

Attachment I - Phase II Subsurface Investigation

PHASE II SUBSURFACE INVESTIGATION

REDEVELOPMENT AREAS

Parcel 148

(BLOCK 6)

(also indicated as Block
12B in the City of Milwaukee
Park East Redevelopment Plan)

**WisDOT Project I.D. 1730-05-01
STH 145/Park East Freeway
Hillside Connection to 4th Street
Milwaukee County**

**WisDOT Project I.D. 1730-06-01
McKinley/Knapp Street Bridge
4th Street to Water Street
Milwaukee County**

**WisDOT Project I.D. 1730-07-01
Local Street Improvements
Local Street
Milwaukee County**

for the

City of Milwaukee, Wisconsin

and

Wisconsin Department of Transportation
District #2

September 21, 2001

Prepared by

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1.0 INTRODUCTION

HNTB Corporation (HNTB) was retained by Wisconsin Department of Transportation (WisDOT) and the City of Milwaukee to perform a subsurface site investigation at the property known as Parcel 148 located at the Park East Freeway (STH 145). The Park East is situated between West 9th Street and North Jefferson Street west to east and between East Lyon Street and West Juneau Avenue north to south. A site location map showing the limits of this project is included as Figure 1.

HNTB conducted a Phase IA Environmental Site Assessment (ESA) in September 2000 and Phase IB ESA in February 2001. Based on the findings of the Phase IA and IB ESAs, HNTB conducted a Phase II Subsurface Investigation of Parcel 148 between May and July, 2001. Results of the Phase II, conclusions, and recommendations for additional work, if warranted, are presented herein.

1.1 Background

Parcel 148 is a triangular parcel located between North Edison Street, North Water Street, and East Knapp Street. The parcel is owned by the FHWA and is occupied by a sand and gravel parking lot beneath the eastbound and westbound lanes of the Park East Freeway. Surrounding area includes Parcel 154 to the south, Parcel 147 to the west and north, and Parcel 149 lot to the east. Parcel 148 occupies the 1300 block of North Edison Street and is slated for possible redevelopment. The property boundaries of Parcel 148 are shown on Figure 2. This parcel was investigated during this Phase II investigation, results of which are included in this report.

1.2 Purpose and Scope

The purpose of the Phase II investigation was to evaluate the presence or absence of impacts in shallow-depth soil and groundwater resulting from previous activities or former operations at the parcel identified during the Phase I ESA.

The scope of the site investigation consisted of the following activities:

- Advancement of five soil borings using the hydraulic direct push drilling method;
- Installation of two temporary groundwater monitoring wells for collecting groundwater samples and elevations;
- Description and classification of soil samples using the Unified Soil Classification System (USCS);
- Field screening of organic vapors in recovered soil samples using a photoionization detector (PID);
- Laboratory analyses of selected soil samples for Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), volatile organic compounds (VOCs), diesel range organics (DRO), and polynuclear aromatic hydrocarbons (PAHs);
- Laboratory analyses of groundwater samples collected from the temporary wells for RCRA metals, VOCs, DRO, and one sample for PAHs; and
- Evaluation of the collected data and preparation of this Phase II Subsurface Investigation report.

One of the five soil borings completed at the site was advanced as a pier boring for evaluating the fill material that will be generated as waste during the removal of the pier footings during freeway demolition.

Soils & Engineering Services, Inc. performed all soil borings and installed the temporary groundwater monitoring wells. The soil boring logs and borehole abandonment forms; and well construction and development forms for the temporary wells are included in Appendices I and II, respectively.

APL, Inc. analyzed all soil and groundwater samples collected during this investigation. Laboratory reports for the soil and groundwater sample analyses are included in Appendices III and IV, respectively.

2.0 PHASE II INVESTIGATION

2.1 1300 Block of North Edison Street

2.1.1 Phase I Findings

The property located at 1300 North Edison Street is currently owned by the FHWA and is occupied by a sand and gravel parking lot beneath the eastbound and westbound lanes of the Park East Freeway. Prior occupants have included; a blacksmith, dwellings, stores, Printz and Rau Manufacturing; Square D Electrical Equipment and Tools, Will Walsh Gas Station, accountants, investors, publishing agencies, La Salle Steel Company, Steam Turbine Company pumps, Turco Products Company (cleaning compounds), Maxon Premis Burners and Republic Steel. The property was not indicated on any of the reviewed state or federal environmental databases.

