LF Green
DEVELOPMENT, LLC

July 7, 2014

Mr. Paul Grittner
WDNR Southeast Region
230 N. Martin Luther King Jr. Drive
Milwaukee, WI 53212

Re: Site Summary – Former DF 02-41-097173
Adjacent Properties:
Former Kitzinger: BRRTS: 03-41-196554 and 02-41-560089
St. Francis Auto Wreckers: BRRTS: 07-41-529274 and 02-41-000269
WisDOT (Lake Parkway Construction) BRRTS: 02-41-000269

Dear Paul:

LF Green Development, LLC, on behalf of the City of St. Francis, is submitting this summary of a review of WDNR files to determine the source of impacts located on the Former D-F Property. More than 50 individual files/reports were reviewed while completing this summary. I am attaching several here that I feel are invaluable for your review of this summary, however I have electronic copies of all of the complete files.

FORMER DF

Former D-F Inc. Property - ERP Site (02-41-097173)

The property was utilized as a manufacturing facility for electronic and metal components, from the late 1940's to 1996. The buildings are situated on the east and south sides of the property, while most of the western side consists of upper and lower level parking lots.

Site investigations conducted at the property between 1996 and 1998 indicate:

- Site investigations conducted at the property between 1996 and 1998 indicate that most of the western parking lot areas contained 3 to 10 feet of fill material consisting of:
  - foundry sand;
  - mixed amounts of debris (i.e. glass, bricks, plastics, wire, wood chips, garbage).
  - The fill material is underlain by top soil and silty clays interbedded with sand and gravel seams.
- Groundwater depths at the property vary widely, from 4 to 15 feet bgs, primarily due to changes in surface elevation in this area.
- The western parking lot is 4 to 7 feet higher than other parts of the property;
- Kitzinger Cooperage Corp./Mid-America Steel Drum Co. Property to the south is over 10 feet higher than the property in most areas.

- Local surface and subsurface features may also be affecting shallow groundwater conditions in this area, such as a 7-foot high retaining wall along the southern property boundary and several large diameter storm sewers underneath E. Norwich and S. Pennsylvania Avenues.
- Regardless of these surface and subsurface features, the prevailing groundwater gradient has remained fairly consistent over a 14-year time period and groundwater flow directions have generally been to the northeast.
- Lab analyses of soil samples collected from over 50 soil borings, two test pits, and several hand augers confirm that soil at the property shows contamination of chlorinated solvents, petroleum products, and arsenic.
- ERM noted that soil samples with the highest contaminant concentrations are located on the west side of the property near the saturated zone between the fill material and native soils (Ref. 1).
- ERM also concluded that these impacts are "likely due to the placement of fill material that was contaminated prior to its delivery to the property" in the 1950's.
- The soil contamination recently identified at the adjacent Kitzinger Cooperage Corp./Mid-America Steel Drum Co. Property is similar to the impacts at the property and the highest concentrations are also situated near the soil/groundwater interface (Ref. 3).
- Since the late 1990's, almost twenty groundwater monitoring wells have been installed at and adjacent to the property. *Several have only been sampled once, including three temporary wells at the St. Francis Auto Wreckers Property that were abandoned after sampling on November 14, 1996.*
- Several of the on-site wells were sampled quarterly and/or semi-annually between 1996 and 2002, including the most recent sampling event conducted in October 2012. All contaminants detected in the groundwater were also detected in the soil samples, and the location of elevated soil impacts closely correlates to the contaminant levels detected in the groundwater.
- The source of fill material encountered at the property and Kitzinger Cooperage Corp./Mid-America Steel Drum Co. Property is unknown.
- Based on the proximity of historical dumping at St. Francis Auto Wreckers and the significant amount of contaminated fill material encountered and still remaining at all three properties, the source of soil/groundwater impacts identified along the west side of the property are most likely associated with historical dumping and contaminant migration through groundwater.
- *The distinct chlorinated solvent and petroleum VOC "hot spots" identified in the soil and groundwater indicate that the source of these impacts appears to be the result of historic waste disposal that occurred in this general area and may not be the result of a spill or release at the property or adjacent properties.* The Auto Wreckers summary discusses the use of the area as a former DUMP site for the former Town of Lake located in the area (Ref. 1).

AUTO WRECKERS SITE

St. Francis Auto Wreckers – SAG Site (07-41-529274)
WI DOT Lake Arterial Auto Wreckers – ERP Site (02-41-000269)

The northern portion of the property remains a vacant lot, while the southern part has been an auto salvage yard for over 40 years. An E-W trending drainage swale intersects the two areas. Following highway construction in 1998, the western side of the property became part of the northbound exit ramp for STH 794, and the swale only drains internally. According to the 2009 STN Environmental report (Attachment B, Page 2), the northern portion of the auto wrecker's property may have also been part of a landfill for the Town of Lake, Wisconsin (Ref. 6).

- Site investigations conducted at the property in the 1990's indicate that the entire property contains up to 14 feet of fill material consisting of foundry sand with mixed amounts of debris (i.e. glass, bricks, plastics, wire, wood chips, asphalt chunks, paint cans, and numerous drums with unknown content).
- The fill material is underlain by native soils (organic silty clay and silty fine sand).
- Monitoring wells installed at the property in 1999 have been sampled twice.
- The groundwater table appears to be near the base of fill material, at a depth of 12 to 16 feet, with a northeast flow direction towards E. Norwich and S. Pennsylvania Avenue intersection. Groundwater impacts include CVOCs, MTBE, and Benzene.
- In 1997, the DOT removed buried drums of waste, paint, resin, foundry sand, slag, asphaltic tar solids, plated debris, and firebricks (Ref 4). Additional fill and drums of waste were observed in the excavation wall on the Auto Wreckers site.
- During construction of the Lake Parkway, additional drums were visible in the east sidewall of the excavation, but were not removed because the area was outside of the temporary easement.
- According to RMT, the contaminated fill material removed along the west side of the property (elevated VOC and PCB impacts) appears to result from miscellaneous dumping that has occurred **and is not the result of a spill or release at the property.**
- Significant number of petroleum spills noted on the southern part of the property (auto salvage yard) have most likely contributed to the petroleum impacted soil/groundwater in this area.
- Remediation activities were initially conducted along the west side of the property between September and October 1997 [MW 2000]. These activities consisted of excavation / off-site disposal of approximately 280 cubic yards of PCB impacted soil and 4,500 cubic yards of petroleum impacted soil. An additional 25 tons of fill material containing several drums were also removed off-site.
- An unknown volume of low level PVOC and PCB impacted soil were also re-graded/re-used on-site.
- Most of this material was placed underneath the roadway and the adjacent storm sewer was installed with a clay plug. Further site investigation and remediation activities have been focused on the northern portion of the property.
- In August 2006, twelve test pits were excavated in the vacant lot down to the native clays at 16 to 21 feet bgs 9 ref. 5 0. The excavated test pit waste materials, including several abandoned containers, were disposed of at a landfill. Analysis of the waste stream identified several compounds exceeding regulatory levels (PCBs, lead, zinc, 1-2 DCA, TCE).
- The City of St. Francis also encountered several buried drums in this area, during the installation of a new water line in 2007.
- *The most recent remediation activity included an extensive excavation of the vacant lot, to a maximum depth of 4 feet bgs (Ref. 6). Approximately 4,575 cubic yards of PCB impacted soil, 490 drums, and 67 paint cans were disposed off-site During construction of the Lake Parkway, additional drums were visible in the east sidewall of the excavation, but were not removed because the area was outside of the temporary easement.*
- Lower level impacts were capped on-site.

- Five test pits near E. Norwich and S. Pennsylvania Avenues were also excavated to a maximum depth of 10 feet bgs. No COC were detected in the composite samples collected from the test pits at 5 feet bgs.

FORMER KITZINGER

Kitzinger Cooperage Corp./Mid-America Steel Drum Co. Property
LUST (BRRTS No: 03-41-196554)
ERP (BRRTS No: 02-41-560089)

This approximately 23-acre property has been operating as a drum reconditioning and manufacturing facility since the 1950s. The property consists of three buildings and numerous paved and unpaved surfaces have been historically used for drum and vehicle storage.

- Petroleum impacted soil and groundwater were initially encountered near Building #1 (east side of property), during the removal of two diesel USTs in May 1998.
- Envirogen conducted investigation activities near Building #1 in 1999 and 2000. The subsurface near Building #1 consists of 3 feet of gravel fill at the surface with native silty clay underneath. Depth to groundwater was 5.5 feet bgs and flow direction was not determined.
- Envirogen's investigation results indicated that soil contamination (DRO) remained confined to the former UST systems and groundwater was impacted with several PAHs exceeding NR 140 PAL. This LUST site was granted a conditional closure from Commerce in February 2005, with a deed notification for residual soil / groundwater contamination.
- In 2012, a Phase II Investigation conducted by The Sigma Group (Sigma) on the west side of the property. Several soil and groundwater samples collected near the property boundary with 2517 E. Norwich Avenue contained high levels of VOCs and chlorinated solvents. The source of these impacts is still unknown. Refer to site summary for Former D-F Inc. for more details on these investigation results.
- Annual reporting to the WDNR indicates that the property owner may be working with Key Engineering Group, Ltd. to determine the next course of action to continue the site investigation. This ERP site remains open with the WDNR.

SUMMARY AND CONCLUSIONS

- Site investigations conducted at the DF property between 1996 and 1998 indicate that most of the western parking lot areas contained 3 to 10 feet of fill material consisting of:
    - foundry sand;
    - mixed amounts of debris (i.e. glass, bricks, plastics, wire, wood chips, garbage).
- A review of the Auto Wreckers summary discusses the use of the area as a former DUMP site for the former Town of Lake located in the area (STN Environmental June 2009).
- During construction of the Lake Parkway, **additional drums** were visible in the east sidewall of the excavation, but were not removed because the area was outside of the temporary easement.
- Based on a review of the Auto Wreckers site, more than 490 buried drums were found during the clean-up activities along the west and north sides of the site.
- This indicates that drum burial was common in this area... so drum burial at Kitzinger's and D-F Property is a possibility.

- The southwest monitoring wells at D-F Property (MW-2 and 15) are up-gradient of Kitzinger Property, and the high solvent concentrations indicate that drum burial and/or spills could be the source of these impacts.
- The extensive amount of fill material still remaining at the Auto Wreckers property indicates that the Auto Wreckers Property may contribute to groundwater impacts in the local area, and may partially contribute to the petroleum and chlorinated solvents detected at the D-F Property. However, the large diameter storm sewers underneath E. Norwich and S. Pennsylvania Avenues and the limited number of groundwater monitoring events (two events over the last 15 years) indicate that the off-site degree/extent of Auto Wreckers contaminant plume cannot be confirmed at this time.

RECOMMENDATIONS

Based on the above summary, it is likely that the source of the impacts encountered at the DF site are from historic dumping at the site of unknown fill and debris.

- Additional investigation (test pits and borings) are needed to confirm the extent of the historic dumping (likely following the topography – where the western area is a higher elevation)
- Place the site on the list of historic fill sites and request site closure using the concrete as a maintenance cap for the property.
- Determine the future land use protecting the maintenance cap.
- If the on-site buildings are demolished, the maintenance cap should be placed over the former building area.

ATTACHMENTS

Attachment A: Site Maps, Tables, and Cross Sections (Ref. 1)

Attachment B: ERM 1999 DF Report (Ref. 1)

Attachment C: Sigma 2012 Phase II (Ref. 3)

Attachment D: STN Report (Ref. 6)

Attachment E: WDNR letter Requesting EPA Assistance (Ref. 8)

REFERENCES:

1. Environmental Resource Management. (March 1999). Final Report - D-F Incorporated, 2517 E. Norwich Avenue, St. Francis, Wisconsin.
2. Environmental Resource Management. (May 2002). Second Quarter 2002 Groundwater Monitoring Report - D-F Incorporated, 2517 E. Norwich Avenue, St. Francis, Wisconsin.
3. The Sigma Group. (November 2012). Phase II Environmental Assessment Activities, Former D-F Inc., 2517 E. Norwich Avenue, St. Francis, Wisconsin.
4. Montgomery Watson. (April 2000). Soil Investigation Report, St. Francis Auto Wreckers, Inc., St. Francis, Wisconsin.
5. North Shore Environmental Construction. (October 2006). Site Investigation, St. Francis Auto Wreckers, St. Francis, Wisconsin.
6. STN Environmental. (June 2009). Final Removal Action Letter Report, St. Francis Auto Wreckers Site, St. Francis, Milwaukee County, Wisconsin.
7. Wisconsin Department of Natural Resources. (June 2004). Site Reassessment Report, St. Francis Auto Wrecker's Site, St. Francis, WI.
8. Wisconsin Department of Natural Resources (August, 2007). EPA Letter Requesting Assistance.

Thank you for your assistance with this very important project. If you have any questions or comments, please feel free to call me at (414) 254-4813 or email me at LFellenz@LFGreendevelopment.com.

Sincerely,

LF GREEN DEVELOPMENT, LLC
Linda J Fellenz
Linda J. Fellenz, Hydrogeologist
President

ATTACHMENT A

SITE MAPS, TABLES, AND CROSS SECTIONS (REF. 1)

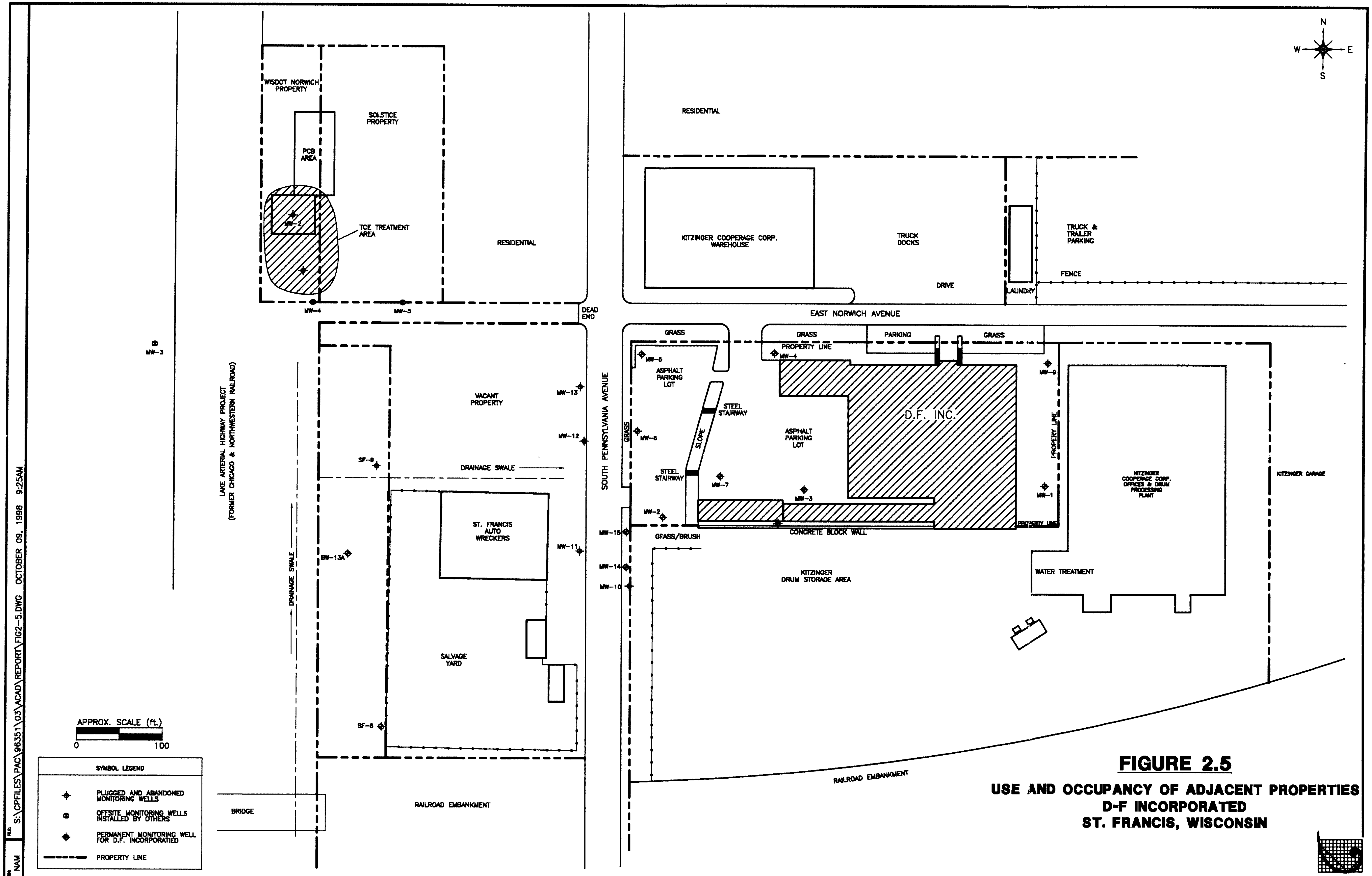

FIGURE 2.5

USE AND OCCUPANCY OF ADJACENT PROPERTIES
D-F INCORPORATED
ST. FRANCIS, WISCONSIN

ERM

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FILE S:\CPFILES\PAC\96351\03\ACAD\REPORT\FIG2-5.DWG OCTOBER 09, 1998 9:25AM

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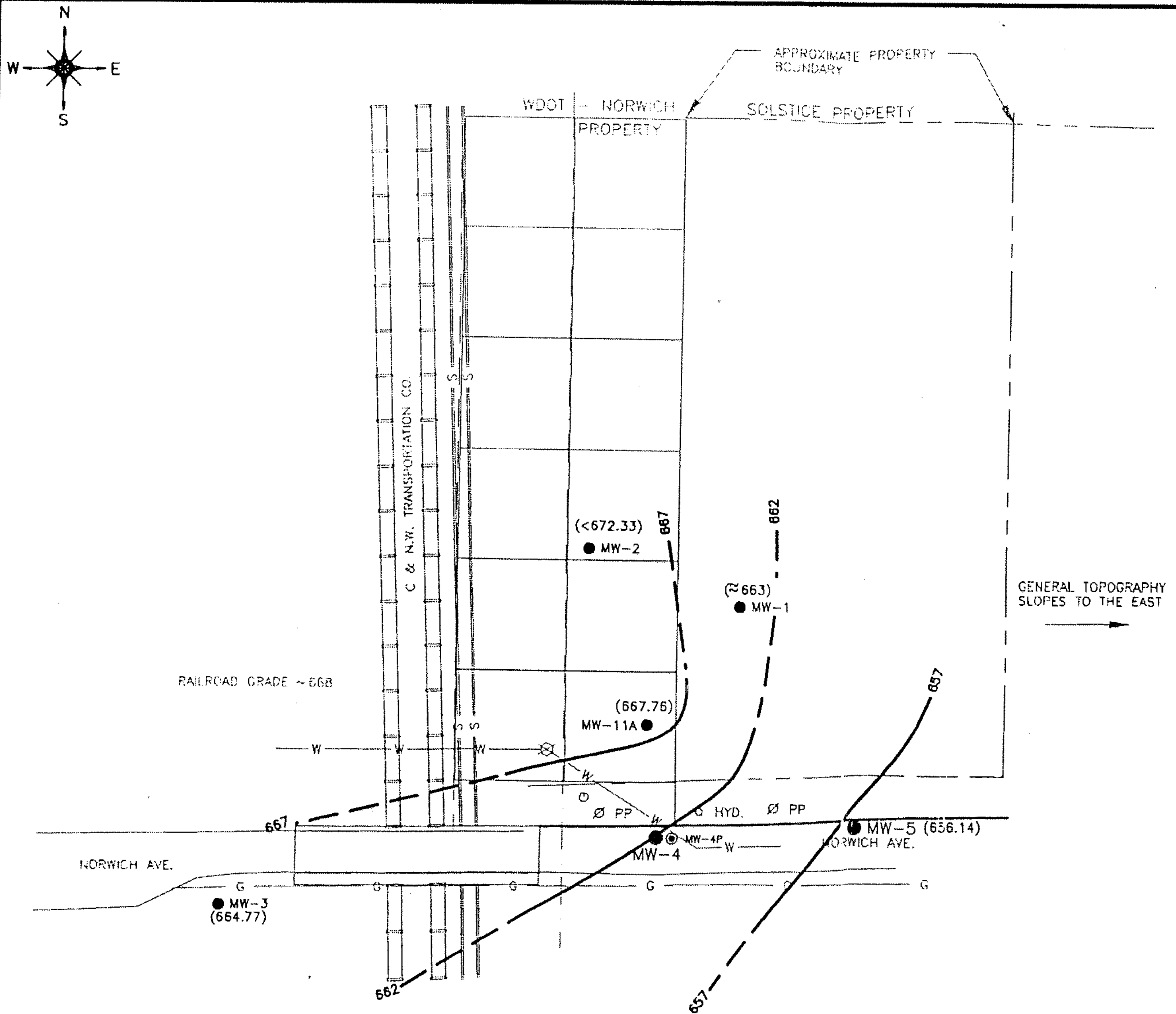


LEGEND

—— S ——	SEWAGE LINE
—— W ——	WATER LINE
—— G ——	GAS LINE
◇ HYD.	HYDRANT
Ø PP	POWER POLE
(656.14) ● MW-5	MONITORING WELL LOCATION
⊙ MW-4P	PIEZOMETER LOCATION
657 ——	GROUNDWATER ELEVATION CONTOUR (CONTOUR INTERVAL = 5FT.)

NOTES

1. MONITORING WELL LOCATIONS ARE BASED ON SURVEYS PREFORMED BY RMT INC.
2. WATER LEVEL DATA BASED ON NOVEMBER 15, 1994 DATA.
3. WATER LEVEL IN MW-1 IS EXTRAPLATED FROM PREVIOUS GROUNDWATER ELEVATION DATA (SEE TEXT).

WATER TABLE CONTOUR MAP
NOVEMBER 15, 1994
WISDOT-NORWICH PROPERTY

RMT INC.

DWN. BY: RBN
APPROVED BY:
DATE: APRIL 1995
PROJ. # 10428.06
FILE # 0609

FIGURE 2.6

LOCATION OF MONITORING WELLS AND APPARENT PIEZOMETRIC SURFACE WIDOT SITE INVESTIGATION ST. FRANCIS, WI

NOTE: MAP OBTAINED FROM RMT INC. OF MADISON

ERM

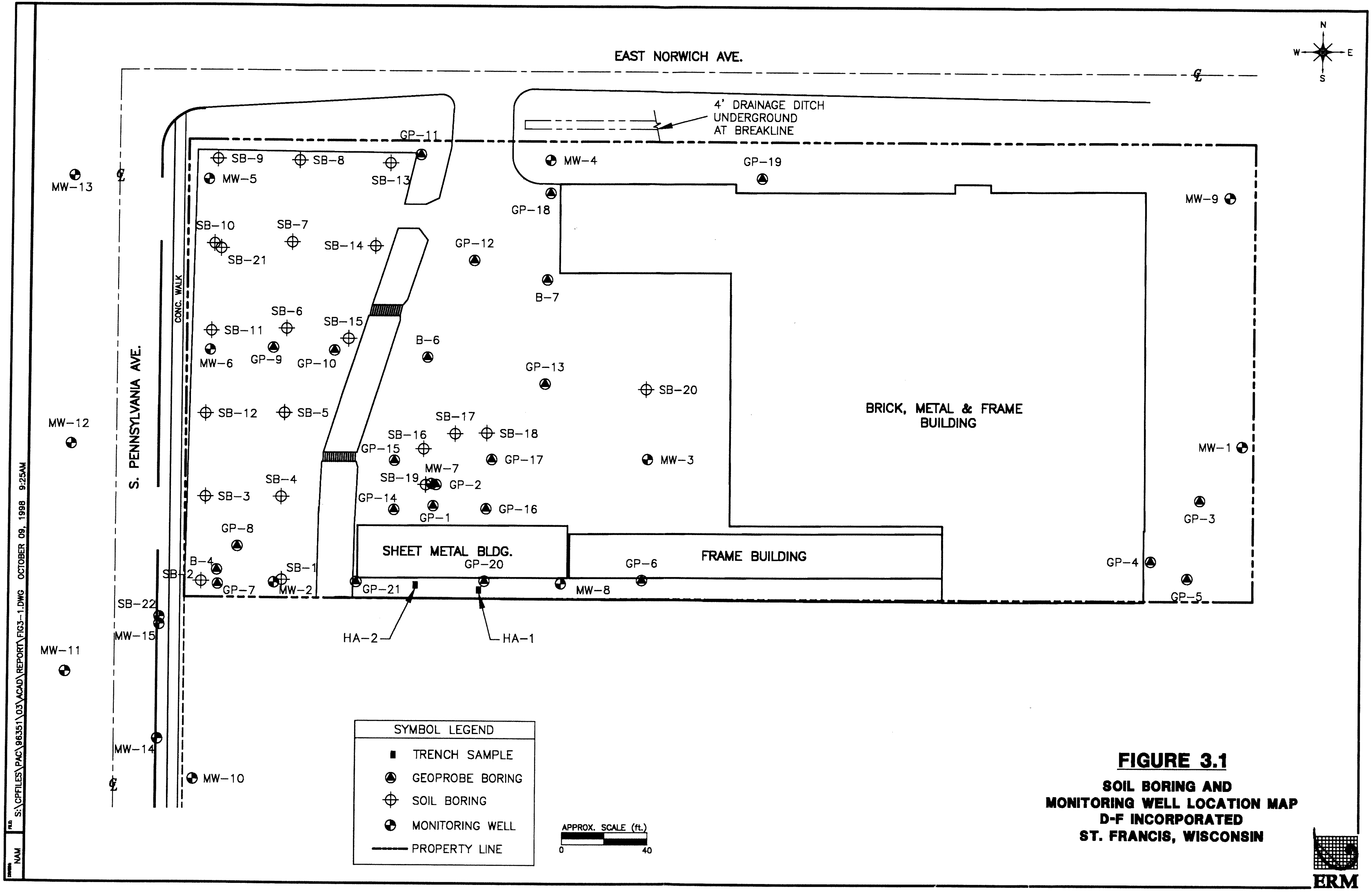
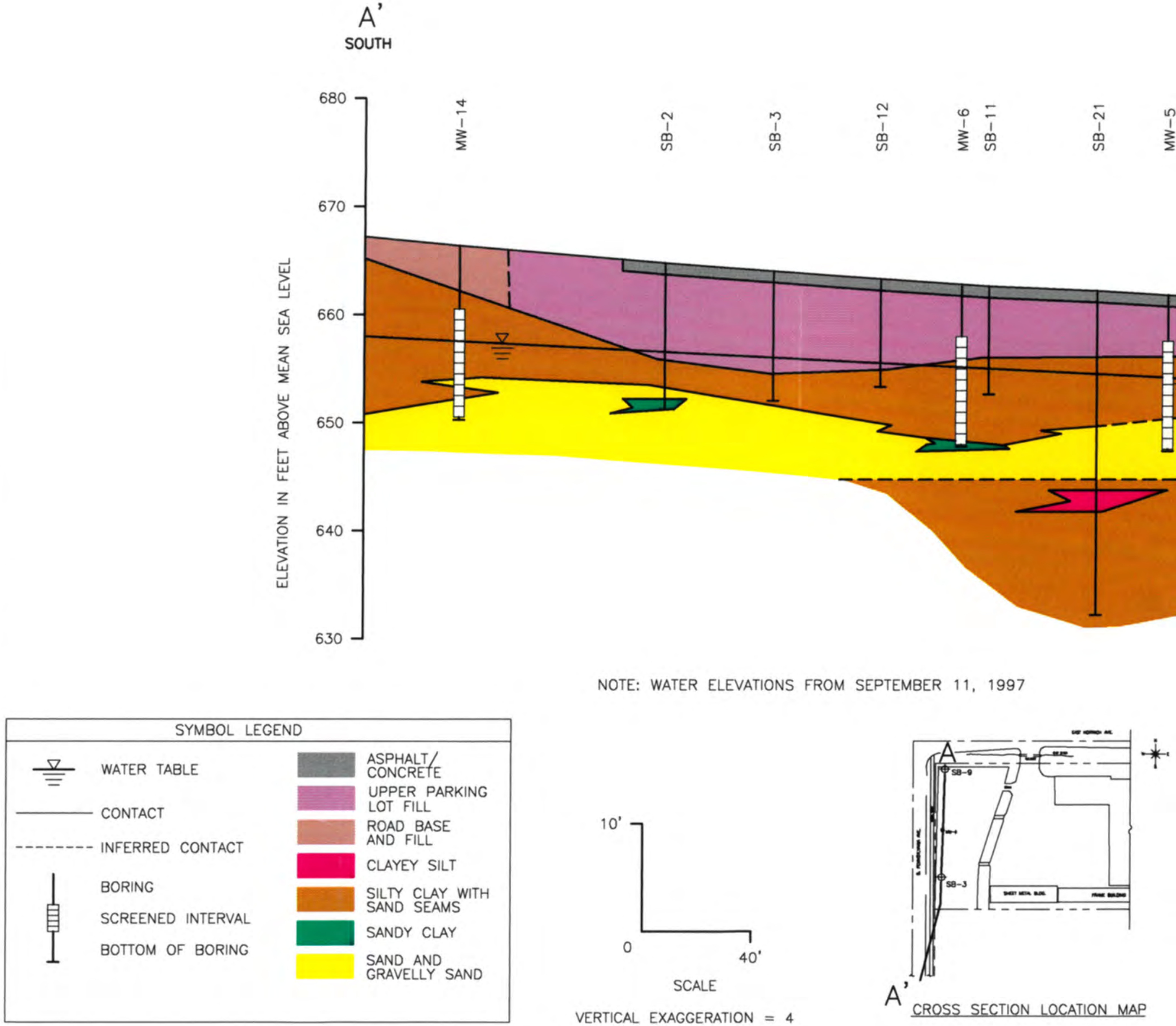


