of institutional controls to restrict access to and prevent use of groundwater.

Alternative B:

- PRB along Coliseum Boulevard;
- Retain fencing along West and Main Kilby Ditches;
- Construction of wetlands and perimeter fencing in the Low-lying Areas;
- Groundwater and surface water monitoring; and
- Implementation of institutional controls to restrict access to and prevent use of groundwater.

Alternative C:

- Covering of West Kilby Ditch and slope stabilization of the northern section of Main Kilby Ditch;
- Retain or reposition fencing along Main Kilby Ditch;
- Construction of wetlands and perimeter fencing in the Low-lying Areas;
- Groundwater and surface water monitoring; and
- Implementation of institutional controls to restrict access to and prevent use of groundwater.

7.2 EVALUATION CRITERIA

The USEPA has developed evaluation criteria by which proposed corrective measures alternatives should be judged. These evaluation criteria include:

1. Overall protection of human health and the environment
2. Long-term effectiveness
3. Reduction of toxicity, mobility, and volume
4. Short-term effectiveness
5. Implementability
6. Cost
7. Acceptance of the corrective measures

Drinking water Maximum Contaminant Levels (MCLs) are not considered to be appropriate evaluation criteria for the CBP Site as access and use of groundwater will be restricted. These restrictions will be detailed in a future amendment to this CMS report. In addition, it is not technically feasible to reduce groundwater concentrations to the USEPA MCLs across the CBP Site.

As discussed in Section 4, a potential exposure pathway to chlorinated VOCs at the CBP Site involves seepage of chlorinated VOC-containing groundwater to surface water. Based on this, and noting that the selected alternative will include permanent restrictions on the use of groundwater, the primary corrective action objective is to prevent access to surface water that could potentially contain chlorinated VOCs, specifically TCE at concentrations greater than the ADEM-specified action level (0.175 mg/L). An evaluation of each of the proposed corrective measures alternatives is provided below and summarized in Table 7-1.

7.2.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

All three alternatives will be protective of human health by limiting access to groundwater containing chlorinated VOCs and surface water containing TCE concentrations greater than the ADEM-specified action level of 0.175 mg/L. For all three alternatives, institutional controls will prevent and/or significantly minimize the potential for complete exposure pathways for groundwater containing chlorinated VOCs.

Under Alternatives B and C, constructed wetlands in the Low-lying Areas would reduce the concentrations of chlorinated VOCs in surface water at the compliance point in Three Mile Branch. In Alternative A, the

PRB would reduce VOC concentrations in groundwater prior to seeping into Kilby Ditch. These alternatives would limit access to chlorinated VOC-containing surface water, and specifically to surface water containing TCE concentrations that could exceed the ADEM-specified action level for TCE in surface water of 0.175 mg/L.

Alternatives A and B would be less protective than Alternative C because access to surface water would be limited via maintenance of existing fencing only and not by a concrete or rip-rap barrier as in Alternative C. Under Alternatives B and C, VOC concentrations in surface water in Kilby Ditch would likely be greater than those under Alternative A. However, Alternatives A and C would be equally protective at limiting access to surface water that could potentially contain TCE concentrations greater than the ADEM-specified TCE surface water action level.

The overall protection of human health resulting from the implementation of the selected alternative will be confirmed through the development and implementation of a comprehensive, monitoring plan for both groundwater and surface water. As a public entity required to indefinitely maintain Alabama's transportation infrastructure, ALDOT can commit to operation, maintenance and monitoring required under all alternatives.

7.2.2 LONG-TERM EFFECTIVENESS

Implementation of permanent institutional controls to restrict access to and use of groundwater would be effective over the long term for all three alternatives. It is assumed that pumping in the southwestern borrow pits would continue throughout the 30-year evaluation period and would be effective because VOC concentrations would be permanently managed such that TCE concentrations would remain less than the ADEM-specified action level for TCE in surface water.

Alternative C would be most effective over the long term since covering West Kilby Ditch and channel stabilization in, and fencing around the northern section of Main Kilby Ditch would result in the continuous prevention of contact with chlorinated VOCs in Kilby Ditch. The closest point of exposure to VOC-containing surface water under this alternative would be in the constructed wetlands, around which fencing and other security controls would be in place, and where surface water concentrations would be reduced prior to discharge at Three Mile Branch.

Alternative A would be slightly less effective in the long term than Alternative C because, although VOC-containing groundwater would pass through the PRB prior to discharging, it is expected that chlorinated VOCs would not be completely removed from the groundwater. Thus, potential contact with surface water in West Kilby Ditch could occur, but VOC concentrations would likely be lower than those under alternatives that do not include groundwater treatment.

In Alternative C other technologies would be used to limit potential exposure downstream of the covered West Kilby Ditch. Under Alternative C slope stabilization would be implemented along the entire northern section of Main Kilby Ditch. The plantings and rip-rap associated with the slope stabilization would effectively limit the potential for access to surface water in the northern section of Main Kilby Ditch. Additionally, the portion of the ditch not covered would be enclosed with a security fence and vegetation, further reducing the likelihood of access to the water in the channel.

Alternative B would be least effective over the long term because maintenance of the existing fencing would be the only measure implemented to prevent access to surface water in the Kilby Ditch. Maintaining the existing fencing is considered relatively less effective than covering the ditch or implementing slope stabilization. The evaluation of long-term effectiveness of Alternatives A and B assumes that the PRBs would be effective for 20 to 30 years from the time of installation.

7.2.3 REDUCTION IN TOXICITY, MOBILITY, AND VOLUME

In all three alternatives, lateral migration of VOC-containing groundwater in the southwestern area is primarily controlled by the continued dewatering of the borrow pits. The constructed wetlands in Alternatives B and C would result in a reduction in the toxicity, mobility, and volume of the chlorinated VOCs in the Low-lying Areas. Under Alternatives A and B, the PRBs in the Kilby Ditch Area would reduce the toxicity, mobility and volume of the chlorinated VOCs through *in-situ* treatment, which would transform the chlorinated VOCs to innocuous byproducts through the process of reductive dechlorination. Therefore, because Alternative B treats a larger volume of the VOC-containing groundwater through the PRB and in the constructed wetlands, this alternative is marginally more effective than the other alternatives under this criterion.

7.2.4 SHORT-TERM EFFECTIVENESS

Alternative C would be most effective in the short term because covering West Kilby Ditch and implementing slope stabilization in the northern section of Main Kilby Ditch would reduce access to chlorinated VOC-containing surface water in the Kilby Ditch. Although Alternative A would limit exposure to surface water with TCE concentrations potentially greater than the ADEM-specified action level for TCE in surface water, this alternative is considered relatively less effective than Alternative C in the short-term because it would be less restrictive of access to surface water in Kilby Ditch. Alternative B would be least effective in the short term because groundwater downgradient of the PRB, which contains TCE at concentrations greater than the ADEM-specified action level for TCE in surface water, would discharge to West Kilby Ditch and only maintenance of the existing fencing is included to limit access to the Kilby Ditch.

7.2.5 IMPLEMENTABILITY

All three alternatives can be implemented using readily-available and proven technologies. Alternatives A and C would be more easily implemented because they do not include the installation of a PRB along Coliseum Boulevard. Implementing Alternative B would cause traffic disruptions and require a high level of safety controls. Alternative C is moderately less difficult to implement because it involves more standard construction techniques than Alternatives A and B, which require specialty construction techniques. Alternative B would be the most difficult alternative to implement.

All alternatives would require access to vacant, privately-owned property in order to implement.

7.2.6 COST

Engineering estimates of capital expenditures and first-year O&M costs for the three alternatives were developed based on proposals and projected costs from technology vendors, RS Means 2005 information, and previous project experience (Tables 7-2 through 7-4). Administration, contingency and design costs were applied equally for each component of the alternatives. The shared components in all three alternatives include Institutional controls and monitoring of surface water and groundwater. The costs for the institutional controls will be included in the second volume to this CMS report to be submitted by October 1, 2006.

Present net worth (PNW) estimates of the three alternatives range from $10.6 million to $15.8 million. Alternative B would be the most expensive alternative, with a capital cost of approximately $10.2 million and a PNW of $15.8 million. The PNW of Alternatives A and C would be approximately $12.7 million and $10.6 million, respectively.

7.2.7 ACCEPTANCE OF THE CORRECTIVE MEASURES

It is anticipated that Alternative C would be more acceptable than Alternatives A and B because access to surface water containing chlorinated VOCs in Kilby Ditch would be more effectively eliminated, or significantly reduced, under this alternative in comparison to the other two alternatives. Although maintenance of the existing fencing is included in Alternatives A and B, these measures are considered less effective at limiting access to surface water in Kilby Ditch than covering or slope stabilization. Alternative C may be somewhat more acceptable to the public because West Kilby Ditch would be covered, eliminating the possibility of coming in contact with surface water and enhancing the aesthetics of the area.

Under Alternative A, the PRB along Kilby Ditch would reduce chlorinated VOCs in groundwater prior to discharging to Kilby Ditch, however the ditch would not be covered, which is anticipated to be a more aesthetically pleasing measure. This alternative would also not include construction of the wetland in the Low-lying areas, which may be unfavorable because the constructed wetlands would provide an additional level of treatment and control of potential exposure pathways.

Alternative B would be the least acceptable alternative, because Alternative B would require short-term disruption of vehicular and/or pedestrian traffic along public ROW to allow for the installation of the

PRB along Coliseum Boulevard. It also would not be as effective as the other alternatives at limiting access to surface water that could contain TCE at concentrations greater than the ADEM-specified action level (0.175 mg/l).

8.1 SUMMARY

ALDOT has completed this CMS to evaluate and recommend a Site-wide corrective measure approach, focused on the long-term protection of public health and management of potential exposure pathways from chlorinated VOCs in groundwater and surface water within the CBP Site, in Montgomery, Alabama. This CMS is based on a review of available technologies to address the CBP. As new or modified technologies are developed and their effectiveness demonstrated, this CMS may be updated to include evaluation of the new or modified technologies for applicability to the CBP Site.

Potential exposure pathways have been investigated throughout the CBP Site through groundwater, surface water, soil, soil vapor, and air sampling. As discussed in Section 4, results from these investigations indicated that some potential pathways could be eliminated from further consideration due to existing natural conditions, or were controllable through legal or institutional methods. The investigations concluded that the most likely potential exposure pathway to chlorinated VOCs at the CBP Site that would require control through application of corrective measures is seepage of chlorinated VOC-containing groundwater into accessible surface water. Therefore, this CMS evaluated potential corrective measures that focus on Kilby Ditch and the Low-lying Areas to the northeast, the two areas of the CBP site where chlorinated VOCs currently discharge to the surface water.

The basis for evaluating Site-wide Area corrective measures for the CBP was to minimize potential human exposure to chlorinated VOCs, specifically TCE, in groundwater and surface water at the CBP Site. During previous site investigations at the Kilby Ditch Area, ADEM established an action level of 0.175 mg/L for TCE in the surface water within Kilby Ditch. The performance and estimated costs of corrective measures alternatives were evaluated over a 30-year period for the purposes of this CMS as recommended by the USEPA guidance for detailed analysis of alternatives (USEPA, 1988). The corrective measures alternatives were evaluated primarily on their effectiveness in limiting access to surface water at the CBP where concentrations may exceed the ADEM-specified action level within the 30-year evaluation period. Alternative measures that could have ancillary benefits, such as reducing the mobility or toxicity of the TCE-containing groundwater, also were considered as part of the Site-wide Area corrective measures strategy.

As discussed in Section 2 of this Report, groundwater samples have been collected from 118 groundwater monitoring wells during investigations of the CBP. Continued groundwater and surface water monitoring will be part of any corrective measures for the CBP. The monitoring program will allow ALDOT to modify corrective measures at the site as site conditions change.

Dewatering operations currently ongoing within the borrow pit areas in the Southwestern Area of the CBP, are anticipated to continue during the 30-year evaluation period due to proposed borrow pit expansion. The most recent investigations in the Southwestern Area in the vicinity of the sand and gravel borrow pits have concluded that dewatering of the borrow pits controls the southwestward migration of the dissolved TCE plume. As discussed in Sections 3 and 4, the effects of pumping required for borrow pit operations were used to predict concentrations of TCE in the surface water. These concentrations are not predicted to exceed 0.005 mg/L, which is well below the ADEM-specified action level of 0.175 mg/L in surface water.

8.2 SITE-WIDE CORRECTIVE MEASURES RECOMMENDATION

Based on the evaluations conducted in this CMS, the site-wide corrective measures comprising Alternative C are recommended for the CBP as a Site-wide remedy. This alternative is considered to be the least difficult to implement and the most effective at minimizing access to chlorinated VOCs in surface water at the CBP Area. These technologies are proven and reliable components of the recommended remedy.

The recommended remedy presented below was developed from currently available remedial technologies. As part of the remedy, a five-year technology review is proposed for the CBP Area. If new technologies are developed or existing technologies are refined this CMS may be amended to include evaluation of the new or modified technologies for applicability to the CBP Site.

8.2.1 OVERVIEW OF REMEDY ELEMENTS

Alternative C includes the following corrective measures:

- Covering of West Kilby Ditch and slope stabilization of the northern section of the Main Kilby Ditch;
- Retain or reposition fencing along Main Kilby Ditch;
- Construction of wetlands and perimeter fencing in the Low-lying Areas;
- Groundwater and surface water monitoring; and
- Implementation of institutional controls to restrict access to and prevent use of groundwater.

8.2.1.1 Institutional Controls

Institutional controls will prevent and/or significantly minimize the potential for complete exposure pathways for groundwater and surface water containing chlorinated VOCs. The specific details of these controls will be discussed in the second volume of this CMS Report, to be submitted to ADEM by October 1, 2006.

8.2.1.2 Covering of West Kilby Ditch

Based on the analyses discussed in Section 6, the culvert designs implemented in the West Kilby Ditch Area would include installation of one 10-foot by 4-foot concrete box culvert (approximately 520 feet in length) to replace West Kilby Ditch. A hydraulic analysis would be performed to assess the effects of such modifications on the existing storm drainage hydraulics within Kilby Ditch and surrounding area.

8.2.1.3 Channel Stabilization

The northern section of Main Kilby Ditch would be modified beginning at the north end of the existing concrete trapezoidal channel of the northern section of Main Kilby Ditch and continue to North Boulevard. The channel modifications would include creation of a uniform channel by sloping the sides and grading the bottom, and lining the bottom and part of the side slopes with approximately 12 to 18 inches of rip-rap. A hydraulic analysis would be performed to assess the effects of such modifications on the existing storm drainage.

Sufficient rip-rap would be placed in the bottom of the channel to reduce the likelihood of direct access to the base surface water elevation. A geo-fabric would support the rip-rap. Vegetation would be planted over the permanent turf reinforcement to aid in erosion control.

8.2.1.4 Fencing

An 8-foot-high perimeter chain link fence would be maintained around the northern section of Main Kilby Ditch, including display of appropriate warning signs. The existing fence around West Kilby Ditch would be removed as part of covering the ditch. An 8-foot-high perimeter chain link fence and appropriate warning signs would be installed and maintained around the Low-lying Areas. Locked gates would be installed in the perimeter fencing to allow access for site maintenance and monitoring. Inspection and maintenance of the fencing would be performed.

8.2.1.5 Constructed Wetlands

Strategic enhancement and expansion of existing wetlands in the Low-lying Areas would intercept discharging groundwater and surface water from Kilby Ditch. As discussed in Section 6, a naturally constructed wetland would be implemented to maximize capture of the discharged groundwater. Sizing of the wetland would be based on water budgets to account for direct precipitation, stormwater runoff, groundwater inflow, and evapotranspiration.

As discussed in Section 6, the Low-lying Areas are suitable for wetland creation or enhancement due to their topographic position and because of the railroad tracks, which, due to the natural relief of the land to the west, form a preexisting berm that would be incorporated into the design. Discharge rates and water depths in the wetlands would be controlled by constructing additional earthen berms, positioned to create a long flow path to impede hydraulic short circuiting and to increase retention time. Overall constructed wetland design will be based on the findings of the following:

- A site investigation that characterizes the presence of existing wetlands and evaluates local depths to groundwater and soil.
- A water budget, consisting of stormwater runoff, groundwater inflow, precipitation and associated runoff, evapotranspiration, and flow through.
- A site topographic survey

Other than construction of low berms, limited site work would be anticipated because the Low-lying Areas are relatively flat. The existing microtopography will provide varying water depths that will improve habitat and induce a variety of redox conditions. Flow from the system would discharge into Three Mile Branch, which would be designated as the compliance point for monitoring of the constructed wetland system.

8.2.1.6 Groundwater and Surface Water Monitoring

The overall protection of human health resulting from the implementation of the selected alternative will be confirmed through the development and implementation of a comprehensive, monitoring plan for both groundwater and surface water. The monitoring plan would incorporate elements of the existing CBP monitoring program, including sampling of groundwater from monitoring wells across the site and monitoring of the constructed wetland in the Low-lying areas. Monitoring frequency and reporting of findings would be consistent with ADEM-specified requirements.

The groundwater monitoring program would include installation of additional monitoring wells adjacent to the current northern and southwestern extents of the CBP to monitor plume expansion in these areas. Surface water monitoring within the CBP will include monitoring of the constructed wetland in the Low-lying Areas at a compliance point where the constructed wetland discharges into Three Mile Branch and surface water monitoring of the northern section of Main Kilby Ditch.

8.2.2 OPERATIONS AND MAINTENANCE OF RECOMMENDED REMEDY

A detailed Operations and Maintenance Plan (O&M Plan) would be developed for the remedy for approval by ADEM, which would include details on site monitoring activities and schedules, the reporting requirements, and periodic review and annual re-certification of engineering and institutional controls.

The O&M plan would specify the location, frequency, and requirements of groundwater and surface water monitoring at the CBP Site. The O&M Plan would include an annual review of the monitoring program including development of a trend analysis of the data to evaluate the monitoring results and suggest changes to the plan as needed. The O&M Plan would also include an annual review of engineering and institutional control implementation and compliance, including submission of written certification of the effectiveness and protectiveness of the engineering and institutional controls. An annual report would be submitted to ADEM, which would include the results of monitoring, trend analysis, a written certification that the institutional and engineering controls are in place and are effective, and recommendations for changes in the O&M plan, as applicable. Additionally, annual notices would be sent to property owners to reiterate or update information on institutional controls that affect their properties.

8.3 CONCLUSIONS

The recommended remedy will meet the primary corrective measures objective of minimizing potential human exposure to chlorinated VOCs, specifically TCE, in groundwater and surface water at the CBP Site. The recommended remedy will be protective of human health by limiting access to groundwater containing chlorinated VOCs and surface water at concentrations greater than the ADEM-specified action level for TCE in surface water of 0.175 mg/L. Institutional controls will prevent and/or significantly minimize the potential for complete exposure pathways for groundwater and surface water containing chlorinated VOCs. Covering West Kilby Ditch and removal of existing fencing, and slope stabilization and maintaining fencing of the northern section of Main Kilby Ditch will limit public access to surface water containing chlorinated VOCs.

The recommended remedy would be effective over the long term since covering West Kilby Ditch and the proposed improvements to the northern section of Main Kilby Ditch would limit access to surface water in Kilby Ditch. The closest point of exposure to VOC-containing surface water under the recommended remedy would be in the constructed wetlands, around which fencing and other security controls would be in place, and where surface water concentrations would be reduced prior to discharge at Three Mile Branch.

As an agency of the State of Alabama, ALDOT can meet the technical and financial requirements to implement, operate, maintain, and monitor the corrective measures that are recommended for the CBP.

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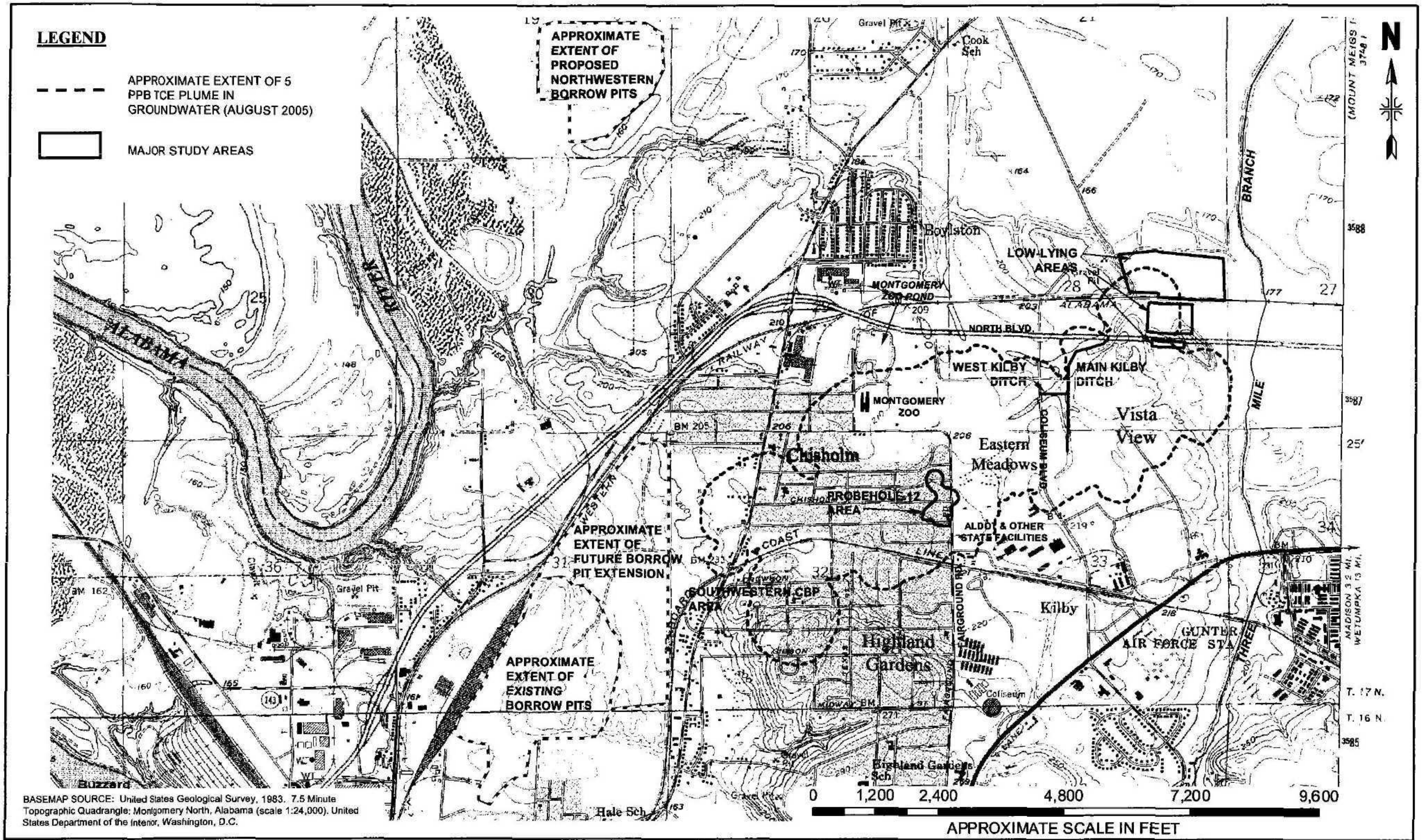

BASEMAP SOURCE: United States Geological Survey, 1983. 7.5 Minute Topographic Quadrangle: Montgomery North, Alabama (scale 1:24,000). United States Department of the Interior, Washington, D.C.