A personal interview regarding historic use of the property confirmed that a gasoline service station occupied the north corner of the parcel. The station included four gasoline pumps and an office structure to the south. Callaway Fuel Company had owned the parcel prior to the Walsh Service Station. The service station was sold to a Realty Company in 1958. The USTs were still present underground on the property at that time. No record of the removal of the identified USTs was observed during this assessment.

Historic land use as a machine shop, gas station, steel manufacturing company and the possible presence of underground gasoline storage tanks (UST) indicated that the potential for environmental impacts is likely. No additional information was obtained from the tax assessor's office, building inspection records, or building plan records regarding historic land use at the property.

2.1.2 Phase II Scope of Work

Five soil borings, consisting of one pier boring (SB-148-3) and four redevelopment borings (SB-148-1, SB-148-2, SB-148-4 and SB-148-5), were performed on this property. Two soil samples were collected for laboratory analysis at each soil boring location. Sampling depths varied and consisted of collecting one shallow sample from within the interpreted fill layer and one deeper sample from within the native soils.

Each soil sample was analyzed for VOCs and DRO. The shallow-depth samples were analyzed for RCRA metals. Soil borings SB-148-1 and SB-148-5 were completed as a temporary groundwater monitoring wells. Groundwater samples were collected from these temporary wells and analyzed for DRO, VOCs, and RCRA metal analyses.

2.1.3 Phase II Results

Soil Conditions

Observations from the soil borings provided the basis for the limited characterization of the site's geology. Soils encountered in the borings advanced on this property generally consisted of 7½ to 12 feet of fill that overlaid layers of silty clay or lean clay. The clay was typically underlain by layers of fine to medium-grained sand or organic silt.

A one-foot peat layer was encountered in boring SB-148-1, at a depth of approximately 11½ feet below grade. Peat was also encountered in boring SB-148-5 at approximately 11 to 12 feet below grade. The location of the peat layers may serve as indicators of where the natural land surface was historically located.

The fill generally consisted of a mixture of gravel, sand, silt and clay. Debris, including glass, cinders, and wood pieces, was encountered within the fill layers of several soil borings. A strong petroleum odor was observed in fill layer in soil boring SB-148-01, at approximately eight feet below grade. The soil boring logs provide additional information and are included in Appendix I. Cross-sections of the soils encountered are presented as Figure 3.

Photoionization detector (PID) readings for samples collected from soil boring SB-148-1 ranged from 1 to 483 instrument units (iu, equivalent to parts per million of benzene). PID readings were below detection at the other boring locations. Table 1 lists the PID reading recorded for each soil sample.

Wet or saturated soils were observed at an estimated depth of 8 feet bgs at one soil boring (SB-148-2) and not observed in the other four borings. Depth to groundwater observed on July 30, 2001 in the temporary wells completed in borings SB-148-1 and SB-148-5 was measured at 9.49 and 10.15 feet, respectively (Table 2). Well construction and development forms for the temporary wells are included in Appendix II.

Soil Sampling Results

Elevated concentrations of VOCs were detected in the shallow-depth (fill) sample collected soil boring SB-148-1 (8 to 10 feet) located in the north corner of the property, near the gasoline USTs identified on the Sanborn map. VOCs detected in this sample included 1,2,4 trimethylbenzene (22,500 ug/kg), ethylbenzene (1,390 ug/kg), isopropylbenzene (1,370 ug/kg), n-butylbenzene (4,900 ug/kg), n-propylbenzene (6,790 ug/kg) and sec-butylbenzene (1,580 ug/kg). Of these detected compounds, ethylbenzene has the only established NR 720 soil cleanup standard of 2,900 ug/kg, which was not exceeded. VOCs were not detected in the other nine soil samples analyzed.

DRO was detected in eight of the ten samples analyzed. Fill sample SB-148-1 (8 to 10 feet) contained the highest DRO concentration of 211 mg/kg and also was the only detection that exceeded the NR 720 RCLs for DRO of 100 mg/kg. All other DRO detections were below the NR 720 RCL of 100 mg/kg.

The shallow-depth (fill) sample from each boring was analyzed for RCRA metals. The metals analyses indicated the presence of barium, chromium, lead, and mercury in all of the soil samples analyzed. The lead concentrations in samples SB-148-3 (66 mg/kg) and SB-148-4 (59 mg/kg) exceeded the RCL for non-industrial properties of 50 mg/kg, respectively, but were below the 500 mg/kg RCL for industrial properties.