FIGURE 3.1

SOIL BORING AND
MONITORING WELL LOCATION MAP
D-F INCORPORATED
ST. FRANCIS, WISCONSIN



NOTE: WATER ELEVATIONS FROM SEPTEMBER 11, 1997

FIGURE 4.1

GEOLOGIC CROSS SECTION A-A'
D-F INCORPORATED
ST. FRANCIS, WI

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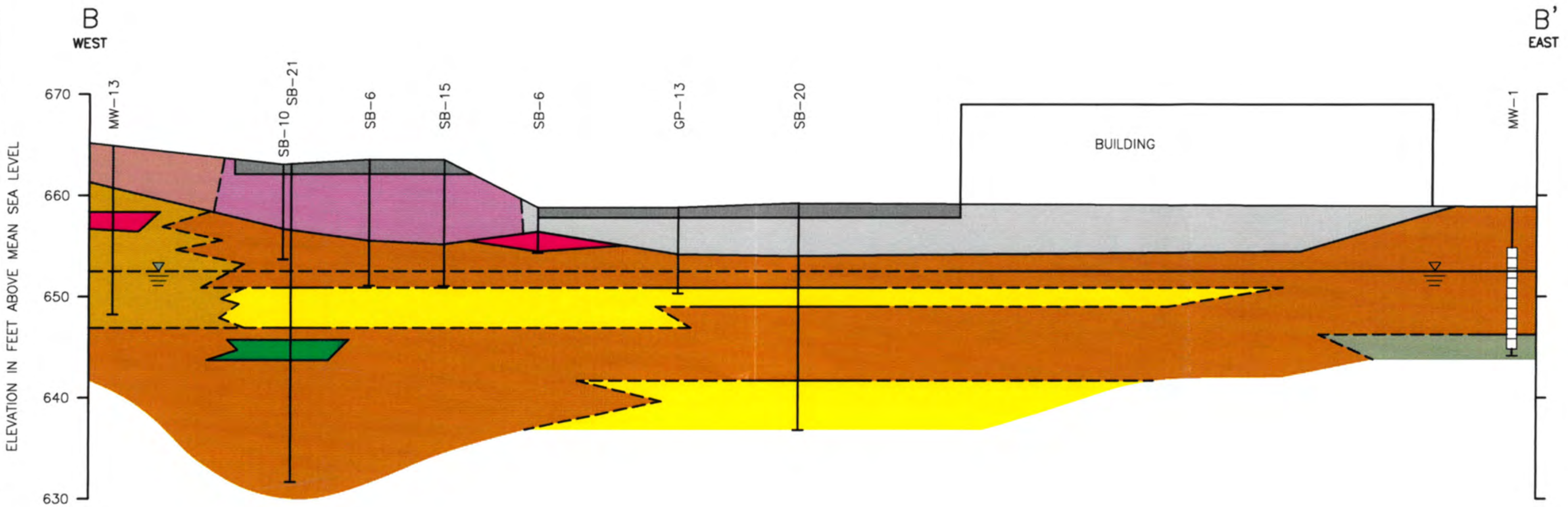
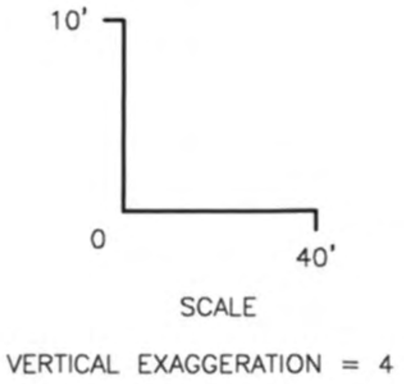
FILE: S:\CPFILES\PAC\96351\03\ACAD\REPORT\FIG4-1.DWG OCTOBER 09, 1998 9:25AM



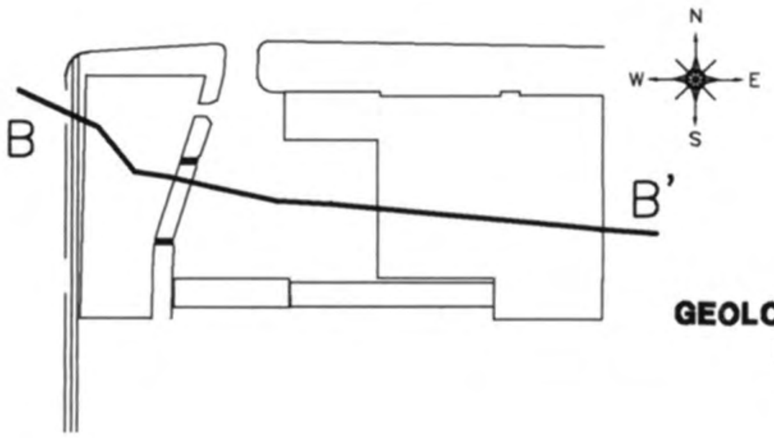
SYMBOL LEGEND

▨	UPPER PARKING LOT FILL	▨	ASPHALT/ CONCRETE
▨	ROAD BASE & FILL	▨	LOWER PARKING LOT FILL
▽	WATER TABLE	▨	CLAY
———	CONTACT	▨	CLAYEY SILT
- - - -	INFERRED CONTACT	▨	SILTY CLAY
- - - -	INFERRED WATER TABLE	▨	SANDY CLAY
	BORING	▨	SILTY SAND
	SCREENED INTERVAL	▨	SAND AND GRAVELLY SAND
	BOTTOM OF BORING		

NOTE: WATER ELEVATIONS FROM SEPTEMBER 11, 1997



VERTICAL EXAGGERATION = 4



CROSS SECTION LOCATION MAP

FIGURE 4-2

GEOLOGIC CROSS SECTION B-B'
D-F INCORPORATED
ST. FRANCIS, WI

ERM

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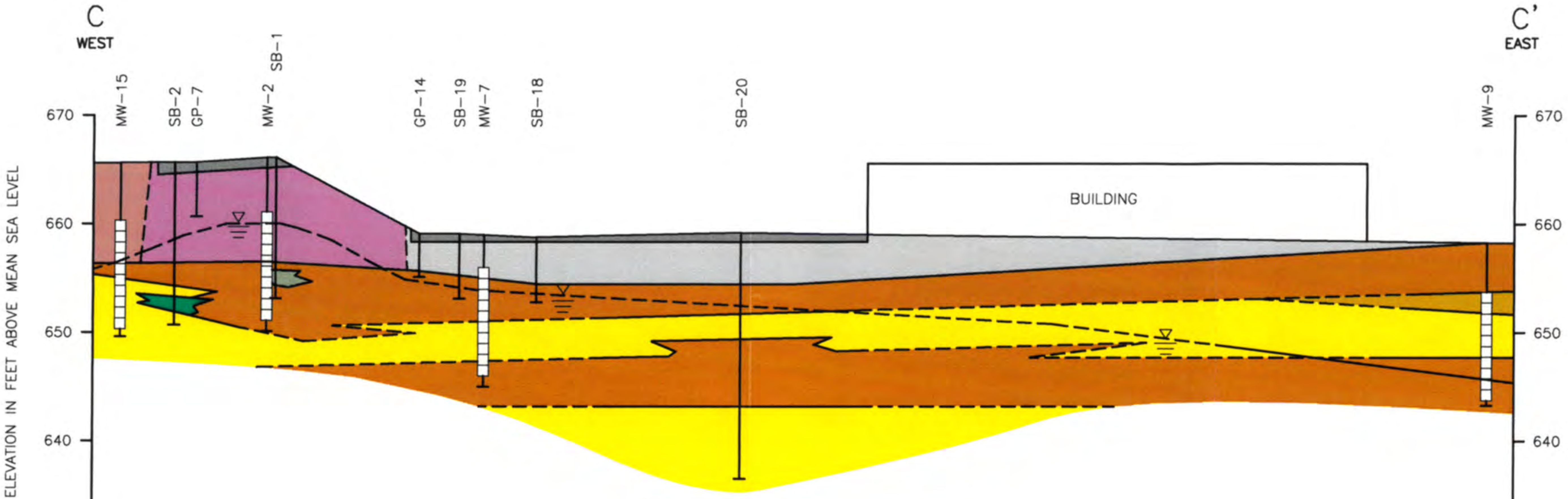
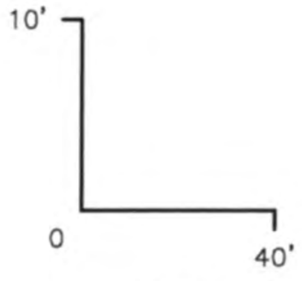


NOTE: WATER ELEVATIONS FROM SEPTEMBER 11, 1997

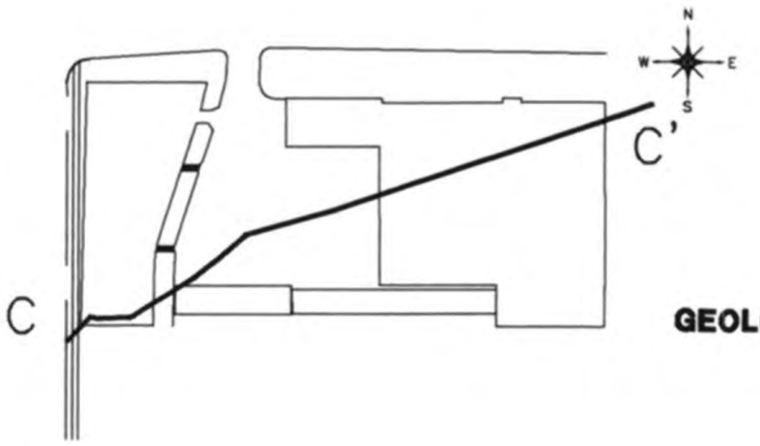
SYMBOL LEGEND

🟪	UPPER PARKING LOT FILL	⬛	ASPHALT/ CONCRETE
🟫	ROAD BASE & FILL	⬜	LOWER PARKING LOT FILL
▽	WATER TABLE	🟩	CLAY
———	CONTACT	🟥	CLAYEY SILT
- - - - -	INFERRED CONTACT	🟧	SILTY CLAY WITH SAND SEAMS
- - - - -	INFERRED WATER TABLE	🟩	SANDY CLAY
│	BORING	🟨	SILTY SAND
▤	SCREENED INTERVAL	🟨	SAND AND GRAVELLY SAND
┴	BOTTOM OF BORING		



SCALE

VERTICAL EXAGGERATION = 4



CROSS SECTION LOCATION MAP

FIGURE 4-3

GEOLOGIC CROSS SECTION C-C'
D-F INCORPORATED
ST. FRANCIS, WI

ERM

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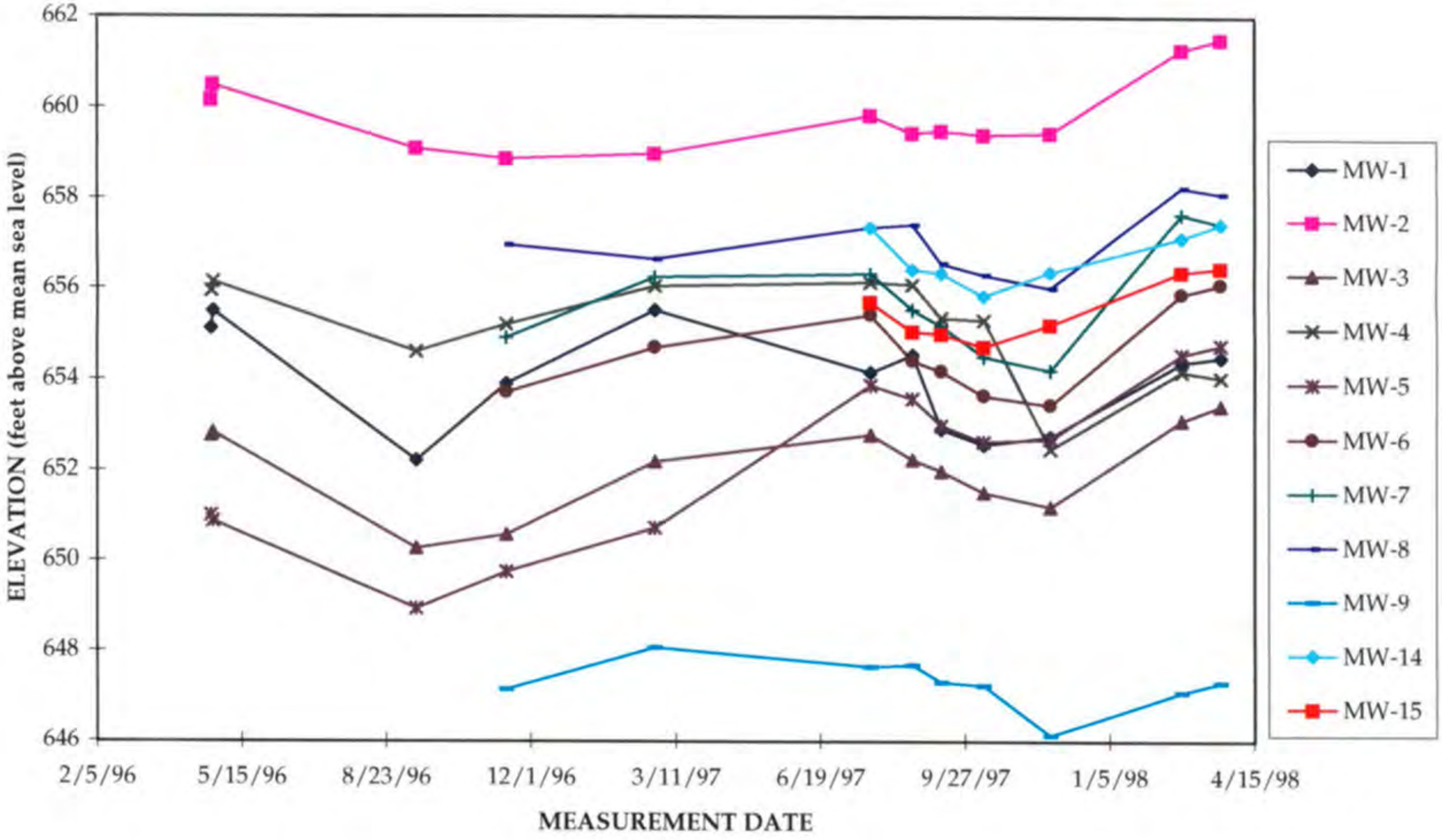
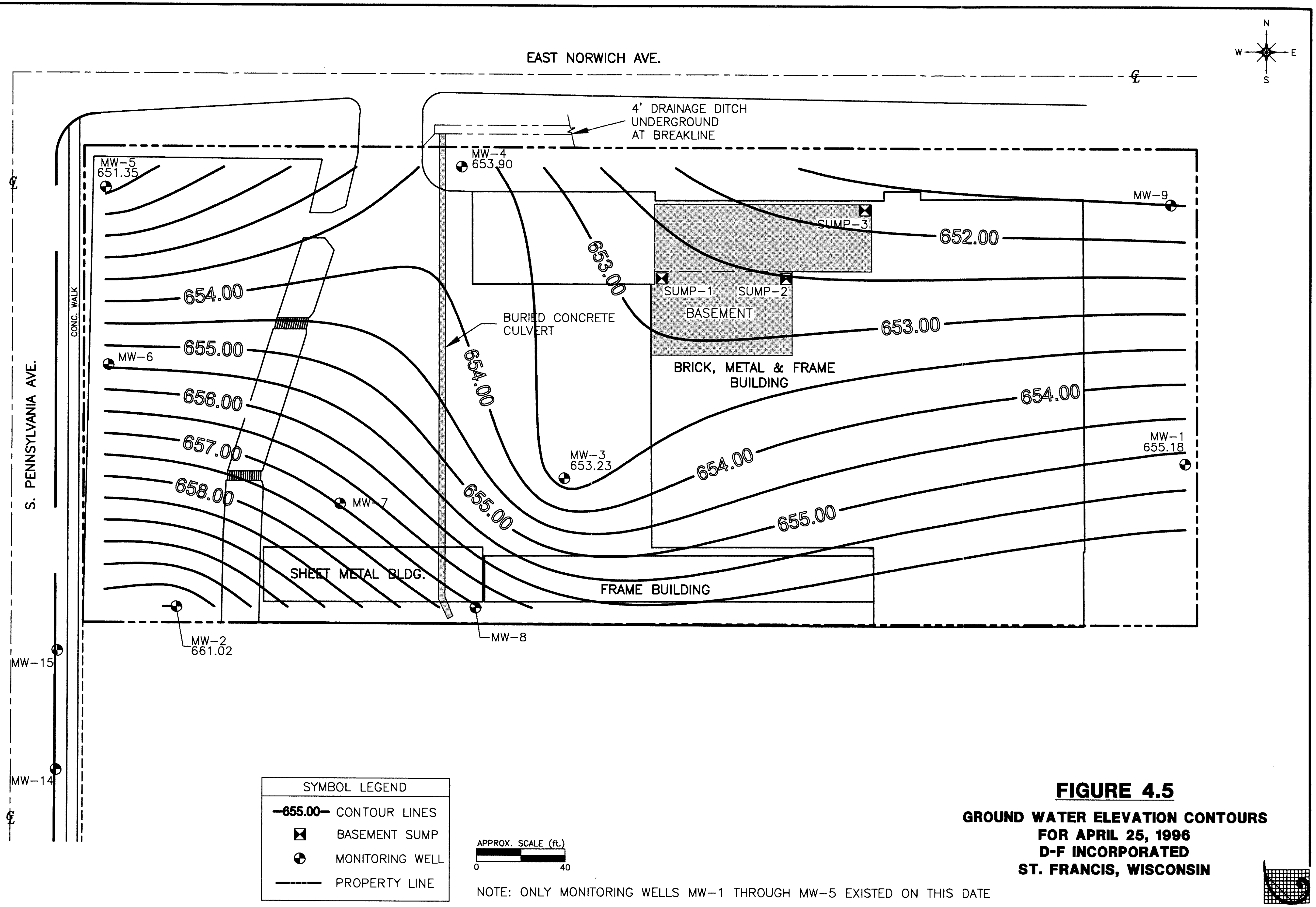
FIGURE 4.4

GROUND WATER ELEVATION HYDROGRAPHS
D-F INCORPORATED, ST. FRANCIS, WISCONSIN



LEVELS2.XLS

ERM



NOTE: ONLY MONITORING WELLS MW-1 THROUGH MW-5 EXISTED ON THIS DATE

FIGURE 4.5

GROUND WATER ELEVATION CONTOURS
FOR APRIL 25, 1996
D-F INCORPORATED
ST. FRANCIS, WISCONSIN

FILE: S:\CPFILES\PAC\96351\03\ACAD\REPORT\FIG4-5.DWG OCTOBER 09, 1998 9:25AM
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ATTACHMENT B

ERM 1999 DF REPORT (REF. 1)

FINAL REPORT

DEPARTMENT OF
NATURAL RESOURCES
SED

1999 MAR 15 PM 4:32

D-F Incorporated
2517 East Norwich Avenue
St. Francis, Wisconsin

March 8, 1999

Project No. 96351

Environmental Resources Management
700 West Virginia Street, Suite 601
Milwaukee, Wisconsin 53204

ERM®

ENVIRONMENTAL RESOURCES MANAGEMENT GROUP

EXECUTIVE SUMMARY

The D-F Incorporated property is a former manufacturing facility located at 2517 East Norwich Avenue in St. Francis, Wisconsin (the "Site"), consisting of approximately 1.9 acres containing a complex of buildings that housed administrative and engineering departments and a manufacturing plant. Asphalt-paved parking areas cover a portion of the western half of the Site. The facility manufactured electronic and metal components for defense industry contracts from the late 1940s until August, 1996.

An environmental site inspection was performed in December, 1995 prior to the shutdown of the facility. The environmental site inspection identified two potential environmental concerns: (1) surface run-off from a drum recycling facility and an auto salvage yard located topographically upgradient to the south and southwest, respectively; and (2) a trichloroethene (TCE) aboveground storage tank (AST) used on site for a period of 4 or 5 years from the late 1960s through the early 1970s.

A subsurface investigation to obtain information regarding these concerns was begun in January 1996. The scope of this investigation subsequently was expanded to define and identify the sources for the complex contaminant distribution encountered in the subsurface. The investigative activities include quarterly ground water sampling events performed since September 1996, to further characterize ground water flow and contaminant distribution.

The results of these investigative activities have revealed the following information regarding Site conditions.

SITE PHYSICAL FEATURES

The Site is rectangular in shape with an upper parking area on the western side of the Site, and lying up to 7 feet higher than the lower parking area and buildings occupying the remainder of the Site to the east. Fill material was placed beneath the two parking areas at different times up through approximately 1970. The thickness of fill material in the upper parking area is as much as 10 feet, and approximately 3 feet in the lower parking lot. Site operations commenced in the early 1950s and consisted of one small building on the east side. Subsequent building additions occurred, the latest in 1967.

The neighboring industrial properties located south and southwest of the Site are both topographically and hydrologically upgradient of the Site.

These properties, St. Francis Auto Wreckers (located to the southwest of the Site) and Kitzinger Cooperage Corporation (located south and east of the Site), commenced operations in the late 1940s and early 1950s. Historical aerial photographs indicate multiple uses of the property located to the south of the Site, including an automobile salvage yard operated by unknown entities, and a drum storage area operated by Kitzinger Cooperage Corporation (Kitzinger).

Aerial photographs taken prior to the placement of fill material on the western portion of the Site show vegetation patterns that indicate the original land surface was low lying, including a small surface water drainage emanating from the Kitzinger property to the south. The placement of fill material on the Site and on adjacent properties affected the surface water flow patterns and raised the local water table. Site improvements during the 1950s and 1960s included building additions, a concrete culvert for channeling surface water flow from south to north across the Site, and a cinder block wall along much of the southern boundary of the Site (Figure E-1).

SHALLOW GROUND WATER FLOW PATTERNS

Regional shallow ground water flow in the vicinity of the Site is to the northeast. Historically, the surface water flow at the Site was to the north across the southern boundary of the Site, and to the north and east across the Site. Prior to and after the placement of fill material, local shallow ground water flow remained consistent with regional shallow ground water flow. Currently, shallow ground water flow on the western portion of the Site continues to the north and northeast (Figure E-1). However, the cinder block wall constructed in the 1960s along much of the southern boundary of the Site locally diverts shallow ground water flow to the west and east around the wall before ground water continues to flow north across the Site. The presence of the cinder block wall results in a high hydraulic head at monitoring well MW-2 (see Figure E-1), in the southwestern portion of the Site. The hydraulic head, along with a buried natural gas utility line near the southern boundary of the Site, contribute to a localized ground water flow component to the east from the upper parking lot area to the lower parking lot area and to the west towards South Pennsylvania Avenue (Figure E-1). A storm sewer located in the right-of-way immediately adjacent to the western edge of the upper parking area may also provide a preferential pathway for ground water flow to the north (Figure E-1). In addition, an underground drainage culvert extending from at least the southern boundary of the Site to East

Norwich Avenue, in approximately the location of the historic surface water pathway (Figure E-1), serves as a conduit for ground water flow onto and across the Site from the south and from the Site itself to the north.

SITE CONTAMINATION OVERVIEW

The Site investigation focused on three groups of ground water constituents: metals, chlorinated organic compounds, and petroleum-related volatile organic compounds (PVOCs). Dissolved metal concentrations are below the Chapter NR140 enforcement standards (ESs) except at MW-15 located off site to the southwest and at MW-2 in the extreme upgradient corner of the Site where concentrations of chromium and lead regularly exceed the ES and where cyanide has sometimes exceeded the ES.

The Site exhibits elevated concentrations of chlorinated organic compounds exceeding the respective ESs in the shallow ground water, with the highest concentrations occurring in the southwestern portion of the Site near the southern property boundary and decreasing across the Site to the north and east. Chlorinated organic compounds present at levels exceeding an ES are trichloroethene (TCE) and 1,1,1-trichloroethane

(TCA) and their breakdown products, including vinyl chloride. The distribution of both chlorinated ethenes (TCE and its breakdown products) and chlorinated ethanes (TCA and its breakdown products) are depicted in Figures E-2 and E-3.

PVOCs have been detected at elevated concentrations exceeding the ESs, with the highest concentrations occurring in the southwestern portion of the Site, as well as off-site to the southwest. PVOC concentrations decrease across the Site to the north and east as shown in Figure E-4. The PVOCs identified at the Site are primarily toluene and xylene.

SITE CONTAMINATION AS RELATED TO SHALLOW GROUND WATER

Measurements of ground water elevations over a 2-year period indicate that the water table and the capillary fringe extend to, or nearly to, the ground surface over the contaminated portion of the Site. Additionally, all soil samples obtained in the area of contamination have been influenced by ground water contamination. Therefore, the Site soil and ground water contamination is related to the migration of one or more ground water constituent plumes, as depicted in Figures E-2 through E-4.