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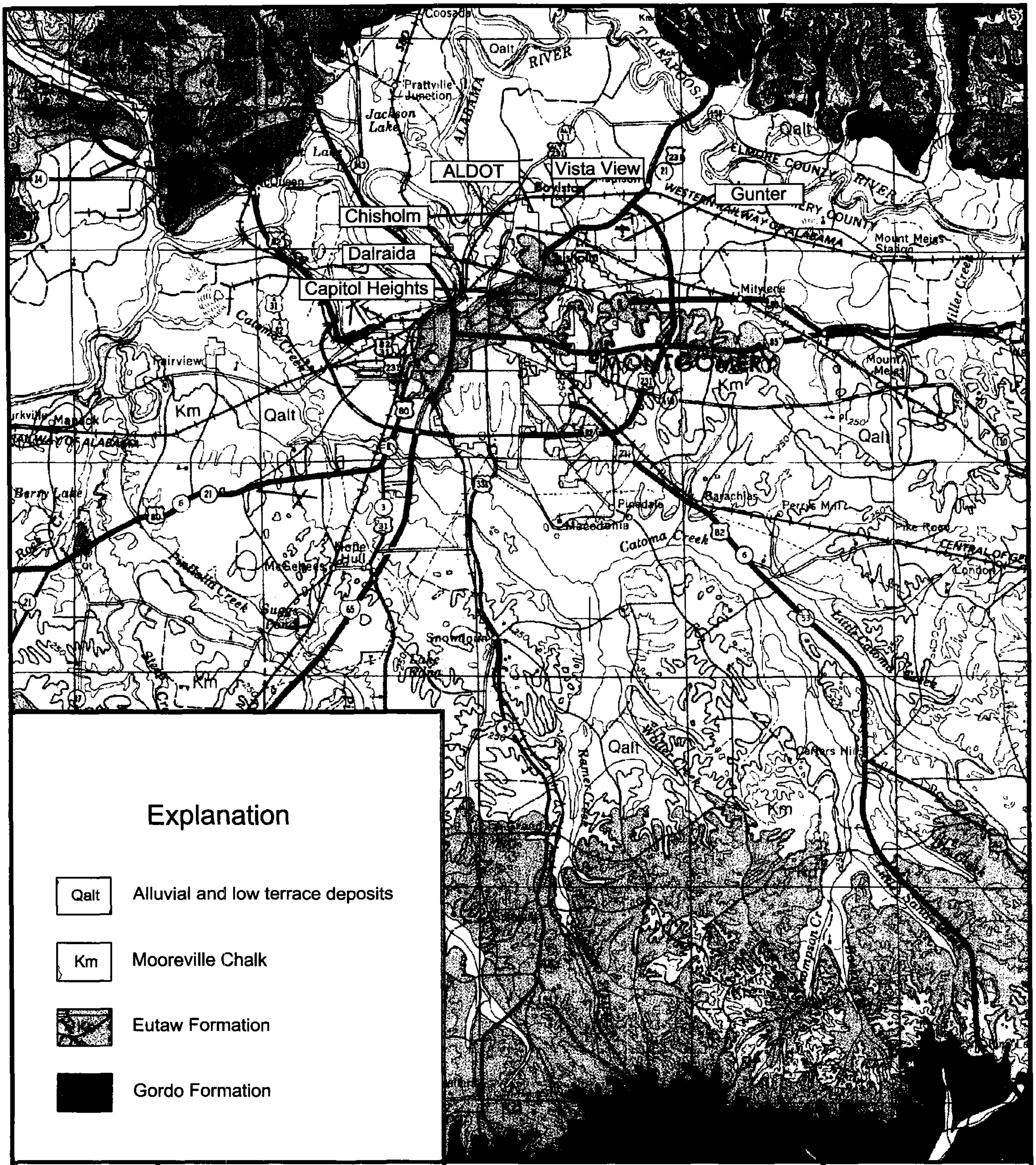
COLISEUM BOULEVARD PLUME

SITE LOCATION AND MAJOR STUDY AREAS

APRIL 2006

FIGURE 1-1



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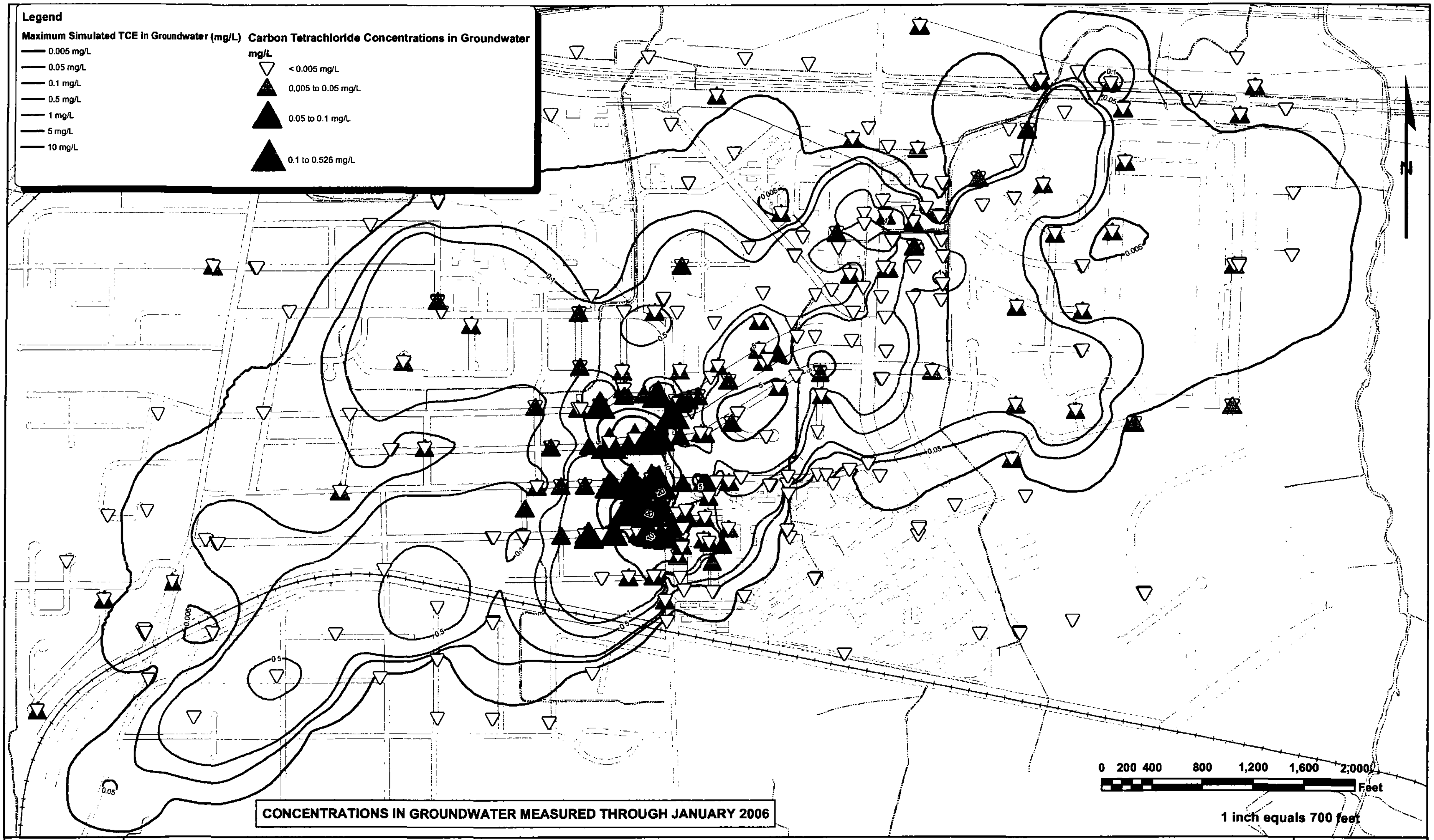
TRANSPORTATION
COLISEUM BOULEVARD PLUME

GEOLOGIC MAP OF MONTGOMERY AREA,
MONTGOMERY COUNTY, ALABAMA.
(FROM GEOLOGIC MAP OF ALABAMA,
SOUTHEAST SHEET, BY SZABO, M.W., AND
COPELAND, C.W., 1988)

APRIL 2006

FIGURE 2-1



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Coliseum Boulevard Project

CARBON TETRACHLORIDE CONCENTRATIONS IN GROUNDWATER

FIGURE 2-2

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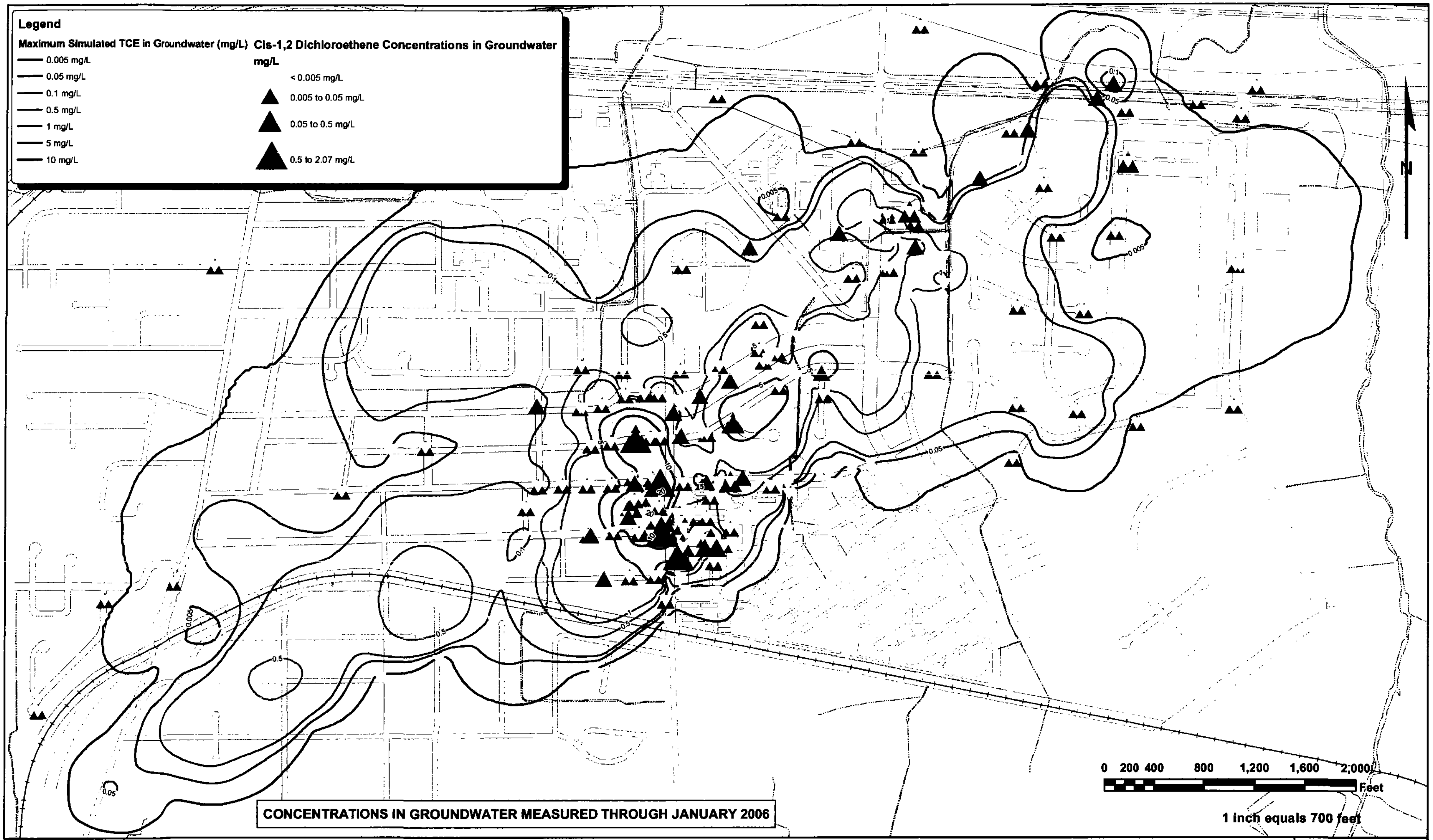