Chromium (total) was detected in the five soil samples analyzed. Three samples, SB-148-2, SB-148-3, SB-148-5 contained a total chromium concentration above the NR 720 RCL for non-industrial properties of 14 mg/kg for hexavalent chromium. Hexavalent chromium was not analyzed in the collected soil samples.

Barium was detected in all five samples at concentrations which ranged from 45 to 180- mg/kg. Mercury concentrations ranged from 0.03 to 0.88 mg/kg. Cadmium was detected in two samples (SB-148-1 and SB-148-5) below the NR 720 RCL (8 mg/kg) for non-industrial properties. Selenium was detected in one sample (SB-148-2) at a concentration of 6 mg/kg. Arsenic and silver were not detected.

The location of the soil borings and soil analytical results are presented on Figure 4. Laboratory reports for the soil sample analyses are included in Appendix III.

Groundwater Sampling Results

The results of the VOCs analysis indicate the detection of total trimethylbenzene (481 ug/l) above the NR 140 ES of 480 ug/l in the sample collected from well SB-149-1. Naphthalene (19 ug/l) and lead (2.4 ug/l) were detected in the sample at concentrations exceeding their PALs of 8 ug/l and 1.5 ug/l, respectively. Additional VOC analytes were detected in this sample but did not exceed the established NR 140 PALs. VOCs were not detected in the groundwater sample from well SB-148-5.

DRO was detected at a concentration of 1,850 mg/l in the SB-148-1 groundwater sample. In addition, PAH analysis at this location indicated the presence of PAH compounds, including a naphthalene concentration of 8.1 ug/l that slightly exceeds its PAL of 8 ug/l. The other reported PAHs were below established PALs and ESs.

The RCRA metals analyses indicated the presence of barium in both groundwater samples. The barium concentration in the sample collected at temporary monitoring well SB-148-5 (1.2 ug/l) exceeded the PAL (0.40 ug/l) established under NR 140.

Dissolved lead was not detected in the sample collected from monitoring well SB-148-5; however, the lead concentration at monitoring well SB-148-1 (2.4 ug/l) exceeded the PAL (1.5 ug/l) established under NR 140.

The location of the temporary wells and groundwater analytical results are presented on Figure 5. The laboratory report for the groundwater sample analysis is included in Appendix IV.

2.1.4 Conclusions and Recommendations

Soil and groundwater sample analyses of samples collected at soil boring SB-148-1 indicate the presence of hydrocarbon constituents exceeding the currently established soil and groundwater regulatory limits. The elevated concentrations of VOCs and PAHs detected in the soil and groundwater samples collected at boring/well SB-148-1 indicates petroleum contamination associated with the gasoline station formerly located in this area. These detections will likely trigger the WDNR to require further action in order to comply with NR 720 and NR 140.

The installation and sampling of permanent groundwater monitoring wells to further evaluate the nature and degree of the impacted groundwater in the area of SB-148-1 is recommended. Each of the wells should be constructed in accordance with NR 141 groundwater monitoring well construction requirements in anticipation that the WDNR will require extent characterization using code-constructed monitoring wells. Additional research to evaluate the fate of the USTs in the north portion of the property is recommended prior to performing any additional subsurface exploration.

Lead levels that exceeded their respective NR 720 RCLs were also detected in soil (fill) samples located in the east portions of the property. The lead levels detected in samples SB-148-3 and SB-148-4 may trigger the WDNR to require further action in order to comply with NR 720. Soil samples should be collected and analyzed for total lead to evaluate the vertical and lateral extent of the lead. Lead was detected in the groundwater sample collected in nearby well SB-148-1. Lead analysis in groundwater located near borings SB-148-3 and SB-148-4 is recommended to evaluate if the lead-impacted soils are affecting groundwater quality in those areas.