SHALLOW GROUND WATER CONTAMINATION

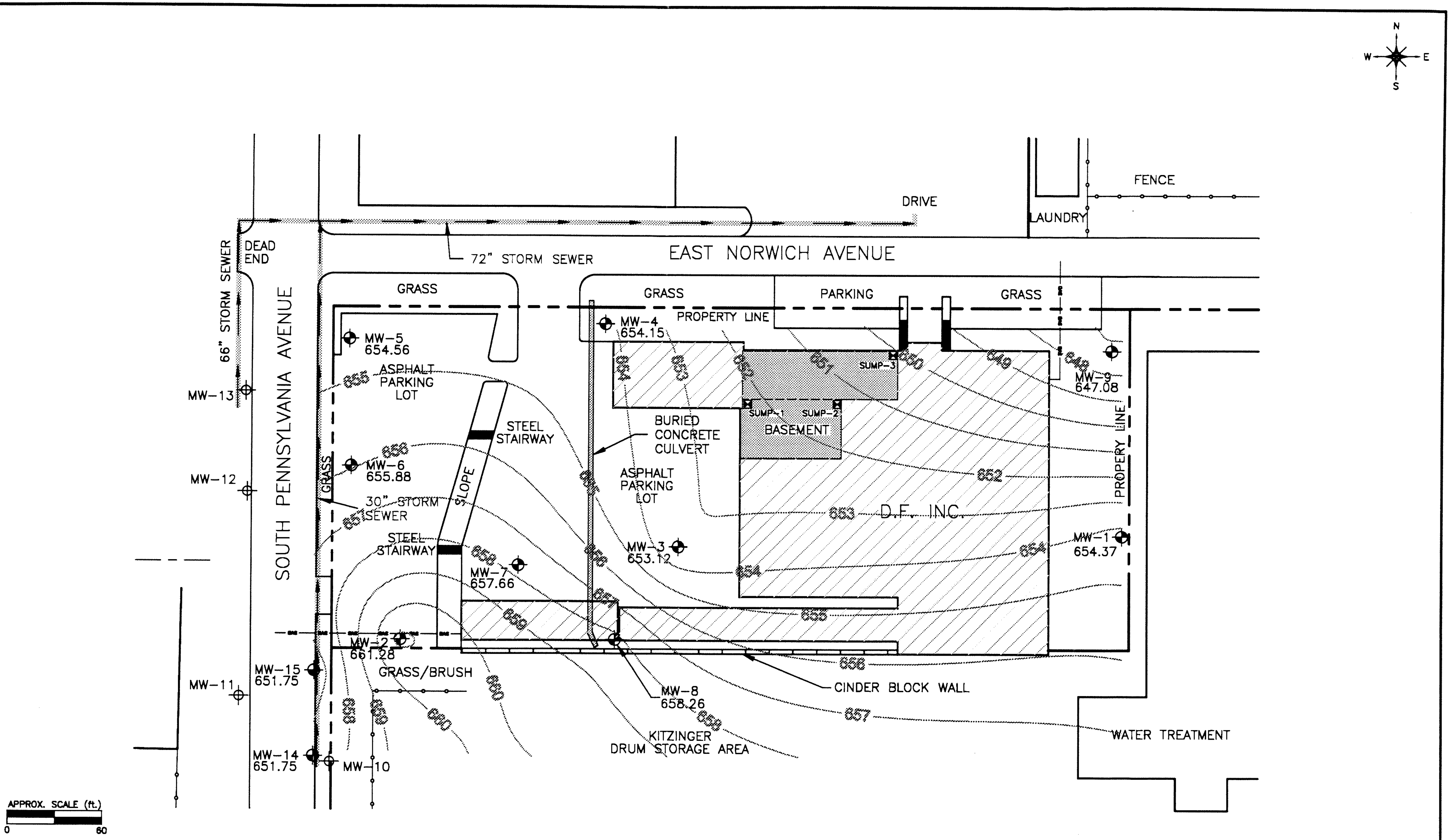
The information developed by this investigation has revealed two shallow ground water constituent plumes: one containing TCE and TCA, and their breakdown products emanating from a source to the south of the Site, and another containing petroleum constituents emanating from a source to the southwest of the Site. Additionally, the samples collected from the concrete culvert beneath the Site revealed the presence of TCE, TCA and their breakdown products, including vinyl chloride; and the PVOCs toluene and xylenes. Concentrations of TCE, TCA, and their initial breakdown products generally decrease across the Site from their highest concentrations in the southwest corner at monitoring well MW-2. The distribution of further breakdown products of TCE and TCA such as vinyl chloride is consistent with the existence of current and historic off-site sources of these compounds. The cinder block wall along the southern boundary of the Site diverts shallow ground water flow from south of the Site to the vicinity of MW-2, and from there, north across the Site. Preferential pathways, including buried utility lines, likely contribute to the spread of chlorinated organic compounds, both to the east from MW-2 and to the north along South Pennsylvania Avenue. TCE, TCA, and their breakdown products in shallow ground water in the vicinity of the former TCE AST primarily have resulted from the flow of contaminated ground water from the south and not from historic operations associated with the TCE AST. The investigation considered but did not identify any significant releases of TCE at the tank location. Therefore, any minor releases that may have occurred from the TCE AST have not exacerbated current shallow ground water conditions at the Site.

In general, PVOC concentrations decrease from southwest to northeast across the Site; the highest concentration of toluene and xylene occurring off-site to the southwest at monitoring well MW-15. This suggests that MW-15 is closer to the source of these constituents than monitoring wells MW-2 or MW-7. The investigation has revealed no release of petroleum products on the Site which would explain the elevated PVOC concentrations. However, the property owner adjacent to the Site to the southwest, St. Francis Auto Wreckers, has maintained a motor vehicle scrap operation since at least the early 1950's to the present.

The analytical data developed during this investigation show that the concentrations of TCE, TCA, and their breakdown products and PVOCs are higher in ground water samples than in soil samples obtained from the capillary fringe portions of the fill material in the upper and lower parking areas. Therefore, fill material placed in the upper and lower parking areas is not a source of the contamination identified in the shallow ground water beneath the Site.

SUMMARY

The investigation has identified the presence of contamination within the shallow ground water at the Site. Shallow ground water flows from south to north across the Site. The shallow ground water contamination on the Site is primarily, if not entirely, caused by off-site sources to the south and southwest of the Site. In particular, there is a petroleum constituent plume emanating from an off-site source located to the southwest, and a chlorinated organic compound plume emanating from an off-site source south of the Site. The investigation has not revealed any evidence of releases from the former TCE AST, and contamination in the vicinity of the former tank appears to be attributable to shallow ground water flow from an off-site source. Fill material does not appear to be contributing to the ground water problems at the Site. Additional work is necessary to delineate fully the horizontal and vertical degree and extent of ground water contamination at the Site and the surrounding properties and to assess the nature of the upgradient off-site sources.



SYMBOL LEGEND

- ⌖ ABANDONED MONITORING WELLS
- ● 651.75 MONITORING WELL SHOWING WATER TABLE ELEVATION
- — PROPERTY LINE

FIGURE E-1

PROMINENT SITE FEATURES AND GROUND WATER CONTOURS OF FEBRUARY 25, 1998
D-F INCORPORATED
ST FRANCIS, WI

ERM

DRAWN NAM
FILE S:\CPFILES\PAC\96351\03\ACAD\REPORT\FIGE-1.DWG OCTOBER 09, 1998 9:25AM

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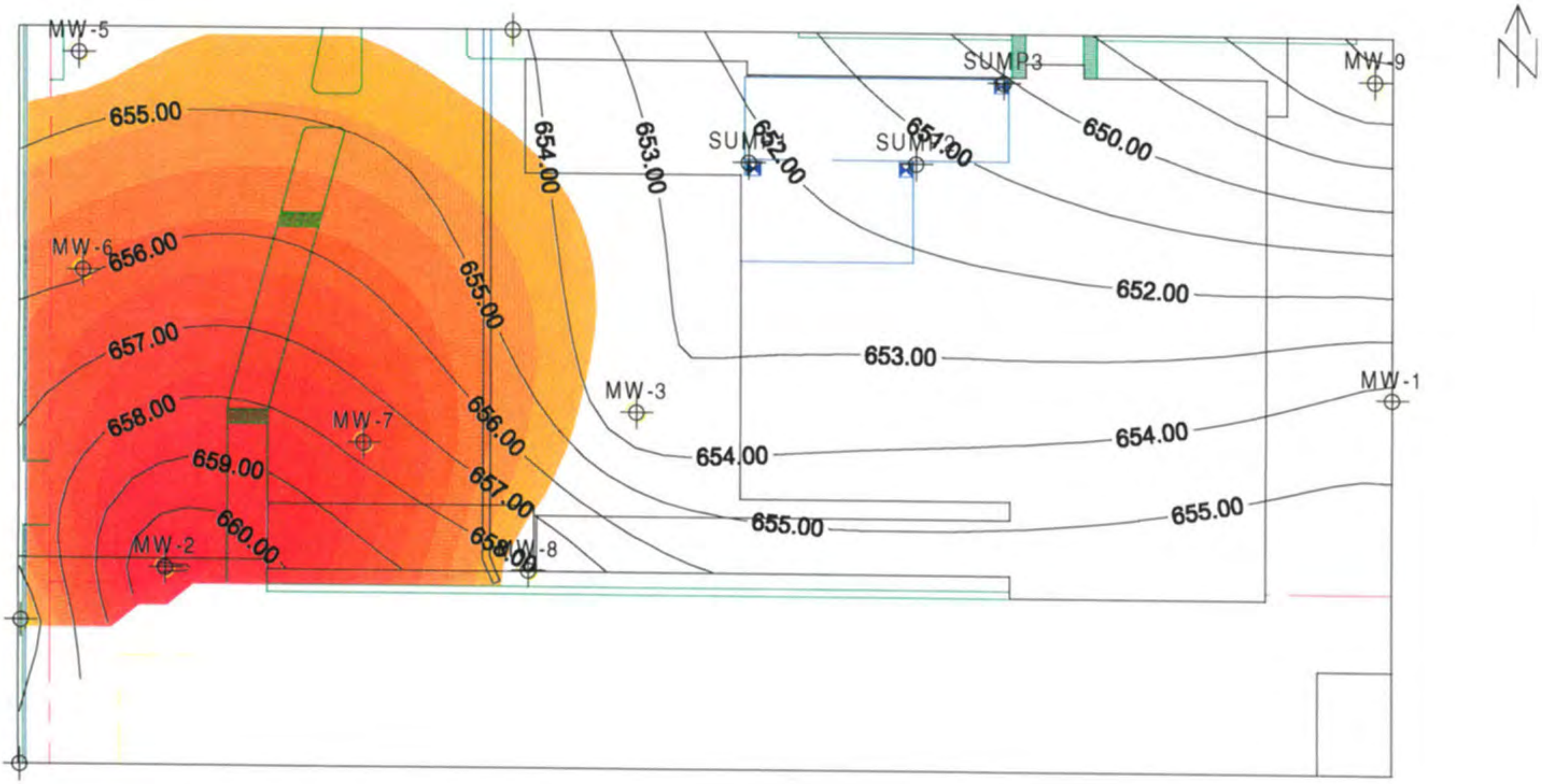

CONCENTRATION (ug/l)

5000 15000 25000 35000 50000

Scale in feet

0 60 120

FIGURE E-2

DISTRIBUTION OF CHLORINATED ETHENES IN GROUND WATER AND GROUND WATER CONTOURS OF FEBRUARY 24-25, 1998 D-F INCORPORATED, ST. FRANCIS, WISCONSIN

ERM

DRAWN: FILE:

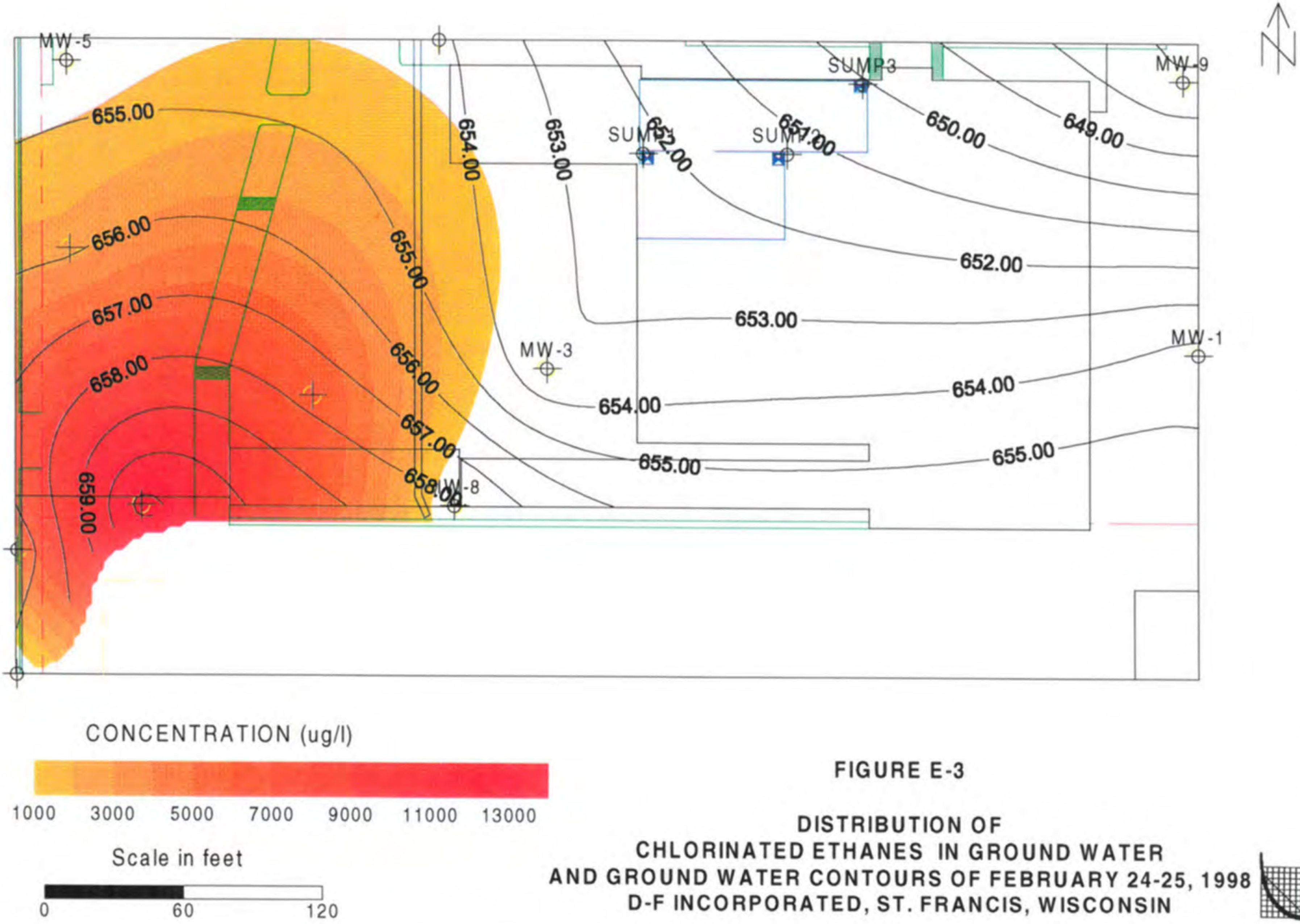

FIGURE E-3

**DISTRIBUTION OF
CHLORINATED ETHANES IN GROUND WATER
AND GROUND WATER CONTOURS OF FEBRUARY 24-25, 1998
D-F INCORPORATED, ST. FRANCIS, WISCONSIN**

ERM

DRAWN:

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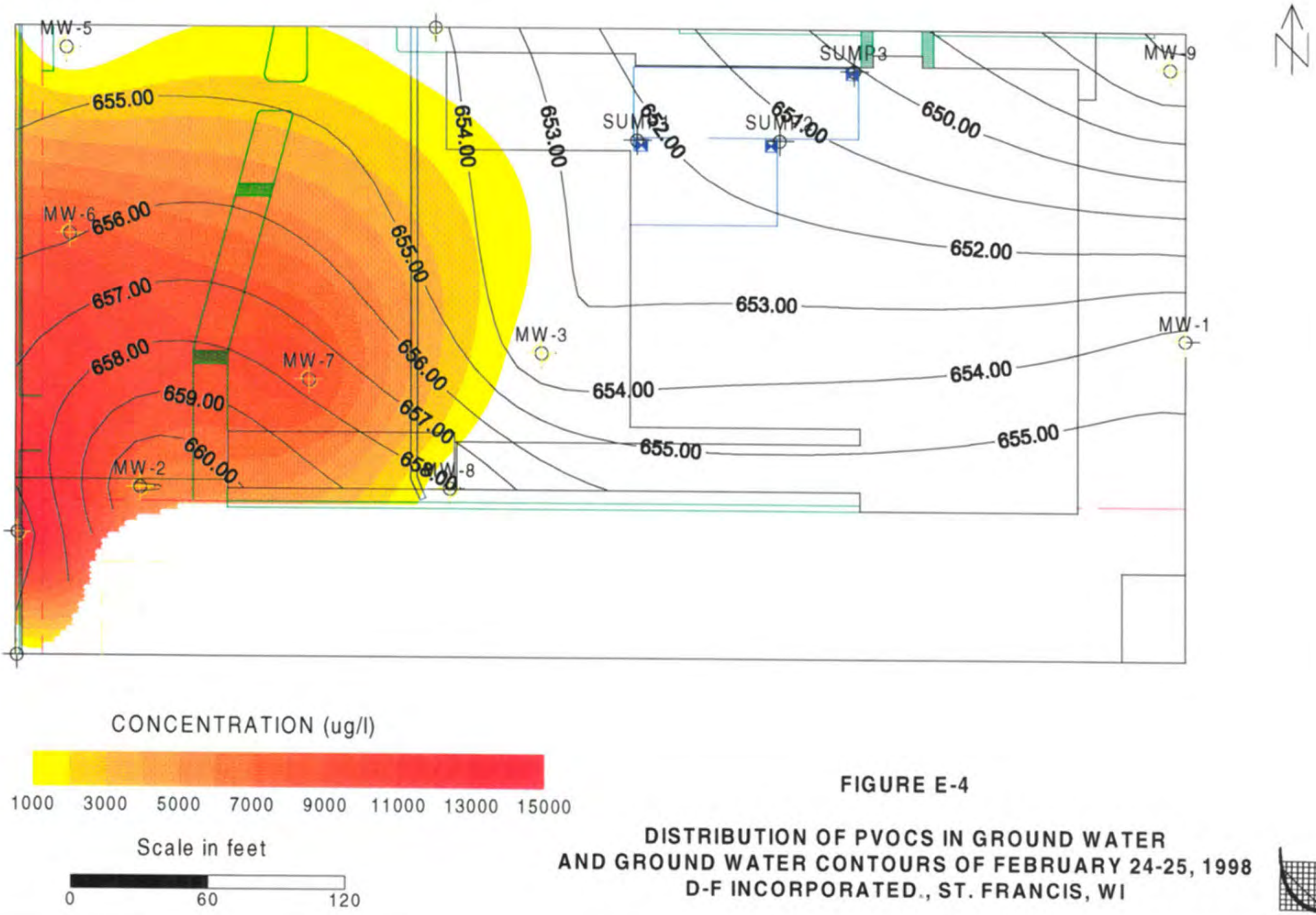

FIGURE E-4

DISTRIBUTION OF PVOCS IN GROUND WATER
AND GROUND WATER CONTOURS OF FEBRUARY 24-25, 1998
D-F INCORPORATED., ST. FRANCIS, WI

ERM

1.0 *INTRODUCTION*

The D-F Incorporated property is a former manufacturing facility located at 2517 East Norwich Avenue in St. Francis, Wisconsin, (the "Site") consisting of approximately 1.9 acres with a complex of buildings which housed administrative and engineering departments, a manufacturing plant and asphalt-paved upper and lower parking areas. The facility manufactured electronic and metal components for defense industry contracts from the late 1940s until August, 1996. The location and layout of the Site are illustrated in Figures 1.1 and 1.2, respectively.

In December, 1995, an environmental site inspection was performed in preparation for shutdown of the facility. Among its findings, the inspection identified potential environmental concerns as: (1) surface run-off from a drum recycling facility and an auto salvage yard located topographically upgradient to the south and southwest, respectively, and (2) a trichloroethene (TCE) aboveground storage tank (AST) used on the site for a period of 5 to 7 years during the late 1960s through the early 1970s . To investigate these concerns, a subsurface investigation was conducted on the Site in January, 1996. Three additional soil and ground water sampling efforts followed in April, 1996; November, 1996; and July and August, 1997 to define and identify the sources for the complex contaminant distribution encountered in the subsurface. Additionally, five quarterly ground water sampling events have been conducted beginning in September, 1996 and extending through February, 1998 to further characterize ground water flow and contaminant concentrations. Two additional ground water sampling events have occurred since February, 1998; but have not been included in this report.

This report has been prepared by Environmental Resources Management (ERM) and Petroleum Automation Consultants, Inc. (PAC) to present relevant site background and subsurface investigation data and discuss sources and migration pathways for contaminants found at the Site. The report is divided into the following six sections which are described below:

- Section 2.0, Site Background, presents the findings of environmental site inspections and research regarding site history, and the historical use of adjacent properties.

- Section 3.0, Investigative Methods, describes the methods used by, Maxim Technologies, Inc. (Maxim) and ERM during subsurface investigations and ground water monitoring to gather data concerning the site geology, hydrogeology, and contaminant concentrations.

- Section 4.0, Investigative Results, presents specific data from soil borings, trenches, ground water monitoring wells, and laboratory analyses concerning site geology, hydrogeology, and the nature and extent of contaminants encountered. Relevant information regarding the regional geology and hydrogeology is also presented.
- Section 5.0, Contaminant Fate and Persistence identifies the potential factors influencing the persistence of contaminants in the subsurface at the Site.
- Section 6.0, Site Conceptual Model identifies the contaminant sources, and migration pathways within the subsurface at the Site.
- Section 7.0, Conclusions, summarizes the conclusions of the investigation findings to date, including the apparent contaminant sources. Recommendations are made for future actions regarding the Site.
- Section 8.0, Recommendations for extended investigations.

2.0 *SITE BACKGROUND*

2.1 *OPERATIONS*

Operations at the site included development and manufacture of metal and electronics components for defense industry contracts from the late 1940s until August, 1996. The metal manufacturing processes included a small foundry, machine and tool shop, and a welding and brazing area. Electronics components and finishing processes included a degreasing, etching, and plating area and paint booth. During the site reconnaissance, the machine and tool shop, and the degreasing, etching, and plating room and paint booth were identified as waste generating processes. The small foundry unit was not operating and reportedly out of service since the early 1970s. Welding and brazing waste consisted of ground metal dust, used welding rods, and scrap metal pieces.

The machine and tool shop used cooling fluids and cutting oils to reduce friction during shaping, cutting, and drilling metal parts. New fluids and oils were stored inside the machine shop in 30- and 55-gallon drums. Used or spent cutting fluids were returned to the drums and stored inside, at the rear of the machine shop for off-site recycling. Storage bins and empty drums were used to store metal shavings; and carbon, stainless, and exotic scrap metals. Signs identified each storage area for new or waste materials, and handled off site as recycle or hazardous waste.

A degreasing, etching, and plating room occupied the east and southeast of the manufacturing area of the Site. This area was constructed on a concrete floor overlaying a slanted concrete basin draining to a concrete-lined sump. Degreasing, etching, and plating vats were situated in process rows according to each etching or plating technique set on level stainless steel grate flooring above the concrete basin. The sump pump was connected to a stainless steel pipe routed and connected to a wastewater treatment system. Process plating chemicals were stored in the plating room or a chemical storage area near the wastewater treatment room south of the plating room. All chemicals were stored inside the building in compatible containers and according to the contents. New solvents used for degreasing and painting (TCE, TCA, methylene chloride, xylene, toluene, and MEK), were stored in 55-gallon drums in a central storage area (prior to receiving TCE in 55-gallon drums, virgin TCE was supplied in bulk to an approximately 200-gallon aboveground tank). Waste or spent solvents were returned to the empty 55-gallon drums and staged inside the machine shop awaiting pick up and off-site treatment.

Etching and plating wastes were collected and stored in the chemical storage area near the wastewater treatment system. Waste containing precious metals such as silver, nickel, and gold were collected and stored for pick up and off-site reclamation. The remaining process wastes were sent to the wastewater treatment plant for total metal reduction, neutralization, and dewatering. The system discharged into a permitted municipal sanitary system. The dewatered filter cake and plating sludge were collected in totes, stored inside, and picked up for off-site hazardous waste treatment.

A small paint booth was located in the center of the barracks building and contained a paint storage cabinet, vented spray booth and work bench. New paint was stored in quart and gallon sizes. Solvents were stored in 1- and 5-gallon containers. The paint and solvent waste were manually transferred from the paint booth to centrally located waste drums in the machine shop. Waste paint was segregated into one drum and solvents into another.

2.2 *SITE RECONNAISSANCE*

Inspection of the Site and adjacent properties revealed that the regional surface drainage is towards the northeast as evidenced by the drainage patterns of the small watersheds. However, the subsequent increase in urban development (both residential and industrial) in the area of the Site may have altered the surface drainage conditions locally.

Site reconnaissance revealed drainage ditches both on the north side and the south side of the active operations of the St. Francis Auto Wreckers property. These drainage ditches allow surface water to flow westward on the south side, but eastward on the north side, of the St. Francis Auto Wreckers property. Precipitation that falls on the Kitzinger property to the south accumulates as run-off and migrates northward onto the Site. Evidence of surface water run-on to the Site can be seen on the hill separating Kitzinger's drum storage area and the sheet metal building located on the Site. A drainage ditch (shown on Figure 1.2) exists on the northern boundary of the Site along East Norwich Avenue. Water entering this ditch flows parallel to the Site, eastward into a storm sewer catchment.

A 3-foot diameter concrete culvert also discharges water into this ditch from the south. This culvert, the location of which is shown in Figure 2.1, transects the Site beginning south of the sheet metal building, and trends due north to the drainage ditch along East Norwich Avenue. A manhole, located within the sheet metal building, allows access to this culvert on the upstream end. An exposed discharge occurs at the ditch. This storm sewer was likely constructed sometime between 1962 and 1967, before the sheet metal building was constructed. This storm sewer likely was constructed to prevent flooding of the sheet metal building and other areas of the Site due to the ground water seep (as shown in the 1962 aerial photograph, Figure 2.2) which stems from the Kitzinger property.

A natural gas line that branches from the gas main located beneath South Pennsylvania Avenue and feeds into the sheet metal building crosses beneath the upper parking area of the Site. This gas line, shown in Figure 2.1, was likely installed at the same time the sheet metal building was constructed (i.e., between 1963 and 1967).

The 1970 addition to the brick, metal, and frame building included a basement (Figure 2.1). This basement includes three ground water collection sumps. An inspection of these sumps indicates that the sump pumps are not operational. The water levels in these sumps appear to have remained static for a long period of time. It is possible that with the construction of the 72-inch-diameter storm sewer beneath East Norwich Avenue, the ground water levels dropped below the operational elevations of the sumps.

2.3 *INTERVIEWS*

During the facility inspection portion of the Phase I ESA in December 1995, PAC conducted interviews with D-F Incorporated personnel knowledgeable of the facility's past and present activities.

Mr. Dale Kadlec, a D-F Incorporated employee since 1969, accompanied PAC during the facility inspection and provided additional information through subsequent interviews. Mr. Kadlec was responsible for hazardous waste storage and handling, process waste disposal, environmental permit maintenance, and recordkeeping. Mr. Kadlec kept extensive waste manifest records dating back to 1982 and was able to retrieve those files for review. The records indicate that D-F Incorporated maintained small quantity generator status for waste storage and disposal. According to the records, D-F Incorporated generated degreasing and paint solvents including organic solvents (methyl ethyl ketone, toluene, and xylene) and chlorinated solvents (TCE, methylene chloride, and TCA). Electroplating waste from plating operations included electroplating wastewater treatment sludge, rinse waters, and hydroxides. Cutting and lubricant oils from machinery operations were stored in drums and recycled or reclaimed.

According to Mr. Kadlec, new product was received in 55-gallon drums, and stored and processed inside the plant. The process waste was then placed in drums and shipped for disposal. The records document off-site transportation and disposal from 1982 through 1993. Annual Hazardous Waste Report records indicated no hazardous waste activity in 1994 due to a decrease in manufacturing.

When questioned regarding waste handling prior to 1982, Mr. Kadlec reported that new product was purchased in 55-gallon drums, Wastes were placed in empty drums and returned to vendors with shipping tickets. No record of waste disposal prior to 1982 was available for review by PAC. Mr. Kadlec denied any on-site disposal of any solvents by D-F Incorporated.

Mr. Kadlec indicated during the interview that an approximately 200-gallon virgin TCE aboveground storage tank (AST) was formerly located outside the metal warehouse building on the southwest portion of the lower parking lot. Mr. Kadlec reported that virgin TCE was used in degreasing operations between the early 1960s through 1980s, although the TCE AST was used for only 5 to 7 years, from the late 1960s to the early 1970s. The tank was removed in the 1980s. The use of TCE was discontinued due to changes in the regulations covering the management of waste solvent. Reportedly, the TCE was gravity-fed through a supply line into the sheet metal building to 5-gallon pails, then manually carried to the plating area. A wall patch was observed in the sheet metal building where the former TCE AST supply line entered the building and was connected to a valve. According to Mr. Kadlec, this valve was always locked in the closed position when not in use.