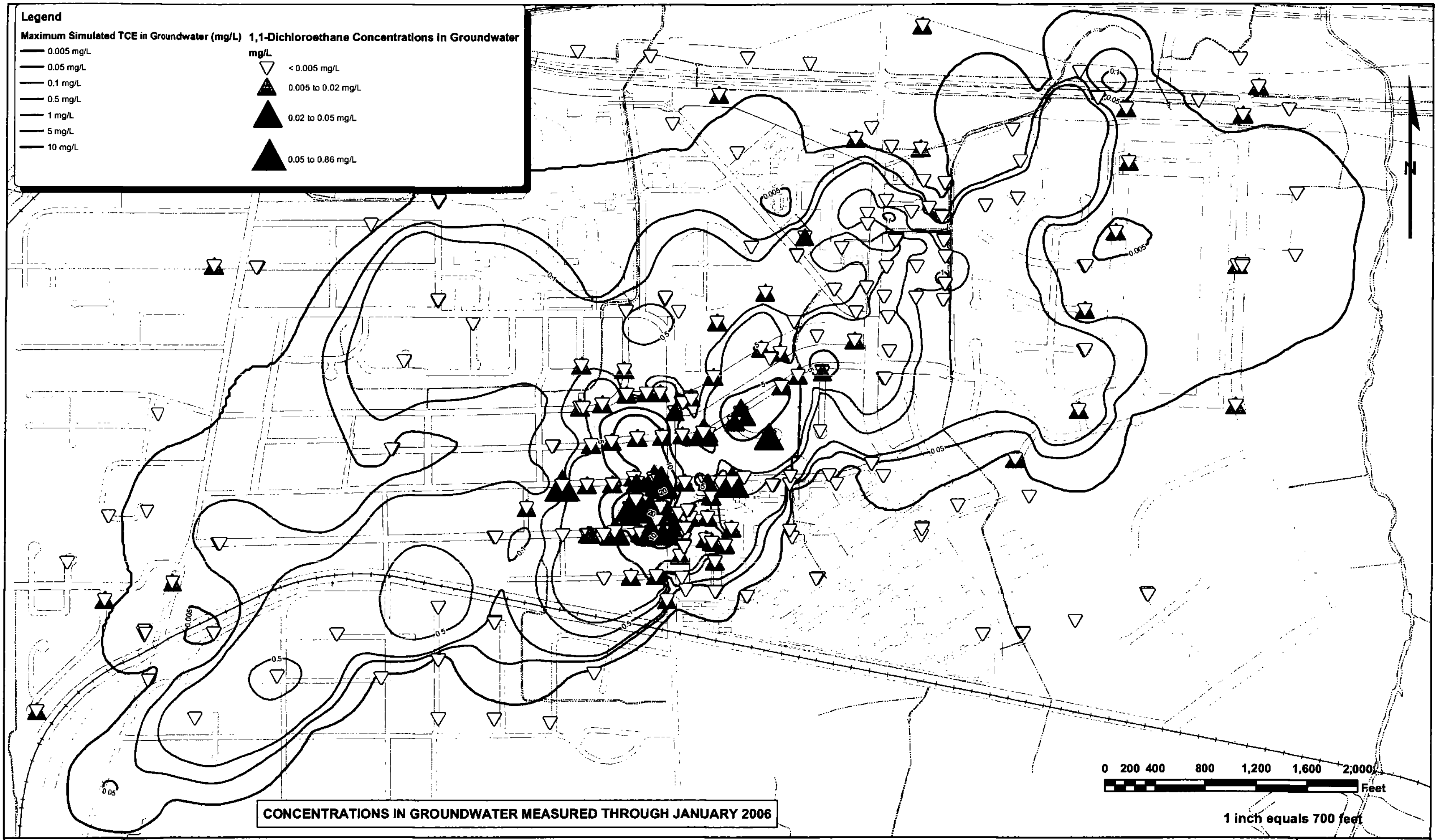
CONCENTRATIONS IN GROUNDWATER MEASURED THROUGH JANUARY 2006

Alabama Department of Transportation
Coliseum Boulevard Project

CIS-1,2 DICHLOROETHENE CONCENTRATIONS IN GROUNDWATER

FIGURE 2-3

APRIL 2006



CONCENTRATIONS IN GROUNDWATER MEASURED THROUGH JANUARY 2006

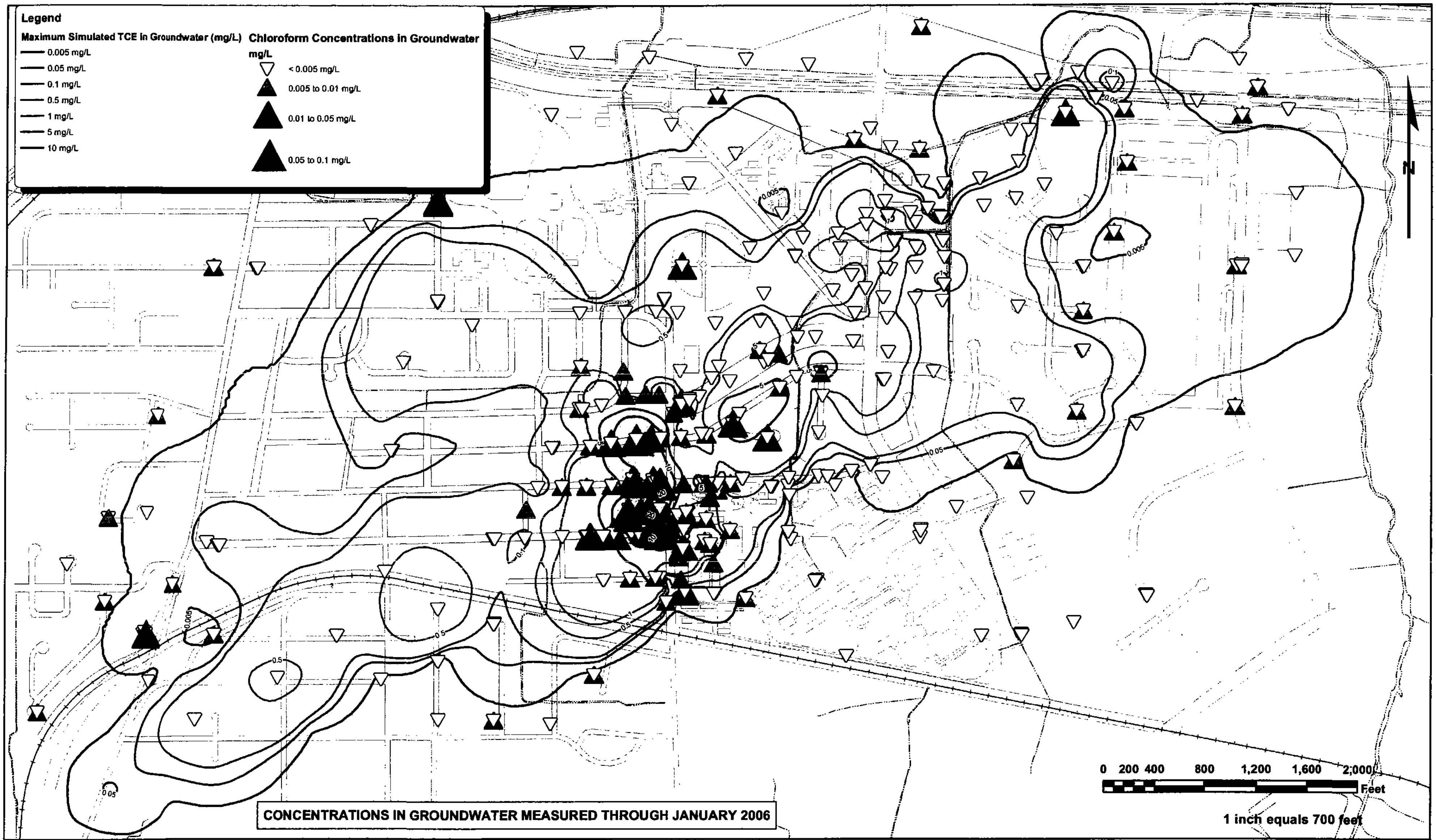
DEPARTMENT OF TRANSPORTATION

Alabama Department of Transportation
Coliseum Boulevard Project

1,1-DICHLOROETHENE CONCENTRATIONS IN GROUNDWATER

FIGURE 2-4

April 2006

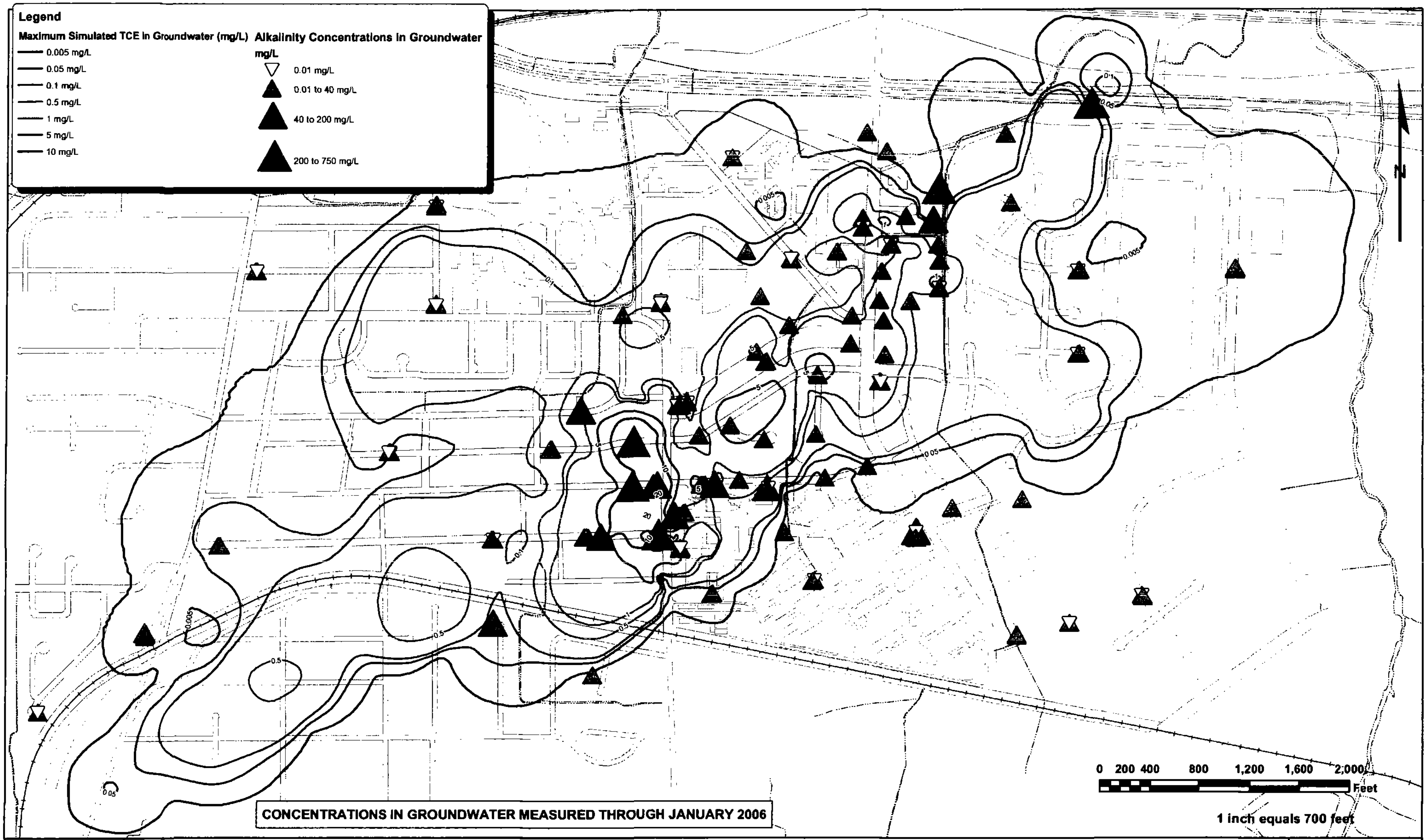


Alabama Department of Transportation
Coliseum Boulevard Project

CHLOROFORM CONCENTRATIONS IN GROUNDWATER

FIGURE 2-5

April 2006



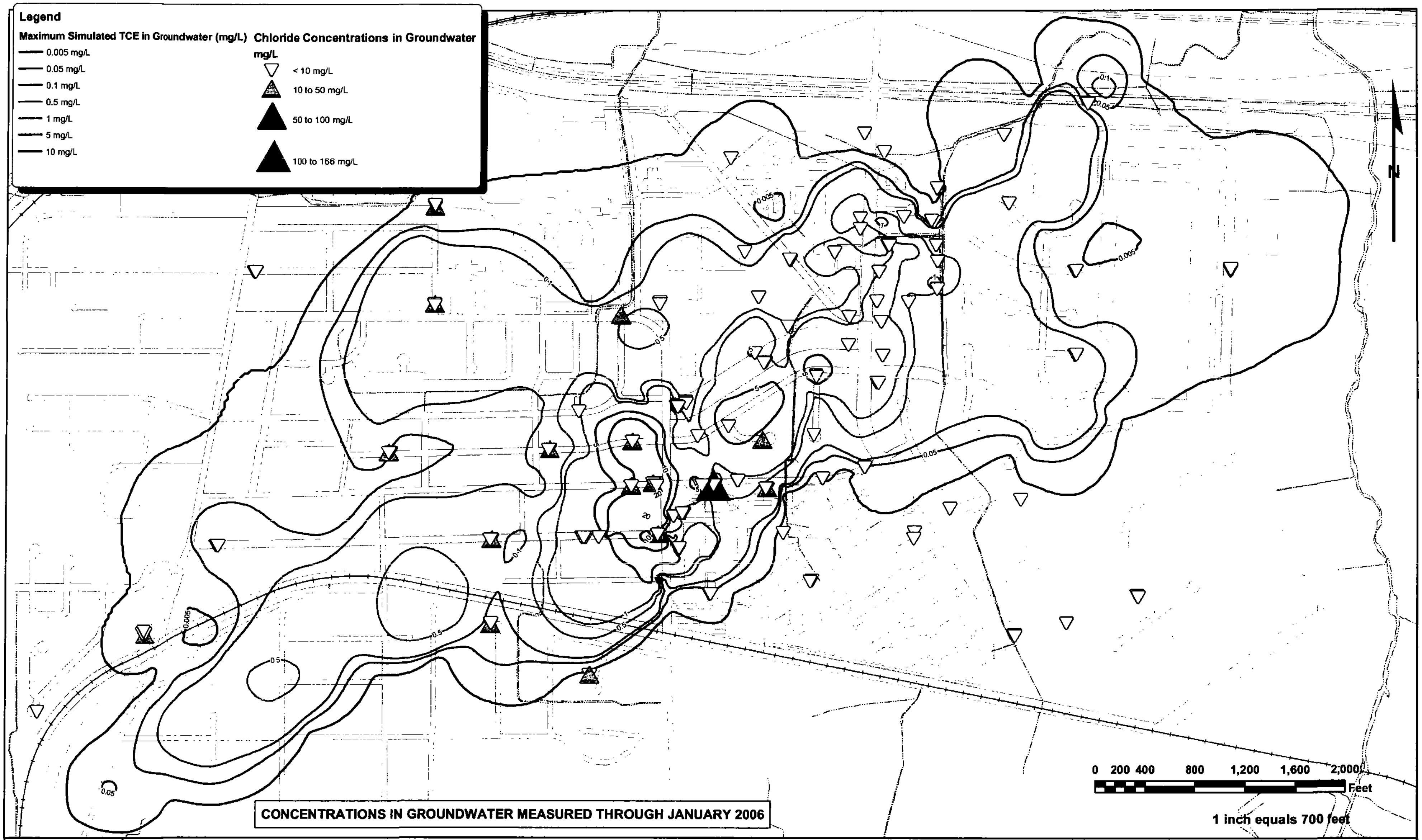
CONCENTRATIONS IN GROUNDWATER MEASURED THROUGH JANUARY 2006

Alabama Department of Transportation
Coliseum Boulevard Project

ALKALINITY CONCENTRATIONS IN GROUNDWATER

FIGURE 2-6

April 2006



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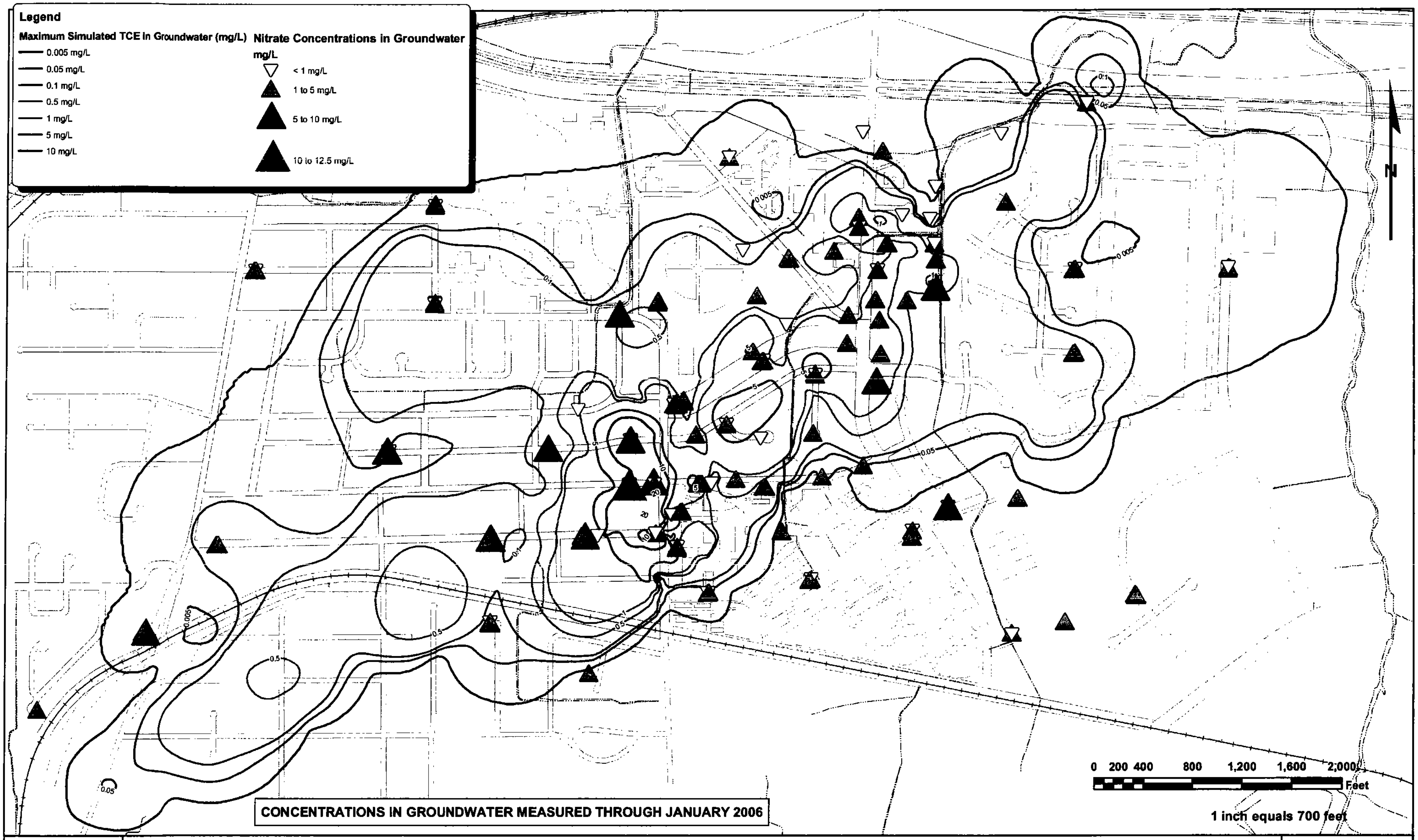
Coliseum Boulevard Project

CHLORIDE CONCENTRATIONS IN GROUNDWATER

FIGURE 2-7

April 2006



CONCENTRATIONS IN GROUNDWATER MEASURED THROUGH JANUARY 2006

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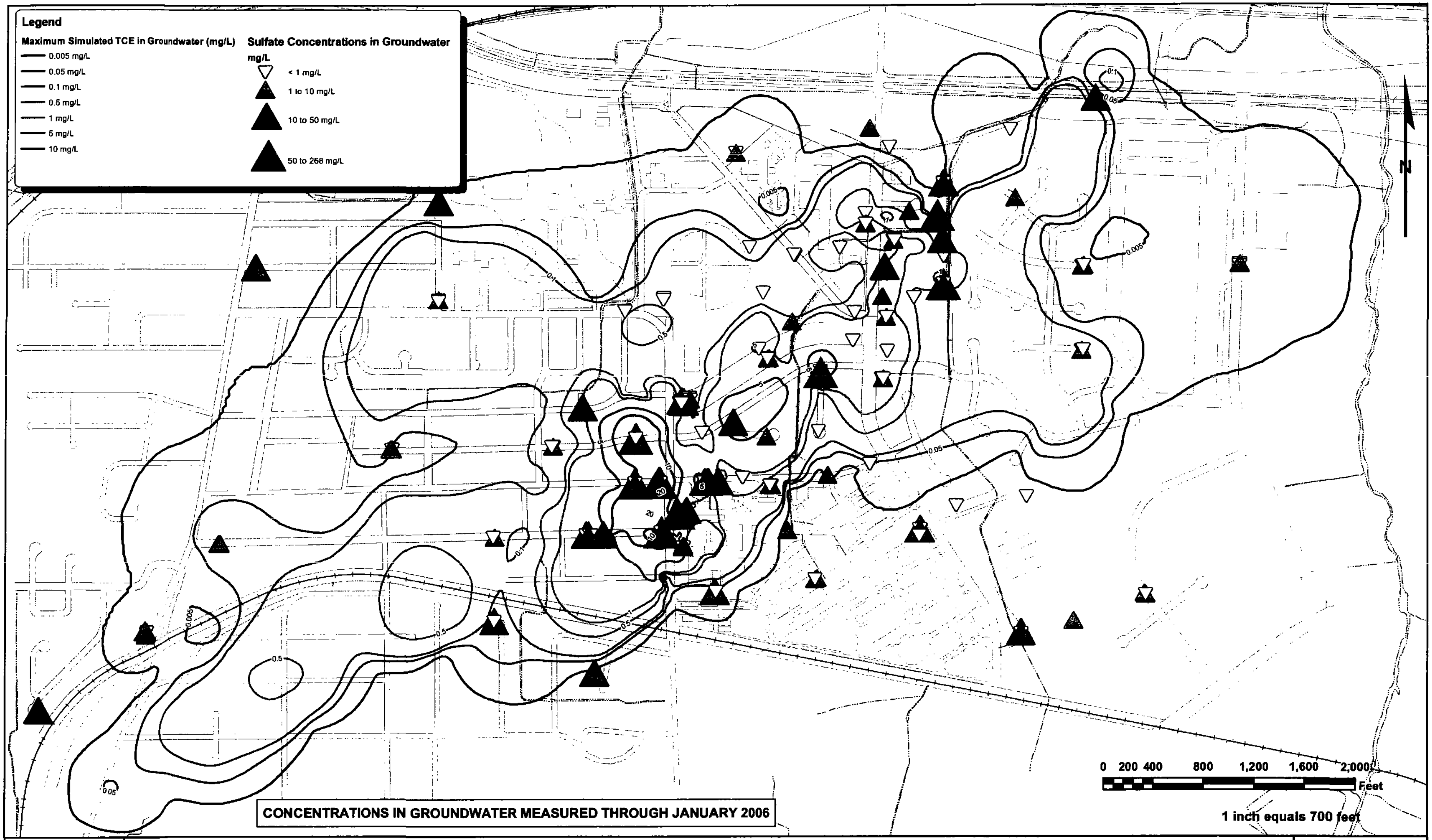
Coliseum Boulevard Project

NITRATE CONCENTRATIONS IN GROUNDWATER

FIGURE 2-8

April 2006



CONCENTRATIONS IN GROUNDWATER MEASURED THROUGH JANUARY 2006

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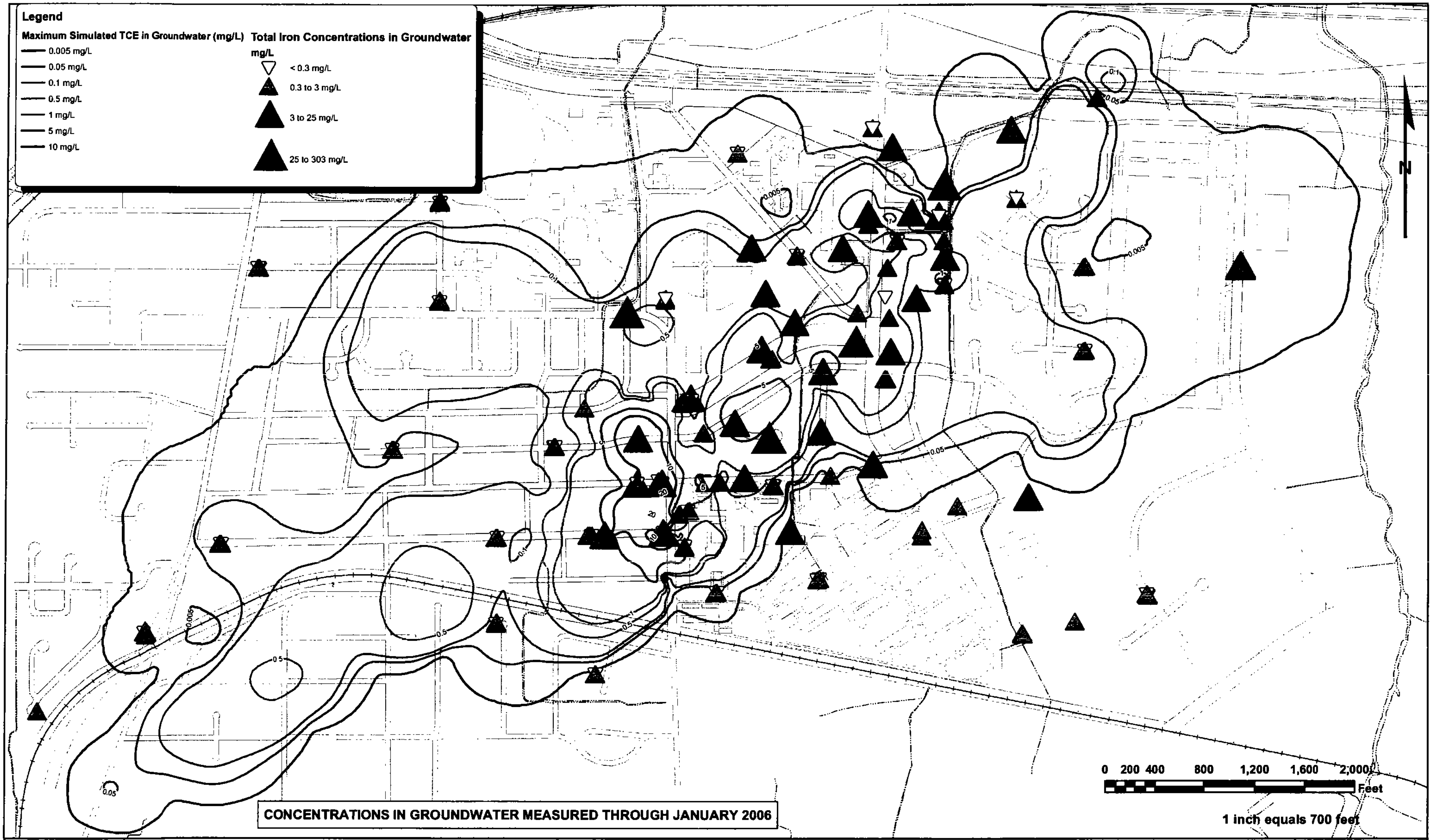
Coliseum Boulevard Project

SULFATE CONCENTRATIONS IN GROUNDWATER

FIGURE 2-9

April 2006



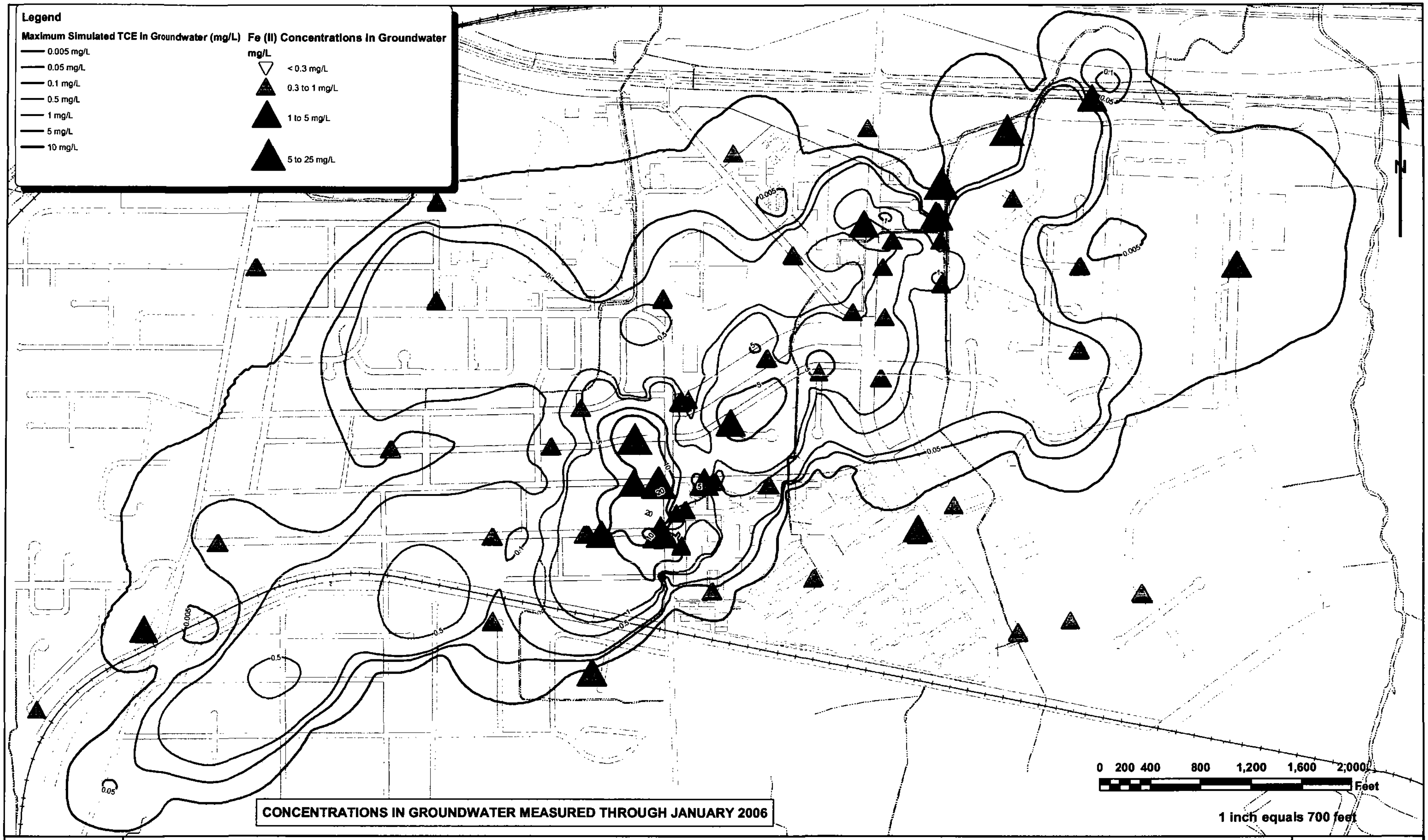
CONCENTRATIONS IN GROUNDWATER MEASURED THROUGH JANUARY 2006

Alabama Department of Transportation
Coliseum Boulevard Project

TOTAL IRON CONCENTRATIONS IN GROUNDWATER

FIGURE 2-10

April 2006



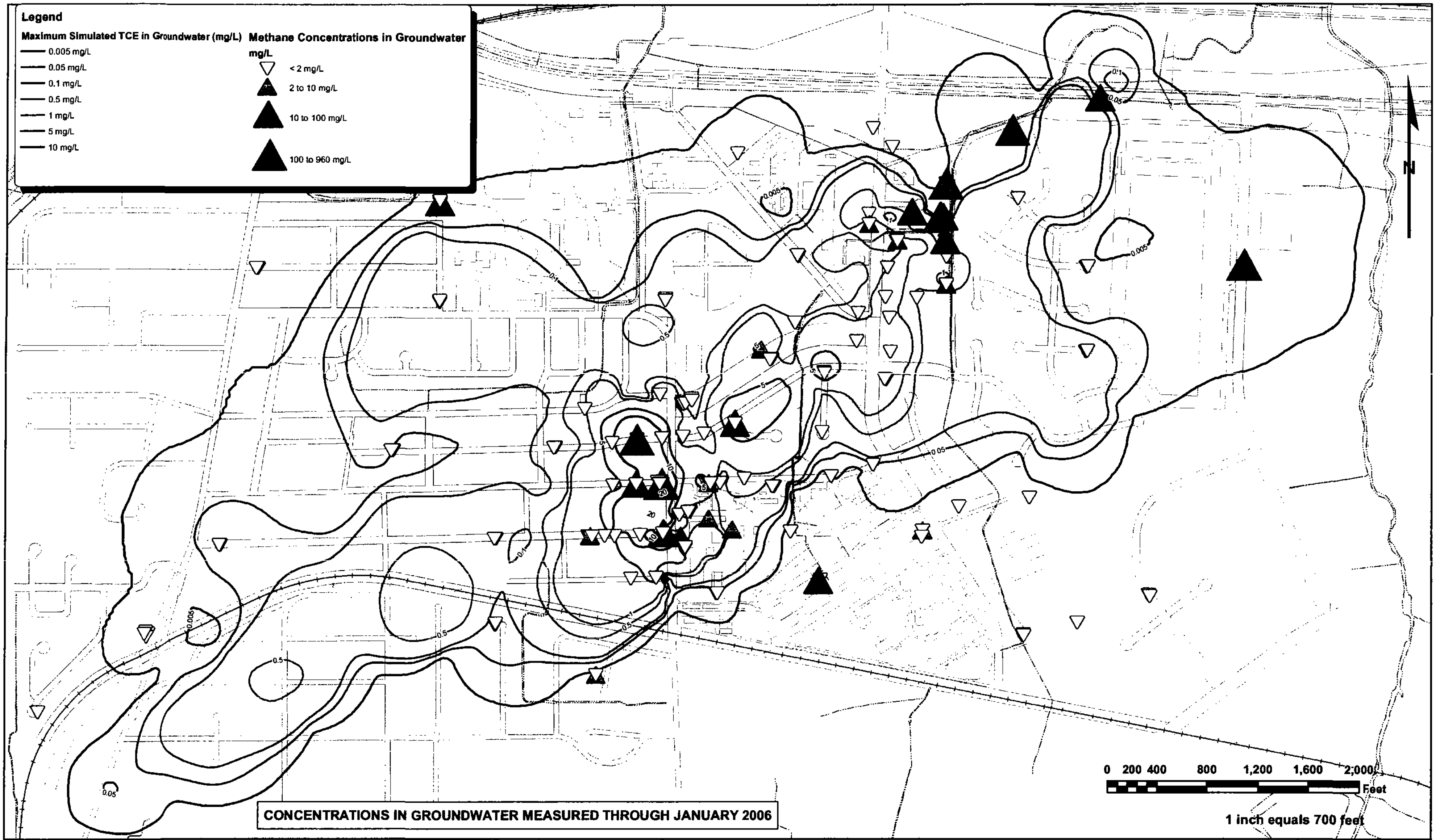
CONCENTRATIONS IN GROUNDWATER MEASURED THROUGH JANUARY 2006

Alabama Department of Transportation
Coliseum Boulevard Project

FERROUS IRON CONCENTRATIONS IN GROUNDWATER

FIGURE 2-11

April 2006



CONCENTRATIONS IN GROUNDWATER MEASURED THROUGH JANUARY 2006

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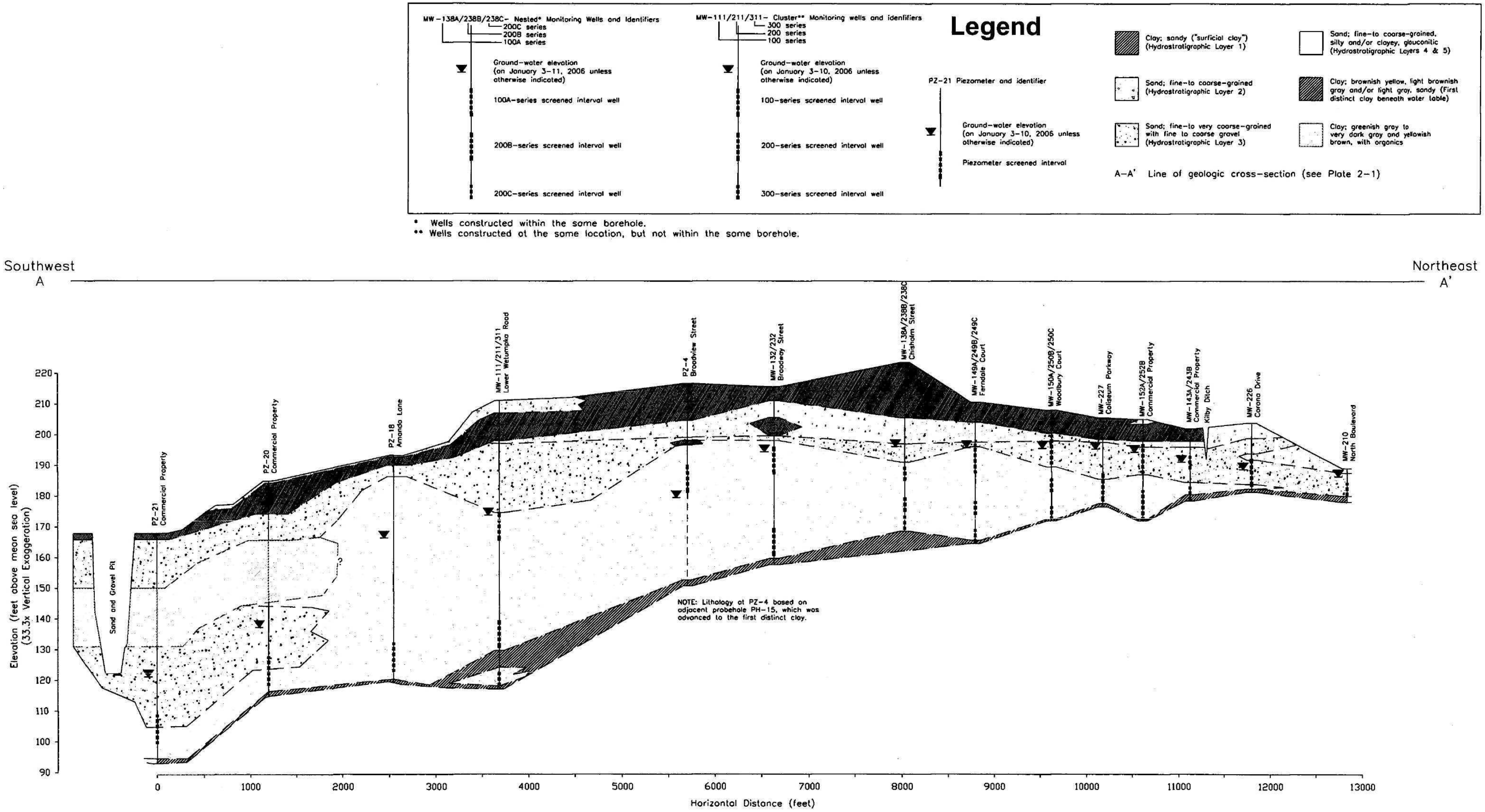
Coliseum Boulevard Project

METHANE CONCENTRATIONS IN GROUNDWATER

FIGURE 2-12

April 2006



* Wells constructed within the same borehole.
** Wells constructed at the same location, but not within the same borehole.