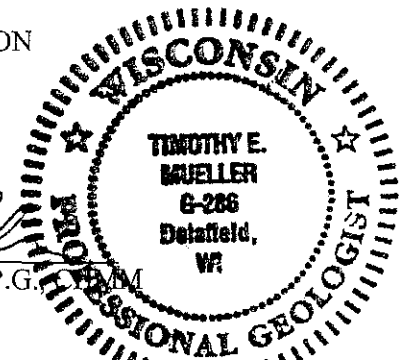
The collection of one soil sample at or near boring SB-148-3 for hexavalent chromium analysis is also recommended to evaluate what portion of the total chromium concentrations detected in the soil samples, if any, was hexavalent chromium. The recommended boring should be extended to a depth that will define the vertical extent of the fill in this area. Lead soil sampling should also be considered in this boring to satisfy the previously recommendation for lead sampling.

Re-sampling of well SB-148-5 for barium is recommended to confirm the previous detection.

Waste characterization is recommended for any soil removed from the property. Due to the presence of elevated concentrations of VOCs, PAHs, DRO, lead, chromium and barium, the collection and analysis of representative soil and or groundwater sample(s) is recommended prior to planned construction or development of the property. Preparation of a Materials Handling Plan may be warranted.

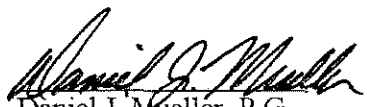
This report was prepared in accordance with the scope of work provided in our services agreement and HNTB's standard terms of agreement. The investigation was intended to address specific objectives and is not intended for use beyond this scope. Results and conclusions were taken from discrete soil samples, with inferences made on conditions between sample points. No guarantee may be given that the inferred conditions exist between the sample points as soil and groundwater quality conditions may vary at a given point. No warranties, representations, or certifications are made.

Prepared by
HNTB CORPORATION


T Mueller
Timothy E. Mueller, P.G.
Hydrogeologist


10-01-01
Date

"I, Timothy E. Mueller, hereby certify that I am a hydrogeologist as that term is defined in s. NR 712.03 (1), Wis. Adm. Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code."


Daniel J. Mueller, P.G.
Hydrogeologist

10/1/01
Date

"I, Daniel J. Mueller, hereby certify that I am a hydrogeologist as that term is defined in s. NR 712.03 (1), Wis. Adm. Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code."


David A. Rudig, P.E.
Principal Engineer

1 Oct. 2001
Date



FIGURE: 1

Park East Freeway
Milwaukee, Wisconsin

Wisconsin Department of Transportation

COMMENTS:

Taken From USGS 7.5 minute series Milwaukee Southwest
Quadrangle, Milwaukee County, Wisconsin (Photorevised 1971)

Date: 8/15/00

Scale: 1" = 2000 Feet





MILWAUKEE RIVER

GASOLINE UNDERGROUND STORAGE TANKS

PARCEL BOUNDARY

PARCEL 147

FORMER BUILDING FOOTPRINT

SB-148-1 WELL

147

NORTH EDISON STREET SW

PIER LOCATION

SB-148-2

SB-148-3

SB-148-4

SB-148-5 WELL

NORTH WATER STREET

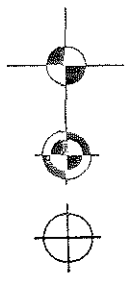
EAST KNAPP STREET

LEGEND

ENVIRONMENTAL BORING

PIER BORING

EXISTING WELL



Time: 01-OCT-2001 10:43
Plotted by: J.Sowinski

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FILE NAME
PEN TABLE



FIGURE 2
BORING LOCATION MAP

PARCEL 148

SCALE 1" = 50'

MILWAUKEE RIVER

PARCEL 147

NORTH EDISON STREET SAN

NORTH WATER STREET

EAST KNAPP STREET

DRG	1850	<0.2	Boron
LE-TC4	<1.5	<0.008	Chromium, Total
LE-OC4	<1.5	<0.004	Silver
THM	481	<5.5	Arsenic
Hexachloro-2-Piclorone	559	<0.4	Cadmium
Benzene	<1.4	2.4	Lead
Chloroform	<1.2	<0.02	Mercury
Chloroethane	<2.5	<4.8	Selenium
Ethylbenzene	134		
Toluene	143		
Naphthalene	19		
Tetrahydrofuran	<1.6		
Toluene	<1.5		
Trichloroethane	<1.7		
Vinyl chloride	<1		