Mr. Kadlec was also questioned about previous petroleum fueling facilities, specifically underground or aboveground storage tanks. According to Mr. Kadlec, the facility did not operate diesel or gasoline fueling operations during his employment. To the best of his knowledge, no fueling equipment of any type was used at the facility. He was aware that the lower and upper parking lots were paved within the past 15 years. Mr. Kadlec mentioned that sometime between 1992 and 1995, there was a hydraulic fluid spill in the lower parking lot. He reported that the disposal company's truck blew out a hydraulic hose during the removal of a waste dumpster causing the release of the hydraulic fluid. Reportedly the disposal company spread oil-dry on the spill as part of the clean up.

2.4 SITE HISTORY

2.4.1 *Use and Ownership Records*

The following information regarding the chain-of-title for the subject property and the corporate history of D-F Incorporated was provided by the law firm von Briesen, Purtell, and Roper, S.C. of Milwaukee, Wisconsin, and from interviews and title information of record. Other information concerning the site history was derived from sources identified elsewhere in Section 2.0.

The land comprising the D-F Incorporated site was originally four separate parcels which were acquired over a period of approximately 13 years, beginning in 1949. The available history of the property begins in 1945. Figure 2.3 shows the four parcels, designated A, B, C, and D, that pertain to these transactions. Table 2.1 lists each transaction, and the parties involved, in chronological order.

Ray H. Dittmore and Robert R. Freimuth, as Dittmore-Freimuth Company, began manufacturing operations at the site in the late 1940s. The three eastern-most parcels (B, C, and D) were acquired by Dittmore and Freimuth from individuals from 1949 to 1953. The parcels appeared to have been vacant at the time of acquisition. The fourth parcel (A), on the western edge of the Site, was acquired by the Milwaukee Forge & Machine Company from Ms. Ann Horrigan in 1945. Prior to 1945, Ms. Horrigan owned all four parcels currently occupied by D-F Incorporated. Parcel A presently contains the sheet metal building outside of which the TCE AST was located, a lower asphalt parking lot, and an upper asphalt parking lot which; in comparison to the lower parking lot area, ranges between 2 feet higher on the north end (near East Norwich Avenue), and 7 feet higher on the south end (near the southern property boundary). This elevated portion of the Site appears to have been created by extensive filling activity. Interviews, soil borings, and a 1950s aerial photograph indicate that the upper parking lot was extensively filled in about the early 1950s, possibly with foundry sand at a time when the parcel was owned by Milwaukee Forge & Machine Company. Wisconsin Department of Natural Resources (WDNR) file information for neighboring properties located west of South Pennsylvania Avenue indicates that this land was also filled with foundry sand (Sections 2.4.2 through 2.4.4). In 1962, Milwaukee Forge and Machine Company sold Parcel A to Dittmore-Freimuth Corp. Although there may have been multiple sources for fill material in the area, no specific documentation has been found related to the fill brought on to the Site.

Dittmore-Freimuth Corp. began in a building on the northeast corner of the site (Parcels C and D), facing East Norwich Avenue. The facility grew with additional construction dating from 1955 to 1967. In the early 1960s, a wood-framed former army barracks was moved to the south side of the property. Up through the mid-1960s, the western portion of the lower parking lot would flood due to surface water run-on and ground water seepage from the hill along the southern site boundary. To manage this water, a concrete culvert was installed in the mid-1960s. Also, sometime between 1965 and 1967, a concrete block wall (with footings) was constructed along the southern site boundary beginning at the southwest corner of the brick, metal, and frame building and extending west to several feet beyond the western edge of the sheet metal building (where currently, the top of the wall is covered by fill material). The combination of the concrete culvert drain and the concrete block wall helped to manage the flow of water onto the Site from the Kitzinger property. By 1967, a steel-framed, metal-sided building (the sheet metal building) was constructed adjoining the west end of the former barracks. Also by 1967, a large manufacturing area and administrative offices had been added to the west side of the original building located on the northeast corner of the property. Included in the construction of the various building additions were several underground utility conduits beneath the brick, metal and frame building. These conduits are accessible through manholes located in this building. The purpose of these conduits was to convey stormwater, cooling water, or wastewater.

Dittmore-Freimuth Corp. and subsequent corporations manufactured specialized mechanical and electrical components to fulfill defense industry contracts. The facility appears to have manufactured these types of products throughout its operational history.

In 1961, Dittmore-Freimuth Corp. became a subsidiary of Universal Telephone, Inc. The plant and property were sold by Dittmore-Freimuth Corp. to Hoffman Homes, Inc. in 1979 and leased back by Dittmore-Freimuth Corp. for a period of 30 years. At that time, Hoffman Homes, Inc. assigned to Mr. Lucien Escallier of Santa Barbara, California and others, all its right, title, and interest as lessor. The. Escallier Group as presently constituted, remains the owner of the plant and property.

In 1984, Dittmore-Freimuth Corporation sold most or all of its assets to D-F Corporation, a new corporation formed by Don Kleinke and Frank Dzurbala, two employees of Dittmore-Freimuth Corporation. In 1991, Cincinnati Control Dynamics, Inc., whose principal is Dr. Frank Bao, acquired the stock of the former Dittmore-Freimuth Corporation, which, following a series of corporate organizational activities and name changes became known as D-F Incorporated. Cincinnati Control Dynamics, Inc. remained the owner of D-F Incorporated, which operated at the site until it abandoned the property in August 1996. Also in 1991, Dittmore-Freimuth Corporation, now Universal Manufacturing Corporation, and D-F Incorporated entered into an agreement which assigned to D-F Incorporated all of Universal Manufacturing Corporation's right, title and interest, obligations, duties, and liabilities as Lessee under the main Lease for the plant and property with Mr. Escallier, the majority owner. For purposes of this Report, the terms D-F Incorporated and D-F are used to identify the facility at 2517 East Norwich Avenue, St. Francis, Wisconsin, regardless of the official corporate name of the operating entity.

2.4.2 *Aerial Photographs*

Historical aerial photographs were reviewed for the years 1937, 1950, 1955, 1956, 1962, 1970, and 1975. Figure 2.3 shows the building additions at the Site based on the aerial photographs. The years shown in Figure 2.3 denote the year when the buildings first appeared on an aerial photograph. These photographs were viewed at, or obtained from the following sources:

- The A.H. Robinson Map Library on the University of Wisconsin Campus in Madison, Wisconsin;
- The United States Department of Agriculture (USDA) in Salt Lake City, Utah;
- The National Archives in Washington, D.C.
- The Southeastern Wisconsin Regional Planning Commission (SEWRPC); or
- The City of St. Francis, Wisconsin.

The 1937 photograph shows the Site as vacant land with some vegetation growing on the western portion and across South Pennsylvania Avenue to the west. A small creek is shown flowing from southwest to northeast across the future St. Francis Auto Wreckers Salvage Yard (St. Francis Auto) property. It appears in this photograph that a culvert located approximately 350 feet south of East Norwich Avenue crosses beneath South Pennsylvania Avenue allowing surface water to flow onto the Site from the future St. Francis Auto property. Although the presence of a defined creek or drainage pathway on the Site leading from this culvert is not apparent, the presence of abundant vegetation is indicative of wetland conditions. The 1937 photograph indicates that some earth movement had taken place south of the Site (i.e., on the future Kitzinger Cooperage Corporation drum storage property). However, no buildings or other improvements were observed on the Kitzinger property.

The 1950 aerial photograph shows some excavating or building activity on the eastern side of the Site and some filling activity apparent in the northwest corner of the Site. By 1950, auto salvage operations had commenced on the St. Francis Auto property, located west of the Site. Raising of the St. Francis Auto property with fill material caused the creek to flow west of the salvage yard. The creek flowed north then east toward South Pennsylvania Avenue between the salvage yard and the adjoining property to the north, then northward along South Pennsylvania Avenue to East Norwich Avenue. The creek was diverted under Pennsylvania Avenue and flowed in a ditch eastward along East Norwich Avenue.

The 1955 and 1956 aerial photographs appear identical with respect to the Site. These photographs show the frame building, and a portion of the brick, metal and frame building. The 1956 photograph shows that additional fill material had been placed at the western portion of the Site since 1950. The St. Francis Auto Wreckers property appears active, and the vacant lot between the salvage yard and East Norwich Avenue appears to have had some clearing or earth-moving activities. A building had been constructed near the southwestern corner of the Kitzinger Cooperage Corporation (Kitzinger) drum storage property.

The 1962 aerial photograph shows no additions to the Site. At the St. Francis Auto Wreckers property, numerous automobiles were present on site, and the property north of the salvage yard appears to have had some activity. The property located immediately south of the Site also contains numerous automobiles (presumably junked automobiles). It is uncertain whether this auto salvage yard was associated with the St. Francis Auto Wreckers property.

The 1962 aerial photograph, a copy of which is shown in Figure 2.2, shows the presence of a "surface water seep." This seep, appearing as a dark, oblong-shaped feature, originated near the western end of the frame building on the Site. Water from this seep appears to originate from the property to the south, and flow northward across the Site toward East Norwich Avenue.

The March 1963 aerial photograph shows that Parcel A appears to have been cleared and leveled. The cinder-block wall on the southern boundary of the Site is not visible in this photograph. This photograph also shows that by March 1963, the automobiles had been removed from the Kitzinger property.

The 1967 aerial photograph, compared to the 1963 photograph, shows additional buildings at the Site. These additions include the sheet metal building; a portion of the brick, metal, and frame building, and the concrete block wall along the southern property boundary. The upper parking lot appears to be unpaved, but portions of the lower parking lot appear to be paved. This photograph shows the first evidence of drum storage on the Kitzinger property to the south.

The 1970 aerial photograph shows an addition to the brick, metal, and frame building; and all other building structures are shown as they appear at the Site today. A fence was constructed around the Kitzinger facility along the Site/Kitzinger property boundary and south along South Pennsylvania Avenue. The upper parking lot remains unimproved and unpaved on this Site.

The 1975 aerial photograph indicates that the upper parking lot at the Site is improved, although not likely paved. All other features on the Site appear unchanged compared to the 1970 aerial photograph.

The Kitzinger property to the south underwent significant changes between the 1970 and 1975 aerial photographs. These changes consist primarily of a greater accumulation of stored materials which appear to be drums. The fence described in the 1970 aerial photograph exists on the Kitzinger property in 1975.

The St. Francis Auto Wreckers property shows a change in storage patterns of automobiles, indicating on-going activities at that site. Comparison of the 1970 and the 1975 aerial photographs indicate little or no change in the vacant lot between the active portion of the St. Francis Auto Wreckers property and East Norwich Avenue.

2.4.3 *Topographic Maps*

An historical topographic map search yielded five maps dated 1958, 1960, 1962, 1971, and 1976. The 1971 and 1976 United States Geological Survey (USGS) topographic maps are photo-revisions of the 1958 USGS topographic map.

The 1958 and 1960 USGS topographic maps are identical. These maps have a scale of one inch equals 2000 feet and a contour interval of 10 feet. This scale and resolution does not allow a detailed study of Site features or changes. The orientation of the topographic contours however, indicates that surface drainage in the area historically has been to the northeast.

The 1962 topographic map was drafted by Abrams Aerial Services Corporation, of Lansing, Michigan and is shown in Figure 2.4. This map was drafted for the engineering firm Mead and Hunt, of Madison, Wisconsin. The contour interval is 2 feet, and the scale is one inch equals 200 feet. This map shows that the property to the south slopes gently downward to the north toward the Site. In addition, the St. Francis Auto property also slopes downward toward the Site. The slope of these two properties indicates that surface water runoff ran toward the Site during the 1960s. Today, these two properties continue to slope toward the Site. Surface runoff from the St. Francis Auto property is conveyed through a storm sewer beneath South Pennsylvania Avenue, but surface runoff from the Kitzinger facility to the south reaches the Site. Finally, a small, northward trending topographic depression near the western end of the frame building confirms the presence of a seep as well as northward surface water flow as shown in the 1962 aerial photograph (see Section 2.3.2).

With respect to the Site, the 1971 and 1976 photo revisions indicate that building additions were constructed since the 1958 map publication. Regional surface drainage remains to the northeast.

2.4.4 *Municipal Improvements*

The location of underground utilities are shown in Figure 2.1. City records show that the City of St. Francis constructed a 30-inch-diameter storm sewer beneath the eastern edge of South Pennsylvania Avenue in 1975. This sewer discharges into a 72-inch-diameter storm sewer constructed beneath East Norwich Avenue during the same period.

In 1988, the City of St. Francis added a 66-inch-diameter storm sewer and catchment on the St. Francis Auto property, installed in the drainage swale between the vacant property on the north and the St. Francis Auto property on the south. This 66-inch storm sewer was connected to the existing 72-inch-diameter sewer beneath Norwich Avenue. At the same time, the City improved South Pennsylvania Avenue by installing curbs and gutters.

2.5 *ADJACENT PROPERTIES*

The area surrounding the Site contains industrial, commercial, and residential development. The use and occupancy of adjacent properties are identified in Figure 2.5. Sections 2.4.1 through 2.4.2 contain more detailed descriptions of neighboring businesses and activities of environmental concern to the Site.

- **South** - Immediately south and uphill of the Site is the drum storage area of Kitzinger. Kitzinger reconditions and recycles used steel drums. This facility is further discussed in Section 2.4.1. Drums for reconditioning are stored on their sides in stacks many drums high and deep. On the south side of the Kitzinger property is a steep, north-facing railroad embankment. This railroad line was used to transport coal to the former Wisconsin Electric Power Company's electricity generating plant located east of the Site adjacent to Lake Michigan. This embankment is still owned by the Wisconsin Electric Power Company. Beyond the railroad embankment to the south are a residential area and an elementary school.

- **North** - Across East Norwich Avenue to the north are the Kitzinger warehouse, a laundromat, and a fenced truck parking area. Further to the north are residential and vacant property.

- **East** - Immediately east of the Site is the Kitzinger drum reconditioning plant and offices located at 2529 East Norwich Avenue. Kitzinger also occupies 2615 East Norwich Avenue. To the south behind the Kitzinger plant are an incinerator and two lugger boxes for storing ash. Further to the east are Kitzinger's garage and truck parking area and a residence. To the northeast, north of East Norwich Avenue are the laundromat and fenced truck parking area identified above.

- **West** - Across South Pennsylvania Avenue to the west are vacant property overgrown with small trees and brush and the St. Francis Auto Wreckers property. The St. Francis Auto Wreckers property is located at 4043 South Pennsylvania Avenue, and the vacant property is located at 4005 South Pennsylvania Avenue. St. Francis Auto Wreckers currently owns both parcels. This business dismantles used automobiles for parts. A small drainage swale running west-east separates the active portion of the St. Francis Auto Wreckers property from the vacant property to the north. These properties are discussed in Sections 2.5.2 and 2.5.3. The recently abandoned railroad tracks of the Chicago & Northwestern Transportation Company border these properties on the west. The Lake Arterial Highway is currently being constructed on the railroad right-of-way. To the north across East Norwich Avenue is residential property. Further northwest on East Norwich Avenue are vacant properties adjacent to the Lake Arterial Highway which have been subject to investigation and remedial action by the Wisconsin Department of Transportation (WIDOT). These properties are discussed in Section 2.4.4.

2.5.1 *Kitzinger Cooperage Corporation*

This section is based on information obtained from WDNR files in July 1996. The file information dates from August 1980 to August 1995.

Kitzinger Cooperage Corporation, located to the south of the Site, reconditions and recycles used steel and plastic drums. Kitzinger has operated at this location since 1951 and may have been preceded by a similar company called Barker Barrel. The facility receives steel barrels for reconditioning and recycling from several sources including chemical companies and a paint company. Drums are stored on the west side of the plant, south of the Site, stacked on their sides many rows high and deep. Processing takes place in the building immediately east of the Site.

The facility handles two types of used drums: the closed type (bung) and the open top type. The closed type drums are washed in a hot caustic solution to remove the contents. Accumulated sludge is periodically removed from the wash tank, filter pressed, then burned in an on-site incinerator. Residual wash water and caustic solution are reused. The Kitzinger facility has water treatment tanks housed in the southwest corner of the plant building near the Site. Open top drums are conveyed through an incinerator and afterburner to remove residual material. Ash is conveyed to two 2,000-gallon lugger boxes located adjacent to the incinerator. The barrels go through DOT re-certification and are painted.

Since about 1983, Kitzinger has required that the barrels it receives meet RCRA standards for emptiness. Drums of free-flowing or hazardous and toxic materials must not contain more than 1% of the capacity of the container. This is about half a gallon for a 55-gallon drum. The maximum amount of non-free flowing or viscous material that may remain in a drum is 2% of the drum capacity. This is about one gallon for a 55-gallon drum. Kitzinger has also required that all bungs be tightened and all rings and covers be secured on drums received for reconditioning. The condition of drums received by Kitzinger prior to these requirements is unknown, as is the extent of current compliance with the requirements. Release of residual materials from "empty" drums could cause significant contamination if these materials infiltrated the subsurface. Prior to 1983, Kitzinger possibly received insufficiently emptied and closed drums which leaked during storage. The drum storage area lies directly south and topographically upgradient of the Site. This area has been described as unpaved or covered with broken asphalt. There are no apparent run-off diversions or liners beneath the drums. Surface runoff would be to the north toward the Site.

Kitzinger Cooperage is a large quantity hazardous waste generator (EPA ID# WID023402639). The hazardous wastes produced are: (1) ash from the drum burnout line, (2) sludge from the hot caustic solution and rinse tanks which is incinerated, and (3) paint filters and sludges which are also incinerated. The ash is conveyed to the lugger boxes which are located southeast of the Site. The luggers are picked up once per month for disposal. The ash is characterized as hazardous, apparently because of the lead content.

Kitzinger filed a Notification of Hazardous Waste Activity with the U.S. Environmental Protection Agency (USEPA) in August 1980. In June 1981, Kitzinger filed with the USEPA a Notification of Hazardous Site. This notification identified the dates of waste handling as 1951 to 1984, inclusive. The types of waste were identified as solvents and heavy metals. The Kitzinger facility was inspected for violations of hazardous waste regulations in July 1983, February 1984, April 1985, February 1986, August 1988, and May 1995. No significant releases of hazardous or potentially hazardous wastes or materials to soil or ground water were documented. However, several inspectors mentioned the absence of controls on emissions from the incinerator. The incinerator appears to have operated for many years.

As of July 1996, there was no information in the WDNR file documenting subsurface conditions at the Kitzinger property. The presence of foundry sand fill or contamination beneath the property is unknown. During Kitzinger's 47 years of operation, leaks from drums or other sources may have migrated by stormwater runoff or through the subsurface onto the Site.

2.5.2 *St. Francis Auto Wreckers Property*

This section is based on information obtained from WDNR files in July 1996. The file information dates from early 1990 through August 1993. Beginning in about 1989, WIDOT commissioned STS Consultants, Inc., through Howard, Needles, Tammen, and Bergendorf, to perform environmental investigations in connection with the Lake Arterial Highway project. Phase I, II, and III investigations were completed for the St. Francis Auto property. In August 1993, the WDNR completed a "Preliminary Assessment Narrative" summarizing the STS assessment

results and identifying exposure targets for the contaminants found at the Site. The following information was derived from these sources.
The St. Francis Auto Wreckers site consists of 2.7 acres located across South Pennsylvania Avenue to the west of the Site (Figure 2.5). The property is divided roughly in half by a drainage swale which trends west-east across the property. The swale drains to a storm sewer beneath South Pennsylvania Avenue. The southern half of the property is occupied by the salvage yard and contains two buildings, automobiles, and piles of various automobile parts. The salvage yard is surrounded by a fence. The ground surface is reportedly unpaved and is covered with stained black gravel. The vacant portion of the St. Francis Auto Wreckers property is unused, and overgrown with trees and underbrush.

Surface soils on both the northern and southern portions of the property consist of foundry sand fill materials. Foundry sand fill is present to an average depth of 12 feet. The fill material contains cinders, wood fragments, glass, and metal debris similar to that found at D.F., Inc. At the time of the investigation (July 1991), ground water occurred about 10 feet BGS. According to STS, ground water may discharge to the drainage swale and flow to the storm sewer beneath South Pennsylvania Avenue.

Extensive shallow soil sampling was conducted in the salvage yard for analysis of polychlorinated biphenyls (PCBs) and Total Petroleum Hydrocarbons (TPH). Five soil borings and three monitoring wells were completed on the west side of the property within the proposed right-of-way (ROW) of the Lake Arterial Highway. Approximate monitoring well locations are shown in Figure 2.6. Shallow soil samples from the salvage yard were analyzed for PCBs and TPH. Selected soil samples from soil borings were analyzed for PCBs, TPH, volatile organic compounds (VOCs), eight RCRA metals using the Toxicity Characteristic Leaching Procedure (TCLP), and reactive cyanide and sulfide. Ground water and surface water samples were analyzed for PCBs, VOCs, eight dissolved metals, and semi-volatile organic compounds.

Somewhat different types of contamination were documented on the salvage yard and the undeveloped property. The salvage yard is characterized by shallow PCBs and TPH contamination. Deeper soils and ground water contain chlorinated VOCs, benzene, toluene, and xylenes. The undeveloped property is characterized by high TPH and BTEX concentrations, particularly xylene. Lead in one soil sample exceeded the RCRA limit for characterization of hazardous waste. Analytical data are described in more detail below.

Elevated levels of PCBs and TPH were detected in surface soils on the salvage yard, particularly on the north side. Deeper soils (greater than 2 feet BGS) and ground water were not impacted by PCBs and TPH. The source of PCBs and TPH appears to be surface spills. Metals concentrations in salvage yard surface soils did not exceed RCRA limits. In fill materials below about 2 feet BGS, moderate levels of VOCs were detected, including chloroform, TCE, toluene, and xylenes. Low concentrations of other chlorinated compounds were detected. In ground water, mercury and selenium concentrations exceeded NR 140 PALs. However, the mercury results are reportedly subject to error. Chlorinated organics including 1,1-dichloroethane, 1,2-dichloroethane, 1,2-dichloroethene, 1,1,1-trichloroethene, TCE, and vinyl chloride were detected in ground water. NR 140 PALs were exceeded by 1,2-dichloroethane, 1,2-dichloroethene and vinyl chloride. Benzene concentrations also exceeded the NR 140 PAL. Toluene, ethyl benzene, and xylene were not detected in ground water samples from the salvage yard.

On the undeveloped property, high solvent odors were evident during advancement of the two soil borings. Elevated TPH concentrations up to 22,460 mg/kg were detected in shallow soil from one boring location. Metals analysis indicated that lead exceeded the RCRA limit for characterization as hazardous waste. VOC concentrations were particularly high in one boring with total concentrations up to 5,842 mg/kg. The dominant VOC constituents in soil were toluene, ethyl benzene, and xylene. Xylene was highest, ranging from 58.4 mg/kg to 4,721 mg/kg for six samples. Only one chlorinated compound, 1,4-dichlorobenzene, was detected at a low concentration.

In ground water, three metals, barium, chromium, and mercury, were present in concentrations exceeding the NR 140 PALs. However, the mercury results are reportedly suspect. Several VOCs exceeded the NR 140 Enforcement Standards (ES), including benzene, toluene, ethyl benzene, xylene, and tetrachloroethene (PCE). The total BTEX concentration in ground water was about 43,400 µg/l. Xylene was the dominant constituent with a concentration of 34,000 µg/l. PALs were exceeded by 1,2-DCA and PCE. Vinyl chloride was not detected in ground water on the undeveloped property.

The west side of the St. Francis Auto property was remediated by WIDOT September and October 1997. A description of the remediation project is included in the following section.

2.5.3 *WIDOT/Auto Wrecker's Property*

This section is based upon the "Work Plan for the Management of Impacted Fill Materials, St. Francis Auto Wrecker's Easement, Lake Parkway Project" (April 1997) and the "Remediation Documentation Report for the WisDot-Auto Wrecker's Property, St. Francis Wisconsin" (March 1998). These reports, prepared by RMT, Inc., were obtained from WDNR files in April 1998.

WIDOT obtained a 60- to 75-foot wide easement along the west side of the St. Francis Auto property for construction of the Lake Arterial Highway. Previous investigations had identified the presence of fill material impacted with VOCs and PCBs on the St. Francis Auto property. PCBs and PVOCs were the constituents of primary concern. The impacted fill apparently resulted from miscellaneous filling and dumping of unknown origin. A sampling grid was established across the easement to identify materials requiring remediation. Soil sampling intervals with PCB concentrations greater than 50 mg/kg required off-site disposal at a TSCA landfill. Sampling intervals with acceptable PCB concentrations but with PVOC concentrations greater than NR 720 Generic Residual Contaminant Levels (RCLs) required off-site transport to a commercial biopile facility for treatment and disposal.

In September and October 1997, approximately 280 cubic yards of PCB-impacted fill and approximately 3,500 cubic yards of fill with elevated PVOC concentrations were removed from the west side of the St. Francis Auto property. In order to grade the area to accommodate the future highway, approximately 1,000 cubic yards of additional material was removed and transported to the biopile facility. Much of the remediation area was excavated to a depth of 10 feet, where the water table is encountered.

During excavation, several drums were encountered in the fill material on the east side of the easement. These drums were found on the northern portion of the property. Some drums were crushed and empty, some contained fill materials, and others contained solid or semi-solid materials identified as paint, resin or adhesive solids, foundry sand and slag, asphaltic tar solids, metal parts and plated debris, and firebrick. Several additional drums were exposed on the eastern sidewall of the excavation, however, because these drums were outside of the easement, they were left in-place. Drums within the easement were segregated and characterized, then disposed appropriately. Analysis of composite samples of organic and inorganic drum contents indicated that the inorganic waste was hazardous for the characteristic of toxicity for lead.

Other debris encountered during excavation included old tires, metal containers and empty drums, and a few miscellaneous objects.

The remaining fill material with lower level impacts is to be beneficially reused beneath the Lake Arterial Highway. Approximately 6 inches of compacted gravel was placed over the fill to prevent direct contact during highway construction. Eventually, the impacted material will be capped by the highway pavement or a 2-foot thick clay cap to prevent infiltration.

2.5.4 *WIDOT Solstice and Norwich Properties*

This section is based upon the "Remediation Documentation Report for the Solstice and WisDot-Norwich Properties, St. Francis, Wisconsin" (April 1997) prepared by RMT, Inc. This report was obtained from WDNR files in April 1998.

The Norwich property is a portion of the Chicago and Northwestern Railroad right-of-way located west of the Site. This property is located immediately north of E. Norwich Avenue on the east side of the railroad right-of-way. The Solstice property adjoins the east side of the Norwich property. Locations of these properties are shown in Figure 2.5. The Solstice and Norwich properties were acquired by the WIDOT for construction of the Lake Arterial Highway. Previous investigations of these properties identified the presence of fill materials impacted with VOCs, primarily TCE, and PCBs. The impacted fill appeared to result from miscellaneous filling and dumping. Previous investigations also identified TCE concentrations in ground water above the Chapter NR 140 ESs.

In September 1996, approximately 600 cubic yards of fill identified as containing PCB concentrations of 50 mg/kg or greater were excavated and transported to a licensed TSCA landfill for disposal. From September through November 1996, approximately 5,000 cubic yards of TCE impacted fill were treated on-site to reduce concentrations to below the hazardous waste limit of 0.5 mg/l when tested by the TCLP test. The fill was aerated in 1-foot thick lifts to a depth of almost 10 feet BGS. The treated material was excavated and stockpiled on-site. Reportedly, the treated, stockpiled fill and residual fill containing low concentrations of PCE and/or PCB will be beneficially reused within engineered structures as part of the highway construction.
Improvements in ground water quality following the removal and constructive reuse of the impacted fill material will be monitored. Further information regarding ground water quality is to be provided in future reports.

2.6 WATER WELL SURVEY

Copies of the water-supply well records for the vicinity of the Site were requested from the Wisconsin Geological and Natural History Survey (WGNHS). The available records are included in Appendix A. Twelve water-supply well records, designated PW-1 through PW-12, were found in Sections 14, 15, 22, and 23 of Township 6 North and Range 22 East (the Site is located in the northwest corner of the northeast corner of Section 22). One well (PW-1) was completed at a depth greater than 230 feet below ground surface (BGS). The remaining wells were completed in the 70- to 115-foot thick unconsolidated glacial drift deposits or in the underlying Silurian carbonate bedrock.