NOTE: Lithology at PZ-4 based on adjacent probehole PH-15, which was advanced to the first distinct clay.

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COLISEUM BOULEVARD PLUME

SOUTHWEST-NORTHEAST GEOLOGIC CROSS-SECTION A-A';
COLISEUM BOULEVARD PLUME; MONTGOMERY, ALABAMA.

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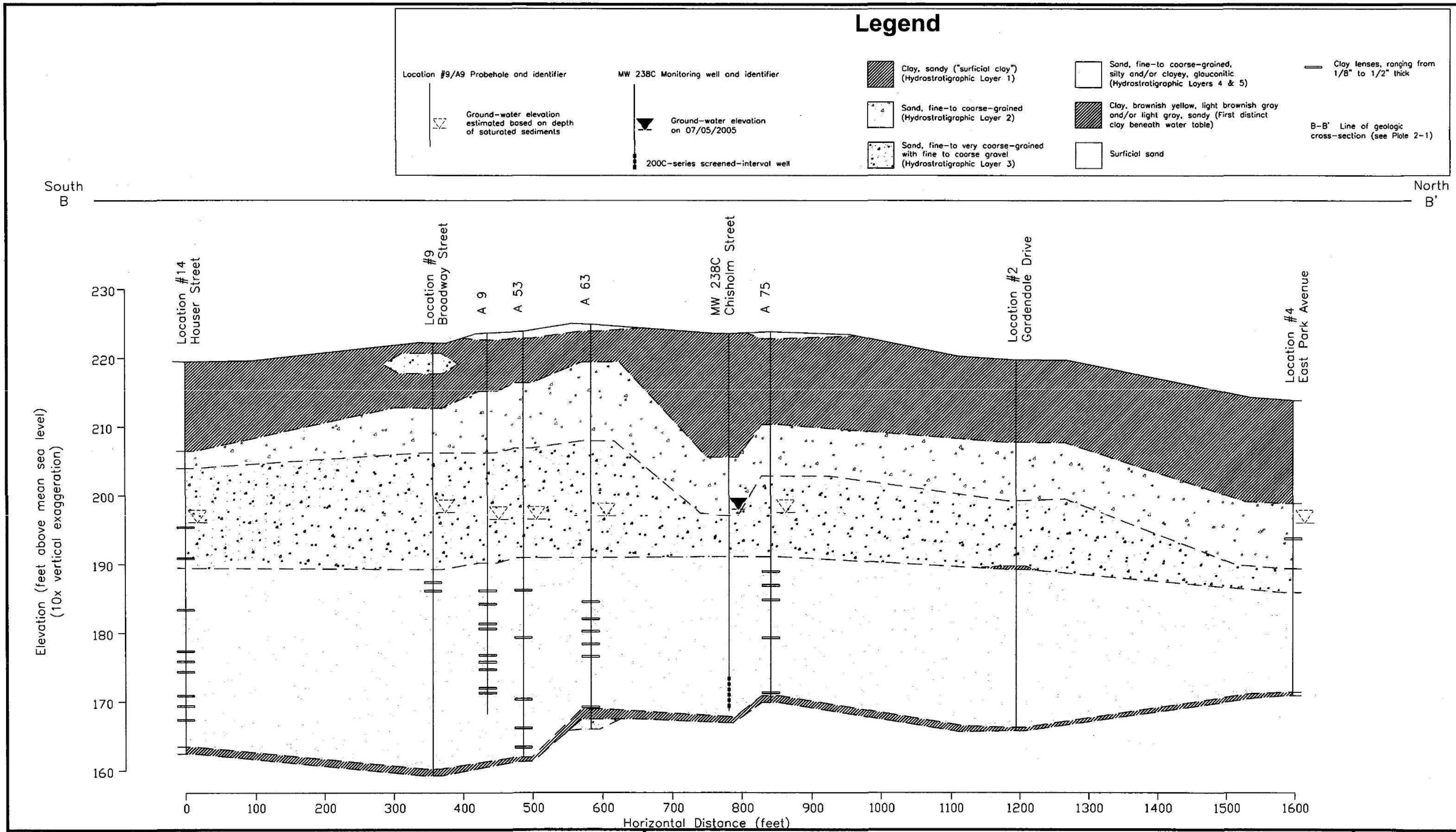
FIGURE 2-13



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COLISEUM BOULEVARD PLUME

SOUTH-NORTH GEOLOGIC CROSS-SECTION B-B';
COLISEUM BOULEVARD PLUME; MONTGOMERY, ALABAMA.

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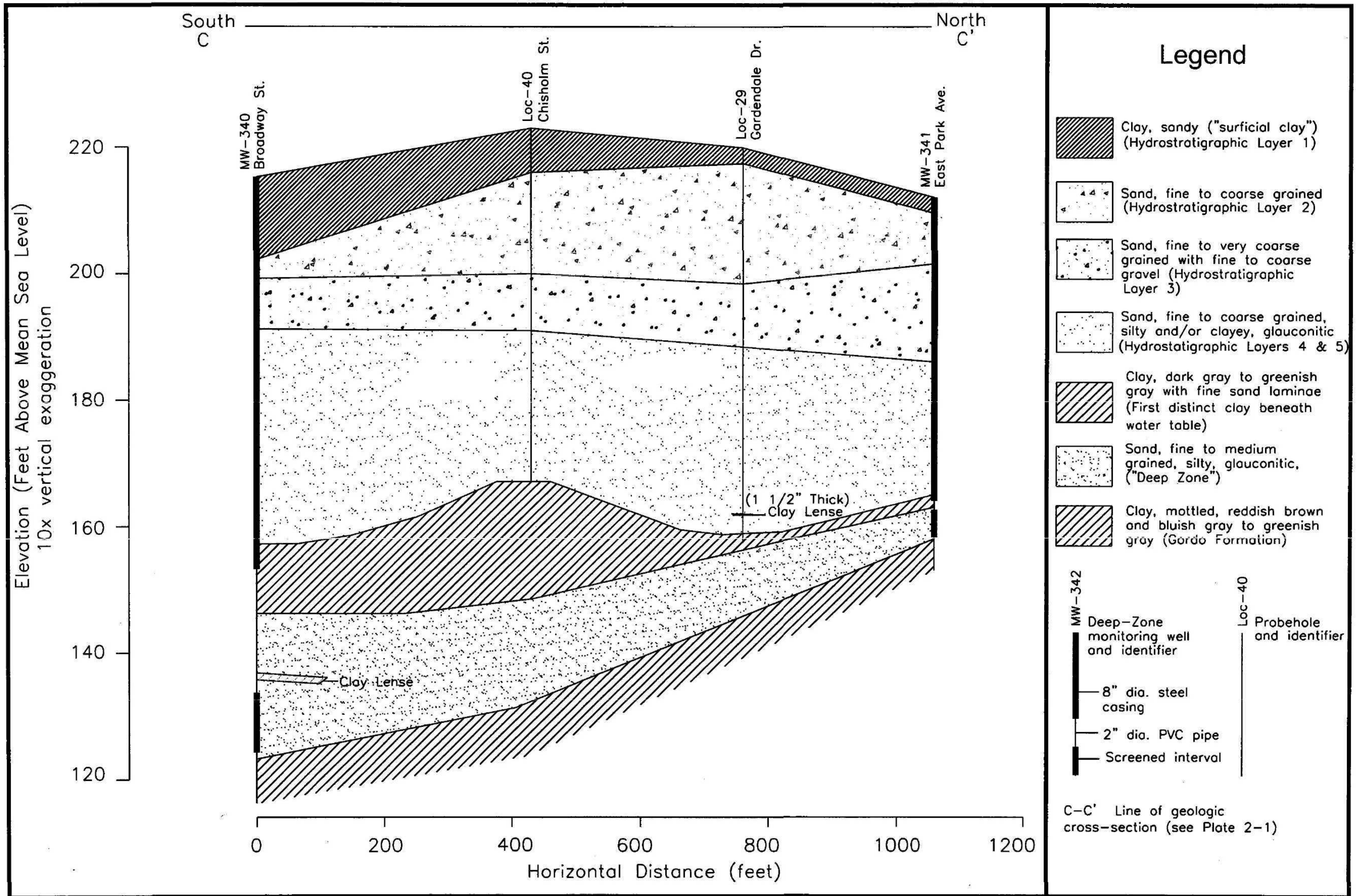
FIGURE 2-14



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COLISEUM BOULEVARD PLUME

SOUTH-NORTH GEOLOGIC CROSS-SECTION C-C';
COLISEUM BOULEVARD PLUME; MONTGOMERY, ALABAMA.

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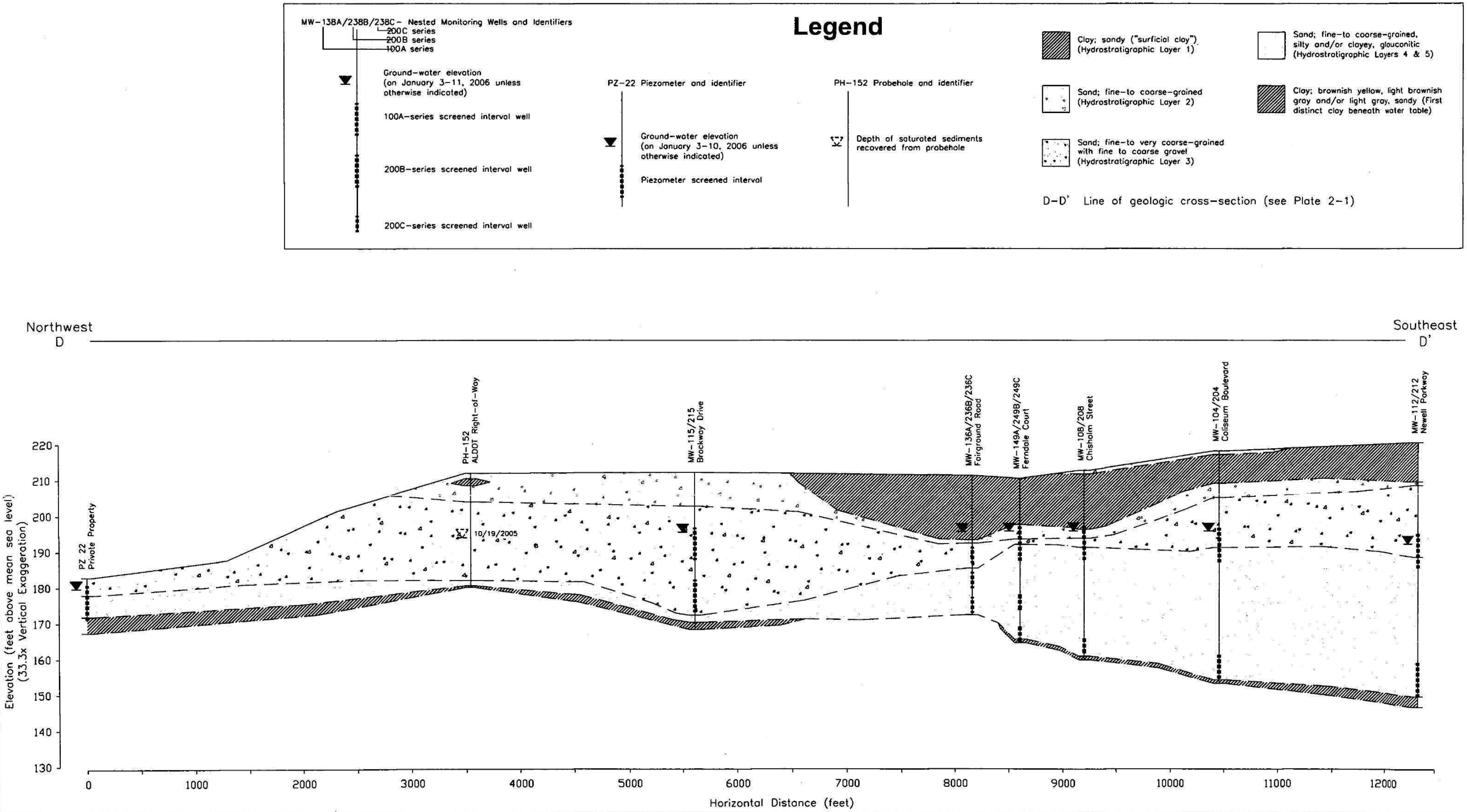
FIGURE 2-15



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NORTHWEST-SOUTHEAST GEOLOGIC CROSS-SECTION D-D';
COLISEUM BOULEVARD PLUME; MONTGOMERY, ALABAMA.

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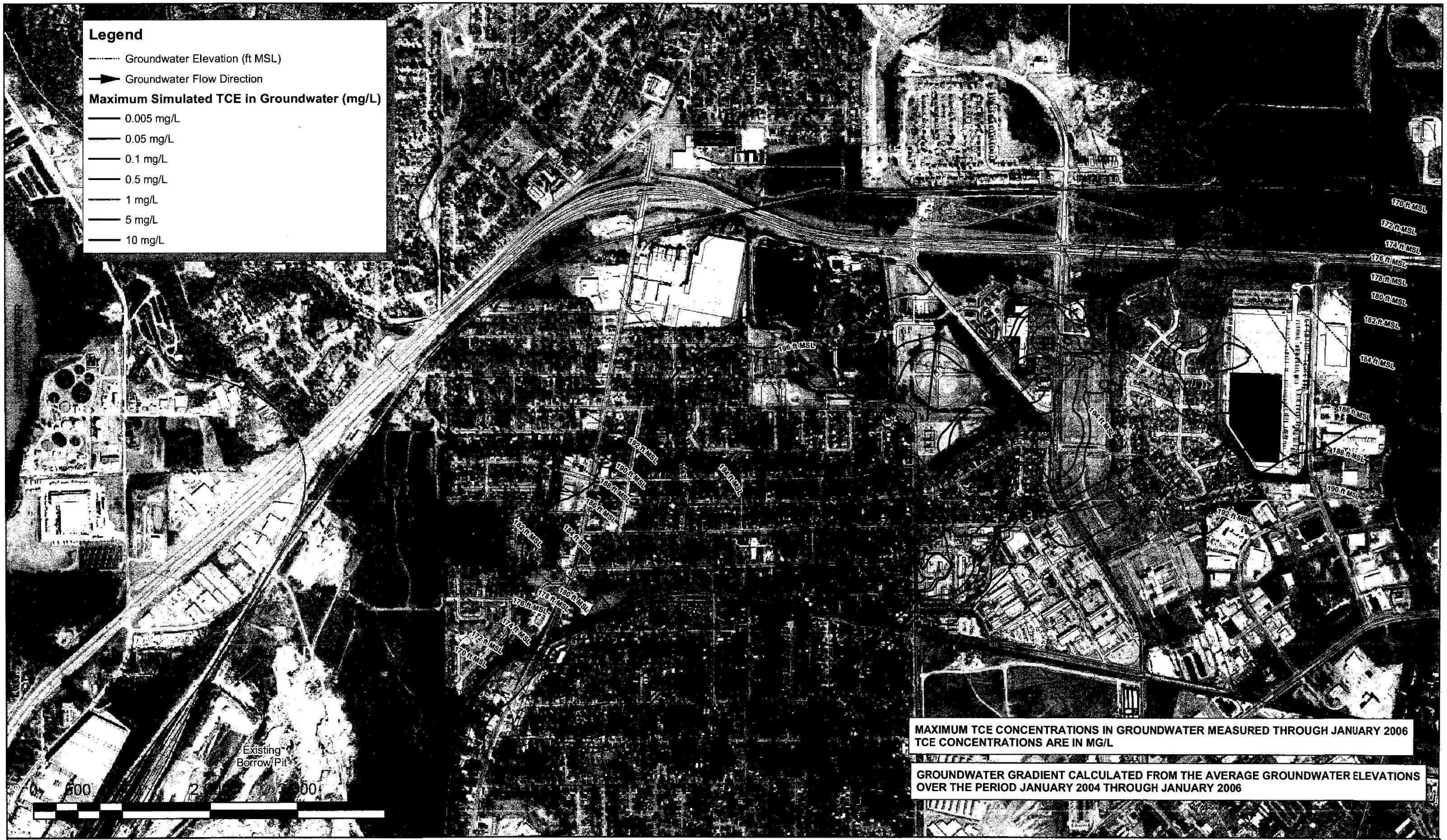
FIGURE 2-16



MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER MEASURED THROUGH JANUARY 2006
TCE CONCENTRATIONS ARE IN MG/L

GROUNDWATER GRADIENT CALCULATED FROM THE AVERAGE GROUNDWATER ELEVATIONS OVER THE PERIOD JANUARY 2004 THROUGH JANUARY 2006

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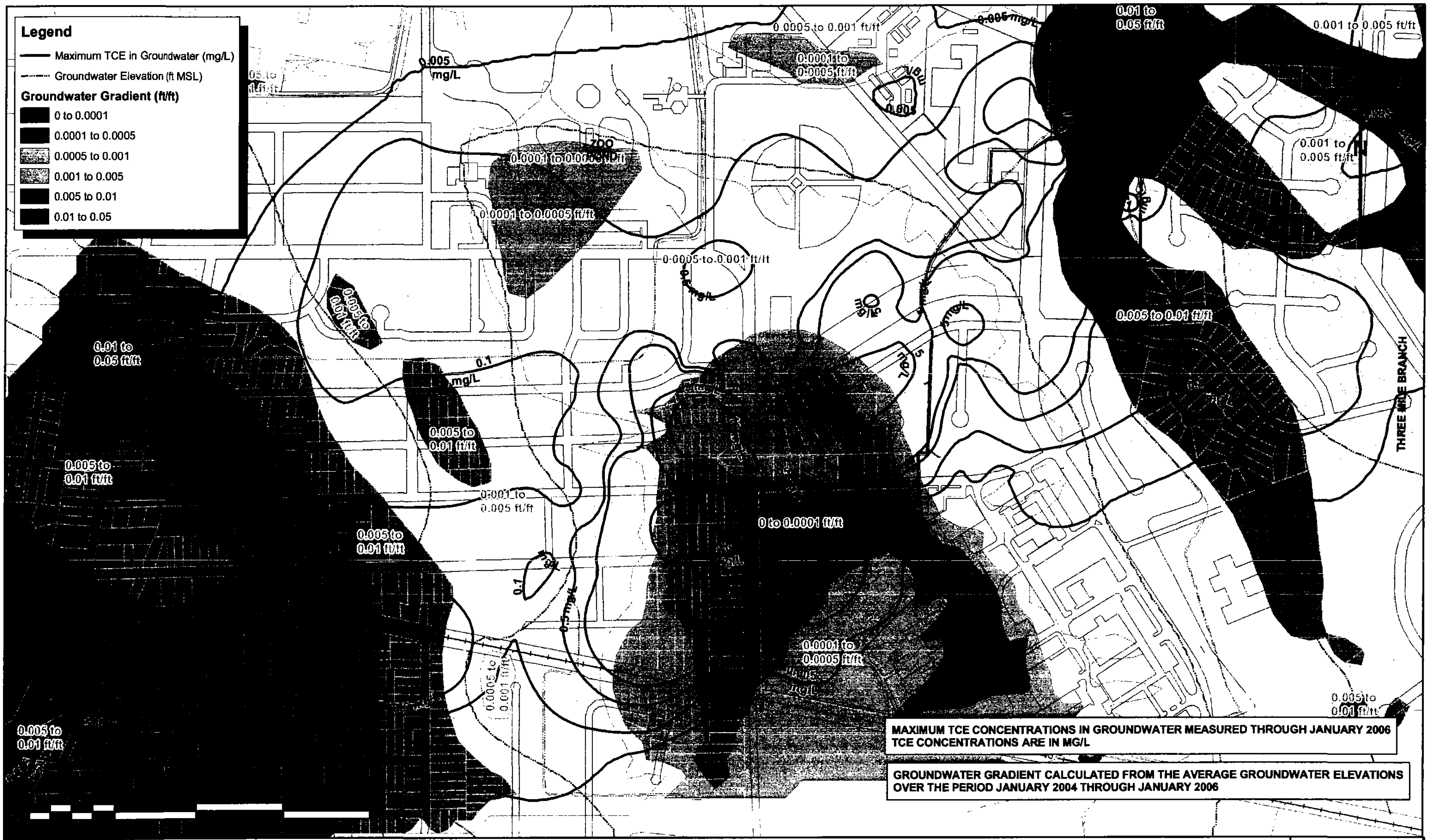
Coliseum Boulevard Project

DEPARTMENT OF TRANSPORTATION

GROUNDWATER ELEVATIONS AND MAXIMUM TCE CONCENTRATIONS THROUGH JANUARY 2006

FIGURE 2-17

April 2006



MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER MEASURED THROUGH JANUARY 2006
TCE CONCENTRATIONS ARE IN MG/L

GROUNDWATER GRADIENT CALCULATED FROM THE AVERAGE GROUNDWATER ELEVATIONS OVER THE PERIOD JANUARY 2004 THROUGH JANUARY 2006

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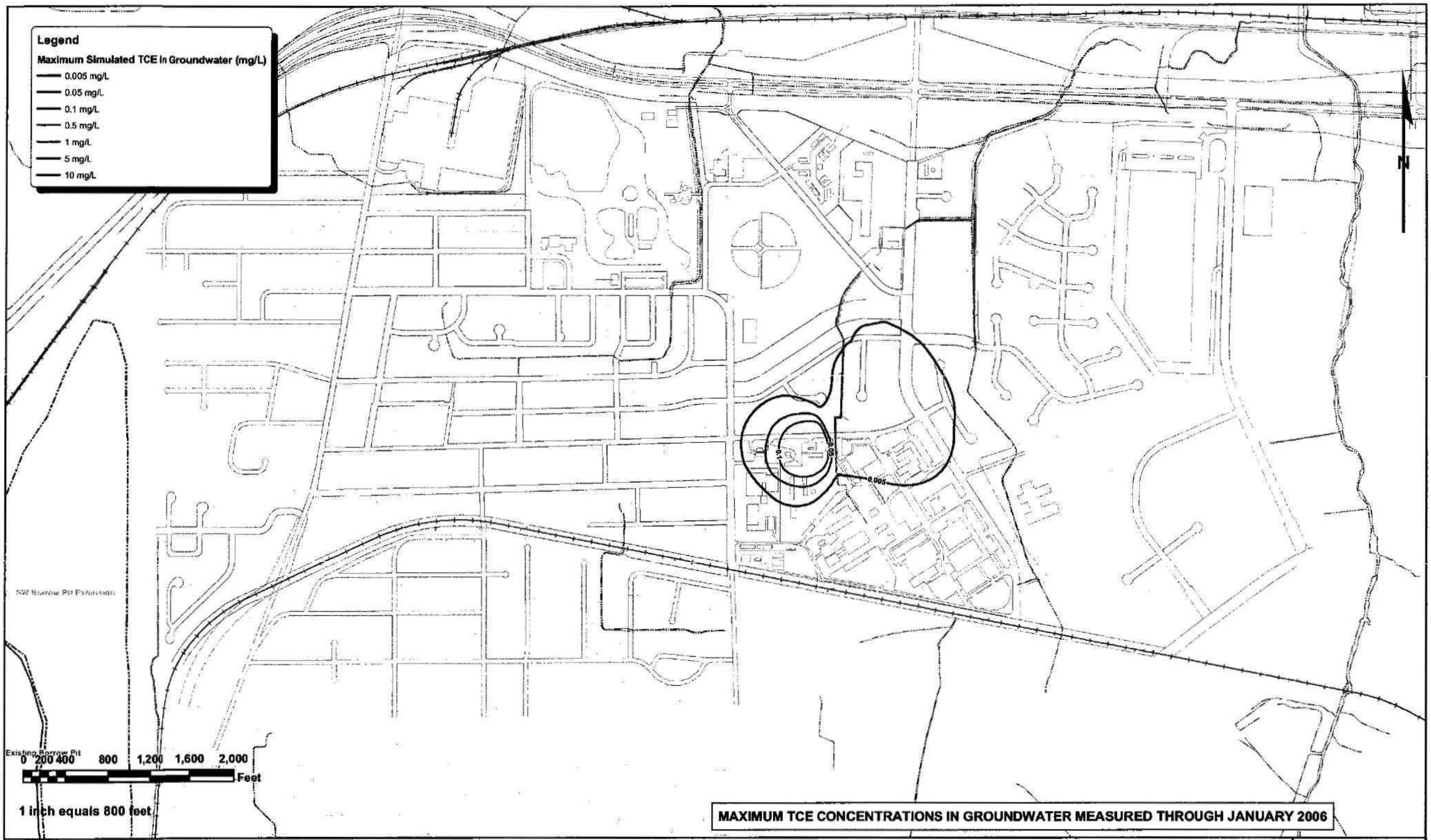
HYDRAULIC GRADIENT AND MAXIMUM TCE CONCENTRATIONS IN PH12 AREA