DRG	138	1.2	Boron
LE-TC4	<0.31	<0.008	Chromium, Total
LE-OC4	<0.32	<0.004	Silver
THM	<0.3	<5.5	Arsenic
Benzene	<0.27	<0.4	Cadmium
Chloroform	<0.24	<1.5	Lead
Chloroethane	<0.49	<0.02	Mercury
Ethylbenzene	<0.25	<4.8	Selenium
Toluene	<0.53		
Naphthalene	<0.75		
Tetrahydrofuran	<0.31		
Toluene	<0.28		
Trichloroethane	<0.34		
Vinyl chloride	<0.2		

- 19 VALUE EXCEEDING NR 140 PREVENTIVE ACTION LIMIT
- 481 VALUE EXCEEDING NR 140 ENFORCEMENT STANDARD



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 FILE NUMBER: 311001101
 DATE: 01/01/2001 10:14
 PLOTTED BY: JGAVENSKI

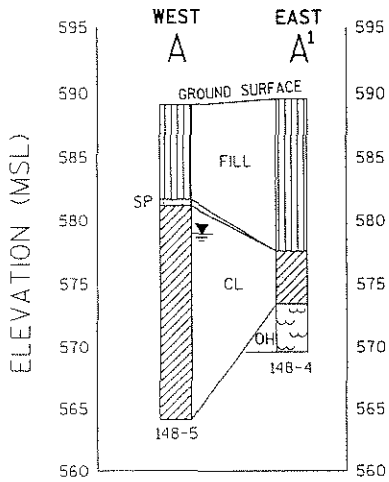


PARK EAST FREEWAY

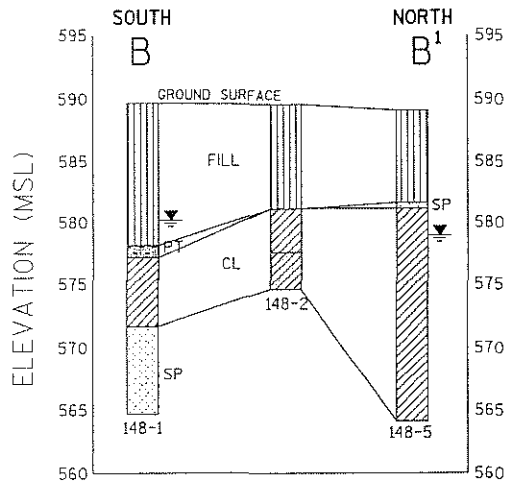
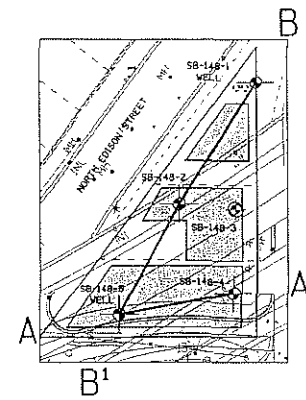
GROUNDWATER ANALYTICAL DATA

PARCEL 148 - FIGURE 5

SCALE 1" = 50'



HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'



LEGEND

ASPHALTIC CONCRETE	FINE TO MEDIUM SAND WITH GRAVEL (SP)
CONCRETE	BASE COURSE
FILL	INTRABEDED (ML)
LEAN CLAY (CL)	SEDIMENTARY PEAT (PT)
SANDY LEAN CLAY (CL)	SILTY SAND (SM)
ORGANIC SILT (OL)	SANDY SILT (SM)
ORGANIC CLAY (OH)	CINDERS
	DEBRIS

- NOTES: 1. WIDTH OF SOIL BORING IS NOT TO SCALE
 2. MONITORING WELL ELEVATIONS SURVEYED BY HNTB. SOIL BORING ELEVATIONS ARE ESTIMATED BASED ON DIGITAL TERRAIN MODELS.
 3. MSL = MEAN SEA LEVEL
 4. FT = FEET
 5. GROUNDWATER ELEVATIONS MEASURED ON JUNE 30, 2001
 6. SOIL DESCRIPTIONS ARE BASED ON UNIFIED SOIL CLASSIFICATION SYSTEM (USCS).
 7. CONTACTS BETWEEN SOIL TYPES ARE INFERRED BETWEEN BORINGS.