Also shown in Appendix A is a map showing well locations within one-half mile radius of the Site. Within a one-half mile of the Site are four wells (record numbers PW-5, PW-7, PW-8, and PW-11). Well PW-5 is located approximately 1600 feet north-northwest of the Site and is completed in a 19-foot thick sand and gravel unit immediately overlying the carbonate bedrock. Well PW-7 is located approximately 600 feet northwest of the Site near the intersection of East Howard Avenue and South Pennsylvania Avenue. This well is completed to a depth of 108 feet and is screened across 23 feet of water-bearing gravel and 17 feet of water bearing carbonate bedrock. Well PW-8 is located approximately 600 feet north of the Site near the intersection of East Howard Avenue and South Pennsylvania Avenue. This well was completed to a total depth of 122 feet and taps the upper 34 feet of the water-bearing carbonate bedrock. Well PW-11 is located approximately 2,400 feet east-southeast from the Site. PW-11 was completed to a total depth of 229 feet, of which 112 feet is carbonate bedrock.

Each of the well records shows a thick sequence of clay overlying the water-bearing units. Specifically, the well record for PW-5 shows a 51-foot thick clay layer, PW-7 shows 63 feet of clay and sandy clay, PW-8 shows at least 53 feet of clay, and PW-11 indicates 43 feet of clay overlying 12 feet of wet sand that and gravel units underlying the clay deposits were under a piezometric head which causes an upward hydraulic gradient from these water-bearing units into the clay and the overlying surficial aquifer.

All of the wells within one-half mile radius of the Site were completed in the late 1930s, and provided water for residential purposes. It is uncertain which of these wells, if any, still exist. However, none of the wells located within one-half mile of the Site are screened within the unconsolidated deposits.

3.0 *INVESTIGATIVE METHODS*

3.1 *INVESTIGATIVE HISTORY*

The results of the environmental site inspection indicated potential environmental impact near the former TCE AST on the lower parking lot and surface run-off from the Kitzinger drum recycling facility located immediately uphill to the south. On January 22, 1996, six soil borings (GP-1 through GP-6) were drilled and sampled near the south property boundary and near the former TCE AST location. Soil boring locations are illustrated in Figure 3.1. Analytical results documented soil and ground water contamination by chlorinated solvents, petroleum hydrocarbons, and arsenic. High concentrations of TCE, cis-1,2-DCE, toluene, ethyl benzene, and xylenes were detected in soil and ground water near the former TCE AST location (GP-1 and GP-2). Soil concentrations in GP-1 and GP-2 of toluene, ethyl benzene, and xylenes were higher than WAC Chapter NR 720 generic RCLs, and TCE; 1,1-DCE and cis-1,2-DCE exceeded the Chapter NR 140 ESs and PALs for ground water. For GP-3, near the southeast corner of the property, the soil concentrations of benzene and 1,2-DCA exceeded the NR 720.10, RCL. Arsenic concentrations in soil from GP-3, GP-4, and GP-5 exceeded the Chapter NR 720.11 RCL. GP-6 on the south property line had soil concentrations of diesel range organics (DRO) of 460 mg/kg, which exceed the RCL of 100 mg/kg given in NR 720.09(4). A report prepared by Maxim dated February 19, 1996 discussed data generated during this investigation. This report was provided to the WDNR.

Three additional phases of subsurface investigation occurred in April 1996, November 1996, and July and August 1997 to identify and delineate the distribution of contaminants, and their likely sources. This section describes the methods used during the site investigation activities performed by Maxim from January 1996 to July 1997, and by ERM from July 1997 through March 1998. The investigative activities included:

- The advancement and sampling of soil borings to develop information regarding the stratigraphy of the Site and the extent of soil contamination.

- The installation and development of ground water monitoring wells to obtain information regarding possible on- and off-site sources of contamination.

- The collection of ground water samples from the monitoring wells to evaluate the degree and extent of ground water contamination in the uppermost aquifer underlying the Site.

- The measurement of ground water elevations in the monitoring wells to evaluate the direction and gradient of ground water flow in the uppermost aquifer underlying the Site and also to determine the extent of seasonal ground water fluctuations over time.

- In-situ hydraulic conductivity testing (slug testing) in all existing monitoring wells located at the Site.

- The collection of soil samples from two trenches dug between the sheet metal building and the cinder block wall located along the southern edge of the Site to obtain information regarding the condition of shallow soils in this area. This information was obtained to assess the potential that: (1) historic activities on the Site have affected shallow soil conditions to the south of the sheet metal building, or (2) off-site contaminant sources exist to the south of the Site.

- The collection of water samples from a 3-foot diameter concrete culvert that conveys water from south of the Site near monitoring well MW-8 to a drainage ditch at East Norwich Avenue (Figure 2.1).

3.2 *ADVANCEMENT OF SOIL BORINGS*

Figure 3.1 shows the locations of all soil borings, monitoring wells, and trench excavations where environmental samples were collected during the Site investigation.

In April 1996, boreholes associated with MW-1 through MW-5, and B-1, B-4, B-6, and B-7 were advanced by Maxim using hollow-stem augers and continuously sampled at 2-foot intervals using a split-spoon or Shelby tube. Most borings were located on the upper and lower parking lots. MW-1/B-1 was located on the east side of the D.F., Inc. building. B-2 was advanced 4 feet BGS in the vicinity of the former TCE AST and abandoned due to obvious signs of shallow contamination. At that state of the project, the field crew was attempting to install an uncontaminated upgradient well. Subsequent advancement of B-3 and B-4 on the upper parking lot near the southwest property boundary indicated that soil and ground water were also contaminated upgradient to the southwest of the former TCE AST location. MW-2 was subsequently installed to monitor ground water contamination near the upgradient southwest corner of the property.

In November 1996, Maxim returned to the Site to sample off-site soil and ground water to the southwest and west, to collect unsaturated soil samples on-site, and to install additional ground water monitoring points. Fifteen GeoProbe® and four hand-augered boreholes were sampled and four permanent and four temporary monitoring wells were constructed and installed. The hand auger was used in areas inaccessible to the GeoProbe® rig (GP-20, GP-21, MW-8) or where the location of underground utilities was uncertain (MW-11). Borings for permanent monitoring wells were advanced and sampled using hollow-stem augers and split-spoons or Shelby tubes. Not all boreholes were sampled continuously.

Soil samples collected during Maxim's investigation were analyzed according to the USEPA SW-846 methods outlined in Table 3.1. Between July 21 and July 24, 1997, ERM advanced 24 soil borings across the upper and lower parking lots, and on August 1, 1997 ERM excavated two trenches behind the sheet metal building (HA-1A-D and HA-2A-D). Soil borings SB-01 through SB-19 were advanced in the upper and lower parking lots at the Site to obtain information regarding VOCs in the unsaturated soil. Soil borings SB-01 through SB-15 comprised a grid of sampling locations across the upper parking lot. The grid nodes were spaced 40 feet apart based on the size of the area to be sampled (20,000 square feet) and the formula provided in the Illinois Environmental Protection Agency's Instructions for the Preparation of Closure Plans for Interim Status Facilities. Soil borings SB-16 through SB-19 were placed in the vicinity of the former TCE AST location in the lower parking lot. Soil borings SB-20 and SB-21 extended below the water table to provide information regarding deeper stratigraphic units in the lower parking lot and upper parking lot, respectively (Figure 3.1). Soil boring SB-22 and soil borings at the locations of monitoring wells MW-14 and MW-15 were advanced to obtain both upgradient and off-site information along the terrace bordering South Pennsylvania Avenue near the southwestern corner of the Site. Copies of the boring logs and their respective abandonment forms for all soil borings are included in Appendix B.

Selected soil samples from soil borings SB-01 through SB-21 were submitted for analysis of VOCs by using the USEPA SW-846 methods shown in Table 3.1. Samples were collected with Shelby Tubes from SB-20 and SB-21 for analysis of vertical hydraulic conductivity (ASTM Method D5084), moisture content (ASTM Method D2216-7), dry density (ASTM Method D2937-71), and grain size (ASTM Methods D422 and D1140). Soil boring SB-22 and soil borings near monitoring wells MW-14 and MW-15 were advanced to obtain stratigraphic information only, and no samples were collected for laboratory analysis. Copies of the soil analytical reports are included in Appendix C.

The following procedures were used in soil borings SB-01 through SB-21 to screen soil samples for contamination and to obtain samples for laboratory analysis:

- The borings were advanced to the observed water table using a truck-mounted drill rig and conventional hollow-stem augers, and soil samples were continuously collected at 2-foot intervals using a 2-inch-diameter split-spoon sampler.

- Soil from each sample collected above the observed water table was immediately placed in an appropriate laboratory-supplied glass jar and stored on ice in a cooler. The soil was packed in the jar and filled to the top so that there was no observable headspace.

- Another portion of each split-spoon sample was placed in a plastic bag for field screening of VOCs. The bag was filled approximately ½ full with soil, closed, and briefly agitated. After allowing the bag to sit for several minutes, an HNu photoionization detector (PID) equipped with an 11.7 electron volt (eV) lamp was inserted into the headspace above the soil to obtain a reading.

- Samples from selected intervals were retained for laboratory analysis based on the field screening results, odor, and visual inspection.

- Each 2-foot interval was described by an ERM geologist with regard to the length, color, density, grain size, sorting, composition, structure, and moisture content of the soil sample based on visual observations. The geologic description and screening results for each sample interval was recorded in a field log book.

- Upon completion, the soil borings were abandoned according to the requirements of WAC Chapter NR 141 by sealing the boring to the ground surface with bentonite grout and chipped bentonite.

- All drill cuttings were placed into steel drums approved by the DOT and held for future management.

- All drilling and sampling equipment were decontaminated before beginning drilling, between borings, and prior to demobilization in accordance with the procedures described in Section 3.8. All decontamination wastewaters were placed in DOT-approved steel drums and held for future management.

The soil samples were delivered to Great Lakes Analytical (Great Lakes), a State-of-Wisconsin-certified laboratory located in Buffalo Grove, Illinois, for analysis of VOCs and total organic carbon (TOC) using the above-referenced methods. All samples for analytical testing were stored on ice during delivery, and shipped using standard chain-of-custody protocol. The geotechnical soil samples were submitted to Midwest Engineering Services, Inc. (Midwest) of Waukesha, Wisconsin; for moisture content, dry density, grain size, and vertical hydraulic conductivity analysis using the methods referenced above. Geotechnical laboratory reports for these soil samples are included with the soil analytical reports in Appendix B.

3.3 *TRENCH SAMPLING*

Additional information regarding the condition of shallow soils located between the sheet metal building and the cinder block wall along the southern edge of the Site was obtained by the collection of samples from trenches (HA-1 and HA-2) dug in the locations shown in Figure 3.1. These trenches were hand dug because this area is inaccessible to conventional drilling equipment. Discrete samples were collected from different depths to assess whether historic activities in the sheet metal building could have affected shallow soil conditions above the water table in this area. The trenches were dug into the hill that rises approximately 3 feet from the footing of the sheet metal building toward the cinder block wall on the southern boundary of the Site.

The trenches were approximately 16 inches wide, 1 foot deep, and extended laterally approximately 7 feet to the south from the sheet metal building. The trenches were excavated with shovels, and the soil was returned to the trenches after samples were collected. In each trench, soil samples were collected for laboratory analysis from four locations that included elevations below and above the observed fill/native material interface. One portion of soil was screened with a PID using the headspace technique previously discussed, another portion was placed in a laboratory-supplied glass jar (with Teflon®-lined lid) and preserved with methanol, and a third portion was packed (with zero head space) into a 4-ounce glass jar (with Teflon-lined lid). The two samples placed in glass jars were submitted to Great Lakes for analysis. The sample preserved with methanol was submitted for analysis of VOCs by using USEPA SW-846 Method 8021, and the unpreserved sample was submitted for analysis of VOCs by using USEPA SW-846 Method 8260. Copies of the laboratory analytical reports for these samples are included in Appendix C.

3.4 *INSTALLATION, CONSTRUCTION, AND DEVELOPMENT OF MONITORING WELLS*

Monitoring wells MW-1 through MW-9 were installed in April and November 1996 by Maxim. Also, Maxim installed four temporary off-site monitoring wells (MW-10 through MW-13) in November 1996, which were abandoned following the collection of ground water samples. ERM installed monitoring wells MW-14 and MW-15 on July 23, 1997, in order to obtain further information on potential ground water contamination upgradient of the Site. Table 3.2 provides information on the location and elevation of all the monitoring wells at the Site.

The permanent monitoring wells were developed approximately 24 hours after installation by using dedicated bailers to surge water back and forth through the well screen and purge turbid water from the well. All permanent monitoring wells were developed in accordance with NR 141 requirements. As development water was removed from MW-14 and MW-15, representative samples were collected in a plastic cup and values of pH, conductivity, and temperature were obtained from each sample. Development continued until: (1) the well went dry or at least 10 borehole volumes were removed; (2) the well yielded low-turbidity water; and (3) consistent values of pH, conductivity, and temperature values were obtained for two consecutive water samples (i.e., pH values within 0.10 pH units, conductivity values within 10%, and temperature values within 1.0 degree Celsius of each other).

The temporary wells were developed using inertial pumps, consisting of rigid plastic tubing with foot valves, or using high-density polyethylene (HDPE) bailers. These wells were developed to remove sediment and to provide representative ground water samples. Monitoring wells MW-10 and MW-11 yielded 3 gallons and 1.75 gallons, respectively. After development, these wells produced silt-free, clear water. However, MW-12 and MW-13 each yielded 0.5 gallon, and did not produce sediment-free water. After the 0.5 gallon of water was removed, no standing water remained in the well, and further attempts at development were abandoned.

3.5 *GROUND WATER MONITORING*

Ground water samples were collected by Maxim on April 23, 1996; September 13, 1996, November 14, 1996; and February 24, 1997. Ground water samples were collected by ERM on July 24-25, 1997, November 25-26, 1997; and February 24, 1998. Ground water monitoring information obtained from MW-10 through MW-13 included one round each of water level measurements, and sample collection for laboratory analysis. Information from MW-10 and MW-11 were used in generating the piezometric surface for November 14, 1996, and analytical results were used from MW-10 through MW-13 in the evaluation presented in the following sections. However, monitoring wells MW-12 and MW-13 appeared to be screened across low-permeable materials. During the 2-day period that these wells existed, the water level continued to slowly rise. Therefore, a static water elevation could not be verified in these wells.

Each permanent monitoring well was purged prior to sampling using a dedicated polyvinyl chloride (PVC) bailer to provide low-turbidity, representative ground water samples. The bailers and all other sampling equipment were decontaminated according to the procedures described in Section 3.8. Standing water was removed from each well by purging a minimum of three well volumes, and purging continued until stabilization of pH, conductivity, and temperature were obtained for two consecutive water samples. If the well did not recharge at a rate fast enough to permit the purging of three well volumes, samples were collected as soon as the water level in the well returned to its pre-purge level. Purged ground water was placed in DOT-approved steel drums and stored on Site for future management. Copies of the laboratory analytical results for ground water samples are presented in Appendix C.

All ground water samples were placed in laboratory-certified clean sample containers using dedicated bailers, properly labeled, stored in an iced cooler, and shipped under standard chain-of-custody protocol to Great Lakes. The ground water samples submitted for laboratory analysis were collected by ERM in the following order: (1) VOCs, (2) metals (total and dissolved fractions), and (3) inorganic constituents. The vials for storing ground water samples for VOC analysis were pre-preserved with 1.0 ml of 1 normal hydrochloric acid by Great Lakes prior to sampling, and the vials were filled with ground water samples so that no headspace existed when the vials were closed. The ground water samples obtained from monitoring wells MW-3 and MW-4 to be analyzed for dissolved metal concentrations were filtered immediately after sample collection using disposable 0.45-micron filters. The filtered samples were then placed in the laboratory-supplied sample containers and preserved with 2 ml of concentrated nitric acid (HNO_3). Failure of the portable filtration system on July 24-25, 1997 prevented the filtering of ground water samples obtained from the other monitoring wells prior to shipment to Great Lakes. These samples were filtered and preserved by Great Lakes upon receipt. Samples from all monitoring wells were analyzed according to the methods listed in Table 3.1 for VOCs; the metals arsenic, barium, cadmium, chromium, lead, mercury, and selenium; and chloride. Select samples from MW-2, MW-6, MW-11, and MW-12 were also analyzed for cyanide.

Duplicate samples, field blanks, matrix spike/matrix spike duplicate samples, and trip blanks were shipped with the investigative samples for quality assurance/quality control (QA/QC) purposes.

Beginning with the July 24-25, 1997 sampling event, additional field water quality parameters were measured. After the collection of laboratory samples from each monitoring well, additional ground water samples were obtained for field analysis of for the following water quality parameters: (1) ferrous (reduced) iron, (2) oxidation/reduction potential (ORP), (3) dissolved oxygen (DO), and (4) alkalinity using the methods listed in Table 3.1. Also, beginning with the July 24-25, 1997 sampling activities, carbon dioxide levels of the headspace in each well were measured using Mine Safety Administration (MSA) colorimetric tubes.

Ground water elevations were measured by Maxim on April 24 and 25, 1996; September 13, 1996; November 14, 1996; and February 24, 1997; and by ERM on July 24, August 22, September 11, October 10, and November 24, 1997; and on February 24, and March 24, 1998 in all monitoring wells using an electronic water level indicator. The depth to water from the surveyed reference point (i.e., top of well casing) was recorded to the nearest 0.01 foot, and then converted to feet above mean sea level (AMSL). The water level indicator was decontaminated according to the procedures described in Section 3.8.

3.6 *HYDRAULIC CONDUCTIVITY TESTING*

Rising-head slug tests were performed by Maxim and by ERM in monitoring wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, MW-9, MW-14 and MW-15. Copies of the hydraulic conductivity testing results are presented in Appendix D.

The following procedures were used in performing the rising-head slug tests:

- The static water level was measured in the well with an electronic water level indicator.

- A pressure transducer was lowered to near the bottom of the well.

- A slug (a cylinder of known volume) was lowered below the water table. After the static water level stabilized, the slug was instantaneously removed.

- Data pairs of time versus water level were recorded with the pressure transducer and an electronic data logger. Readings were taken on a logarithmic time scale, with water level measurements collected at more frequent intervals during the early portion of the test to discern initial rapid changes in the recovering water level.

- All equipment that was lowered into the well was decontaminated according to the procedures described in Section 3.8.

- Recorded time versus water level information was downloaded into a portable computer and analyzed by using the method described by Bouwer and Rice (1976, 1989).

3.7 *SURFACE WATER SAMPLING*

Water samples were collected on March 25, 1998 from the 3-foot diameter concrete culvert that extends northward from the south property line near MW-8 to the ditch at East Norwich Avenue adjacent to MW-4 (see Figure 2.1). In February and March, 1998, the flow rate from this culvert into the ditch was measured at approximately 2 liters per minute. The water samples were collected in 40-ml VOC vials at the manhole located in the sheet metal building, and also at the discharge point on East Norwich Avenue. These water samples were submitted to Great Lakes for analysis of VOCs by USEPA SW-846 Method 8260. Copies of the laboratory analytical reports for these samples are included in Appendix C.

3.8 *DECONTAMINATION PROCEDURES*

Drilling equipment was decontaminated by steam cleaning prior to initiating work, between borings, and before leaving the Site. All steam cleaning, wash, and rinse procedures were conducted at a decontamination station that consisted of a large tub that contained all wash water and soils from the drill augers. Soil sampling equipment was decontaminated between samples/wells by steam cleaning at the decontamination station by: (1) scrubbing with a reagent-grade detergent mixed with potable water, (2) rinsing once with potable water, and (3) rinsing once with distilled water.

Residual solids from the decontamination activities were managed by containerization in drums and staging the drums at the Site for future management. All decontamination wastewater generated during the field activities was placed in DOT-approved drums and held in the secure sheet metal building. Personnel decontamination consisted of soap and water washing to remove contaminants from reusable protective gear (i.e., neoprene boots, chemical-resistant gloves). Disposable protective apparel was removed in such a manner to prevent the spread of contaminants to other clothing (i.e., remove gloves by turning them inside out). The decontaminated PPE was placed in plastic garbage bags and disposed of in a municipal landfill as a non-hazardous waste.

4.0 INVESTIGATIVE RESULTS

4.1 GEOLOGY

4.1.1 Regional Geology

The following documents were reviewed to assess the regional geology and hydrogeology in the vicinity of the Site.

- USGS's 7.5-minute topographic quadrangle map (Greendale, Wisconsin showing the Site.
- Wisconsin Geological and Natural History Survey (WGNHS) geologic log MI-87, and local water-supply well records.
- Bedrock Geologic Map of Wisconsin, 1982, by M.G. Mudrey, Jr., B.A. Braun, and J.K. Greenberg.
- Ground Water Conditions in the Milwaukee-Waukesha Area, Wisconsin, 1953, by F.C. Foley, W.C. Walton, and W.J. Drescher, U.S. Geological Survey Water Supply Paper 1229.
- Aerial photographs as described in Section 2.3.2

The geology in the vicinity of the Site is composed of unconsolidated Quaternary deposits underlain by sedimentary bedrock composed of Silurian dolomites; Ordovician shale, dolomite and sandstone; and Cambrian sandstone and shale.

4.1.1.1 Quaternary Deposits

The unconsolidated Quaternary deposits overlying bedrock in the vicinity of the Site are largely glacial ice contact, lacustrine, and outwash sediments. Ice contact (till) deposits generally consist of massive to stratified silty clay, silt, and sand deposits with varying amounts of pebbles and cobbles. Glacial lake deposits are composed of sand, silt, and clay derived from melting glaciers and deposited in freshwater lakes. Outwash is a stratified deposit, generally sand or gravel, laid down by water from melting ice fronts. The thickness of unconsolidated Quaternary deposits is approximately 140 feet in the vicinity of the Site. The log of one water-supply well, drilled approximately 2 miles west of the Site, includes in its descriptions of the Quaternary deposits (from bottom to top): 45 feet of gravel; 10 feet of coarse sand; 5 feet of till; 19 feet of silt, clay, and fine sand; 11 feet of sand; and 45 feet of till. This till, present in all of the water-supply well records, separates the basal sand and gravel deposits overlying the carbonate bedrock, from the uppermost, shallow water-bearing units. As described in the following section on Site geology, the shallow, coarse-grained unconsolidated deposits are all potentially water-bearing. Due to the nature of glacial deposits, however, the areal extent of these coarse-grained deposits may be limited locally. Based on well logs obtained from WGNHS, the Quaternary deposits are not used by local water-supply wells.

4.1.1.2 *Silurian System*

The Silurian Dolomite Formations are the uppermost bedrock units in the area. The Silurian units are generally undifferentiated on well logs in the area and consist of light gray to pink dolomite. The maximum thickness of the Silurian section, based on driller's logs, is 380 feet in southern Milwaukee County. The Silurian dolomite has been eroded extensively except where overlain by the younger Devonian rocks along the shoreline in north Milwaukee County. The Silurian rocks dip generally eastward.

4.1.1.3 *Ordovician System*

Ordovician sedimentary rocks present in the vicinity of the Site include the St. Peter Formation, the Platteville and Decorah Formations and Galena Dolomite, undifferentiated (mostly dolomite and herein called the Galena-Platteville unit), and the Maquoketa Group. The St. Peter and the Galena-Platteville units are commonly tapped by water-supply wells because they yield abundant quantities of good-quality water. However, the City of St. Francis receives its potable water supply from Lake Michigan.

Driller's logs indicate a maximum thickness of 469 feet of the St. Peter Formation in the area. The St. Peter Formation is a medium- to fine-grained sandstone. Immediately overlying the St. Peter Formation is the Galena-Platteville unit, a 290-foot thick slightly shaly dolomite. Overlying the Galena-Platteville unit are the 225-foot thick, dolomitic shales of the Maquoketa Group. The Maquoketa Group serves as a regional confining unit for the underlying water-bearing dolomite and sandstone formations. Unconformably overlying the Maquoketa Group are the Silurian Dolomite Formations.

4.1.1.4 *Cambrian System*

The oldest rocks penetrated by water-supply wells drilled in the vicinity of the Site are sedimentary rocks associated with the Cambrian System.

The Cambrian rocks are primarily sandstone; but include some shale, siltstone, and dolomite. They consist of five formations, which are, from oldest to youngest; the Mount Simon, Eau Claire, Galesville, Franconia Formations, and Trempealeau Group. In this report these formations are not differentiated, but are called the Cambrian sandstone. The upper surface of the Cambrian sandstone joins unconformably with the Ordovician Saint Peter Sandstone.

4.1.2 *Site Geology*

The investigative activities provide geologic data for areas on and immediately adjacent to the Site from the ground surface to a maximum depth of 30 feet BGS. This geologic data includes the results of the advancement of soil borings and the installation of monitoring wells by Maxim in January, April, and November 1996, and by ERM in July 1997. Figure 3.1 shows the locations of soil borings and monitoring wells on the Site. Soil boring logs, abandonment forms, and monitoring well completion logs resulting from Maxim's and ERM's site investigative activities are presented in Appendix B.

The surficial geology in the vicinity of the Site is a complex arrangement of fill materials overlying native, unconsolidated, glacial-, lacustrine- and fluvial-derived deposits.

The Site is situated near the base of a north-facing slope. The elevation of this slope increases to the south by several feet beginning from the intersection of East Norwich Avenue and South Pennsylvania Avenue (see Figure 2.4). The elevation of the ground surface on the Kitzinger drum storage area, located south and adjacent to the Site, is approximately 15 feet higher than the Site. On the Site, the upper parking lot ranges between 2 and 7 feet higher than the lower parking lot.

Grading of existing topography and placement of fill occurred at various times during development of the Site and adjacent areas to create level building sites, stabilize wet areas, and provide railroad and roadway grades (see Section 2.1). Areas of fill at the Site include the lower parking lot and building areas, the upper parking lot, and the shoulder of South Pennsylvania Avenue. Fill material is not present east of the brick, metal, and frame building in the vicinity of monitoring wells MW-1 and MW-9. ERM compiled the geologic data obtained during the investigative activities and developed one north-south and two approximately east-west cross-sections which are presented as Figures 4.1, 4.2, and 4.3. The following discussion of the site-specific geology starts from the highest point investigated and proceeds downward and to the northeast.

The soil borings advanced in the terrace bordering South Pennsylvania Avenue near the southwestern corner of the Site (i.e., SB-22, MW-10, MW-14, and MW-15) encountered fill material from 4 to 9.5 feet thick. The fill material consisted of silty clay, gravely sand, and sand; which was likely emplaced during the construction of South Pennsylvania Avenue. The fill material is underlain by top soil and a silty clay deposit with interbedded sand and gravely sand seams that extend to a depth of at least 16 feet BGS. During the advancement of the soil boring for monitoring well MW-15, a concrete obstruction was penetrated by the augers at a depth of 4.6 feet, after which drilling encountered less resistance (i.e., loose soils were once again encountered). After the obstruction was passed, the headspace samples yielded elevated readings indicating the presence of VOCs beneath the obstruction.

The fill material in the upper parking lot ranges in thickness from approximately 6 feet in the northern portion near the southern property boundary. Descriptions of soil boring logs completed in the upper parking lot included:

Northern Portion
gravel, sand, silt and clay
wood fragments
siliceous/glassy cinders
black, red and brown cinders
siliceous slag
metallic slag
foundry sand
foundry brick
paint chips
white fibrous material
glass fragments

Southern Portion
gravel, sand, silt and clay
wood fragments
cinders
concrete fragments
metallic slag
foundry slag
gold-colored metallic fragments
rubber-like sludge
paint chips
glass fragments
garbage

The fill material is locally underlain by loamy topsoil material. In several of the borings, the bottom of the fill material was underlain by decayed vegetation.