FIGURE 2-18

April 2006



MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER MEASURED THROUGH JANUARY 2006

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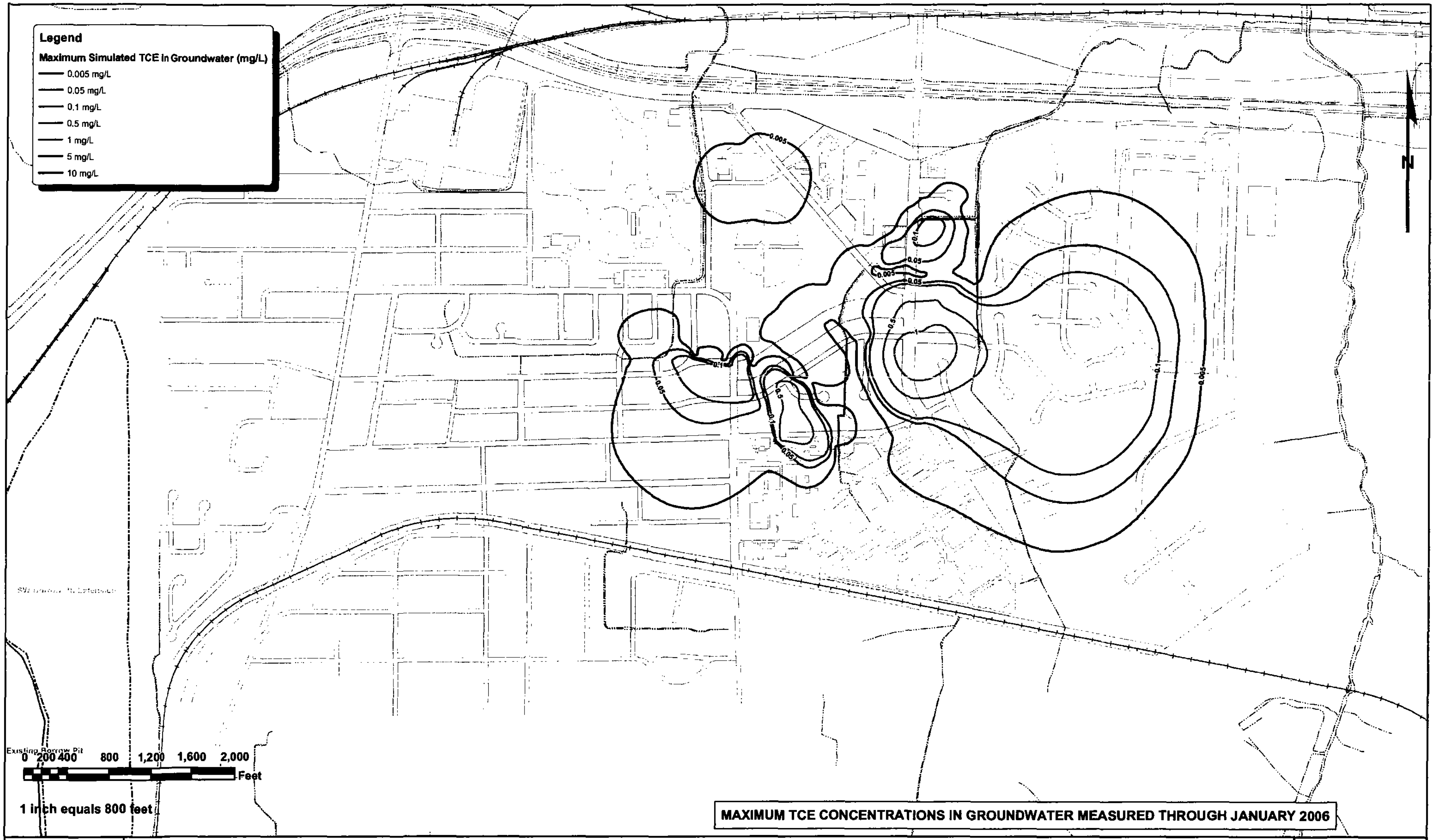
MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER FOR HYDROSTRATIGRAPHIC LAYER 1

FIGURE 2-19

April 2006



MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER MEASURED THROUGH JANUARY 2006

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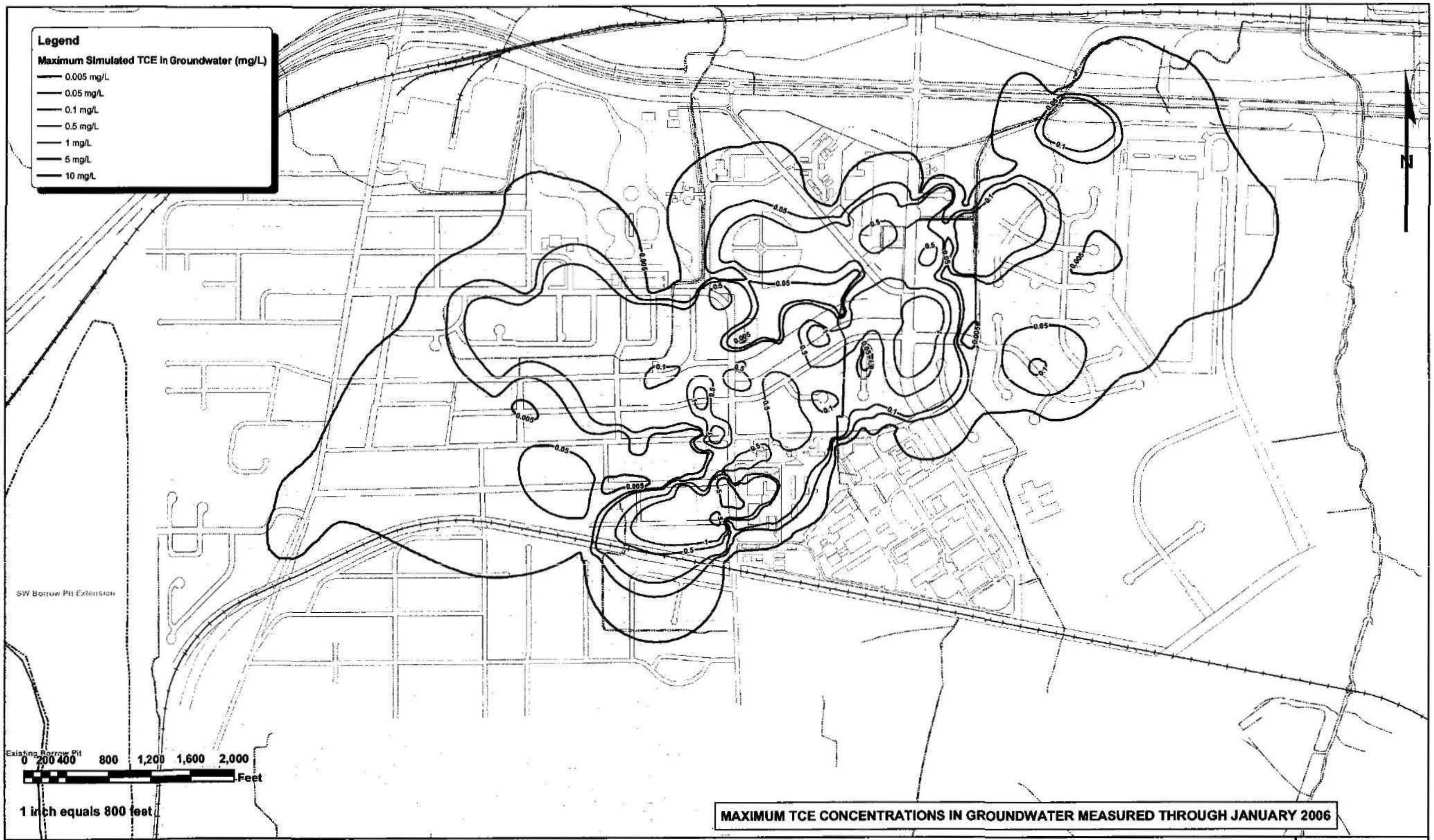
Coliseum Boulevard Project

MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER FOR HYDROSTRATIGRAPHIC LAYER 2

FIGURE 2-20

April 2006



MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER MEASURED THROUGH JANUARY 2006

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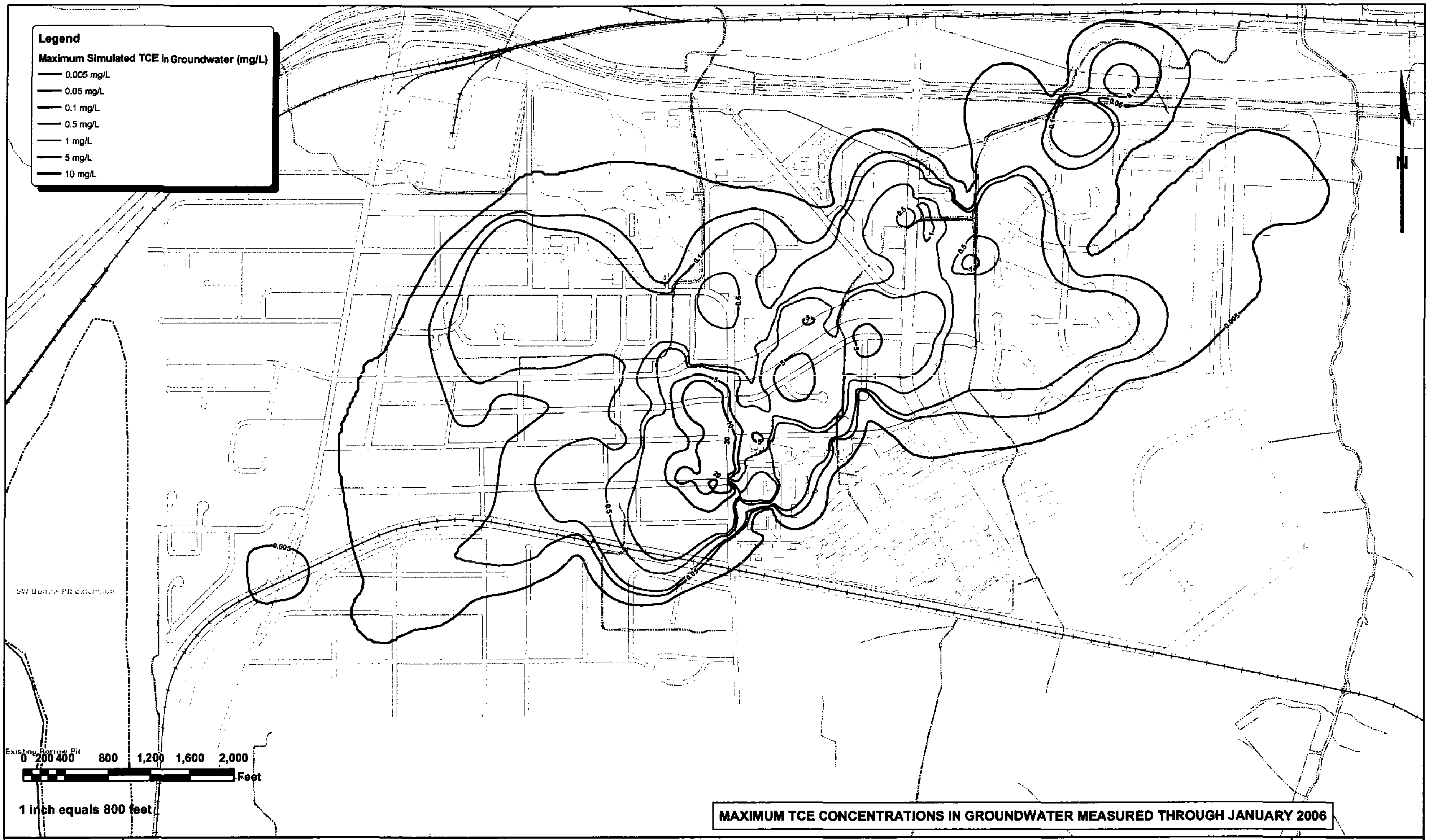
MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER FOR HYDROSTRATIGRAPHIC LAYER 3

FIGURE 2-21

April 2006



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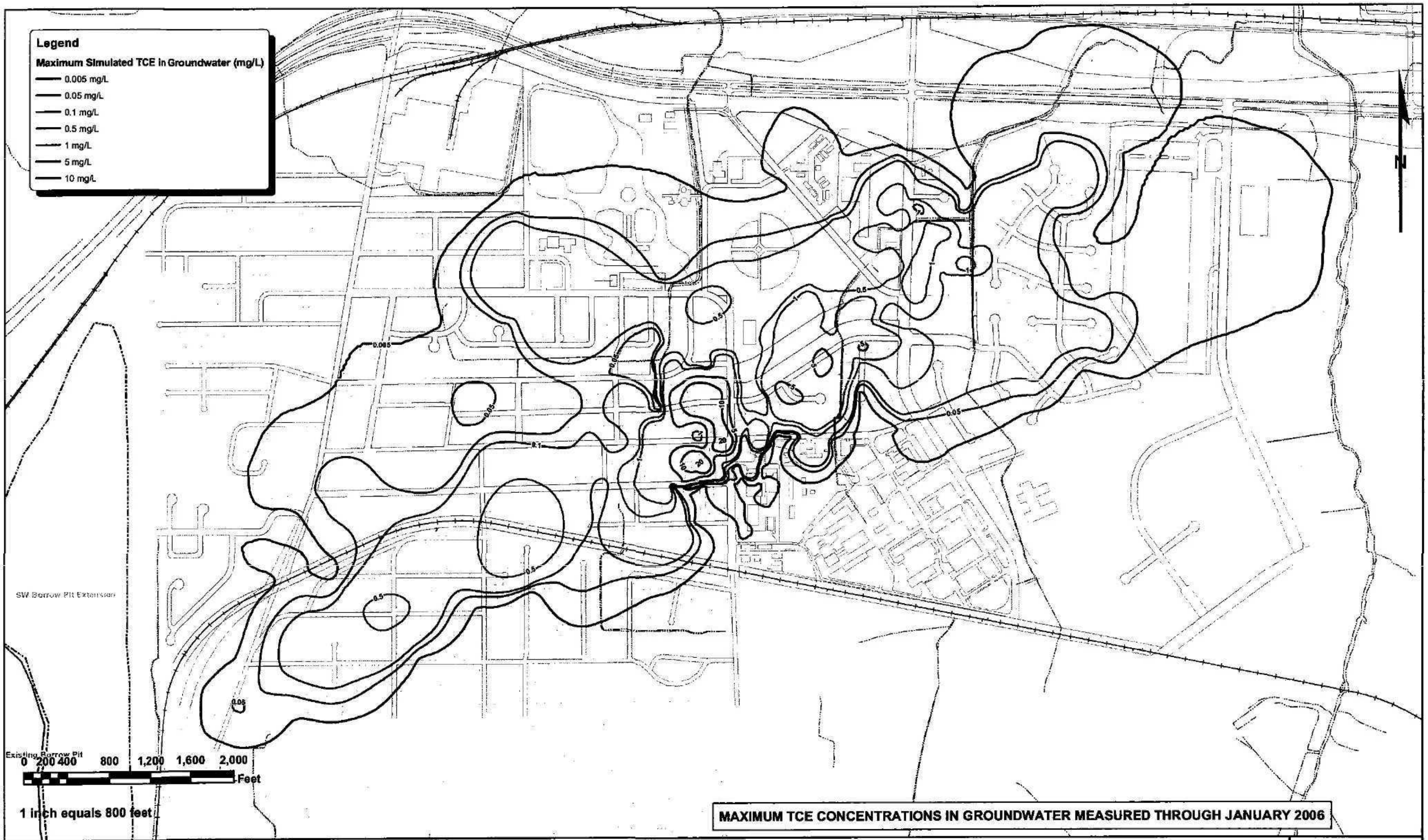
MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER FOR HYDROSTRATIGRAPHIC LAYER 4

FIGURE 2-22

April 2006



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Coliseum Boulevard Project

FIGURE 2-23

MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER FOR HYDROSTRATIGRAPHIC LAYER 5

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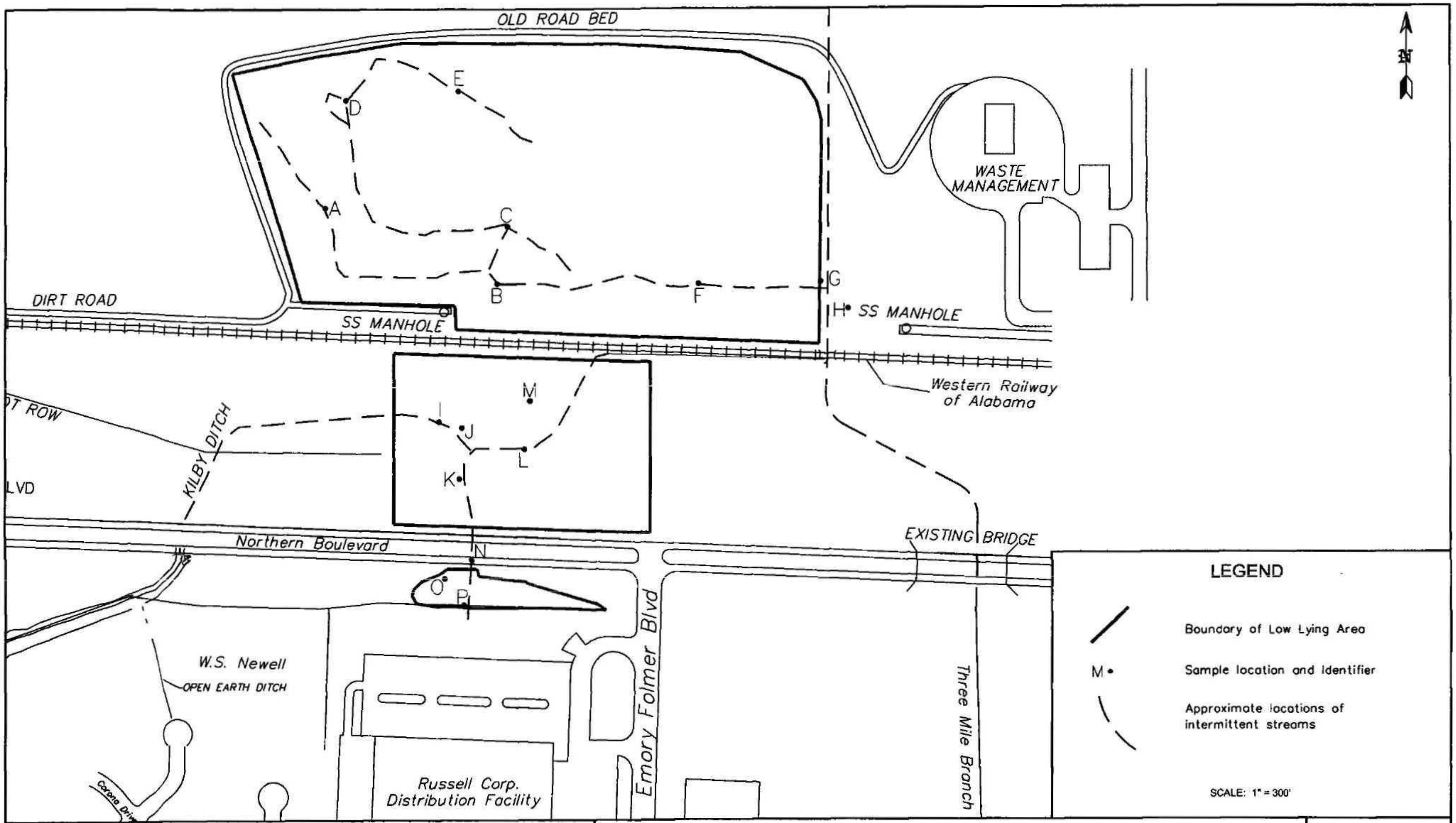
Coliseum Boulevard Project

ROUTINE SURFACE WATER SAMPLING LOCATIONS

FIGURE 2-24

April 2006



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COLISEUM BOULEVARD PLUME

SAMPLE LOCATIONS IN LOW-LYING AREAS; COLISEUM BOULEVARD PLUME; MONTGOMERY, ALABAMA.

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FIGURE 2-25

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Coliseum Boulevard Project

MEASURED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER THROUGH JANUARY 2006

FIGURE 3-1

April 2006

MODEL SIMULATED GROUNDWATER ELEVATIONS (ft MSL)

MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

Alabama Department of Transportation
Coliseum Boulevard Project

MODEL SIMULATED BASELINE CONDITIONS - YEAR 2011

FIGURE 3-2

April 2006

MODEL SIMULATED GROUNDWATER ELEVATIONS (ft MSL)

MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

Alabama Department of Transportation
Coliseum Boulevard Project

MODEL SIMULATED BASELINE CONDITIONS - YEAR 2016

FIGURE 3-3

April 2006

MODEL SIMULATED GROUNDWATER ELEVATIONS (ft MSL)

MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

Alabama Department of Transportation
Coliseum Boulevard Project

MODEL SIMULATED BASELINE CONDITIONS - YEAR 2026

FIGURE 3-4

April 2006

MODEL SIMULATED GROUNDWATER ELEVATIONS (ft MSL)

MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

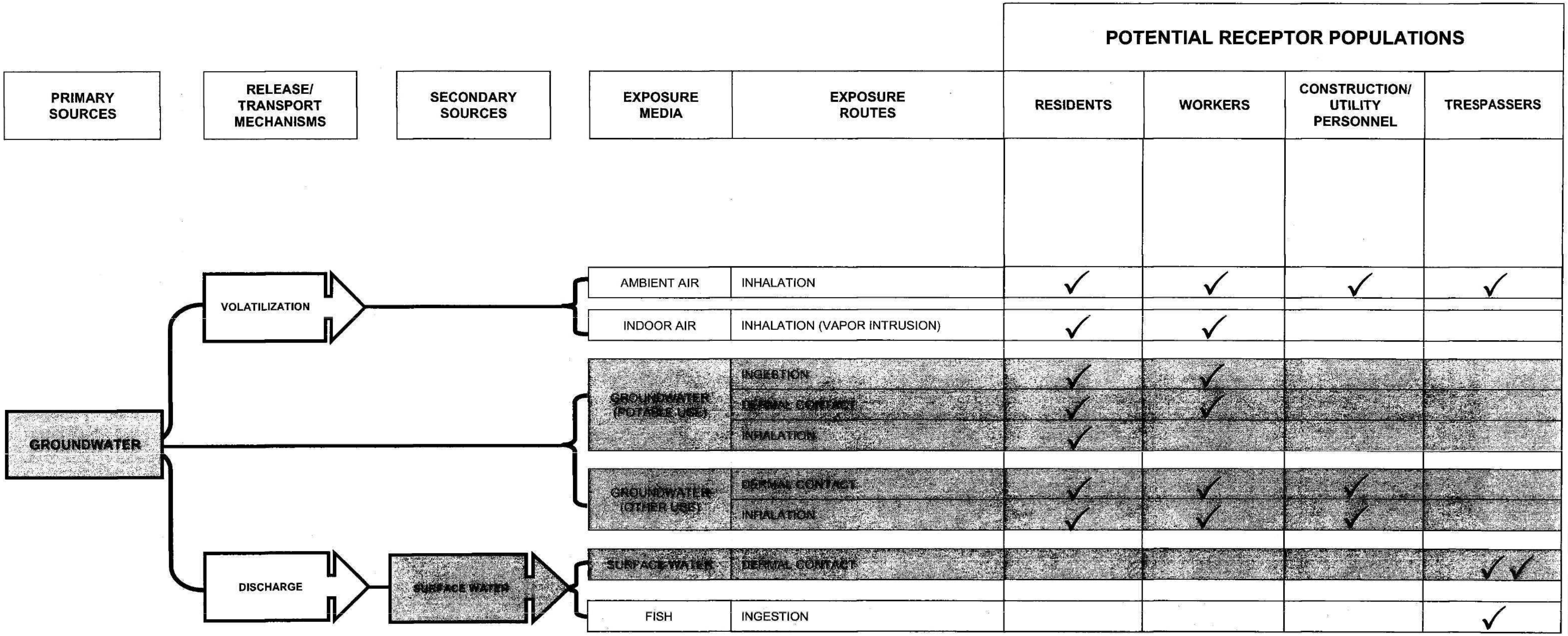
DEPARTMENT OF TRANSPORTATION

Alabama Department of Transportation
Coliseum Boulevard Project

MODEL SIMULATED BASELINE CONDITIONS - YEAR 2036

FIGURE 3-5

April 2006



EXPOSURE MEDIA	EXPOSURE ROUTES	RESIDENTS	WORKERS	CONSTRUCTION/ UTILITY PERSONNEL	TRESPASSERS
AMBIENT AIR	INHALATION	✓	✓	✓	✓
INDOOR AIR	INHALATION (VAPOR INTRUSION)	✓	✓		
GROUNDWATER (POTABLE USE)	INGESTION	✓	✓		
	DERMAL CONTACT	✓	✓		
	INHALATION	✓			
GROUNDWATER (OTHER USE)	DERMAL CONTACT	✓	✓	✓	
	INHALATION	✓	✓	✓	
SURFACE WATER	DERMAL CONTACT				✓✓
FISH	INGESTION				✓