TABLE 1

**PARK EAST FREEWAY PHASE II
SOIL SAMPLE FIELD SCREENING (PID) RESULTS**

Boring I.D.	Date Completed	PID Results												
		Sample Depth:												
		0-2	2-4	4-6	6-8	8-10	10-12	12-14	14-16	16-18	18-20	20-22	22-24	24-25
SB-148-1	6/20/01	2.2	3.4	0	2.7	483	21.9	1	0	1.8	1.3	9.6	5.9	2.9
SB-148-2	6/20/01	0	0	0	0	0	0	0	0	---	---	---	---	---
SB-148-3	6/20/01	0	0	0	0	0	0	---	---	---	---	---	---	---
SB-148-4	6/20/01	0	0	0	0	0	0	0	0	0	0	---	---	---
SB-148-5	6/20/01	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes:
 PID = Photo Ionization Detector
 PID results are an indication of total volatile organic compounds vapors in the soil sample detected by a PID equipped with a 11.7eV lamp
 Field screening results are reported in instrument units (iu) which are equivalent to parts per million (PPM)
 0-2 = Sample interval in feet below ground surface (FBGS)
 --- = Not field screened - no sample collected data collected

TABLE 2

**PARK EAST FREEWAY PHASE II
GROUNDWATER ELEVATION DATA**

Well Number	Top of Protective Casing Elevation (feet, MSL)	Depth to Groundwater July 30, 2001 (feet)	Groundwater Elevation (feet, MSL)
119-5	646.18	11.76	634.42
129-2	627.68	18.67	609.01
129-6	641.84	19.67	622.17
129-9	643.72	20.74	622.98
129-11	642.4	10.08	632.32
129-12	634.56	7.8	626.76
131-5	610.08	15.38	594.7
131-6	605.87	12.64	593.23
131-9	625.72	17.53	608.19
37-3	595.97	17.8	578.17
37-6	599.1	DRY	NA
37-11	597.41	8.22	589.19
37-15	597.21	8.95	588.26
37-18	595.04	23.52	571.52
38-2	594.02	12.32	581.7
38-7	594.22	16.03	578.19
39-2	592.48	15.95	576.53
39-7	593.3	17.58	575.72
40-2	593.14	13.14	580
153-2	589.93	5.69	584.24
147-1	590.88	12.2	578.68
147-4	588.23	10.75	577.48
148-1	589.65	9.49	580.16
148-5	589.09	10.15	578.94
149-1	590.97	11.13	579.84
149-5	589.93	12.02	577.91
149-7	589.35	11.08	578.27
150-8	596.92	14.07	582.85
150-10	603.4	8.9	594.5
145-1	589.97	9.08	580.89
124-2	592.17	12.88	579.29
2-1	600.38	10.49	589.89
8-1	592.16	9.84	582.32
8-3	592.22	10.71	581.51
10-2	589.59	product in well	NA

Notes:

All groundwater elevation data are presented in feet below the mean sea level (MSL).

TABLE 3

Soil Analytical Results
Park East Freeway Phase II - Parcel 148

Sample ID		148-1A	148-1B	148-2A	148-2B	148-3A
Date Collected		6/20/01	6/20/01	6/20/01	6/20/01	6/20/01
Sample Interval (ft Bgs)		8-10	22-24	2-4	12-14	2-4
Soil Matrix		Fill	Native	Fill	Native	Fill
Measured Depth to Groundwater		9.49 ft Bgs				
Analyte	Unit					
Solids, Total Percent	%	86	88	88	69	86
Arsenic	mg/kg	<2.44	---	<2.36	---	<2.43
Barium	mg/kg	23	---	53	---	65
Cadmium	mg/kg	0.70	---	<0.39	---	<0.41
Chromium, Total	mg/kg	11	---	17	---	17
Lead	mg/kg	19	---	15	---	66
Mercury	mg/kg	0.03	---	0.03	---	0.14
Selenium	mg/kg	<4.07	---	6.0	---	<4.06
Silver	mg/kg	<0.23	---	<0.23	---	<0.23
Diesel Range Organics	mg/kg	211	7.1	6.7	2.2	16
Total -Trimethylbenzene	ug/kg	22500	<17	<17	<22	<17
1,2-Dichlorobenzene	ug/kg	<79	<19	<19	<25	<20
Benzene	ug/kg	<63	<15	<15	<20	<16
Ethylbenzene	ug/kg	1390	<14	<14	<18	<15
Isopropyl Ether	ug/kg	<69	<17	<17	<22	<17
Isopropylbenzene	ug/kg	1370	<19	<19	<24	<19
Total -xylene	ug/kg	<124	<30	<30	<39	<31
n-Butylbenzene	ug/kg	4900	<20	<20	<26	<21
n-Propylbenzene	ug/kg	6790	<16	<16	<21	<16
Naphthalene	ug/kg	<175	<43	<43	<55	<44
p-Isopropyltoluene	ug/kg	<73	<18	<18	<23	<18
sec-Butylbenzene	ug/kg	1580	<19	<19	<25	<20
Toluene	ug/kg	<68	<17	<17	<21	<17