The "deep boring" drilled in the upper parking lot (SB-21) intersected a 3.7-foot-thick interval of sand within the silty clay deposit between 12.8 and 16.4 feet BGS. Thinner sand and silt interbeds were observed in this boring down to 24 feet BGS. Massive silty clay deposits were encountered between 24 feet and the boring's total depth of 30 feet BGS.

The thickness of the fill material present in the lower parking lot is approximately 4 feet. The lower parking lot fill material is underlain by topsoil in some locations (SB-16, SB-17, SB-18, SB-19, and SB-20). Fill materials within the lower parking lot consist of sand, silt, clay and cinders similar to the fill material found in the upper parking lot. However, bricks were encountered in only two of the borings advanced in the lower parking lot. In addition, slag was noted at only one location. Plastic, rubber, metal debris and paint chips were not noted in the logs of borings advanced in the lower parking lot.

Underlying the topsoil and fill is silty clay with interbedded sand and gravely sand seams. Prior to placement of the fill materials during the 1950s, the top of the silty clay likely approximated the ground surface.

The interbedded sand and gravely sand seams were present from 7 to 12 feet BGS in the "deep boring" drilled in the lower parking lot (SB-20). These gravely sand seams appear correlative with the sand unit found between 12.75 and 16.4 feet BGS in SB-21. Silty clay was encountered beneath the sand and gravely sand seams in SB-20 between 10.2 and 16.75 feet BGS. A gravely sand deposit was encountered in soil boring SB-20 beginning at 16 feet BGS and extending to at least the total depth of the boring at 22 feet BGS. Because field observations (i.e., a sheen visible on water coating the outside of the split-spoon) indicated the presence of contamination in the gravely sand, SB-20 was not advanced beyond 22 feet BGS. This lower gravely sand deposit was not encountered in the "deep boring" in the upper parking lot (SB-21), indicating that this deposit is discontinuous beneath the Site.

The two test trenches dug into the hill between the sheet metal building and the cinder block wall (Figure 3.1) revealed fill materials including bricks, wood, slag, plastic and wire below 6 to 10 inches of topsoil. The thickness of fill in this location increased from approximately 1 foot near the sheet metal building to approximately 3 feet further south, near the cinder block wall. Native silty clay was observed immediately below the fill materials. The elevation of the interface between the fill and native material corresponded to approximately 1 foot below the top of the concrete floor in the sheet metal building.

4.2 HYDROGEOLOGY

4.2.1 Regional Hydrogeology

The uppermost bedrock aquifer in the Milwaukee region is the Silurian-Devonian aquifer, which is composed primarily of the Niagara dolomite. The Maquoketa Group underlying the Silurian-Devonian aquifer acts as a confining unit impeding the vertical migration of water between this uppermost bedrock aquifer and the underlying aquifers. In other parts of Milwaukee County, the Silurian-Devonian aquifer is exposed at the surface, and receives recharge directly from precipitation and surface water. However, in the vicinity of the Site, where this aquifer is overlain by approximately 140 feet of unconsolidated glacial sediments, vertical migration of recharging ground water is impeded due to the fine-grained character of these silt and silty clay deposits. The ground water flow direction in the Silurian-Devonian aquifer is influenced locally by high-capacity industrial-use wells, although the overall flow direction is eastward toward Lake Michigan.

The surficial aquifer in southern Milwaukee County consists primarily of the unconsolidated glacial sediments, principally in the more coarse-grained deposits. In northern Milwaukee County however, the Silurian-Devonian and surficial aquifers often behave as one aquifer, especially in locations where the unconsolidated deposits are thin, or where sand and gravel deposits lie directly on the Silurian-Devonian dolomite. In southern Milwaukee County, a thick (50 to 110 feet) clay sequence within the quaternary deposits separates the uppermost water-bearing sands and gravels from the basal sands and gravels immediately overlying the Silurian-Devonian dolomite. These clay deposits act as a confining unit that impedes vertical migration of ground water and contaminants to the lower aquifer units.

Ground water in the surficial aquifer typically occurs within 25 feet BGS. Although the coarse-grained portions of the unconsolidated sediments are the principle water-bearing units, they may yield low volumes of water due to their limited extent. Regionally, ground water flows in an easterly direction toward Lake Michigan. Locally however, ground water flow may be influenced by streams and man-made drainage features.

4.2.2 Local Hydrogeology

The following discussion of the Site hydrogeology is based upon the geologic and ground water data obtained during the investigative activities. This data includes ground water elevations measured in the

Site monitoring wells, hydraulic conductivity tests, and laboratory permeability test results.

4.2.2.1 *Surface Hydrology*

As noted in the section on Site Background (Section 2.0), the topographic maps and field reconnaissance indicates a regional surface water drainage to the northeast toward Lake Michigan. Surface water flow across the Site is toward the northeast as the topography slopes downward toward the north and east. One creek, located to the west of the St. Francis Auto Wreckers property flows to the storm water catchment immediately north of the St. Francis Auto Wreckers property. This catchment connects to an east-trending, 72-inch-diameter, storm sewer beneath East Norwich Avenue (See Figure 2.1). Another small creek, located east of the Kitzinger property flows into a storm sewer catchment that also connects to this 72-inch storm sewer. This 72-inch storm sewer extends to the northeast underneath properties situated north of Norwich Avenue.

Surface water that accumulates on site either infiltrates into the ground or flows overland to topographically lower areas. Because a large portion of the Site is covered by asphalt or by buildings, infiltration occurs mainly through cracks in the asphalt. Surface water runoff flows overland towards the ditch that runs parallel to East Norwich Avenue. This ditch connects to a storm sewer that feeds into the 72-inch storm sewer beneath East Norwich Avenue.

4.2.2.2 *Unsaturated Zone Hydrogeology*

In unconsolidated geologic deposits, soils consist primarily of granular particles with void spaces between them. The unsaturated zone is defined as that portion of the subsurface whose voids contain some amount of moisture with pockets of air. When precipitation falls on the ground surface, it flows to lower areas and accumulates in depressions, or infiltrates into the ground. Infiltrated water migrates down through the soil primarily by gravity. When this occurs, the water content within the soil pores increases. When the pores are completely filled with water, then the soil is defined as being water-saturated.

The unsaturated zone at the Site is generally less than a few feet thick, and in some areas is non-existent because the void spaces are completely water-saturated. The thickness of the unsaturated zone at any given location fluctuates during the year due to increased precipitation and infiltration, or due to a fluctuating ground water table.

All of the soil samples examined during the subsurface investigation had some amount of moisture. Whether these samples were saturated, located within the capillary fringe, or unsaturated could not always be determined in the field. The unsaturated zone at the Site was typically found only within the upper few feet of the subsurface, and usually only within the fill.

4.2.2.3 *Capillary Fringe Hydrogeology*

Between the unsaturated zone and the water table is a region where the soil pores are saturated but are subject to a negative pressure. This negative pressure is due to capillary forces imposed upon the water by the fine-grained nature of the soils. The region immediately below the unsaturated zone is termed the capillary fringe. The capillary fringe behaves much like a sponge which draws water into it when it is placed on a wet surface. As the water is drawn into the capillary fringe, dissolved constituents are also drawn up into the soils, resulting in soils which can become impacted with constituents that primarily migrated via ground water flow.

The capillary fringe fluctuates along with the rising and falling water table. During periods of time when the water table is high, the capillary fringe may extend upwards to the ground surface. When this occurs, the unsaturated zone no longer exists, and the entire soil column is saturated. As the water table declines, the capillary fringe recedes and once again an unsaturated zone is developed.

During precipitation events, water that infiltrated the soil migrates downward through the unsaturated zone and reaches the capillary fringe. The excess water then can create a local temporary ground water mound with an extended capillary fringe, and if near-surface, the unsaturated zone is non-existent. When infiltration ceases, the ground water mound dissipates, the capillary fringe recedes, and the unsaturated zone once again develops.

Depending upon the grain size of the deposits, the thickness of the capillary fringe can range from several inches (sand) to several feet (silt and clays).

4.2.2.4 *Saturated Zone Hydrogeology*

Water elevation measurements are summarized in Table 4.1. Between April 24, 1996, and March 23, 1998, ground water elevations fluctuated between 1.3 feet at MW-9 and 5.7 feet at MW-5. During periods of little or no precipitation, the ground water table is encountered typically within the silty clay layer. During periods of abundant precipitation, the ground water table rises to within the overlying fill material. During high water table conditions, much of the Site soils (both fill and native silty clay) are saturated from the water table to ground surface. A high water table was encountered on February 24, and March 24, 1998. The depth to the water table from ground surface was less than 5 feet at monitoring wells MW-1, MW-2, MW-4, and MW-7 on these dates. At MW-7, the depth to ground water was about 1.5 feet BGS. The capillary fringe likely extended to near ground surface at these locations.

Due to the complex fill and native unconsolidated deposit stratigraphy, the Site monitoring wells are screened within one or more of the different stratigraphic units at the Site. Monitoring wells MW-1 and MW-9, located in the eastern portion of the Site, are screened entirely within native materials, including sands. Monitoring wells MW-3 and MW-8 are screened within native materials (including sands), but their sand packs extend upward nearly 1 foot above the fill/native silty clay contact. The remaining monitoring wells (MW-2, MW-4, MW-5, MW-6, MW-7, MW-14, MW-15) are screened across varying thicknesses of fill and native materials, including sand intervals within the silty clay. A portion of the screened interval in monitoring well MW-15 includes fill containing concrete materials up to 1 foot thick.

The depth to ground water measurements by Maxim and ERM were converted to elevation above mean sea level (AMSL) and used to construct ground water hydrographs, shown in Figure 4.4, and contour maps, shown in Figures 4.5 through 4.14.

An apparent ground water mound occurs at MW-2 and appears anomalously high compared to the water levels measured in adjacent wells (i.e., MW-7, MW-8 and MW-15) This apparent mound is present in all historical water elevation data sets. The MW-2 well screen is set in fill beneath the upper parking lot and in the underlying silty clay. The water level in MW-2 is most likely influenced by a ground water mound resulting from the nearby east-west cinder block wall on the southern boundary of the Site. The cinder block wall acts as a partial barrier to shallow, northward-flowing ground water. Ground water flowing northward toward the Site may be impeded by the wall. This retaining wall is not completely impermeable. Evidence of seepage through the wall includes precipitation of inorganic salts in cracks and joints in the cinder block wall. These precipitates were observed behind the frame building. While a portion of the ground water seeps through or underneath the wall, another portion is diverted east and west until it can continue north around the ends of the wall. This creates a ground water mound immediately south of the concrete block wall and extending to the ends of the wall. The hydraulic head observed in MW-2 is likely caused by this flow pattern.

Figures 4.13 and 4.14 present ground water contour maps developed using the most recent elevation data (March 24, 1998). As shown in Figure 4.13, ground water beneath the Site generally flows north and northeast toward monitoring wells MW-4 and MW-9, respectively. This flow pattern follows the topography of the area and also the surface water drainage patterns east of South Pennsylvania Avenue. However, because of the high hydraulic head at MW-2, the water levels during all events also indicate a westward component of flow towards MW-15. Removal of the head at MW-2 results in the contours presented in Figure 4.14. This figure indicates that ground water heads are highest immediately south of the Site, south of the sheet metal building. Based upon this information, ground water flows beneath the Kitzinger property, north toward the cinder block wall. A significant amount of ground water flow is then diverted east or west along the wall until it can flow northward around the ends.

Hydraulic conductivity testing results are shown in Table 4.2. The geometric mean hydraulic conductivity is 8.0 x 10^{-5} cm/sec. This hydraulic conductivity is consistent with the silty sand deposits encountered at the Site. However, it should be noted that this hydraulic conductivity value is from by wells screened across multiple units and heterogeneous deposits, so that the hydraulic conductivity represents an average across these different deposits.

The hydraulic gradient (i) changes across the Site. However, the mean gradient for March 24, 1998 is approximately 0.018 cm/cm. The geometric mean hydraulic conductivity (k) is 8.0 x 10^{-5} cm/sec. Based on Darcy's law (v=ki/n), and a porosity (n) of 25%, the mean ground water velocity (v) across the Site is 1.82 meters (6.0 feet) per year. However, man-made and natural heterogeneities in the geology at the Site may provide conduits of flow that exceed 1.82 meters per year, or may provide boundaries that cause a decreased flow velocity. Possible horizontal and vertical flow boundaries include the cinder block wall along the southern end of the Site; thinning of the fill between the upper and lower parking lots; and the silty clay underlying much of the Site. Features that may act as possible flow conduits include natural gas line backfill, gravel intervals within the native silty clay deposits, and storm sewer lines.

4.3 DEGREE OF CONTAMINATION

This section presents the analytical data obtained during investigative activities at the Site. The evaluation of this data is presented in Section 5.0.

4.3.1 Soil Sampling Results

Table 4.3 summarizes laboratory analytical results for soil samples collected from soil borings. These 61 samples were collected at depths ranging from 0 to 2 feet BGS on the lower parking lot near the former TCE AST location to 16 to 17 feet BGS in "deep" boring SB-20. Laboratory analytical results for soil samples collected from trenches dug into the hill south of the sheet metal building are summarized in Table 4.4. These samples were collected from about 1 foot below the elevation of the sheet metal building floor to 3.6 feet above the floor elevation.

A review of the percent solids and the depths of soil samples indicates that many samples were saturated with ground water or influenced by ground water in the capillary fringe. Soil samples are considered likely to be saturated if: (1) samples had a dry weight (percent solids) of 70% or less, or (2) samples were located below the ground water table interpolated from nearby monitoring wells. Table 4.5 gives an estimate of whether soil samples were collected in the unsaturated zone using these criteria which are described below. Soil samples which fit these criteria are potentially impacted by contaminant transport via ground water migration. Additionally, soils may be influenced by ground water in the capillary fringe, the height of which fluctuates in response to changes in ground water elevation.

Tables 4.3 and 4.4 include the percent solids in each soil sample, as VOC concentrations are reported in terms of dry weight. The laboratory determines the percent moisture of each sample in order to derive the percent solids. Samples varied in moisture content from 5% to 61% with the corresponding percent solids ranging from 39% to 95%. As the moisture content in soil increases, the soil approaches saturation with all pore spaces filled with water. In saturated soils, the percent moisture provides an estimate of the porosity of a sample. If a typical porosity of 30% is assumed for samples collected at the Site, those samples with 70 percent solids or less can be assumed to have been saturated at the time of collection. Samples with greater than 70 percent solids can be assumed to have been collected in the unsaturated zone above the capillary fringe. Based on these assumptions 16 of the 61 samples collected from soil borings were saturated when collected.

The likelihood of whether a given soil sample was collected in the saturated or unsaturated zone can also be estimated by comparing the elevation of the sampling interval with the average ground water elevation interpolated from nearby monitoring wells. The elevation of the soil sampling interval was either directly measured using conventional surveying methods or estimated from the surveyed ground elevations adjacent to surveyed soil boring or monitoring well locations. In Table 4.5, the average soil sample elevation is compared to the nearest monitoring well and at the nearest date when the soil sample was collected. If the average soil sample elevation is lower than the estimated ground water elevation, then the sample was likely saturated. Using these assumptions, 34 of the 61 samples collected from soil borings were saturated.

Based upon the above two criteria, 39 of the 61 soil samples collected during the investigation were saturated at the time of collection.

As discussed in Section 4.2.2.4, ground water elevations have fluctuated over a range of 1.3 to 5.7 feet across the Site. During these fluctuations, the influence of the ground water table and the associated capillary fringe have extended near or to ground surface, thereby carrying dissolved organic constituents from impacted ground water into previously unimpacted soils. During this investigation, observed contaminant concentrations in Site soils were associated with correspondingly elevated concentrations of VOCs in the ground water. Because seasonal fluctuations of the water table have contributed to the presence of VOCs in Site soils, and because unsaturated soils within the area of contamination are thin or non-existent at certain times of the year, this report does not distinguish between saturated and unsaturated soil. Accordingly, the evaluation of contamination at the Site should most appropriately be treated as strictly a ground water problem.

Soil analyses may be used qualitatively to identify areas of contamination and estimate the degree of ground water contamination. Soil contamination isoconcentration maps were prepared based on the soil sample results shown in Tables 4.3 and 4.4. Figure 4.15 was prepared for the PVOCs (benzene; toluene; ethyl benzene; total xylenes; 1,2,4-TMBZ; and 1,3,5-TMBZ). Figure 4.16 was prepared for the chlorinated ethenes (PCE; TCE; cis- and trans-1,2-DCE; 1,1-DCE; and vinyl chloride). Figure 4.17 was prepared for the chlorinated ethanes (1,1,1-TCA; 1,2-DCA; 1,1-DCA; and CA). As shown in these figures, elevated concentrations of the PVOCs, chlorinated ethenes, and chlorinated ethanes are centered around the southwestern portion of the Site, specifically surrounding soil borings GP-21, B-03/MW-2 and the boring associated with MW-7. As shown in

Figure 4.15, areas with the highest total PVOC concentrations (1) extend across the southern boundary of the upper parking lot to sample trench HA-2, and (2) at locations associated with the soil borings for MW-7 and extending from B-06 to B-07. It should be noted, however, that all of these samples were likely water-saturated at the time of the sample collection.

The distribution of total chlorinated ethenes in soil samples is shown in Figure 4.16. The highest concentration of total chlorinated ethenes are associated with soil borings at MW-2 and GP-21, both located near the southern property boundary. The high concentration of chlorinated ethenes at GP-21 (a water-saturated soil sample), indicates that ground water concentrations are also likely high.

The distribution of total chlorinated ethanes in soil samples is shown on Figure 4.17. The highest concentration of total chlorinated ethanes were found at soil sample location GP-21. Also having a high concentration of total chlorinated ethanes is the soil sample associated with MW-7.

The analytical results obtained from samples collected from the two trenches between the sheet metal building and the southern boundary of the Site are summarized in Table 4.4. This table also compares the approximate elevation of the soil samples to the elevation of the sheet metal building floor and the ground water elevations measured in monitoring wells MW-7 and MW-8 on July 24, 1997. All soil samples from the trenches were collected above the measured ground water table observed in these two wells. However, based on the low percent solids (48% to 62%) observed in soil samples HA-1-A and B, and HA-2-A and B, these samples appear to represent conditions within the capillary fringe, where the saturated conditions exist. TCE, Cis-1,2-DCE, 1,1,1-TCA, and 1,1-DCA were measured in all of the soil samples from the trenches that were submitted for analysis. Concentrations of ethyl benzene, toluene, and xylenes were also measured in the sample HA-2A, and toluene was observed in HA-2B. Based upon the results of these soil samples, concentrations of VOCs are higher in the deeper sample locations compared with results from the shallow sample locations. From these relationships we conclude that contaminated ground water beneath these two trench locations has been the sole contributor to VOC-impacted soils.

The presence of VOC constituents in the soils underlying the upper parking lot is likely due to:

- the placement of fill material that was contaminated prior to its delivery to the Site,

- run-on of contaminated surface water from upgradient, off-site sources, or

- a ground water contaminant plume(s) migrating onto the Site from an upgradient source(s).

Fill material was brought into the area up through approximately 1970, to fill in low-lying areas and to create sub-bases for building construction. It is not certain whether soils in the upper parking lot were impacted prior to being used as fill material at the Site. Based on our observations:

- The types of constituents found in the upper parking lot fill material and ground water are consistent with the types of constituents found in lower parking lot fill material and ground water.

- All constituents detected in ground water were also detected in soil samples. There were no constituents found in soil samples that were not found in ground water.

- Ground water fluctuations (including the capillary fringe) likely affected all soil sampling locations to some extent, thereby potentially impacting the soils with contaminants transported by the ground water.

Based on the foregoing, we conclude that any contamination present in fill material brought onto the Site is inconsequential in comparison to the contamination carried onto the Site via ground water flow.

Although surface water run-on is a possible pathway for the migration of contaminants onto the Site, it is unlikely that this pathway is significant because of the presence of unpaved surfaces on the Kitzinger property. Relatively flat, unpaved surfaces would typically inhibit lateral spreading of liquid spills. It is also unlikely that surface water run-on from the St. Francis Auto Wreckers facility would be a factor impacting Site soils due to the presence of South Pennsylvania Avenue. Surface run-off from the St. Francis Auto Wreckers property enters the storm sewer system and does not cross the Site.

Surface run-on may have carried some contamination onto the Site prior to placement of fill material, when the uppermost unsaturated soil layer was native silty clay. This surface run-on would have stemmed primarily from the Kitzinger property to the south. Prior to the placement of fill material in the 1950s, surface water flowed onto the Site via sheet flow primarily from precipitation, or via an intermittent stream that historically crossed South Pennsylvania Avenue from the west. With the subsequent placement of fill material in the early 1950s, portions of the silty clay that may have been impacted by surface run-on became part of the shallow ground water unit.

The presence of VOCs in the fill material and soils beneath the upper parking lot is primarily due to the migration of constituents onto the Site via ground water flow. Fill material and soils below the water table would immediately become impacted with VOCs, and fill material and soils within the capillary fringe would become impacted as the water table fluctuated.

The presence of VOC constituents in the soils underlying the lower parking lot is due to one or more of the following:

- migration of contaminants from sources to the south and west through preferential pathways such as backfill surrounding utility lines,
- minor leaks or spills associated with the former TCE AST (located north of the sheet metal building, shown in Figure 1.2),
- the placement of fill material that was contaminated prior to its delivery to the Site, or
- the impacted surface water run-on from the south.

A natural gas utility line and associated backfill, located beneath the upper parking lot, runs east from South Pennsylvania Avenue to the sheet metal building. This line and associated backfill is approximately 5 feet north of monitoring well MW-2. This buried utility line creates a preferential pathway for contaminated ground water to migrate from the upper parking lot near MW-2 to the lower parking lot beneath the sheet metal building, thereby impacting the soils below the water table, and within the capillary fringe.

As stated in Section 2.3, there is no indication from former employees, or visible evidence, that spills or leaks occurred in association with the TCE AST or its delivery line.

Any contamination that was present in the a fill material that was placed in the lower parking lot has been masked due to the high concentrations of VOCs in the ground water and the shallow depth to ground water in the lower parking lot.

Because of the historic problems of managing stormwater running onto the Site from the Kitzinger property, it is possible that some quantity of VOCs were carried onto the Site, thereby impacting the soil. However, it is unlikely that the high concentrations found within the lower parking soils is due entirely to surface run-on.

Of these four, the most likely source is associated with ground water migration or surface run-on from an upgradient source, and the subsequent migration through preferential pathways into the lower parking lot soils. Whether migration from that source occurred before or after filling activities began is unknown.

4.3.2 *Ground Water Sampling Results*

Seven ground water sampling events have been performed at the Site since April 1996. Ground water samples were collected by Maxim from monitoring wells at the Site on April 23, 1996; September 13, 1996; November 14, 1996; and February 26, 1997; and by ERM on July 24-25, 1997; November 25-26, 1997; and February 24, 1998. Table 4.6 summarizes the results of the total and dissolved metals, cyanide and chloride analyses; Table 4.7 summarizes the results of the volatile organic compounds; and Table 4.8 summarizes the ground water quality data collected in the field during the July 1997, November 1997 and February 1998 monitoring events. Copies of all of the laboratory reports for the ground water samples are included in Appendix D.

The WAC Chapter NR 140 ground water ESs and PALs are included in Tables 4.6 and 4.7. In most cases, the detection limit exceeded either the PAL or the ES for each compound. This was due to the high concentrations detected in many of the samples, which caused the laboratory to increase the detection limits. Therefore, only the actual detected concentrations are used in the following discussion.

In general, only minor levels of VOCs were detected in MW-1 and MW-9. The following VOCs were detected in MW-1 water samples:

- April, 1996: TCE, which equals the PAL at a concentration of 0.5 μg/l and 1,2-DCA (which exceeds the PAL of 0.5 μg/l) at a concentration of 1.2 μg/l;

- September, 1996: benzene (which exceeds the PAL of 0.5 μg/l) at a concentration of 0.65 μg/l, toluene at 0.34 μg/l, xylenes at 0.56 V, 1,2,5-TMBZ at 0.44 μg/l, TCE (which exceeds the PAL of 0.5) at 1.3

µg/l and 1,2-DCA (exceeding the PAL of 0.5 µg/l) at a concentration of 2.1 µg/l.

- February 1997: cis-1,2-DCE at a concentration of 0.58 µg/l and 1,2-DCA (exceeding the PAL of 0.5 µg/l) at a concentration of 0.68 µg/l.

In samples collected from MW-9, the following constituents were detected:

- November, 1996: xylenes at 0.43 µg/l and 1,1,1-TCA at 0.95 µg/l.

- February, 1997: MBTE at 2.9 µg/l; PCE at 0.27 µg/l; 1,1,1-TCA at 0.71 µg/l; 1.2-dichlorobenzene at 0.27 µg/l; and 1,2-dibromo-3-chloropropane (which exceeds the ES of 0.2 µg/l) at 0.82 µg/l.

- November, 1997: PCE (exceeding the PAL of 0.5 µg/l) at a concentration of 2.3 µg/l.

Due to the inconsistent trends and detection of these constituents near or below the detection limits, the presence of these constituents in these wells is not further described in this report. The levels of VOCs present in MW-1 and MW-9 are considered insignificant compared with the concentrations of constituents in wells on the western portion of the Site as described below. Because of the inconsistency in the presence of VOCs in MW-1 and MW-9, analytical results for the samples collected from these wells are not included.

Ground water analytical data were grouped for discussion as inorganic compounds, petroleum VOCs (PVOCs), chlorinated ethenes and chlorinated ethanes. The groups of organic compounds were used because they commonly occur together, have a similar chemical makeup, and, in general, the more complex constituents break-down into the simpler constituents within the same group.

4.3.2.1 *Inorganic Compounds*

The inorganic compounds evaluated include total and dissolved metals, chloride and cyanide. Results of the ground water analyses for metals, chloride and cyanide are presented in Table 4.6. Total metal concentrations detected in ground water samples often exceeded the PALs and sometimes the ESs, for the respective metal. The high concentrations of total metals can be attributed to the collection of turbid ground water samples. Beginning on February 26, 1997, ground water samples were collected and analyzed for both total and dissolved metals to determine the contribution of suspended solids to total metals concentrations. As shown in Table 4.6, dissolved metals are significantly lower than total metals concentrations. The following discussion focuses on dissolved metals concentrations.

Lead, with an ES of 15 µg/l, was the only dissolved metal for which the ES was exceeded. These exceedences occurred in MW-15 on November 26, 1997 at a concentration of 220 µg/l, and in MW-2 on February 25, 1998 at a concentration of 18 µg/l. The dissolved metals and the number of samples that exceeded their respective PALs were arsenic PAL of 5 µg/l exceeded 12 times), barium (PAL of 400 µg/l exceeded 9 times), cadmium (PAL of 0.5 µg/l exceeded 2 times), chromium (PAL of 10 µg/l exceeded 5 times), lead (PAL of 1.5 µg/l exceeded 8 times) and mercury (PAL of 0.2 µg/l exceeded 3 times). Cyanide was analyzed in samples from MW-2 because ground water in this well has blue tint. Cyanide is a component of Prussian Blue, a blue dye. For five sampling events, cyanide concentrations in MW-2 varied widely, from less than 10 µg/l to 2,800 µg/l. The ES of 200 µg/l was exceeded three times. The PAL of 40 µg/l was exceeded by one sample which did not exceed the ES. For the November 14, 1996 sampling event, cyanide was analyzed in ground water samples from MW-6, MW-11, and MW-12. In these samples, cyanide was less than the detection limit of 10 µg/l.

For the 12 ground water samples in which dissolved arsenic was detected, the average concentration was 8.9 µg/l with a maximum concentration of 14 µg/l in a sample collected from MW-4 on July 24, 1997. The PAL for arsenic of 5 µg/l was exceeded in all of the samples where detected, which were collected from MW-2, MW-3, MW-4, MW-6, MW-7 and MW-15.