POTENTIAL RECEPTOR POPULATIONS

✓ POPULATION EVALUATED FOR POTENTIAL EXPOSURE

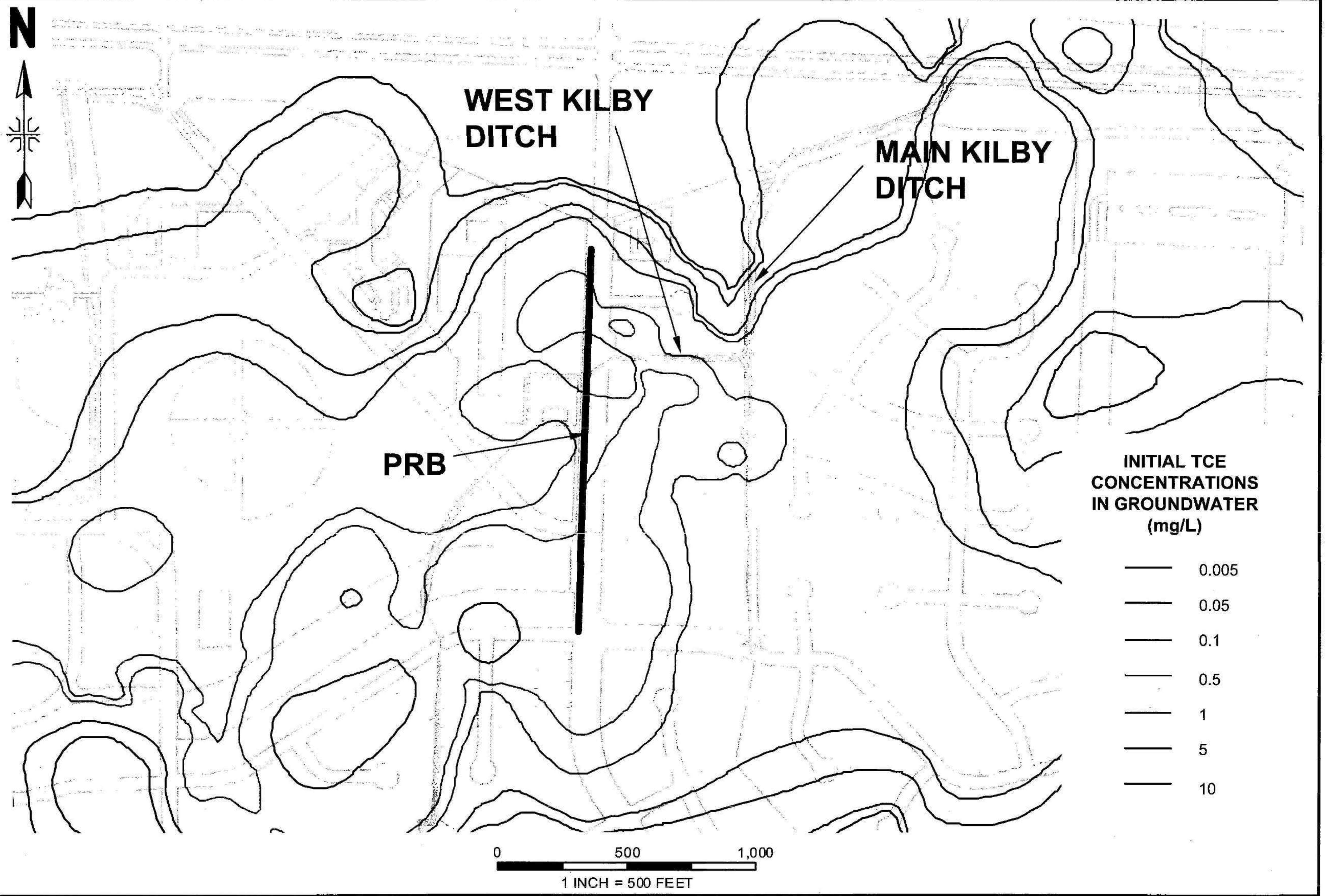
✓ POTENTIALLY COMPLETE EXPOSURE PATHWAY

ALABAMA DEPARTMENT OF TRANSPORTATION
COLISEUM BOULEVARD PLUME

SITE CONCEPTUAL EXPOSURE MODEL

FEBRUARY 2006

FIGURE 4-1

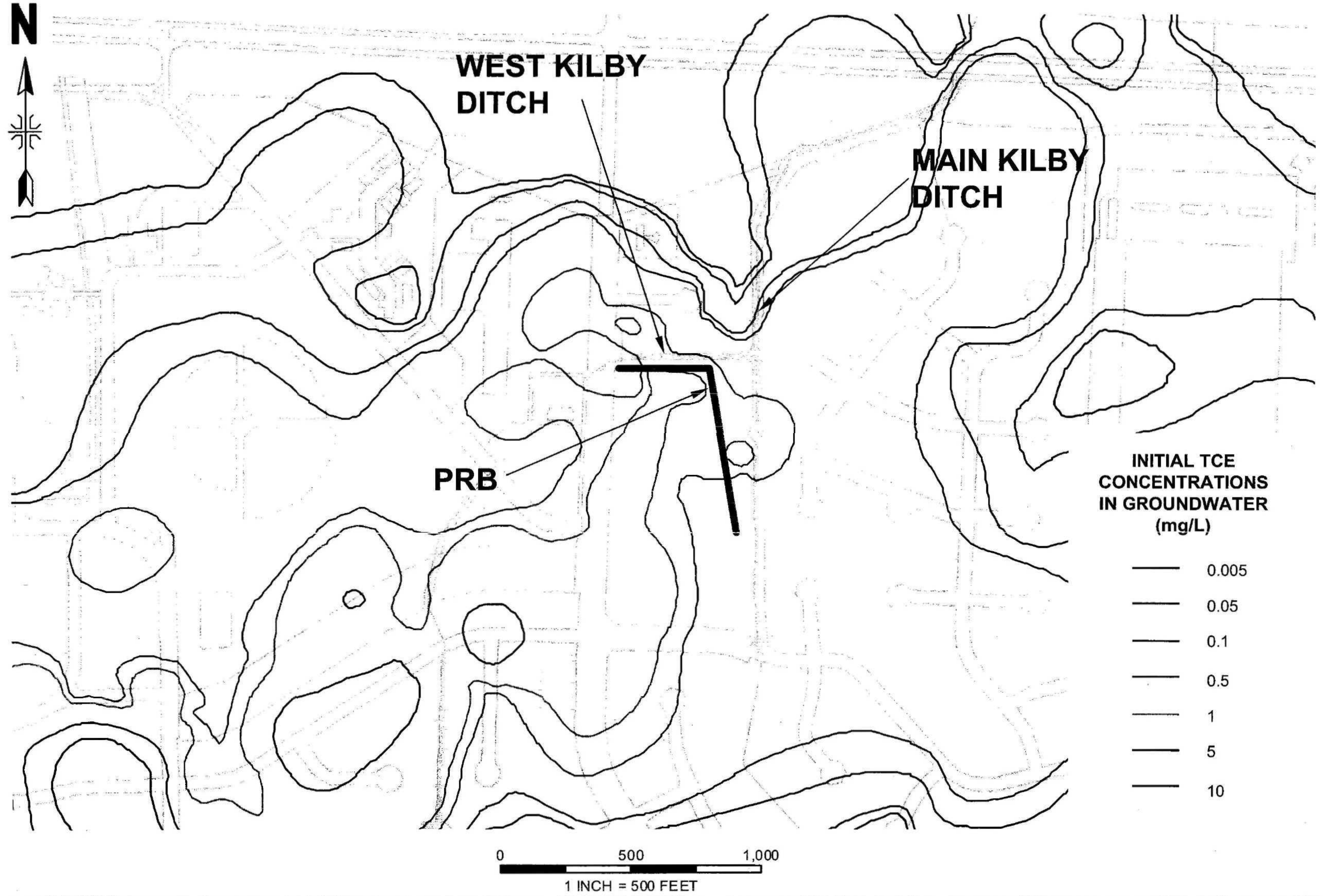


ALABAMA DEPARTMENT OF TRANSPORTATION
COLISEUM BOULEVARD PLUME

LOCATION OF PRB ALONG COLISEUM BOULEVARD

APRIL 2006

FIGURE 6-1



ALABAMA DEPARTMENT OF TRANSPORTATION
COLISEUM BOULEVARD PLUME

LOCATION OF PRB ADJACENT TO AND SOUTH OF KILBY DITCH

APRIL 2006

FIGURE 6-2

Table 7-1
Summary of Alternatives Evaluation
Site-wide CMS Report
ALDOT CBP – Montgomery, Alabama

ALTERNATIVE	CORRECTIVE MEASURES	OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT	LONG-TERM EFFECTIVENESS	REDUCTION OF TOXICITY, MOBILITY, AND VOLUME	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST	ACCEPTANCE	OVERALL EVALUATION
A	■ PRB at West Kilby Ditch ■ Retain fencing along West and Main Kilby Ditches ■ Construction of perimeter fencing in the Low-lying Areas ■ Groundwater and surface water monitoring ■ Implementation of institutional controls to restrict access to and prevent use of groundwater	■ Protective via limiting access to groundwater and surface water with VOCs > 0.175 mg/L set by ADEM. ■ Protective via fencing, and border vegetation to prevent and/or minimize complete dermal, inhalation, and/or ingestion pathways via surface water. ■ Equally protective as Alternative C with respect to limiting access to surface water with TCE concentrations >0.175 mg/L action level set by ADEM. PRB will reduce VOC concentrations to <0.175 mg/L in baseflow to Kilby Ditch.	■ Slightly less effective than Alternative C. VOC concentrations reduced but access to surface water not eliminated. ■ Access limited by fencing only, which is less effective than covering ditch or implementing slope stabilization	PRB reduces toxicity, mobility and volume of chlorinated VOCs in limited area near West Kilby Ditch.	Effective in short term because PRB reduces VOCs in groundwater before discharging to West Kilby Ditch.	Moderately more difficult than Alternative C because constructing PRB involves more specialized construction techniques than Alternative C.	■ PNW of $12.7M ■ Capital cost of approximately $7.3M	PRB would reduce concentrations of VOCs in baseflow to Kilby Ditch but Ditch not covered and no constructed wetlands. Less effective than Alternative C at reducing access to surface water in Kilby Ditch.	Slightly more difficult and costly than Alternative C, but not significantly more effective at meeting objectives.
B	■ PRB along Coliseum Boulevard ■ Retain fencing along West and Main Kilby Ditches ■ Construction of wetlands and perimeter fencing in the Low-lying Areas ■ Groundwater and surface water monitoring ■ Implementation of institutional controls to restrict access to and prevent use of groundwater	■ Protective via limiting access to groundwater and surface water with VOCs > 0.175 mg/L set by ADEM. ■ VOC concentrations in surface water in Kilby Ditch probably greater than the concentrations via Alternative A. ■ Wetlands will reduce VOC concentrations in surface waters.	■ Least effective because groundwater west of Kilby Ditch and east of PRB not treated by PRB. ■ Access limited by fencing only, which is less effective than covering ditch or implementing slope stabilization	Marginally the most effective because treats a larger volume of VOC-containing groundwater and treats surface water within the constructed wetlands. PRB in Kilby Ditch area reduces toxicity, mobility and volume of chlorinated VOCs. Effectiveness of constructed wetlands equal to Alternative C.	Least effective of the three alternatives because VOC-containing groundwater downgradient of the PRB will discharge to West Kilby Ditch.	Most difficult to implement. Traffic disruptions and high levels of health and safety controls to construct PRB along Coliseum Boulevard. PRB requires more specialized construction techniques.	■ PNW of $15.8M ■ Capital Cost of approximately $10.2M	Least acceptable alternative because short-term disruption of vehicular and pedestrian traffic and would not eliminate surface water exposure via West Kilby Ditch as do the other two alternatives. Reduction of VOCs in surface water via constructed wetlands.	Most difficult and costly to implement, and least effective at meeting objectives.
C	■ Covering of West Kilby Ditch and slope stabilization of the northern section of Main Kilby Ditch ■ Retain or reposition fencing along Main Kilby Ditch ■ Construction of wetlands and perimeter fencing in the Low-lying Areas ■ Groundwater and surface water monitoring ■ Implementation of institutional controls to restrict access to and prevent use of groundwater	■ Protective via limiting access to groundwater surface water with VOCs > 0.175 mg/L set by ADEM. ■ VOC concentrations in surface water in Kilby Ditch potentially greater than the concentrations via Alternative A. ■ Wetlands will reduce VOC concentrations in surface waters. ■ Most protective at significantly reducing access to VOC-containing surface water in West Kilby Ditch and northern section of Main Kilby Ditch.	■ Permanently eliminates access to surface water in West Kilby Ditch. ■ Potential access in northern section of Main Kilby Ditch significantly reduced by slope stabilization with plants and rip rap.	Effectiveness of constructed wetlands equal to Alternative B.	Effective in short term because covering West Kilby Ditch & slope stabilization of Main Kilby Ditch significantly reduces access.	Least difficult to implement of the three alternatives because covering West Kilby Ditch, implementing slope stabilization, and constructing wetlands uses standard construction techniques, versus PRBs, which require specialized construction techniques.	■ PNW of $10.6 M - ■ Capital cost of $4.7M	Potentially most acceptable to public because West Kilby Ditch covered and potential access to surface water in Main Kilby Ditch reduced. Includes constructed wetland to provide reduction of VOCs in surface water to meet discharge criteria of Three Mile Branch.	Less difficult to implement and most effective at meeting objectives.

TABLE 7-2
SUMMARY OF COST ESTIMATES FOR ALTERNATIVE A
CORRECTIVE MEASURES COMPONENTS
COLISEUM BOULEVARD PLUME SITE
MONTGOMERY, ALABAMA

	Estimated Costs		
Corrective Measures Component	**Capital**	**First Annual O&M**	**PNW***
PRB in Kilby Ditch Area (a)	$6,200,000	$0	$6,200,000
Perimeter Fencing of Low-lying Areas (b)	$900,000	$7,000	$1,000,000
Groundwater and Surface Water Monitoring	$180,000	$340,000	$5,500,000
TOTAL	**$7,280,000**	**$347,000**	**$12,700,000**

Notes:
*PNW - Present Net Worth based on 30 years at a 5% discount rate.
(a) Includes land purchase.
(b) Includes land purchase.

TABLE 7-3
SUMMARY OF COST ESTIMATES FOR ALTERNATIVE B
CORRECTIVE MEASURES COMPONENTS
COLISEUM BOULEVARD PLUME SITE
MONTGOMERY, ALABAMA

	Estimated Costs		
Corrective Measures Component	**Capital**	**First Annual O&M**	**PNW***
PRB along Coliseum Boulevard	$8,200,000	$0	$8,200,000
Constructed Wetlands and Fencing in Low-Lying Areas (a)	$1,800,000	$35,000	$2,100,000
Groundwater and Surface Water Monitoring	$180,000	$340,000	$5,500,000
TOTAL	**$10,180,000**	**$375,000**	**$15,800,000**

Notes:

*PNW - Present Net Worth based on 30 years at a 5% discount rate.

(a) Includes land purchase.

APPENDIX A

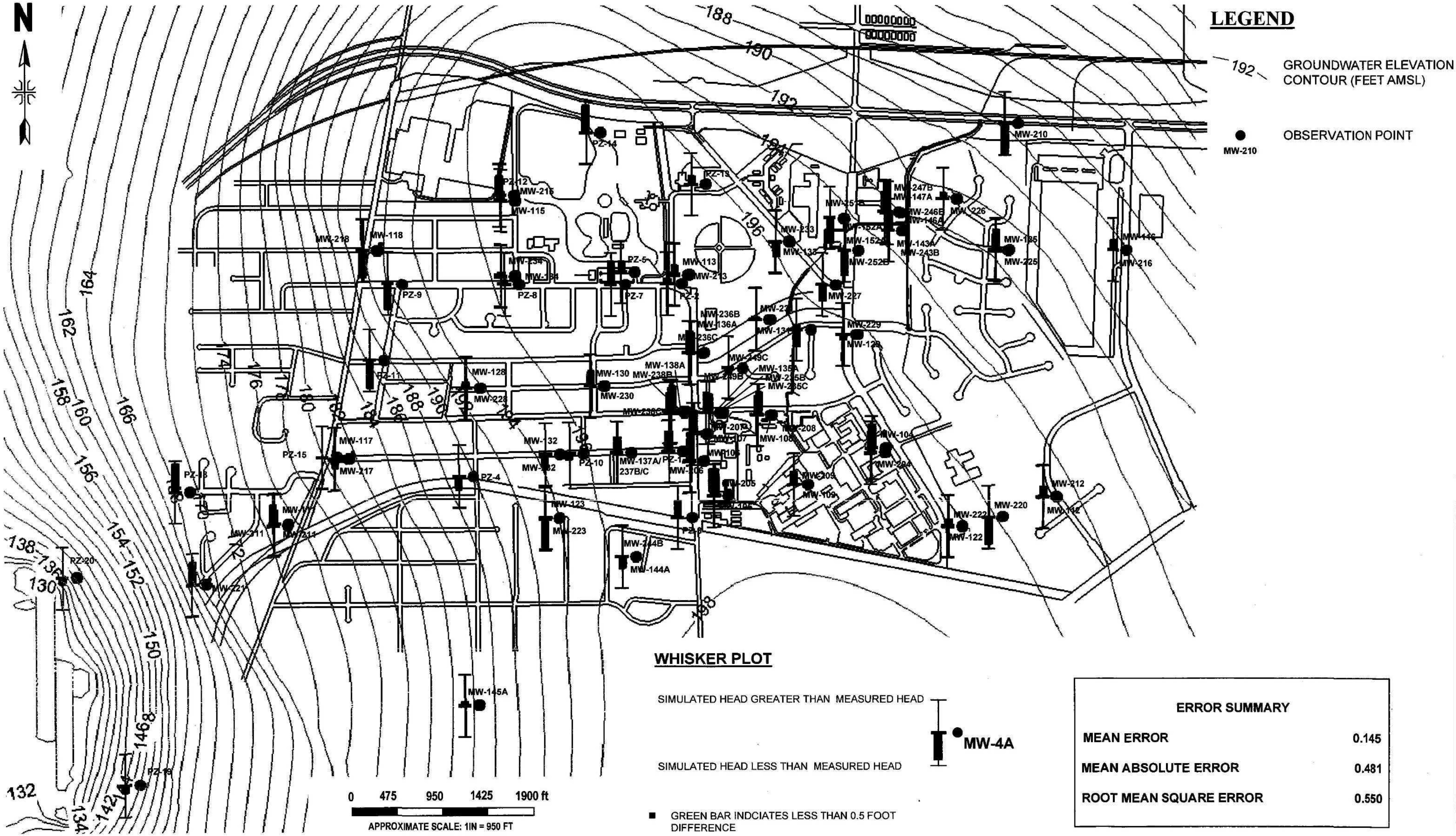
MODELING RESULTS

EVALUATION OF SITEWIDE CORRECTIVE MEASURES

COLISEUM BOULEVARD PLUME SITE
MONTGOMERY, ALABAMA

ALABAMA

DEPARTMENT OF TRANSPORTATION



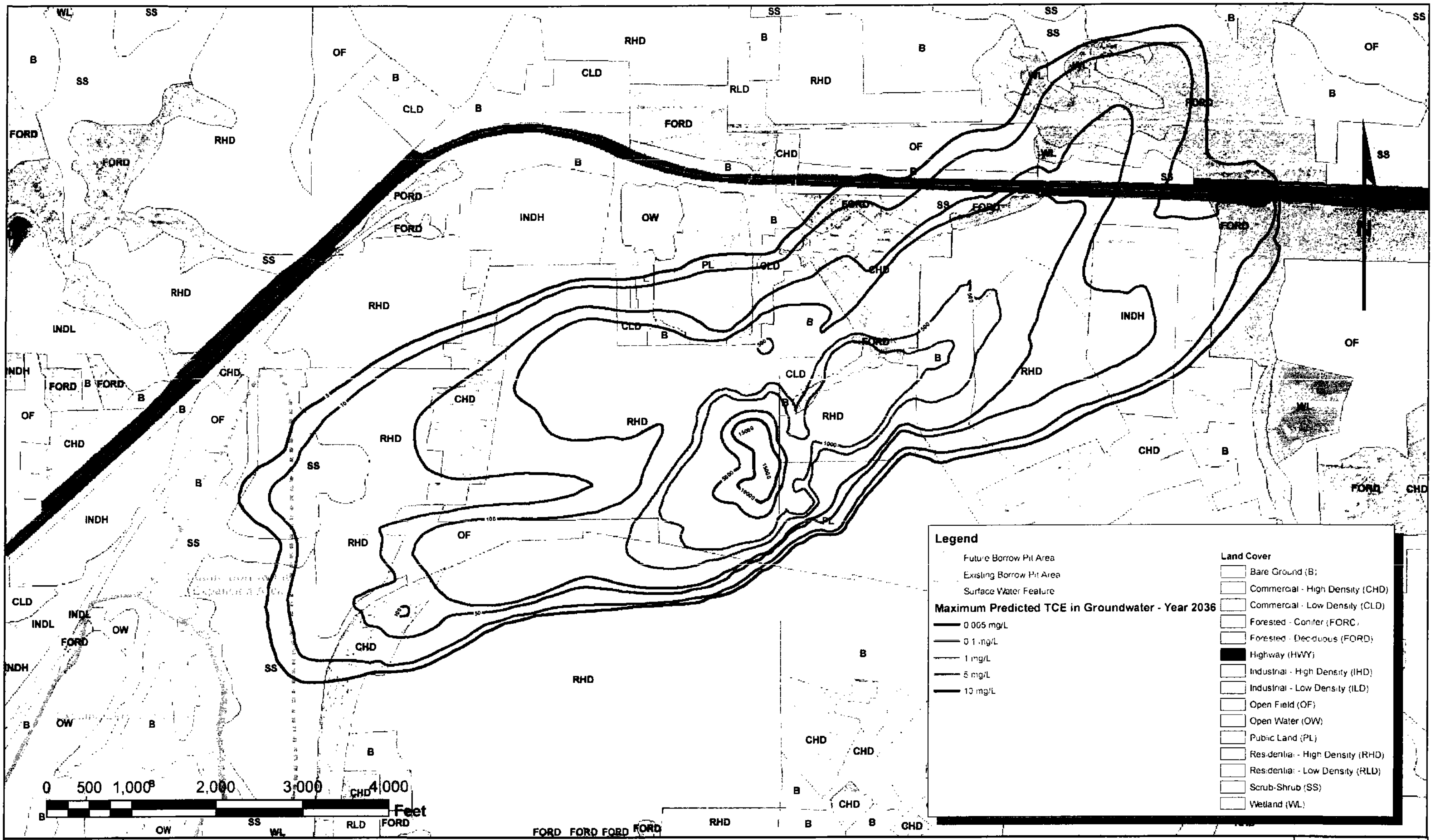
ERROR SUMMARY	
MEAN ERROR	0.145
MEAN ABSOLUTE ERROR	0.481
ROOT MEAN SQUARE ERROR	0.550