Notes:

- 1) ft Bgs = Feet below ground surface.
- 2) mg/kg = Milligrams per kilogram.
- 3) ug/kg = Micrograms per kilogram.
- 4) --- = Not analyzed.
- 5) Bold values indicate detection's of compound.
- 6) Bold and shaded value indicates concentration exceeding NR 720 established or suggested generic Residual Contaminant Level.

TABLE 3

Soil Analytical Results
Park East Freeway Phase II - Parcel 148

Sample ID		148-3B	148-4A	148-4B	148-5A	148-5B
Date Collected		6/20/01	6/20/01	6/20/01	6/20/01	6/20/01
Sample Interval (ft Bgs)		10-12	6-8	16-18	4-6	18-20
Soil Matrix		Fill	Fill	Native	Fill	Native
Measured Depth to Groundwater					10.15 ft Bgs	
Analyte	Unit					
Solids, Total Percent	%	70	87	69	85	66
Arsenic	mg/kg	---	<2.41	---	<2.45	---
Barium	mg/kg	---	66	---	52	---
Cadmium	mg/kg	---	<0.40	---	0.50	---
Chromium, Total	mg/kg	---	14	---	18	---
Lead	mg/kg	---	59	---	17	---
Mercury	mg/kg	---	0.05	---	0.03	---
Selenium	mg/kg	---	<4.01	---	<4.09	---
Silver	mg/kg	---	<0.23		<0.23	---
Diesel Range Organics	mg/kg	<1.4	59	5	<1.1	1.7
Total -Trimethylbenzene	ug/kg	<21	<17	<22	<18	<23
1,2-Dichlorobenzene	ug/kg	<24	<20	<25	<20	<26
Benzene	ug/kg	<19	<15	<20	<16	<20
Ethylbenzene	ug/kg	<18	<14	<18	<15	<19
Isopropyl Ether	ug/kg	<21	<17	<22	<18	<23
Isopropylbenzene	ug/kg	<23	<19	<24	<19	<25
Total -xylene	ug/kg	<38	<31	<39	<32	<41
n-Butylbenzene	ug/kg	<25	<20	<26	<21	<27
n-Propylbenzene	ug/kg	<20	<16	<20	<17	<21
Naphthalene	ug/kg	<54	672	<55	<45	<57
p-Isopropyltoluene	ug/kg	<22	<18	<23	<19	<24
sec-Butylbenzene	ug/kg	<24	<19	<25	<20	<26
Toluene	ug/kg	<21	<17	<21	<17	<22

Notes:

- 1) ft Bgs = Feet below ground surface.
- 2) mg/kg = Milligrams per kilogram.
- 3) ug/kg = Micrograms per kilogram.
- 4) --- = Not analyzed.
- 5) Bold values indicate detection's of compound.
- 6) Bold and shaded value indicates concentration exceeding NR 720 established or suggested generic Residual Contaminant Level.