The average dissolved barium concentration was 349 µg/l with a maximum concentration of 1600 µg/l detected in a sample collected from MW-7 on February 25, 1998. The PAL was exceeded in samples from MW-2 (710 µg/l), MW-3 (430 µg/l), MW-5 (440 µg/l), MW-6 (670 µg/l), MW-7 (710 µg/l), MW-14 (400 µg/l) and MW-15 (1200 µg/l), all collected during the November 26, 1997 sampling event, and in MW-6 (430 µg/l) and MW-7 (1600 and 500 µg/l) in samples collected on February 25, 1998.

Dissolved cadmium was detected only in two samples collected from MW-9. These samples exceeded the PAL of 0.5 µg/l on February 26, 1997 (2.79 µg/l) and on February 25, 1998 (0.9 µg/l).

Dissolved chromium (with a PAL of 10 µg/l) was detected in samples collected from MW-2 on February 26, 1997 (10.8 µg/l); July 25, 1997 (13 µg/l); November 26, 1997 (11 µg/l); and February 28, 1998 (14 µg/l). In addition, one sample collected from MW-15 on November 26, 1997 contained 15 µg/l dissolved chromium, exceeding the PAL.

Concentrations of dissolved lead that exceed the PAL (1.5 µg/l) were detected in MW-2 on February 26, 1997 (4.59 µg/l), July 25, 1997 (1.6 and 2.4 µg/l), November 26, 1997 (2.7 µg/l), and February 25, 1998 (18 µg/l, which also exceeds the ES of 15 µg/l). Dissolved lead exceeding the PAL was also detected in a sample collected from MW-5 on July 25, 1997 (12 µg/l); in MW-9 on July 24, 1997 (2.8 µg/l) and November 26, 1997 (6.0 µg/l); and in a sample collected from MW-15 on November 26, 1997 (220 µg/l, which also exceeded the ES of 15 µg/l).

Dissolved mercury exceeding the PAL of 0.2 µg/l was detected in MW-2 (0.22 µg/l), MW-6 (0.2 µg/l), and MW-15 (0.21 µg/l) all from the July 24-25, 1997 sampling event.

Concentrations of chloride exceeded the PAL of 125,000 µg/l in samples collected from MW-2 on November 26, 1997 (130,000 µg/l); MW-7 on November 26, 1997 (210,000 µg/l) and on February 25, 1998 (210,000 µg/l); MW-9 on November 26, 1997 (130,000 µg/l); and MW-15 on February 25, 1998 (200,000 µg/l).

The ES for chloride (250,000 µg/l) was exceeded in samples collected from MW-5 on July 25, 1997 (290,000 µg/l); from MW-15 on July 25, 1997 (450,000 µg/l), and from MW-14 on February 25, 1998 (410,000 µg/l). The average chloride concentration detected in all monitoring wells and on all dates is 110,000 µg/l.

The distribution of dissolved metals that exceed a PAL or ES is not consistent across the Site. However, exceedences of the PAL or ES were most common in samples collected from MW-2.

4.3.2.2 *Petroleum Volatile Organic Compounds*

Concentrations of PVOCs in ground water samples from individual wells are presented in Table 4.7 and plotted in Figures 4.18 through 4.26. An isoconcentration map of total PVOCs for the February 25, 1998 sampling date is shown in Figure 4.27. The highest total concentrations of detected PVOCs occur (in order of abundance) in MW-2, MW-7, MW-15, and MW-6. MW-2 is located on the upper parking lot near the southwest corner of the Site. MW-7 is located on the lower parking lot near the sheet metal building and the former TCE AST location. MW-15 is located south of the southwest corner of the Site, in the terrace of South Pennsylvania Avenue. MW-6 is installed on the upper parking lot on the west Site boundary downgradient of MW-15 and MW-2. Lower PVOC concentrations (less than 1,000 µg/l) occur in downgradient wells MW-3, MW-4, and MW-5; and in upgradient well MW-8 behind the sheet metal building. The lowest concentrations are found off site and upgradient in MW-10 and MW-14. Results for individual PVOC parameters are discussed below.

Benzene

The benzene ES of 5 µg/l was exceeded in all wells containing detectable levels of benzene (MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, and MW-15) except for a sample from MW-5 collected on February 25, 1998, with a benzene concentration of 4.4 µg/l. This concentration exceeded the PAL of 0.5 µg/l. The highest detected benzene concentrations of 40 µg/l and 200 µg/l occurred in samples from MW-7. Benzene has not been detected in samples obtained from MW-8 in the southern portion of the Site and in MW-10 and MW-14 located in the terrace of South Pennsylvania Avenue south of the Site.

Toluene

The ES for toluene of 343 µg/l was exceeded by all samples collected from MW-2, MW-6, MW-7, and MW-15. The highest toluene concentrations, ranging from 1,900 to 13,000 µg/l, occurred in samples from MW-7. High concentrations ranging from 2,100 to 6,500 µg/l in MW-15 and 1,600 to 5,900 µg/l in MW-2 were detected in samples from these locations upgradient and southwest of MW-7. For MW-6 on the west property boundary, toluene concentrations ranged from 580 to 1,100 µg/l. The PAL of 68.6 µg/l was exceeded by concentrations of 70.4 µg/l and 89 µg/l in samples collected from MW-5 on April 23, 1996 and September 13, 1996. Toluene concentrations are low or not detected in MW-8 near the south property boundary and in MW-10 and MW-14 located south in the terrace of South Pennsylvania Avenue. Toluene concentrations are also low or not detected in down gradient wells MW-3 and MW-4.

Ethyl Benzene

The ES for ethyl benzene of 700 µg/l was exceeded in all samples collected from MW-7 and MW-15. The highest ethyl benzene concentrations, ranging from 2,000 to 2,500 µg/l, occurred in samples from upgradient, off-site well MW-15. Concentrations in MW-7 ranged from 890 to 2,100 µg/l. Concentrations in MW-6 were lower, ranging from 600 to 990 µg/l. Concentrations for all MW-6 samples, except for the February 26, 1997 sampling date, exceeded the ethyl benzene ES. The range of ethyl benzene concentrations for MW-2 is 8.4 to 1,900 µg/l. The ES was exceeded by samples collected on September 13, 1996; February 26, 1997; July 24, 1997; and November 25, 1997. The PAL of 140 µg/l was exceeded by samples from MW-2 for all dates except the first sampling date on April 23, 1996. Ethyl benzene was not detected in samples from MW-10 and MW-14 located to the south in the terrace of South Pennsylvania Avenue. In the remaining monitoring wells, ethyl benzene was usually detected, but below the ES and PAL.

Xylenes

The ES for xylenes of 620 µg/l was exceeded on all dates by samples collected from MW-2, MW-6, MW-7, and MW-15. The highest concentrations ranging from 9,200 to 14,000 µg/l occurred in samples from upgradient, off-site well MW-15. High xylene concentrations ranging from 5,000 to 11,500 µg/l occur in MW-7. Concentrations in MW-2 and MW-6 had similar ranges from 2,900 to 9,200 µg/l and from 3,200 to 5,400 µg/l, respectively. The PAL for xylenes of 124 µg/l was exceeded by the first sample collected from MW-4 on April 25, 1996 and by a sample collected from MW-5 on September 13, 1996. Xylene concentrations are low (less than 100 µg/l) or not detected in the remaining samples from all monitoring wells.

Trimethyl Benzenes

Currently, there is no Chapter NR 140 ES or PAL for 1,2,4-trimethyl benzene (1,2,4-TMBZ) or 1,3,5-TMBZ. However, according to the USEPA Region III Risk-Based Concentration (RBC) table, a RBC of 12 µg/l for each of these constituents has been established. The RBCs for both TMBZs were exceeded by samples from MW-2, MW-4, MW-6, MW-7, MW-8, and MW-15. The highest concentrations of both TMBZs occurred in samples from MW-7. 1,2,4-TMBZ concentrations ranged from 920 to 4,200 µg/l and 1,3,5-TMBZ concentrations ranged from 280 to 1,700 µg/l. Both TMBZs were not detected in MW-7 for two sampling dates; however, the detection limits were well above the RBCs. For MW-2, detectable concentrations of 1,2,4-TMBZ ranged from 300 to 890 µg/l and for 1,3,5-TMBZ, detectable concentrations ranged from 82 to 720 µg/l. Concentrations of 1,2,4-TMBZ are also high for MW-6 and MW-15 with ranges of 60 to 360 µg/l and 350 to 1,300 µg/l, respectively. Concentrations for MW-8 have ranged from less than 1.0 to 350 µg/l.

1,2,4-TMBZ concentrations in MW-3 and MW-4 have ranged from less than detection limits to about 100 µg/l. 1,2,4-TMBZ concentrations for all samples from upgradient wells MW-10 and MW-14 and downgradient well MW-5 are below the RBC for 1,2,4-TMBZ. 1,3,5-TMBZ concentrations for MW-8 and MW-15 have been consistently higher than RBCs, ranging from 23 to 63 µg/l and 130 to 330 µg/l, respectively. 1,3,5-TMBZ concentrations in MW-6 have ranged from less than 1.0 to 130 µg/l. For MW-4, the RBC was exceeded for only one sampling event by a concentration of 19 µg/l. Concentrations for all samples from MW-3, MW-5, MW-10, and MW-14 are below the ES for the 1,3,5-TMBZ.

Methyl-t-butyl ether

The ES of 160 µg/l for methyl-t-butylether (MTBE) was exceeded by one sample collected from MW-2 on November 26, 1997 with a concentration of 5,300 µg/l. MTBE was not detected in MW-2 for the remaining sampling dates. The PAL of 12 µg/l for MTBE was not exceeded by any of the remaining ground water samples. Only one sample collected from MW-6 on February 24, 1998 had a detectable MTBE concentration of 8.7 µg/l.

4.3.2.3 *Chlorinated Ethenes*

Concentrations of chlorinated ethenes detected in ground water samples are presented in Table 4.7 and plotted for individual wells in Figures 4.18 through 4.26. An isoconcentration map for the February 25, 1998 sampling event is shown in Figure 4.28. As with PVOCs, the highest detectable chlorinated ethene concentrations occur in MW-2, MW-7, MW-15, and MW-6. The lowest or non-detectable concentrations tend to occur in MW-8, temporary well MW-10, and MW-14. Results for individual chlorinated ethenes are discussed below.

Perchloroethene

The PCE ES of 5 µg/l was exceeded by samples from MW-2 for the first two ground water sampling events on April 23, 1996 and September 13, 1996. Concentrations were 573 µg/l and 870 µg/l, respectively. These are the highest PCE concentrations detected in ground water at the Site. PCE did not exceed detection limits for all other sampling dates, though the detection limits frequently exceeded the ES. In MW-6, located downgradient of MW-2, a PCE concentration of 400 µg/l on November 14, 1996 exceeded the ES. PCE was not detected on the remaining sampling dates; however, detection limits were above the ES. For MW-4, MW-10, MW-14, and MW-15, the ES was exceeded in each well on one sampling date with PCE concentrations ranging from 5.6 µg/l in MW-14 to 34 µg/l in MW-10. For MW-4 and MW-15, PCE was not detected for the remaining sampling dates. For MW-14, the PAL of 0.5 µg/l was exceeded by concentrations of 3.1 µg/l and 4.7 µg/l for samples collected on July 24, 1997 and February 24, 1998, respectively. Finally, PCE did not occur above detection limits in any samples from MW-3, MW-7, and MW-8.

Trichloroethene

TCE is one of the most common VOCs detected at the Site. The ES for TCE of 5 µg/l was exceeded by all samples collected from MW-2 near the southwest corner of the property and from MW-7 near the former TCE AST location. TCE concentrations are highest for samples from MW-2, ranging from 2,000 to 61,600 µg/l, followed by MW-7 with concentrations ranging from 370 to 25,000 µg/l. TCE concentrations in MW-2 have shown a consistent decrease over time (Figure 4.18). The third highest concentrations, ranging from 300 to 630 µg/l, occurred in upgradient, off-site wells MW-10 and MW-14. It is unexpected that TCE was not detected in upgradient off-site MW-15; however, detection limits for three sampling events ranged from 2 µg/l up to 1,000 µg/l. TCE exceeded the ES in all but one sample each from downgradient wells MW-3 and MW-5 and upgradient well MW-8. All detectable concentrations in samples from MW-4 exceed the ES. TCE was not detected in MW-4 for two sampling events. For MW-6, TCE exceeded the ES for the February 25, 1998 sampling event, but was below detection limits of 10 to 100 µg/l for all four previous sampling events.

Cis-1,2-Dichloroethene

Cis-1,2-DCE like TCE, is also one of the most common VOCs detected at the Site. As discussed in Section 5, cis-1,2-DCE is a degradation product of TCE. The ES of 70 µg/l was exceeded in all samples from MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, MW-14, and MW-15. The highest concentrations up to 410,000 µg/l occur in MW-7 followed by concentrations up to 230,000 µg/l in MW-2. South of MW-2, concentrations in MW-15 have ranged from 2,700 to 15,000 µg/l. Further upgradient and to the south, concentrations are lower in MW-10 and MW-14, ranging from 190 to 350 µg/l. Cis-1,2-DCE decreases downgradient along the west property boundary in MW-6 and MW-5, ranging from 6,200 to 7,700 µg/l and 670 to 7,700 µg/l, respectively. Concentrations in downgradient wells on the lower parking lot are lower, ranging from 150 to 910 µg/l in MW-4 and 89 to 180 µg/l in MW-3. Only MW-8, located south of the sheet metal building, did not have exceedences of the ES for cis-1,2-DCE. However, the PAL of 7 µg/l was exceeded in MW-8 by concentrations ranging from 10 to 67 µg/l.

Trans-1,2-Dichloroethene

Trans-1,2-DCE, with an ES of 100 µg/l and a PAL of 20 µg/l, was detected in only a few samples at the Site. The highest concentration of 1,000 µg/l occurred in MW-7 for the July 25, 1997 sampling event. Duplicate values of 160 µg/l and 100 µg/l were detected for February 25, 1998. Trans-1,2-DCE was not detected in MW-7 for the remaining three sampling events, however, detection limits were 1,200 µg/l or greater. In MW-6, concentrations of 180 µg/l and 160 µg/l detected for samples from July 25, 1997 and February 23, 1998 exceeded the ES. Trans-1,2-DCE was not detected for the remaining sampling events where detection limits were 100 or 120 µg/l. The PAL was exceeded by one sample each from MW-2, MW-5, and MW-15 with concentrations of 36 µg/l, 39.2 µg/l, and 72 µg/l, respectively. The remaining analyses for these wells are below the PAL or below detection limits which are frequently above the PAL. For downgradient wells MW-3 and MW-4 and upgradient wells MW-8, MW-10, and MW-14, trans-1,2-DCE concentrations are below the PAL or below detection limits which are generally less than the PAL.

1,1-Dichloroethene

The ES of 7 µg/l for 1,1-DCE was exceeded in most wells, including MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, and MW-15. Detectable concentrations are generally highest in MW-7, ranging from 260 to 2,300 µg/l, followed by MW-15 and MW-2 with detectable concentrations from 110 to 2,500 µg/l and 175 to 1,500 µg/l, respectively. High concentrations of 3,600 µg/l and 1,400 µg/l were detected for MW-5 and MW-6, respectively, for the November 1997 sampling event. In MW-5, 8.6 µg/l of 1,1-DCE was detected for the first sampling event in April 1996. 1,1-DCE was not detected in the remaining samples from MW-5 and MW-6, though detection limits were often above the ES. Lower concentrations of 11 to 180 µg/l were detected in four samples from MW-3, two samples from MW-4, and one sample from MW-8. The ES was not exceeded by concentrations reported for off-site, upgradient wells MW-10 and MW-14. Most results were below detection limits. However, one sample from MW-14 with a concentration of 2.2 µg/l exceeded the PAL of 0.7 µg/l.

Vinyl Chloride

Vinyl chloride was detected above the ES of 0.2 µg/l for nearly all ground water samples collected at the Site, with the exceptions of MW-1, MW-9, and temporary well MW-10. Vinyl chloride is a degradation product of chlorinated ethenes and ethanes (Section 5). The highest concentrations, up to 17,000 µg/l, occurred in MW-2 and MW-6 on the upper parking lot. Somewhat lower concentrations ranging from 38 to 3,600 µg/l were found in MW-5, MW-7, and MW-15. Samples from downgradient wells MW-3 and MW-4 contained concentrations ranging from 55 to 1185 µg/l. In MW-8 near the south property boundary, vinyl chloride concentrations are lower, ranging from less than 0.97 µg/l to 94 µg/l. Low concentrations of 5.3 µg/l and 2.2 µg/l were detected in two samples from MW-14. Vinyl chloride was not detected in one sample from MW-14 and one sample from MW-10; however, the detection limit exceeded the PAL.

4.3.2.4 *Chlorinated Ethanes*

Concentrations of chlorinated ethanes detected in ground water samples are presented in Table 4-7, and plotted in Figures 4.15 through 4.26. An isoconcentration map was prepared for the total chlorinated ethanes in ground water and is presented as Figure 4.29. Concentrations of 1,1,2-trichloroethane (1,1,2-TCA) exceeding the ES (5 µg/l) were measured in only two samples collected from MW-2 (April 25, 1996 and February 25, 1998). The PAL (0.5 µg/l) was exceeded in only one sample collected from MW-5 (on April 23, 1996).

1,1,1-Trichloroethane

The VOC 1,1,1-trichloroethane (1,1,1-TCA) was detected above the ES (200 µg/l in several samples collected at the Site. Specifically, the ES was exceeded in all samples drawn from MW-2 and MW-6. The ES was exceeded in all samples from MW-7 except for the sample drawn on February 26, 1997. Samples collected from MW-8 and MW-14 had no exceedences of the ES or PAL. However, two samples drawn from MW-15 had exceedences of the ES for 1,1,1-TCA. They were collected on November 25, 1997 and on February 24, 1998.

1,2-Dichloroethane

Concentrations of 1,2-DCA were detected in several samples collected at the Site. The ES (5 µg/l) was exceeded in samples drawn from MW-2 on all dates except two (February 26, 1997 and November 25, 1997, which had detection limits greater than the ES). 1,2-DCA was not detected in MW-3. The ES was exceeded for 1,2-DCA in three samples drawn from MW-4 on September 13, 1996, November 25, 1997, and February 25, 1998. Three samples drawn from MW-5 exceeded the ES for 1,2-DCA. They were collected on April 23, 1996, July 24, 1997, and February 24, 1998. All other samples collected from MW-5 reported non-detected concentrations. Two samples collected from MW-6 (July 24, 1997 and February 24, 1998) exceeded the ES. The samples drawn from MW-7 on two dates had detected concentrations of 1,2-DCA that exceeded the ES. All other samples had detection limits that exceeded the ES but had no reported concentrations. Only one sample collected from MW-8 (April 23, 1996) had a detectable concentration that exceeded the ES for 1,2-DCA. Detectable concentrations of 1,2-DCA were not measured in samples collected from MW-14 or MW-15.

1,1-Dichloroethane

The ES for 1,1-DCA (850 µg/l) was exceeded in all samples collected from MW-2, MW-6, and MW-7. In addition, the sample on September 13, 1996 collected from MW-5 had an exceedence of the ES. The PAL for 1,1-DCA (85 µg/l) was exceeded in MW-4 in all samples except for the sample collected on September 13, 1996. No exceedences of the PAL were noted in samples collected from MW-3, MW-8, MW-14, or MW-15 except one sample in MW-15 that was collected on February 25, 1998.

Chloroethane

The ES for chloroethane (400 µg/l) was exceeded in four samples collected from MW-4 (September 13, 1996, July 24, 1997, November 25, 1997, and February 24, 1998), and one sample from MW-6 (February 24, 1998). The PAL for chloroethane (80 µg/l) was exceeded in the two remaining samples drawn from MW-4, namely the April 23, 1996 and the February 26, 1997 sampling events, and in one sample collected from MW-6 on February 26, 1997. In all other samples, chloroethane was not detected or was present at below the PAL.

4.3.2.5 *Other Constituents*

Several other constituents were found in samples collected from Site monitoring wells but were not included as PVOCs, chlorinated ethenes, or chlorinated ethanes.

The VOCs n-propylbenzene, sec-butylbenzene, tert-butylbenzene and n-butylbenzene do not have WAC Chapter NR 140 ESs or PALs. However, an RBC for each of these constituents was reported as 61 µg/l by USEPA Region III. The following monitoring wells had concentrations of n-propylbenzene above the RBC: MW-2, MW-7, MW-8, and MW-15. Sec-butylbenzene was detected above the RBC in MW-2, MW-7, and MW-8. Tert-butylbenzene exceeding the RBC was detected in samples drawn from MW-2, MW-6, and MW-8. N-butylbenzene exceeded the RBC in samples collected from MW-7 and MW-8.

The VOCs isopropylbenzene (cumene) and p-isopropyltoluene do not have established ESs or PALs, but isopropylbenzene has an RBC of 3700 µg/l. However, the RBC for isopropylbenzene was not exceeded in any samples collected at the Site.

The ES for naphthalene (40 µg/l) was exceeded in one sample collected from MW-6 (April 23, 1996), and from a sample drawn from MW-7 on November 4, 1996. No other ES exceedences for naphthalene were found. However, the PAL (8 µg/l) was exceeded in two samples collected from MW-3 (September 13, 1996 and February 26, 1997), one sample from MW-4 (September 13, 1996), and one sample from MW-8 (November 14, 1996). Methylene chloride was detected in a sample drawn from MW-2 and exceeded its respective ES (5 µg/l) on September 13, 1996. Chloroform, which exceeded the ES of 6 µg/l in MW-2 on April 23, 1996. Styrene, which had an exceedence of the ES (100 µg/l) in a sample collected from MW-2 on September 13, 1996, in MW-6 from a sample drawn on November 4, 1996, and in a sample collected from MW-7 on November 4, 1996.

4.3.3 *Buried Culvert Water Sampling Results*

Two water samples were collected on March 3, 1998 from the concrete culvert beneath the Site (see Figure 2.1). One sample, (designated "inlet") was collected at the manhole located inside the sheet metal building, and another sample (designated "outfall") was collected from the outfall located at the ditch adjacent to MW-4. The results obtained from these samples are presented in Table 4.8. VOCs were detected in both samples. The inlet sample had detectable concentrations of 1,1-DCA (200 µg/l); 1,1-DCE (210 µg/l); cis-1,2-DCE (3,500 µg/l); methylene chloride (64 µg/l), which was flagged as a laboratory artifact; vinyl chloride (200 µg/l); and xylenes (270 µg/l). The outfall sample had concentrations of the VOCs: 1,1-DCA (300 µg/l); 1,1-DCE (38 µg/l); cis-1,2-DCE (2,700 µg/l), ethyl benzene (62 µg/l); toluene (29 µg/l); 1,1,1-TCA (410 µg/l); vinyl chloride (260 µg/l); and xylenes (190 µg/l). Comparison of the inlet versus the outlet concentrations of the detected VOCs shows that three constituents (toluene, ethyl benzene, and vinyl chloride) increased, but that three constituents decreased (i.e., xylenes; cis-1,2-DCE; and 1,1-DCE) and two constituents had the same concentration (i.e., 1,1,1-TCA and 1,1-DCA). Because concentrations both increase and decrease between the inlet and outlet, the differences may be due in part to the method of sampling, the degree to which these constituents volatilize, or the degree in which they partition onto organic debris present in the culvert. As a result, we can only conclude that at the upgradient portion of the Site, dissolved VOCs are entering the culvert, and at the downgradient portion of the Site, the same VOCs discharge into the surface water ditch adjacent to East Norwich Avenue.

4.3.4 *Ground Water Quality*

Beginning with the July 24, 1997 sampling event and continuing with the November 1997 and February 1998 sampling events, ERM collected several field-measured water quality parameters. These parameters included pH, dissolved oxygen (DO), oxidation-reduction potential (ORP), ferrous iron (Fe^{2+}), alkalinity, specific conductance, and carbon dioxide gas (CO_2). In addition, ground water samples were collected and analyzed for chloride at the laboratory. A summary of the results of the analyses are presented in Table 4.9 and contour plots for each of these parameters are presented in Figures 4.30 through 4.32. The following paragraphs describe the results of the field measurements for these three rounds.

pH was consistently lower within the more contaminated portions of the ground water (i.e., in the vicinity of MW-2 and MW-7) than elsewhere. There was an overall 0.3 to 0.5 pH unit difference between the low pH values within the contaminated portion of the aquifer and the background pH values measured in the upgradient (MW-14) and sidegradient (MW-1 and MW-9) locations.

Dissolved oxygen readings in ground water range between 0.3 mg/l (MW-2 on November 25, 1997) and 9.25 mg/l across the Site. However, there were no noticeable trends in DO readings between sampling events. The July 1997 measurements showed a uniform decrease in DO from southwest to northeast with the highest DO readings fond in MW-5, MW-6, and MW-15, and the lowest readings in MW-1, MW-4, and MW-9. The November 1997 DO readings indicated an elevated DO at MW-3 and a depleted DO at MW-2. The lowest DO reading collected in February 1998 was from MW-3 at 1.81 mg/l.

The ORP measurements indicate a depletion in the general area of the contaminant plume. The July ORP measurements were lowest in MW-8 at 133 mV, and in MW-3 at 137 mV (water from MW-2 and MW-7 were not analyzed). Elsewhere, the ORP ranged from 165 mV in MW-4 to 399 mV in MW-14. The November 1997 ORP measurements indicated negative values of ORP in MW-15 (-98 mV), MW-2 (-26.6 mV) MW-6 (-20.3 mV), and in MW-3 (-19.3 mV). The highest reading of ORP was in MW-14 (167.2mV). The negative ORP in several wells in the February 1998 sampling event were located at MW-6 (-183 mV), MW-15 (-136.6 mV), MW-3 (-122.8 mV), MW-8 (-28.7 mV), and MW-4 (-16.2 mV). Positive ORP measurements were recorded in MW-2 (11.0 mV), MW-9 (57 mV), MW-5 (86.2 mV), MW-1 (91.7 mV), and MW-14 (93.9 mV). The wide range of ORP measurements between sampling dates and within sampling events indicates a possible unstable ground water regime pertaining to oxidation-reduction reactions. Nevertheless, the lowest ORP measurements are generally in the area containing the highest concentrations of VOCs.

Ferrous iron (Fe^{+2}) measurements are consistently high for all three sampling events within the area of highest VOC concentrations. The highest Fe^{+2} measurements in July 1997 were at MW-8 (5.6 mg/l) and MW-7 (5.5 mg/l). The lowest Fe^{+2} concentrations were associated with MW-9 (0.0 mg/l), MW-14 and MW-15 (0.2 mg/l each), MW-5 (0.6 mg/l) and MW-1 (1.5 mg/l).

Alkalinity measurements were made by acid titration to an endpoint of pH=4.0. No apparent trends in alkalinity were noted across the Site. Alkalinity measurements in July 1997 ranged between 438 and 713 mg/l as $CaCO_3$. The November 1997 alkalinity measurements ranged between 450 and 775 mg/l as $CaCO_3$, and the February alkalinity measurements ranged between 217 and 702 mg/l as $CaCO_3$.

Specific conductance (SC) is a direct measurement of the concentration of ions in solution. SC increases as ion concentrations increase (Hem, 1986). SC measurements at the Site were generally lowest in MW-2, MW-7 and MW-3 during each sampling event, and higher elsewhere.

Carbon dioxide gas (CO_2) was measured using Draeger tubes attached to the well casing. The amount of CO_2 present in soil gas (obtained from the screened portion of the monitoring well above the water table) provides evidence of the breakdown of organic molecules into CO_2 and water. CO_2 measurements were collected in July 1997 and November 1997 but not in February 1998 due to a high water table. The July 1997 measurements indicated that concentrations of CO_2 were highest in the vicinity of MW-3 (2400 ppm) and MW-5 (1750 ppm). CO_2 measurements in November 1997 were highest in MW-7 (2400 ppm) followed by MW-3 (1300 ppm).

Background measurements of CO_2 for July and November 1997 were between 100 and 200 ppm.

The July 1997 chloride concentrations at the Site ranged between 11 mg/l in MW-8 to 290 mg/l in MW-5. The November 1997 chloride concentrations at the Site ranged between 23 mg/l in MW-8 to 300 mg/l in MW-14. The February 1998 chloride concentrations at the Site ranged between 17 mg/l in MW-8 to 410 mg/l in MW-14. The high concentrations of chloride detected in MW-5, MW-14 and MW-15 may be attributed to historical use of road salt during the winter months along South Pennsylvania Avenue.