DEPARTMENT OF TRANSPORTATION

Alabama Department of Transportation
Coliseum Boulevard Project

APPENDIX A - STEADY-STATE CALIBRATION – WISKER PLOTS

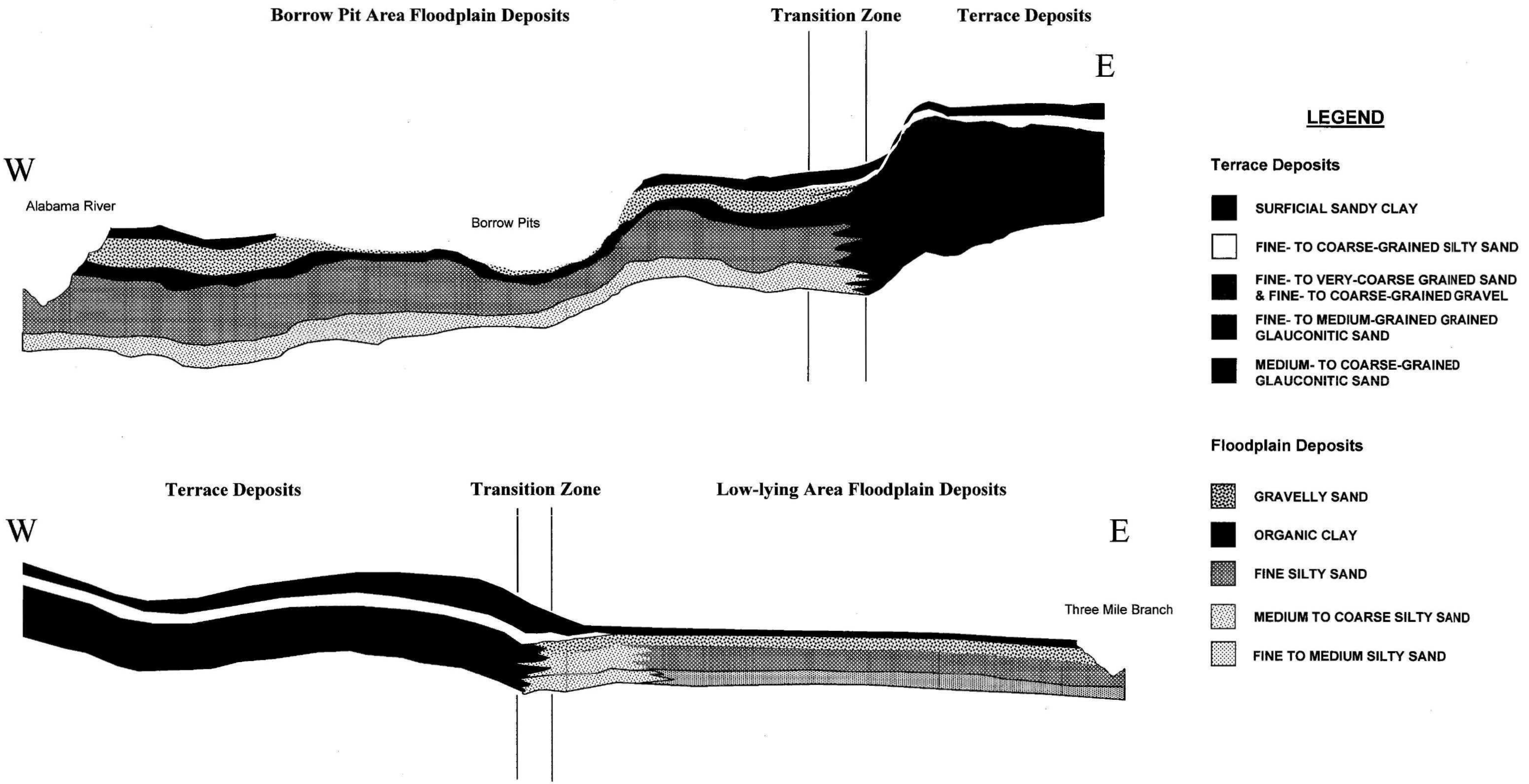
FEBRUARY 2006



Alabama Department of Transportation
Coliseum Boulevard Project

APPENDIX A - EXISTING LAND COVER TYPE

April 2006



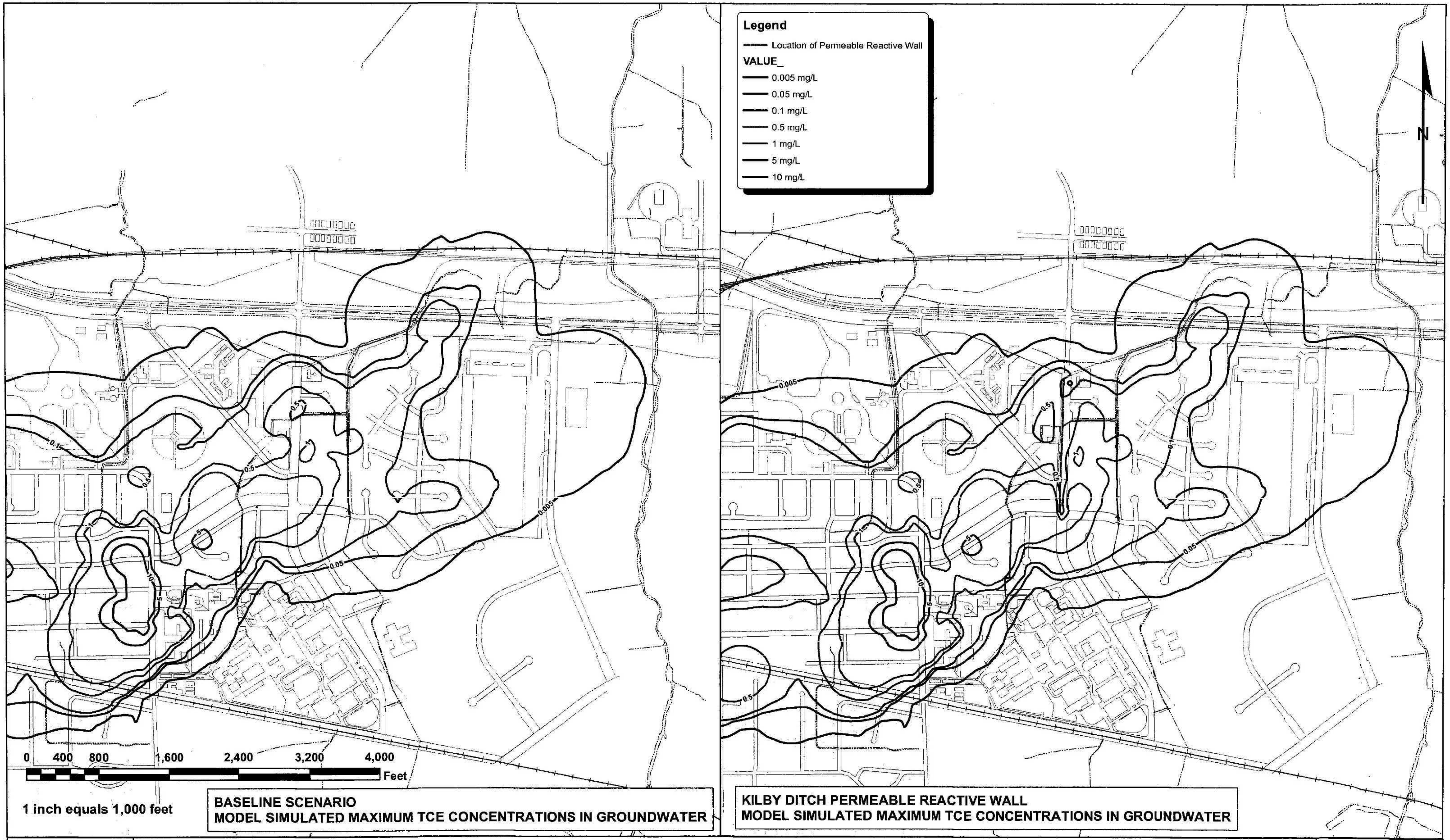
NOT TO SCALE
VERTICAL APROXIMATELY 15x HORIZONTAL

DEPARTMENT OF TRANSPORTATION

Alabama Department of Transportation
Coliseum Boulevard Project

APPENDIX A – GENERALIZED FLOODPLAIN FIGURE SHOWING TRANSITION FROM TERRACE TO FLOODPLAIN DEPOSITS

April 2006



BASELINE SCENARIO
MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

KILBY DITCH PERMEABLE REACTIVE WALL
MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

DEPARTMENT OF TRANSPORTATION

Alabama Department of Transportation
Coliseum Boulevard Project

COLISEUM BOULEVARD PERMEABLE REACTIVE WALL - SIMULATION YEAR 2011

FIGURE A-1

April 2006

BASELINE SCENARIO
MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

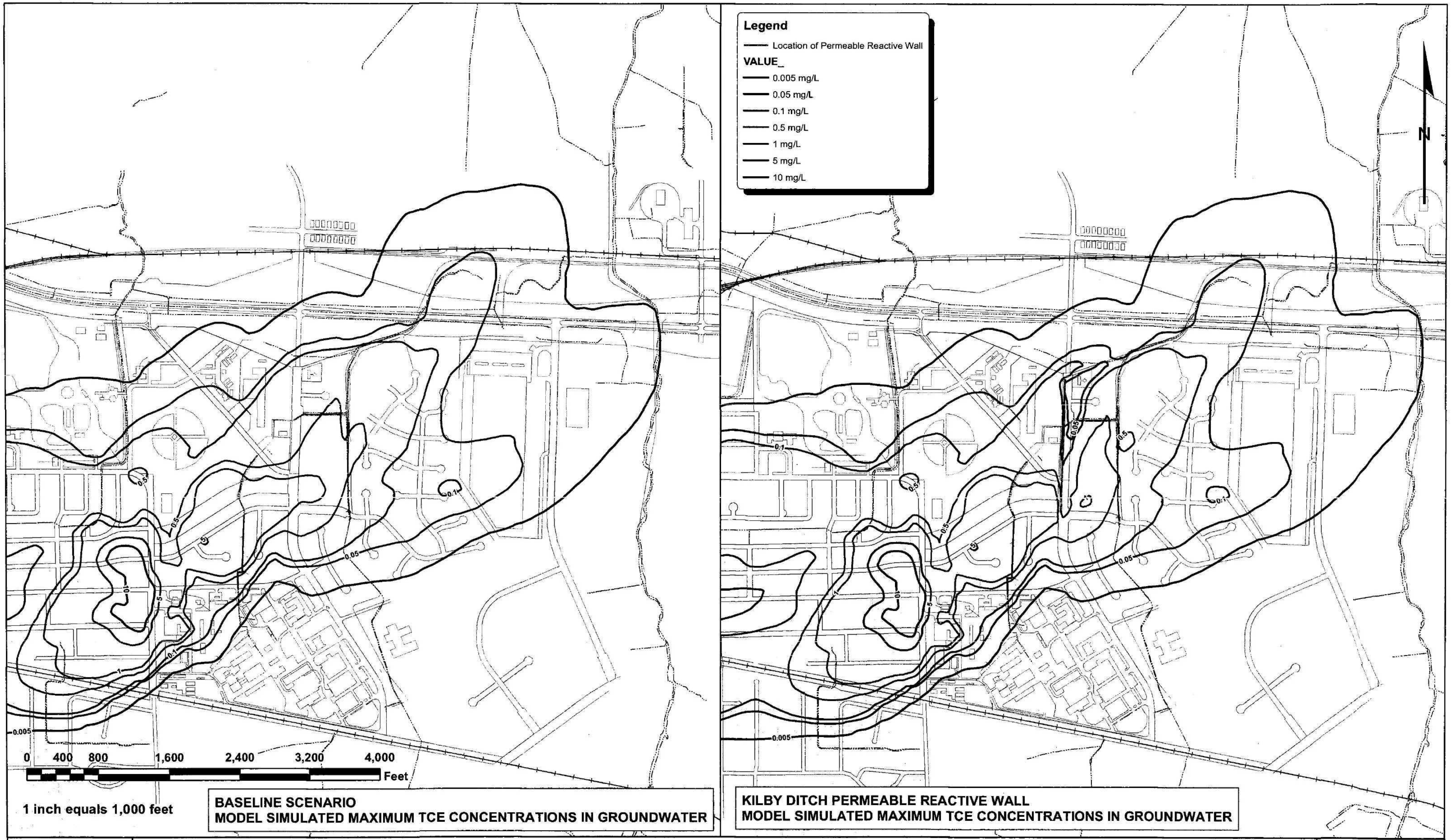
KILBY DITCH PERMEABLE REACTIVE WALL
MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

Alabama Department of Transportation
Coliseum Boulevard Project

COLISEUM BOULEVARD PERMEABLE REACTIVE WALL - SIMULATION YEAR 2016

FIGURE A-2

April 2006



BASELINE SCENARIO
MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

KILBY DITCH PERMEABLE REACTIVE WALL
MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

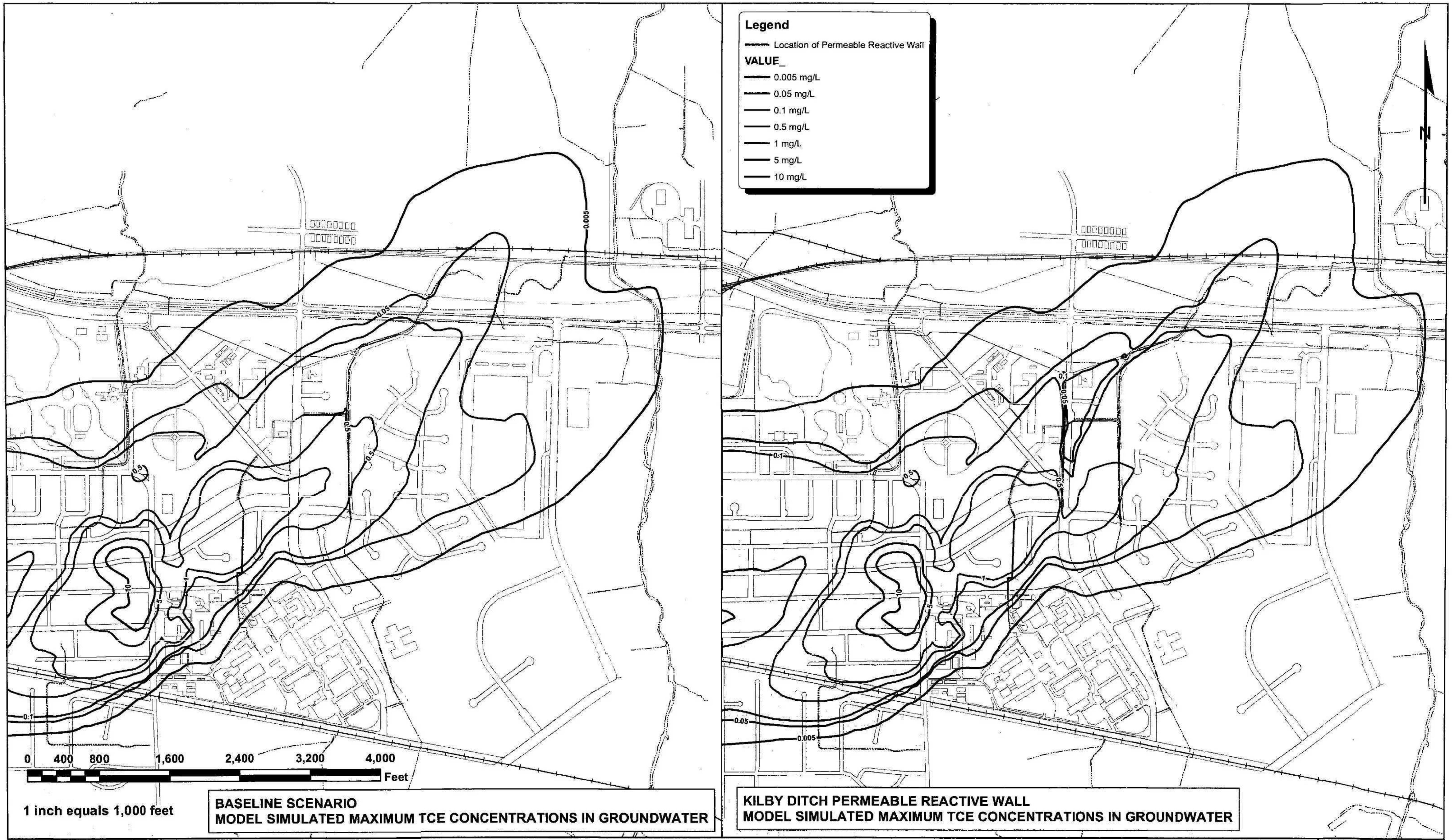
DEPARTMENT OF TRANSPORTATION

Alabama Department of Transportation
Coliseum Boulevard Project

COLISEUM BOULEVARD PERMEABLE REACTIVE WALL - SIMULATION YEAR 2026

FIGURE A-3

April 2006



BASELINE SCENARIO
MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

KILBY DITCH PERMEABLE REACTIVE WALL
MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

Alabama Department of Transportation
Coliseum Boulevard Project

COLISEUM BOULEVARD PERMEABLE REACTIVE WALL - SIMULATION YEAR 2036

FIGURE A-4

April 2006

BASELINE SCENARIO
MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

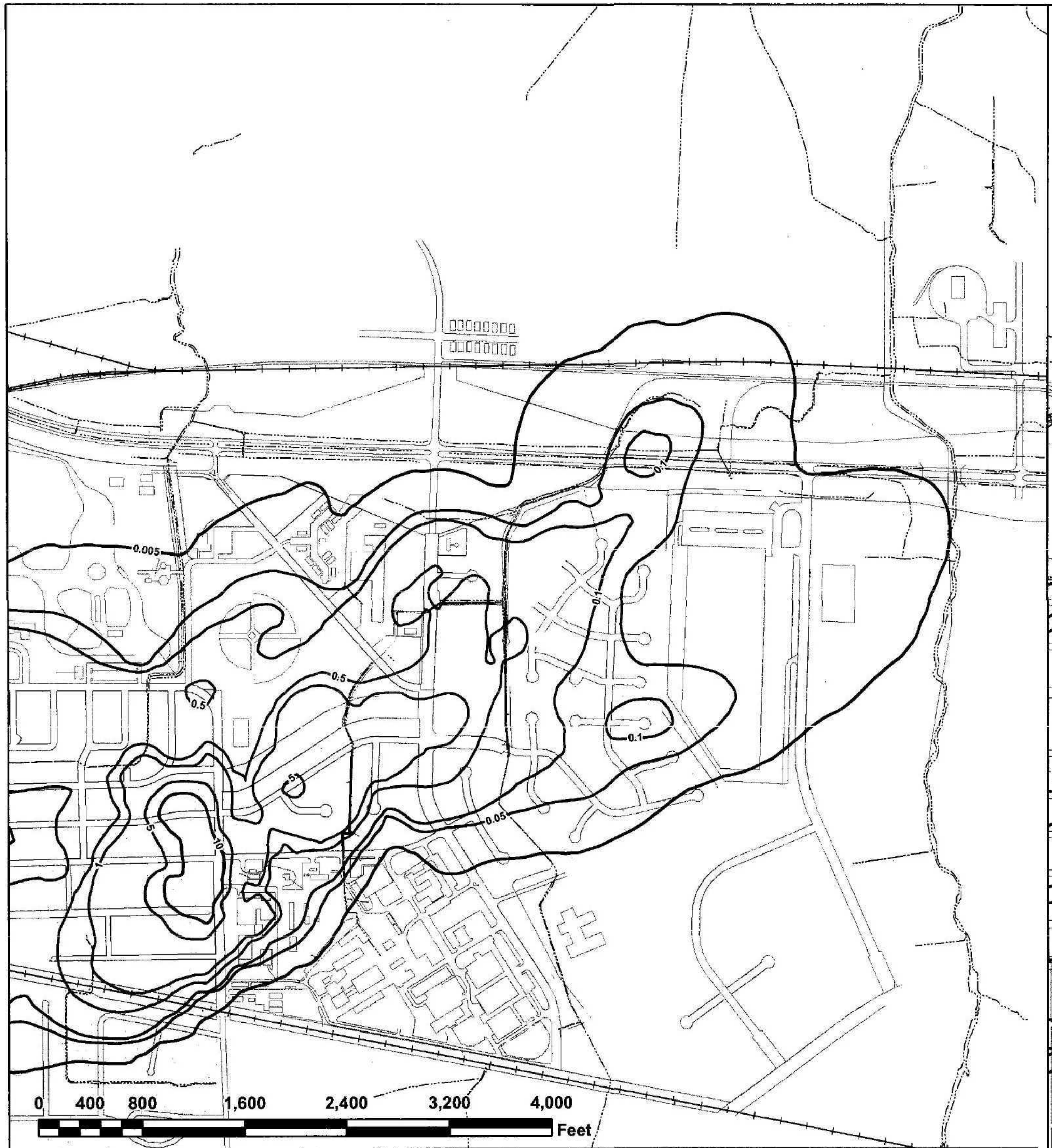
KILBY DITCH PERMEABLE REACTIVE WALL
MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

Alabama Department of Transportation
Coliseum Boulevard Project

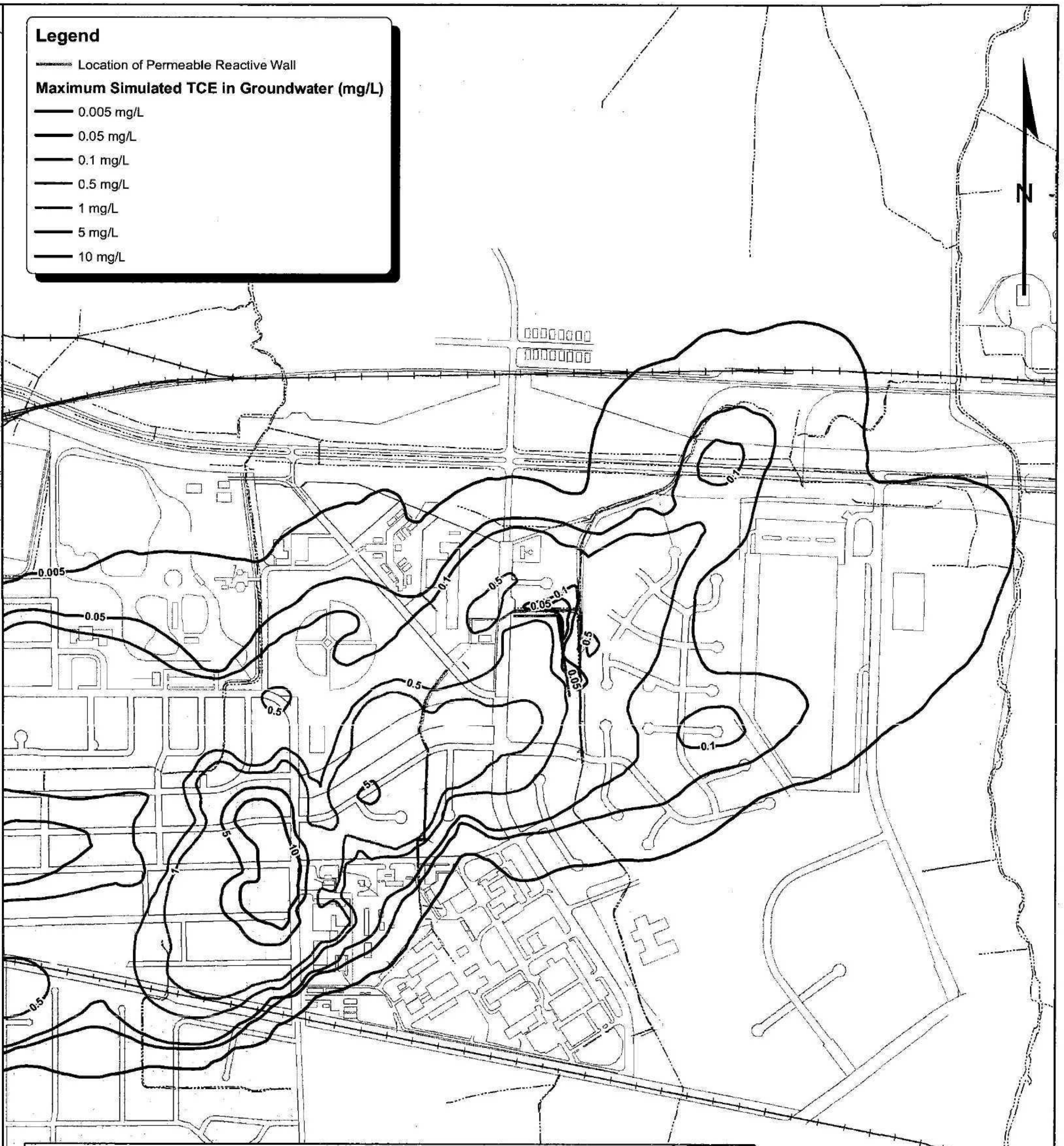
KILBY DITCH PERMEABLE REACTIVE WALL - SIMULATION YEAR 2011

FIGURE A-5

April 2006



BASELINE SCENARIO
MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER



KILBY DITCH PERMEABLE REACTIVE WALL
MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