TABLE 4
Groundwater Analytical Results
Park East Freeway Phase II

Well ID:		148-1	148-5		
Sample Date:		7/10/01	7/10/01	NR 140	NR 140
Analyte	Unit			PAL	ES
Diesel Range Organics	ug/l	1850	138	---	---
Metals					
Barium	mg/l	0.20	1.2	0.4 mg/l	2 mg/l
Chromium	ug/l	<0.008	<0.008	10	100
Silver	ug/l	<0.004	<0.004	10	50
Arsenic	ug/l	<5.6	<5.6	5	50
Cadmium	ug/l	<0.4	<0.4	0.5	5
Lead	ug/l	2.4 (PAL)	<1.5	1.5	15
Selenium	ug/l	<4.8	<4.8	10	50
VOCs					
1,1,1-Trichloroethane	ug/l	<1.6	<0.31	40	200
1,1-Dichloroethane	ug/l	<1.6	<0.32	85	850
1,1-Dichloroethene	ug/l	<1.7	<0.34	0.7	7
1,2,3-Trichlorobenzene	ug/l	<2.5	<0.50	ne	ne
(1,2,4 & 1,3,5) -Trimethylbenzene	ug/l	481 (ES)	<0.30	96	480
1,2-Dichloroethane	ug/l	<1.8	<0.35	0.5	5
4-Methyl-2-Pentanone	ug/l	559	<0.80	ne	ne
Benzene	ug/l	<1.4	<0.27	0.5	5
Chloroethane	ug/l	<3.2	<0.64	80	400
Chloroform	ug/l	<1.2	<0.24	0.6	6
Chloromethane	ug/l	<2.5	<0.49	0.3	3
cis-1,2-Dichloroethene	ug/l	<1.4	<0.27	7	70
Ethylbenzene	ug/l	134	<0.25	140	700
Isopropylbenzene	ug/l	44	<0.33	ne	ne
m,p&o-xylene	ug/l	143	<0.53	1000	10000
Methyl-t-butyl ether	ug/l	<2.0	<0.39	12	60
n-Butylbenzene	ug/l	<1.8	<0.36	ne	ne
n-Propylbenzene	ug/l	147	<0.28	ne	ne
Naphthalene	ug/l	19 (PAL)	<0.75	8	40
sec-Butylbenzene	ug/l	16	<0.34	ne	ne
Tetrachloroethene	ug/l	<1.6	<0.31	0.5	5
Toluene	ug/l	<1.5	<0.29	200	1000
Trichloroethene	ug/l	<1.7	<0.34	0.5	5
Vinyl chloride	ug/l	<1.0	<0.20	0.02	0.2

Notes:

- 1) ug/l = Micrograms per liter.
- 2) mg/l = Milligrams per liter.
- 3) PAL = Groundwater Quality Preventive Action Limit per Wisconsin Administrative Code (WAC), Chapter NR 140.
- 4) ES = Groundwater Quality Enforcement Standard per WAC, Chapter NR 140.
- 5) 15 (ES) = Values exceeding the WAC NR 140 ES.
- 6) 15 (PAL) = Values exceeding the WAC NR 140 PAL.
- 7) ne = PAL / ES not established for this analyte.
- 8) --- = Sample was not tested for this analyte.

TABLE 4
Groundwater Analytical Results
Park East Freeway Phase II

		Well ID:	148-1	148-5		
		Sample Date:	7/10/01	7/10/01	NR 140	NR 140
Analyte	Unit				PAL	ES
PAHs						
1-Methylnaphthalene	ug/l	13	---	ne	ne	ne
2-Methylnaphthalene	ug/l	3	---	ne	ne	ne
Acenaphthene	ug/l	0.81	---	ne	ne	ne
Acenaphthylene	ug/l	18	---	ne	ne	ne
Anthracene	ug/l	<0.01	---	600	3000	3000
Benzo (a) anthracene	ug/l	<0.07	---	ne	ne	ne
Benzo (a) pyrene	ug/l	<0.10	---	0.02	0.2	0.2
Benzo (b) fluoranthene	ug/l	<0.07	---	0.02	0.2	0.2
Benzo (g,h,i) perylene	ug/l	<0.52	---	ne	ne	ne
Benzo (k) fluoranthene	ug/l	<0.01	---	ne	ne	ne
Chrysene	ug/l	<0.7	---	0.02	0.2	0.2
Dibenz (a,h) anthracene	ug/l	<0.42	---	ne	ne	ne
Fluoranthene	ug/l	1	---	80	400	400
Fluorene	ug/l	4.4	---	80	400	400
Indeno (1,2,3-cd) pyrene	ug/l	<0.59	---	ne	ne	ne
Naphthalene	ug/l	8.1 (PAL)	---	8	40	40
Phenanthrene	ug/l	<0.04	---	ne	ne	ne
Pyrene	ug/l	<0.06	---	50	250	250

Notes:

- 1) ug/l = Micrograms per liter.
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- 3) PAL = Groundwater Quality Preventive Action Limit per Wisconsin Administrative Code (WAC), Chapter NR 140.
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- 5) 15 (ES) = Values exceeding the WAC NR 140 ES.
- 6) 15 (PAL) = Values exceeding the WAC NR 140 PAL.
- 7) ne = PAL / ES not established for this analyte.
- 8) --- = Sample was not tested for this analyte.