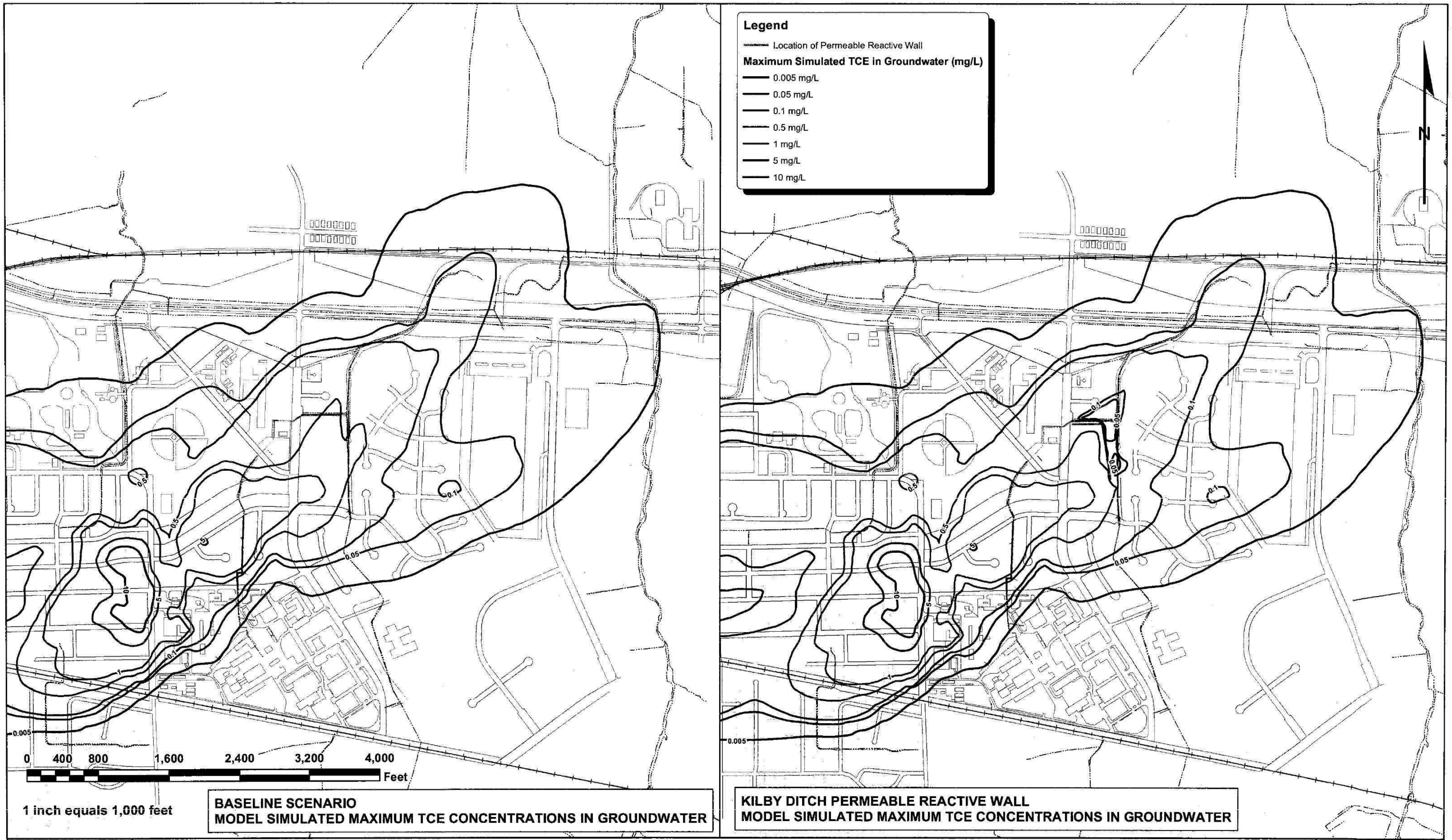
DEPARTMENT OF TRANSPORTATION

Alabama Department of Transportation
Coliseum Boulevard Project

KILBY DITCH PERMEABLE REACTIVE WALL - SIMULATION YEAR 2016

FIGURE A-6

April 2006



BASELINE SCENARIO
MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

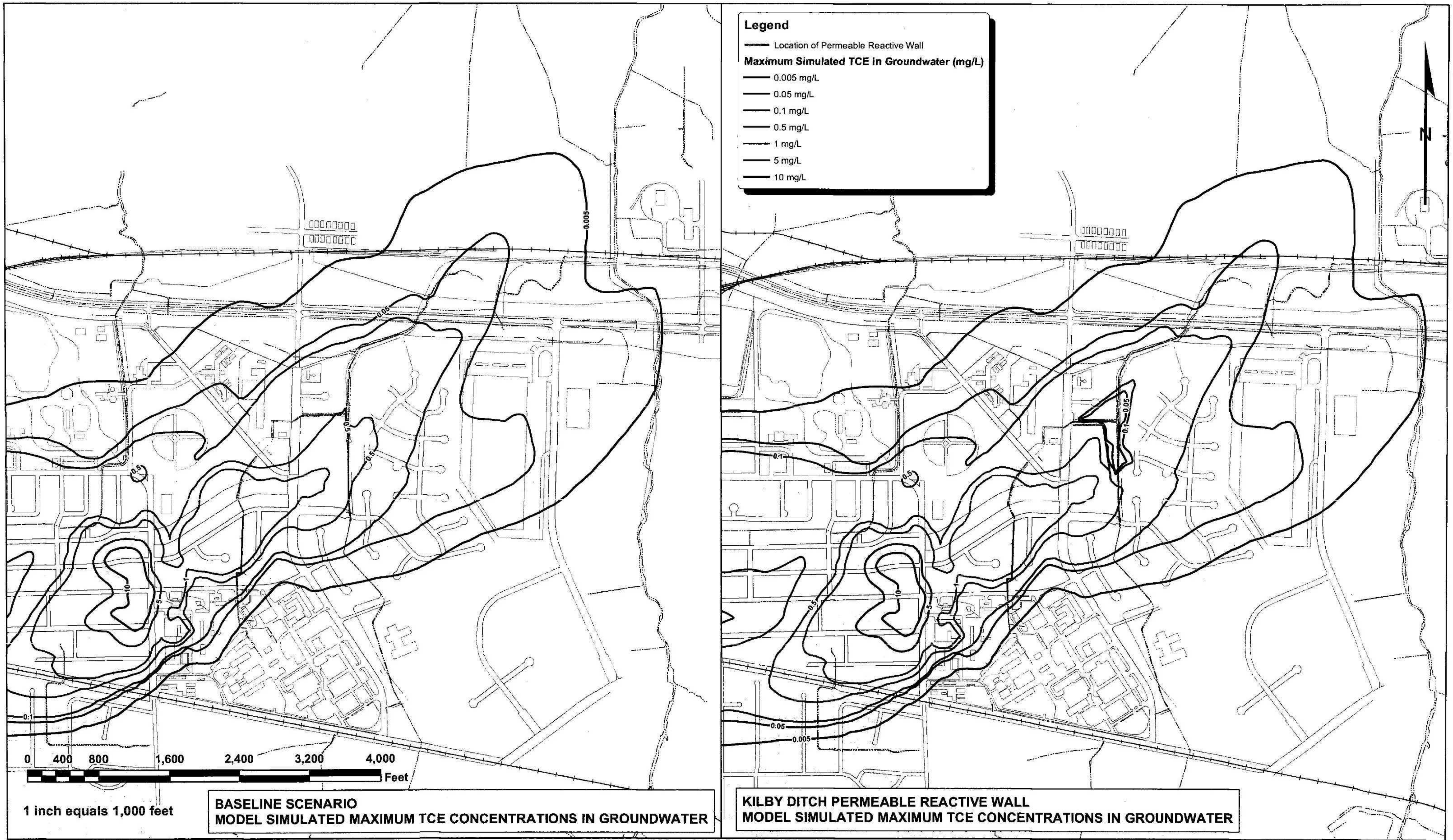
KILBY DITCH PERMEABLE REACTIVE WALL
MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

Alabama Department of Transportation
Coliseum Boulevard Project

KILBY DITCH PERMEABLE REACTIVE WALL - SIMULATION YEAR 2026

FIGURE A-7

April 2006



BASELINE SCENARIO
MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

KILBY DITCH PERMEABLE REACTIVE WALL
MODEL SIMULATED MAXIMUM TCE CONCENTRATIONS IN GROUNDWATER

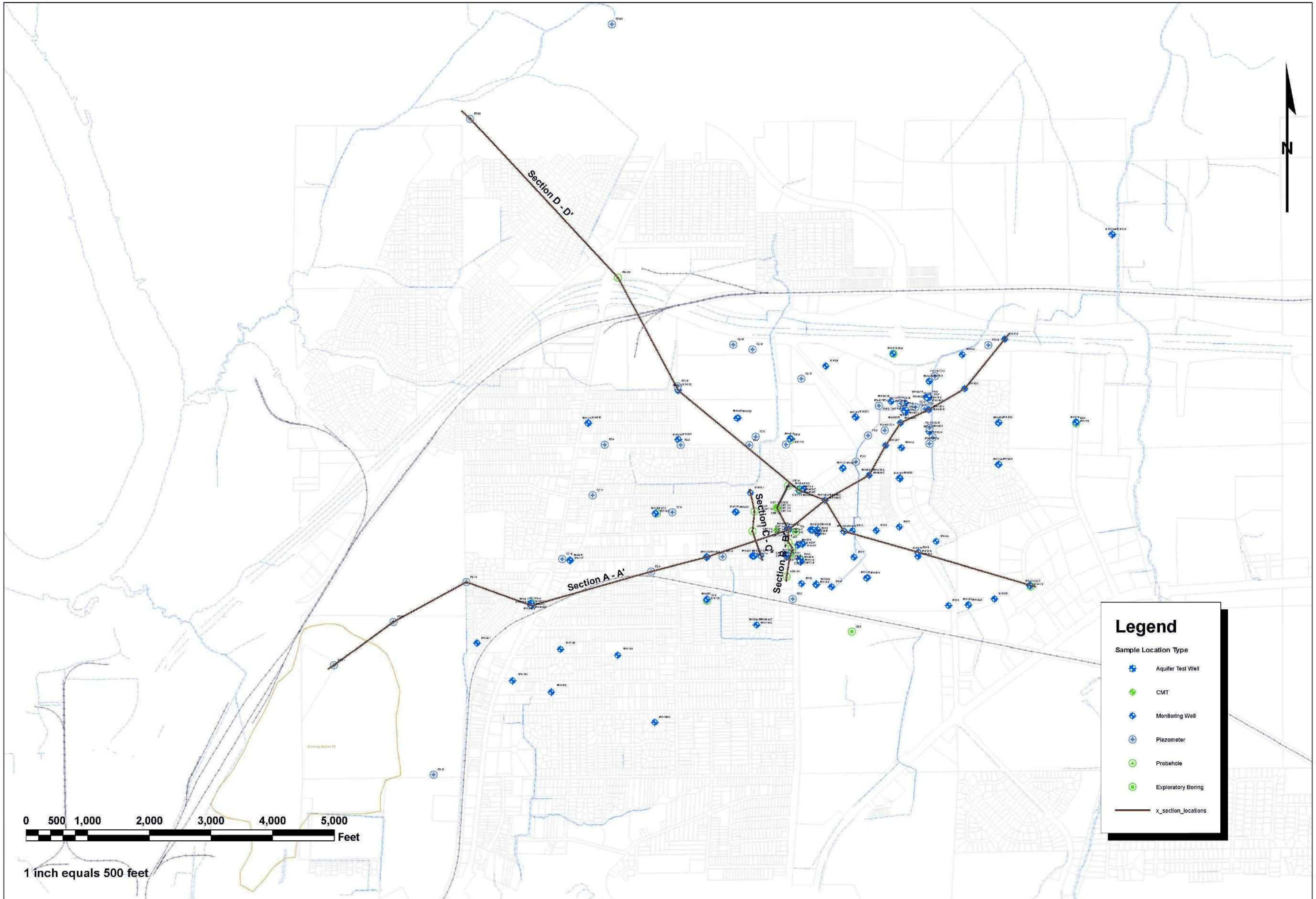
DEPARTMENT OF TRANSPORTATION

Alabama Department of Transportation
Coliseum Boulevard Project

KILBY DITCH PERMEABLE REACTIVE WALL - SIMULATION YEAR 2036

FIGURE A-8

April 2006



Alabama Department of Transportation
Coliseum Boulevard Project

Locations of Shallow and Deep-Zone Monitoring Wells, CMT Wells, Piezometers, Exploratory Borings, and Lines of Geologic Cross-Sections

PLATE 2-1

April 2006

Alabama Department of Transportation
Coliseum Boulevard Project

PROBEHOLE LOCATIONS

PLATE 2-2

January 2006

Meeting Notes
Coliseum Blvd. Plume
MTG. in MONTGOMERY, AL

Site: Coliseum Blvd. Plume
Break: 1.1
Other: v.13

5-2-2007
Ralph O. Howard, Jr.
US EPA

Institutional Control Program Update
Coliseum Boulevard Plume

Presented to :
ADEM
EPA
May 2, 2007

Big picture:
- Risk and (2) Inst. Controls are proceeding; slow on IC's
-

Background

- TCE was discovered in Coliseum Boulevard area groundwater in 1999
- TCE was used for asphalt testing from the 1960s through 1985
- TCE discharges into the sewer were discontinued over 20 years ago
- TCE was discharged in accordance with manufacturer's recommendations
- TCE is in the groundwater covers about 700 acres

- Orig. found in at nearby BP Station GW

- asphalt testing - interstate highways

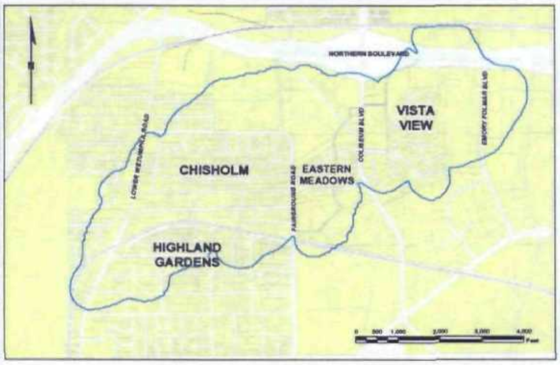
Corrective Measures

- Propose covering Kilby Ditch and constructing Wetlands Treatment System to capture CBP to northeast
- Propose controlling groundwater flow to southwest through agreements with sand and gravel pits
- Implement Institutional Controls to restrict groundwater contact in CBP area

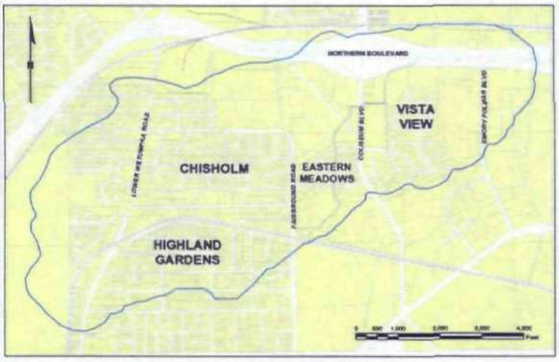
@118-120 wells

2002-03 Air study
30 samples - homes
for vapor intrusion

Borrow pits - wells take 7 or 8 thousand gpm...



APPROXIMATE EXTENT OF 1PPB
TCE IN GROUNDWATER - 2006



Projected Extent of TCE Plume through 2036

Purpose of Institutional Controls

- Protect human health and the environment by minimizing the risk of unacceptable exposure to TCE
- Institutional Controls are necessary because:
  - Size of the CBP
  - Density of aboveground structures
  - Lack of source (DNAPL)
  - Current treatment technologies are ineffective for entire CBP area

Institutional Control Program

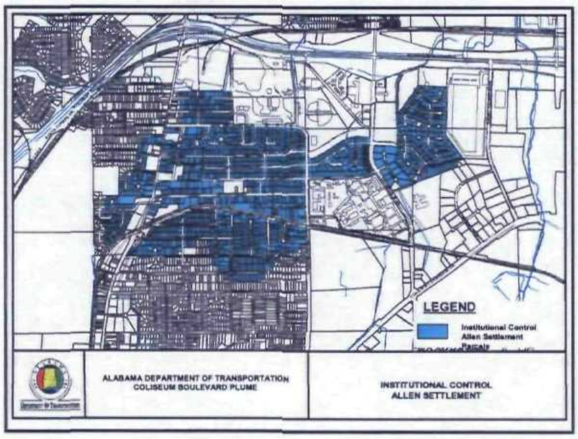
- Allen Settlement ("Phase I")
  - 1,516 parcels
    - 99.6% of eligible properties
    - *All residential parcels*
- Phase II
  - 612 additional parcels
    - Non-residential properties within CBP
    - Residential and non-residential properties within area where CBP will migrate over next 30 years, plus 100 foot buffer

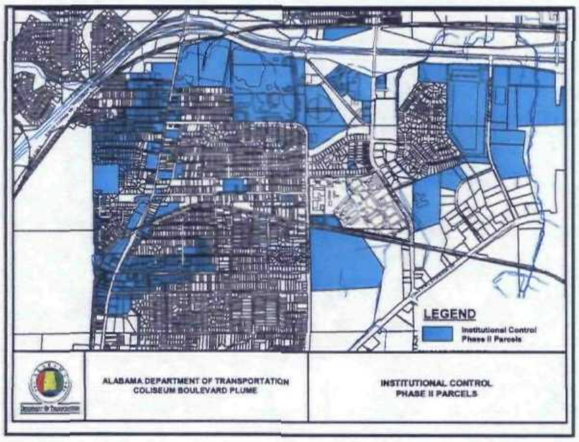
3 of remaining 6 came in in Phase 2.

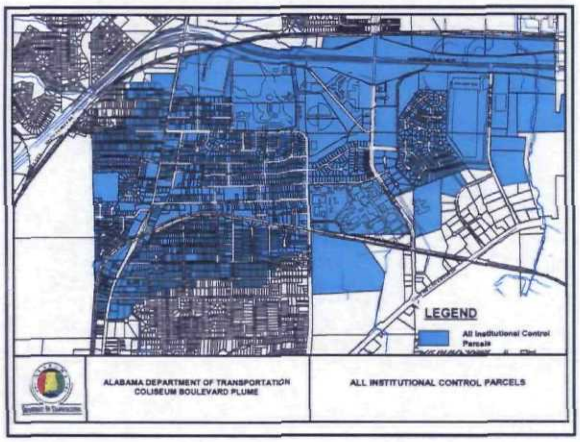
-of 1522 res. properties.

-AL DOT got access, gw use restriction, and covenant not to sue

→(See next pg. middle slide)







Institutional Control Program Components

1. Restrictive Covenant
   1. Deed restriction to control groundwater use and access
   2. Access to property by ALDOT
   3. Release of future claims against ALDOT
      - Except personal injury claims
2. Compensation to property owners
   - 5.1% of 2006 tax appraised value

Execution of Restrictive Covenants

- Commercial Property Owner Focus Group Meetings- (December 2006 and January 2007)
- Media coverage to announce meetings
- Invitation letters mailed to property owners
- Information meetings-March 5 and 7, 2007 (nine meetings)
- Sign up meetings (Notary Service)-March 14 and 15, 2007

Outreach Efforts

- 2 toll free numbers to contact Program Administrator
- CBP 24-hour information line for technical issues/questions
- Public repository of documents
- Meetings with Community Outreach Group

One rep – contractor fellow selected (mutual agreement) by plaintiffs & DOT, in Allen settlement. (–out of B'ham)

Status of Phase II Parcels

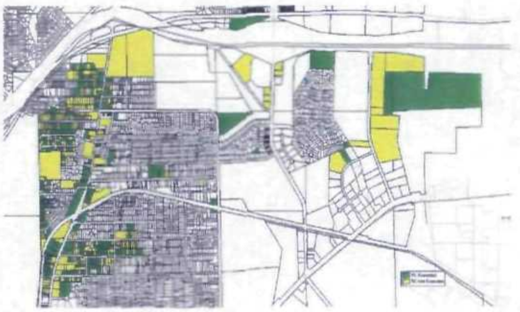
April 20, 2007

49% of non-residential parcels (83 of 168 parcels)

55% of residential parcels(246 of 444 parcels)

Total of 54% of Phase II parcels signed up

Status of Phase II Parcels



Future Efforts

- Additional Notary Service sign up days with letters mailed to eligible property owners
- Meetings and telephone calls to explain Institutional Control Program and deal with individual issues
  - Neighborhood meetings
  - Individual meetings
- Planned public meetings for Site-wide Corrective Measures Plan after ADEM accepts plan

Additional Outreach

- Plannned meetings with Montgomery Area Realtors Association
  - Brokers and Realtors
  - Property Managers
  - Mortgage companies
  - Appraisers
  - Closing attorneys

Well Survey

- A small number of wells have been identified in expansion zone:
  - Sanders: Well not in use
  - Bama Budweiser: Irrigation well to be abandoned and replaced with Gordo aquifer well
- Well inventory will be performed concurrently with door to door efforts to have property owners execute Restrictive Covenants

→ Gordo is immediately below...

Implementation

- Stakeholders Group formed
  - ADEM
  - City and County Representatives
  - Well Drillers
  - Property Owners
  - Utilities
  - Railroad
  - UST owners
- Stakeholders meetings to continuously monitor and improve system

Implementation

- Includes, but not limited to:
  - Notification to well drillers
  - Check of ADEM/City records for well notifications
  - Letter to all persons who purchase property in Institutional Control Boundary
  - Verification of deed restrictions
  - Meetings with area brokers, realtors, mortgage companies and closing attorneys

Name	Agency
Dannette Ratcliff	ALDOT
Buddy Cox	ALDOT
NEIL SASS	ADPH
Kristy WRIGHT	ADEM
Jimbo Carlson	ADEM
Brian Espy	ADEM
Ralph O. Howard, Jr.	US EPA
Andy Everall	MPT
Ashley Cousins	ACESS
Stephen Cobb	ADEM
Wesley Edwards	ADEM

THE STATE OF ALABAMA }
MONTGOMERY COUNTY }

RESTRICTIVE COVENANT, EASEMENT, AND RELEASE TO RUN WITH THE LAND

WHEREAS The City of Montgomery, Alabama, hereinafter "Grantor" holds legal title in fee simple to the real property located at (S of) 0 North Blvd hereinafter referred to as the "Property" and which is more particularly described as:

(Part of Lot 9-B, Kilby Property) A parcel of land being the north 8.000 acres of Lot 9-B, said Lot 9-B being the south 15.866 acres of Lot 9, Kilby Property, City of Montgomery, Alabama, as per Kilby Boundary Map dated September 18, 1972, said parcel being more particularly described as follows: Commencing at the southwest corner of Section 28, T17N, R18E, said corner being the point of beginning; thence N 0° 54' 00" W 343.66 feet along the west line of said Section 28; thence N 89° 06' 20" E 817.25 feet; thence S 33° 00' 10" E 450.89 feet; thence S 89° 56' 30" W 1001.71 feet; thence N 03° 00' 15" W 22.79 feet; thence S 89° 56' 30" W 55.30 feet to the point of beginning.

As recorded in the Montgomery County Judge of Probate Office at RLPY Book 482, Page 889.

WHEREAS, the Grantor is aware that the soil and/or groundwater beneath the Property is now or may in the future be included in what is generally known as the "Coliseum Boulevard Plume" ("CBP"), an area in the City of Montgomery that is contaminated by trichloroethelene ("TCE") and/or other known or unknown chemical compounds that may have originated on lands owned by the Grantee;

WHEREAS, the Grantor knows and understands that he/she/they does not own the groundwater beneath the Property, but has the right to a reasonable use thereof;

WHEREAS, that for and in consideration of the sum of one dollar ($1.00) in cash paid by the Alabama Department of Transportation, an agency of the State of Alabama, hereinafter referred to as "Grantee," to the Grantor, the receipt whereof is hereby acknowledged, and in further consideration of the mutual benefits accruing to the Grantor and the Grantee by the investigation and remediation of the CBP, the Grantor does grant, bargain and convey unto the Grantee, and/or its successor agency, the following:

1. A <u>Restrictive Covenant with a Deed Restriction</u> whereby the use of, access of, interference with, and/or consumption of the groundwater beneath the Property is hereby forever in perpetuity prohibited without the prior written consent from the Grantee. Written approval and/or direction from the Grantee or its successor agency must be sought, regardless of distance to the watertable, for any and all drilling of wells or installation of underground swimming pools. Written approval and/or direction from ALDOT or its successor agency must be sought for any use of the groundwater. Any approval requested hereunder may not be unreasonably denied.

2. An <u>Easement</u>, in gross, whereby the ALDOT or its successor agency or agents shall have access to and for right-of-way over, on, upon, under, through and across all areas of the Property except improved appurtenant structures thereon for purposes of investigation and/or remediation of the CBP; and,

3. A Release of and from any and all claims, demands, causes of action, suits at law or in equity, losses, damages, and any other claims of any nature except for claims of personal injury, which are specifically excluded from this Release, which the Grantor may have now or in the future or which any successor in interest or bona fide purchaser for value of the Property may have in the future against Grantee, the State of Alabama, the Alabama Department of Transportation, and/or its Director, officials, and employees, both in their official and individual capacities, and their agents, representatives, assigns or successors in interest arising from or related to, either directly or indirectly, the presence of TCE and related compounds in the soil or groundwater beneath the Property.

To Have and to Hold the same unto the said Grantee, the State of Alabama, the Alabama Department of Transportation, an agency of the State of Alabama, its Director, employees, successors and assigns, for the uses and purposes of the said restrictive covenant, deed restriction, and easement for which said Property and for which said Release is granted, now and forever more, unless and until expressly waived and released by the Grantee, and it is expressly understood and intended that the said restrictive covenant, deed restriction, easement, and release is intended to be and shall run with the Property and shall be perpetual and binding on any successive owner, lessee, invitee or licensee of the Property.

In Witness Whereof, the said Grantor, The City of Montgomery, Alabama has/have signed and sealed these presents on the date first above written.

GRANTOR

____

____

This Document was prepared by:
Floyd R. Gilliland, Jr.
Nix Holtsford Gilliland Higgins & Hitson, P.C.
P.O. Box 4128
Montgomery, Alabama 36103:

I, ____________________, a Notary Public, in and for Montgomery County in the State of Alabama, hereby certify that ________________________________, Grantor(s), whose name(s) is/are signed to the foregoing conveyance as holder of fee simple title to the Property,

or__________________ as_________________(office) of the _________________(corporation); and who is known to me, acknowledged before me on this day that, being informed of the contents of the conveyance, he/she executed the same voluntarily on the day the same bears date.

Given under my hand this the ________ day of _______________, 2006.

____
NOTARY PUBLIC

My Commission expires______________

SEAL