4.3.5 *Summary*

The distribution of VOCs in soil samples parallels the distribution of VOCs in ground water. This similarity is expected due to the absence of an unsaturated zone in the southern portion of the lower parking lot, and the thickness of the capillary fringe in other areas, which draws VOCs from the ground water into the soil. Because of this relationship, the nature of contamination at the Site is considered to be solely a ground water problem.

Both total and dissolved metals were analyzed in ground water samples. However, the total metal concentrations likely represent a combination of dissolved, particulate and sorbed metal species within the ground water samples. Therefore, the dissolved metals concentrations were considered to best represent mobile, ground water constituents. PVOCs are distributed in Site wells (except MW-1, MW-9 and MW-14 where no PVOCs were detected) with concentrations detected in samples collected from (from highest to lowest concentrations) MW-7, MW-15, MW-2, MW-6, MW-4, MW-8, MW-5, and MW-3. The most prevalent PVOCs at the Site are toluene and xylenes. Historically, these two PVOCs were used in Site activities. However: (1) there is no record or evidence of spillage or on-site disposal, (2) they are not restricted to the lower parking lot area, and(3) high concentrations of toluene and xylenes at MW-15 suggests an off-site source.

The highest total chlorinated ethenes concentrations are centered around MW-7 (near the location of the TCE AST) with cis-1,2-DCE being the most abundant. However, high concentrations were also detected in samples drawn from other wells. Although cis-1,2-DCE concentrations were not as high in MW-2, the concentrations of TCE were generally greater than in MW-7, indicating that chlorinated ethenes, occurring in a source near MW-2, are migrating toward MW-7.

The highest concentrations of the chlorinated ethanes occur in MW-2 again, followed by MW-7 ground water samples (see Table 4.10). Although water samples drawn from other wells have contained chlorinated ethanes, their concentrations are at least two orders of magnitude less than those found in MW-2 and MW-7.

Although there are no historical records of releases in the vicinity of MW-7, the analytical data indicate the presence of high concentrations of VOCs in this area. However, it should be noted that MW-7 is also immediately downgradient of several sampling locations where high concentrations of VOCs also occur. They are HA-1, HA-2 and GP-21, which are soil sampling locations, south of the sheet metal building, and ground water samples obtained from MW-2, located southwest of MW-7 in the upper parking lot. The gas utility line entering the sheet metal building may also provide a preferential conduit for migration of VOCs from the upper to the lower parking lot.

5.0 CONTAMINANT PERSISTENCE

This section presents an evaluation of the potential fate and persistence of the major organic contaminants detected in the ground water at the Site. This evaluation is based on the available information regarding the physical conditions of the Site and surrounding area, the contaminant source characteristics, and the nature and extent of the contamination detected at the Site.

The contaminants detected at the Site and the medium in which they were detected are listed in Table 5.1. This section focuses on the fate and transport of the PVOCs, chlorinated ethenes and chlorinated ethanes detected in the Site. Other VOCs detected in soil and ground water at the Site are considered minor, and are therefore not included in the following discussion. The ultimate fate of all of these compounds is to break down into simpler chemical species (i.e., methane, carbon dioxide, and water). Before reaching its ultimate fate, a chemical may be transported within a medium or may migrate from one medium to another.

5.1 TRANSFORMATION

Transformation is defined as the processes that a single organic constituent undergoes to change into one or more daughter compounds. The two processes that account for most transformations in the environment are hydrolysis and biodegradation. The following paragraphs briefly describe the processes of hydrolysis and biodegradation as applied to constituents detected at the Site.

5.1.1 Hydrolysis

Hydrolysis is the direct reaction of dissolved compounds with water molecules. For the PVOCs, hydrolysis is not a significant transformation process. For the chlorinated ethenes and ethanes, hydrolysis may contribute to transformation of these organics depending upon site conditions. The rate of hydrolysis generally depends upon the pH and temperature of the water as well as the compound. Typical hydrolysis half-lives for the VOCs detected at the Site are given in Table 5.2.

5.1.2 Biodegradation

Biodegradation is the transformation of one compound into another through reactions catalyzed by microorganism-produced enzymes. The occurrence of this mechanism is highly dependent on the nature of the compounds and the microbial species present at the Site. Degradation of highly chlorinated ethenes and ethanes (parent compounds) form less chlorinated (daughter product) compounds. Typical degradation pathways between parent and daughter products are shown in Figure 5.1. However, the rates of degradation between one parent and daughter (for example PCE to TCE) are not the same as between another parent and daughter (for example TCE to cis-1,2-DCE). Howard and others (1991) summarized the degradation rates of chlorinated and non-chlorinated degradation rates of organic compounds. The available information on the rates of aerobic and anaerobic biodegradation for the chemicals of concern found at the Site is presented in Table 5.2. For example, the aerobic half-life for the degradation of TCE is 360 days, which means that under ideal conditions, one-half of the released mass of TCE is degraded within 360 days. These data show that the aerobic and anaerobic biodegradation half-lives for the contaminants of concern range from a few days to several years. Generally, aerobic decay is much faster than anaerobic decay. Based on the results of dissolved oxygen readings obtained from Site wells, the conditions needed for aerobic biodegradation exist in the unconsolidated soils and fill material and the upper portion of the water table aquifer. Evidence of oxidizing conditions (i.e., mottled soil structures observed in split-spoon samples) within the upper units of the silty clay suggest that aerobic biodegradation may be possible in the geologic materials beneath the Site.

The dissolved oxygen data collected from the Site indicate that sufficient oxygen is present in the water table aquifer for aerobic biodegradation to occur. The presence of lower dissolved oxygen concentrations in the contaminated portions of the aquifer indicates that biodegradation is active and is consuming some of the oxygen in the water. Therefore, aerobic biodegradation is an active and significant process for reducing the VOC contamination present in the unconsolidated soils and fill material at the Site, as well as the contaminant plume in the water table aquifer. Given sufficient time, biodegradation will reduce the contaminant concentrations at the Site.

5.2 *CONTAMINANT MIGRATION*

In addition to naturally occurring transformation processes, migration may reduce the amount of a contaminant in a given medium at a site. Migration pathways include transport within a medium, transfer from one medium to another, and phase-change reactions. The major mechanisms of migration include volatilization, sorption, bioaccumulation, advection and dispersion, and solubility. These mechanisms are discussed further in the following paragraphs.

5.2.1 *Volatilization*

Volatilization is a phase-change reaction in which a compound migrates from a solid or liquid phase into a gaseous phase. Substances in the subsurface soil and ground water can volatilize into the subsurface gas phase and subsequently migrate into the atmosphere.

Volatilization from water can be evaluated by using the Henry's Law Constant (Table 5.2). A Henry's Law Constant value greater than 0.04 (dimensionless units) indicates high volatility, whereas a value less than 1.2×10^{-5} (dimensionless units) indicates low volatility. As shown on Table 5.2, most of the contaminants of concern at the Site have high Henry's law constants and readily volatilize. The rate of volatilization from subsurface soils and/or ground water is dependent upon the availability for air to contact the VOCs. Therefore, volatilization is a migration process for contaminants in: (1) the near-surface soils of the unpaved portions of the Site, (2) the capillary fringe overlying the water table and (3) the ground water after it discharges to a surface water body.

5.2.2 *Solubility*

Contaminants sorbed onto soil particles or present as non-aqueous phase liquids (NAPLs) can dissolve in water that percolates through the soils or NAPL. This generally occurs as water from precipitation events infiltrates the soils and migrates through the unsaturated soils to the water table. The extent of dissolution depends on: (1) the equilibrium partitioning of the chemical between soil and water; and (2) the mole fraction of the individual compounds in a chemical mixture (Feenstra et al., 1991). The effects of equilibrium partitioning are reviewed in Section 5.2.3.

The effective solubility of an individual compound in a chemical mixture is equal to its pure-compound solubility multiplied by its mole fraction in the mixture. Because of this relationship, the effective solubility of a compound that has a high pure-compound solubility but a low mole fraction in the mixture can be much lower than the pure-compound solubility.

The pure-compound and effective solubilities [assuming average chemical mixtures based on the concentrations detected in MW-2 (chlorinated ethanes), MW-7 (chlorinated ethenes), and MW-7 (PVOCs)] of the contaminants of concern detected at the Site are presented in Table 5.3. The effective solubilities of the PVOCs, chlorinated ethenes, and chlorinated ethanes are sufficiently high that water passing through soil containing sorbed concentrations of these compounds will dissolve some fraction of these compounds and transport them to the ground water beneath the Site. As clean water displaces the contaminated water passing through the soil, further dissolution of the contaminants sorbed on the soil particles will continue.

5.2.3 *Sorption*

Sorption is the partitioning process that governs the distribution of a compound between soil and a contacted liquid. Experimentally derived partition coefficients for the chemicals of concern are useful for estimating the distribution of the contaminants in soil, ground water, and NAPLs. A soil-water partitioning coefficient, which indicates the distribution of contamination between soil and ground water, can be determined for the compounds in the ground water by using the following relationship, taken from the USEPA document, Transport and Fate of Contaminants in the Subsurface (USEPA, 1989b):

$$K_d = C_{soil}/C_{water}$$

Where:

K_d = Soil-water partition coefficient (l/kg)
C_{soil} = Concentration of a compound sorbed on the soil (µg/kg)
C_{water} = Concentration of the compound in the water (µg/l)

The factors affecting the sorption of the organic substances are the TOC content of the soil and the nature of the contaminant compounds. The soil-water partitioning coefficient for the organic compounds can be estimated with the following equation, which uses the TOC content of the soil and the compound's organic carbon-water partitioning coefficient to determine the soil-water partitioning coefficient:

$$K_d = (K_{oc})\ (f_{oc})$$

Where:

K_d = Soil-water partitioning coefficient (l/kg)
K_{oc} = Organic carbon-water partitioning coefficient (l/kg)
f_{oc} = TOC content of the soil (g/g)

As shown on Table 5.2, the K_{oc} values for the contaminants of concern show that they are very susceptible to sorption, depending on the availability of the TOC in the soil. Only two samples were collected and analyzed for TOC data (i.e., f_{oc} values). The TOC content in these two samples (1.1 and 1.3 percent), is typical of clay soils. Connor and Shacklette (1977) provide ranges and average TOC values for a variety of rock and soil types. According to the data presented in Connor and Shacklette (1977), TOC values for uncultivated glaciated prairie soils, which most closely resemble the silty clay soils observed on the Site, have TOC values ranging between 1.1% to 2.2%, with a mean of 1.7%. Based on the TOC values measured in Site soils, the propensity for sorption in the unsaturated soils at the Site is moderate to high.

Values of the logarithm of the octanol-water partition coefficient (LOG K_{ow}) that are greater than zero indicate that a compound preferentially partitions into a non-aqueous phase. As shown on Table 5.2, all of the volatile chemicals of concern have LOG K_{ow} values greater than zero, indicating that they preferentially partition into a non-aqueous phase.

The potential presence of NAPL in Site soils and fill material can be assessed by using the results of chemical and physical analyses of the soil and fill material, and the principals of chemical partitioning in unsaturated or saturated soil. The apparent pore-water concentration of each contaminant of concern can be calculated from the measured total soil concentration by assuming equilibrium chemical partitioning between the solid, pore-water, and soil-gas phases. If no NAPL is assumed to be present, there is a hypothetical maximum mass of chemical that can be contained in a sample of soil, pore-water, and soil gas. The corresponding hypothetical maximum total soil concentration is defined by the effective solubility of the chemical in water, the saturated soil-gas concentration, and the sorption capacity of the solids. If a chemical mixture in the form of NAPL is present in a sample, the hypothetical maximum total soil concentration would be exceeded, and the calculated pore-water concentration would exceed the solubility of the chemical.

Feenstra et. al. (1991) present the following expression to estimate the pore-water concentration of an organic compound in saturated or unsaturated soil:

$$C_w = \frac{C_t p_b}{(K_d \bullet p_b + \phi_w + H_c \bullet \phi_a)}$$

Where:

C_w = the pore-water concentration (mg/l)

C_t = the total soil chemical concentration (mg/l dry-weight basis)

P_b = dry bulk density of the soil sample (gm/cm^3)

K_d = soil-water partition coefficient (cm^3/gm)
ϕ_w = water-filled porosity (volume fraction)
ϕ_a = air-filled porosity (volume fraction)
H_c = Henry's Law Constant (dimensionless)

By assigning the appropriate values to the variables and comparing the calculated C_w to the effective solubility of the contaminant of concern, an estimate can be made to determine the likelihood that residual NAPL is present in the soils. If the pore-water concentration (C_w) is greater than the individual compound's effective solubility, then residual NAPL is likely present in the soil sample.

The physical and chemical properties of the contaminants of concern presented in Table 5.2, and the analytical results for soil samples collected at the Site (Table 4.3) are used to calculate the likelihood of the presence of NAPL. Site-specific soil properties determined from geotechnical analyses are used to ensure that the level of sorption is not overestimated. Table 5.3 contains the VOC analytical results for several of the soil samples collected from various locations and depths at the Site, and the calculated hypothetical pore-water concentrations.

The evaluation of contaminant concentrations in the soil samples collected from GP-21, B3/MW-2, B-04, B-06, and MW-7 contains strong evidence for the presence of NAPL at these locations.

5.2.4 *Bioaccumulation*

Bioaccumulation is the migration into and the accumulation of chemicals in biological tissues. Bioaccumulation can be significant for organic compounds that are present in surface waters, soil, and ground water where the compounds can be incorporated into the tissues of microorganisms and plants and then progress up the food chain.

The primary means of evaluating the bioaccumulation of compounds are bioconcentration factors (BCFs); the BCFs for the contaminants of concern are included in Table 5.2. Each BCF represents the ratio of the respective chemical's concentration in biological tissues to the water concentration in the environment. Bioaccumulation is not an important migration process for the VOC contaminants from the Site because the bulk of the contamination is in the subsurface soils, fill material, and ground water; where there is little potential for plants and animals to accumulate the contaminants in their tissues.

5.2.5 *Advection, Dispersion and Retardation*

Advection is the migration of a chemical with ground water flow, and dispersion is the distribution of a compound throughout a ground water volume via mixing. For all practical purposes, diffusion (i.e., the transport of a compound as a result of collisions between molecules) is included in the definition of dispersion. Site factors affecting the advection and dispersion of contaminants in the ground water include both aquifer characteristics (i.e., vertical and horizontal hydraulic conductivities and flow gradients) and contaminant characteristics (i.e., density, viscosity, solubility).

As indicated in Section 4.0, the VOC constituents in the water table aquifer at the Site migrate to the northeast. The downgradient migration of the contamination in the ground water occurs via advection and dispersion. The velocity of the ground water beneath the Site was calculated (Section 4.2) as approximately 6.0 feet per year. Therefore, the time required for ground water to travel through the silty clay deposits from MW-7 to MW-4 (a distance of 163 feet) is 27 years. However, because the ground water also migrates through the fill material, and because preferential pathways exists due to man-made structures, the time of travel through these more permeable units may be on the order of a few years.

Because of the affinity of organic compounds to adsorb onto soil particles, the migration of these constituents is usually slower than ground water. The retardation factor for a compound is a measure of its rate of migration in a ground water setting. The retardation factor is calculated by:

$$R = 1 + \left(\frac{p_b \bullet k_d}{n} \right)$$

where:

R = Retardation factor;
P_b = bulk density of the soil (gm/cm^3);
K_d = distribution coefficient of the compound (ml/gm); and
n = effective soil porosity (cm^3/cm^3).

The retardation factor is also defined as the ratio of the velocity of ground water to the velocity of the compound:

$$R = \frac{V_x}{V_c}$$

where:

V_x = velocity of ground water (L/T); and
V_c = compound velocity (L/T).

Therefore, if the ground water velocity is 6 feet per year, and the compound retardation factor is 10, then the compound velocity is 0.6 feet per year.

By understanding the chemical and physical properties of the VOC constituents at the Site, conclusions can be made regarding the fate and transport of these constituents. The physical characteristics of soils and man-made structures, coupled with the behavior of the VOCs in the subsurface create a complex distribution of contaminants across the Site. Conclusions regarding fate and transport at this Site are summarized in Section 6.0.

6.0 *SITE CONCEPTUAL MODEL*

The following conceptual model describes the patterns of ground water flow and constituent transport at the Site.

The Site topography reflects changes made to the area due to man-made improvements. Regionally, the land surface slopes from southwest to northeast toward Lake Michigan. Surface water drainage follows the topography. Since the early 1960s, the surface topography has not changed significantly at the Site or on the surrounding properties. The 1963 topographic map depicted in Figure 2.3 shows that both the Kitzinger and St. Francis Auto Wreckers properties are higher in elevation than either the lower or upper parking lots on Site. In addition, the upper parking lot is 2- to 7-feet higher than the lower parking lot. A drainage ditch borders the Site to the north along East Norwich Avenue. This ditch receives surface runoff from the upper and lower parking lots and empties into a 72-inch storm sewer beneath East Norwich Avenue.

Precipitation falls on the Site and infiltrates into the ground through pervious surfaces including joints and cracks in the asphalt. Surface water runoff enters the Site from topographically higher areas, and leaves the Site at topographically lower areas. Infiltrated water percolates downward until it reaches and mixes with the ground water at the water table.

The capillary fringe is the zone of soil that is saturated but is above the water table. In coarse sand, the thickness of the capillary fringe is typically several inches above the water table but in fine sand and silt the capillary fringe extends upwards several feet. Due to the high water table at certain times of the year, the capillary fringe potentially extends to ground surface in most areas within the Site. Chemical constituents found in the ground water migrate upward into the capillary fringe by capillary forces and by the processes of advection and hydrodynamic dispersion.

Ground water flows from areas of high hydraulic head to areas of low hydraulic head. Accordingly, the areas at the Site where the highest hydraulic heads occur are at the south and southwestern boundaries. Water level contour maps generated for the Site indicate that ground water consistently flows from the south and southwest, across the Site towards the north and northeast.

Prior to the placement of fill material at the Site in the 1950s, surface water existed in the area of the parking lots. This water was fed by a ground water seep near the base of the hill at the southern Site boundary behind the now existing sheet metal building and near MW-8. Placement of a north-south trending concrete culvert and overlying fill material in the lower parking lot covered the seep and surface water, thereby elevating the local ground water table. During wet periods, water flows through the culvert indicating that the culvert continues to capture ground water seepage from the south.

In the mid-1960s, a basement was excavated as a part of building expansion at the Site. Three sumps were included in the construction in order to manage the water table below the floor elevation in the basement. These sumps operated for a period of approximately 10 years. In November 1975, construction of a 72-inch storm sewer was completed beneath the north side of East Norwich Avenue. The sewer and associated backfill created a highly permeable drain which lowered the water table in the area. It is likely that the basement sumps were no longer needed to manage the high water table beneath the basement in this building. The basement sumps have not been operational since the beginning of this investigation.

A cinder block wall was constructed in the mid1960s along the southern boundary of the Site, extending from the southernmost portion of the brick, frame and metal building west to approximately the western end of the sheet metal building, where the top of the wall is covered by fill material. This wall was built in order to accommodate a roof that was anticipated to extend from the brick, frame and metal building south to the wall. Thus, the wall was constructed with a foundation sufficient to support the roof. However, the roof was never extended to the wall. The footing of the wall was not encountered during the on-site investigation. However, it appears to be deep and extensive enough in order to affect local ground water flow paths. As ground water flows north toward the Site, it encounters the cinder block wall, which is likely less permeable than the water-bearing materials south of the wall. Therefore, northward flowing ground water is impeded by the wall. Ground water mounds up behind the wall and eventually flows around, through or under the wall. The high hydraulic head at MW-2 is therefore a reflection of the ground water mound that occurs south of the wall. After the ground water flows around the ends of the wall, it continues to flow north and east across the Site.

In November 1975, construction of a 30-inch storm sewer was completed beneath the sidewalk on the east side of South Pennsylvania Avenue.

This sewer and associated backfill likely provides a conduit for ground water flow from areas of high hydraulic head in the south to areas of lower hydraulic head to the north. Other utility lines that intersect the storm sewer include a natural gas line that extends from South Pennsylvania Avenue to the sheet metal building on the Site.

The presence of the high hydraulic head at MW-2 provides a driving force for ground water flow north and northeast across the Site and preferentially through the gas-line backfill in both the east and west directions. To the east, ground water can migrate along the gas-line backfill toward the sheet metal building, and to the west, ground water can migrate along the gas-line backfill toward the 30-inch storm sewer conduit. As ground water enters the backfill of the storm sewer conduit, it likely flows to the north along this conduit to areas of lower hydraulic head.

The highest concentrations of chlorinated and PVOC constituents are found along the southern property boundary at the uppermost ground water hydraulic head locations. Because ground water does not flow from areas of low head to areas of high head, the impacted ground water can only flow to the north and east across the Site.

Constituent distributions within the ground water at the Site reflects the ground water flow pathways. It is apparent that a constituent source area south of MW-2 impacts the ground water. The impacted ground water flows west, and then north around the cinder block wall to a point, where it encounters the gas line backfill. Impacted ground water then flows east or west through the gas line backfill, or continues to the north through the fill material of the upper parking lot. Constituents migrating to the west through the gas line backfill encounter the gravel backfill of the 30-inch storm sewer, and migrate northward thereby impacting the ground water at MW-6 and MW-5.

Constituents migrating eastward through the gas line backfill impact the soil and ground water beneath the sheet metal building where the natural gas line connects to building piping.

Constituents that migrate north and east via ground water flow impact the ground water at MW-7, and continue northeastward across the Site. When the impacted ground water encounters the north-south trending buried concrete culvert (beneath the lower parking lot), the ground water primarily flows to the north. Thus, the highest concentrations of chlorinated ethenes, chlorinated ethanes and PVOCs in shallow ground water occur west of the concrete culvert.

Ground water drawn from MW-4 and MW-5 have elevated concentrations of chlorinated ethenes and ethanes, and PVOCs. These wells are situated along the north property boundary. As impacted ground water leaves the Site, it flows toward the 72-inch storm sewer beneath East Norwich Avenue. It is likely that impacted ground water follows the backfill along this 72-inch sewer toward the north and east.

During the several quarterly monitoring events conducted at the Site, it appears that the concentrations of chlorinated ethenes, ethanes and PVOCs are decreasing over time. Natural fate and transport processes, including biodegradation, sorption and volatilization can account for the loss of these constituents.

7.0 CONCLUSIONS

The environmental investigation of the Site was initiated to investigate the potential residual constituents associated with a former on-site TCE AST. However, subsequent investigative activities revealed extensive contamination unrelated to the TCE AST. The investigation has identified the presence of contamination within the shallow ground water at the Site. Shallow ground water flows from south to north across the Site. The shallow ground water contamination on the Site is primarily, if not entirely, caused by off-site sources to the south and southwest of the Site. In particular, there is a petroleum constituent plume emanating from an off-site source located to the southwest, and a chlorinated compound plume emanating from an off-site source south of the Site. The investigation has not revealed any evidence of releases from the former TCE AST, and contamination in the vicinity of the former tank appears to be attributable to shallow ground water flow from off-site. Fill material on site does not appear to be contributing to the ground water problems at the Site. Additional work is necessary to delineate fully the horizontal and vertical degree and extent of contamination at the Site and the surrounding properties and to assess the nature of the upgradient off-site sources.

7.1 SITE PHYSICAL FEATURES

The Site is rectangular in shape with an upper parking lot area on the western side of the Site, containing fill material and lying up to 7 feet higher than the lower parking lot and buildings occupying the remainder of the Site to the east. The neighboring industrial properties to the south and southwest are uphill and up-gradient from the Site. A review of historical maps, aerial photographs, city records, and WDNR files indicates that Site operations commenced in the early 1950s. Adjacent properties, including St. Francis Auto Wreckers and Kitzinger also commenced operations in the later 1940s and early 1950s. Historical aerial photographs also indicate multiple uses of the property located to the south of the Site, including an automobile salvage yard and a drum storage facility. Site improvements during the 1950s and 1960s included building additions, a concrete culvert for channeling surface water flow from south to north across the Site, and a cinder block wall along much of the southern boundary of the Site which diverts shallow ground water flow.

Aerial photographs taken prior to placement of fill on the western portion of the Site show vegetation patterns that indicate the original land surface was low lying, including a small surface water drainage emanating from the Kitzinger property to the south. The placement of fill material on the Site and on adjacent properties affected the surface water flow patterns and raised the local water table.

7.2 SHALLOW GROUND WATER FLOW DIRECTION

Regional shallow ground water flow in the vicinity of the Site is to the northeast. Historically, the surface water flow at the Site was to the north across the southern property boundary and to the north and east across the property. Thus local shallow ground water flow would be expected to be consistent with regional ground water flow. Currently, shallow ground water flow on the western portion of the Site continues to the north and northeast. However, a cinder block wall constructed along a portion of the southern property boundary in the 1960s diverts shallow ground water flow locally to the west and east around the wall before ground water flow continues to the north across the Site. This results in a high hydraulic head at MW-2, in the southwestern portion of the Site. The hydraulic head, or mound, along with a buried natural gas utility line near the southern property boundary, contribute to a localized ground water flow component to the east from the upper parking lot area to the lower parking lot area and to the west towards South Pennsylvania Avenue A storm sewer located in the right-of-way immediately adjacent to the western edge of the upper parking lot may also provide a preferential pathway for constituent migration to the north. In addition, an underground drainage culvert extending from at least the southern property boundary to East Norwich Avenue, in approximately the location of the historic surface water pathway, serves as a conduit for ground water flow onto and across the Site from the south and from the Site itself to the north.

7.3 SITE CONTAMINATION OVERVIEW

Investigation at the Site focused on three types of constituents: metals, chlorinated organic compounds, and PVOCs. Dissolved metal concentrations are below the Chapter NR140 ES except at MW-15, off-site to the southwest, and at MW-2 in the extreme up-gradient corner of the Site where concentrations of chromium and lead regularly exceed the ES and where cyanide has sometimes exceeded the ES.

The Site exhibits elevated concentrations of chlorinated organic compounds exceeding the ES, in the shallow ground water, with the highest concentrations occurring at the southwestern portion of the Site near the southern property boundary and decreasing across the Site to the north and east. Chlorinated organic compounds detected include TCE and TCA and their breakdown products, including vinyl chloride.

PVOCs exceeding the ESs have been detected at elevated concentrations, with the highest concentrations occurring in the southwestern portion of the Site, as well as off-site to the southwest. PVOC concentrations decrease across the Site to the north and east. The petroleum constituents identified at the Site are primarily toluene and xylene.

7.4 *SITE CONTAMINATION AS RELATED TO SHALLOW GROUND WATER*

Measurement of historic ground water elevations indicate that the water table and the capillary fringe extend to or nearly to the ground surface over the contaminated portion of the Site. Additionally, all soil samples obtained in the area of contamination have been influenced by ground water contamination. Therefore, the Site soil and ground water contamination is related to the migration of one or more ground water constituent plumes.

7.5 *SHALLOW GROUND WATER CONTAMINATION*

The information developed by this investigation has revealed two shallow ground water constituent plumes: one containing petroleum constituents emanating from a source to the southwest of the Site, and another containing TCE, TCA and their breakdown products emanating from a source to the south of the Site. Additionally, the samples collected from the concrete culvert beneath the Site revealed the presence of TCE, TCA and their breakdown products, including vinyl chloride; and the PVOCs, toluene and xylenes. In general, PVOC concentrations decrease from southwest to northeast across the Site, and the highest concentration of toluene and xylene occurs off-site to the southwest at MW-15. This suggests that MW-15 is closer to the source of these constituents than MW-2 or MW-7. The investigation has revealed no release of PVOCs on the Site which would explain the elevated PVOC concentrations. However, the property owner adjacent to the Site to the southwest is St. Francis Auto Wreckers, which has maintained a motor vehicle scrap operation since at least the early 1950's to the present.

Concentrations of TCE, TCA and their initial breakdown products generally decrease across the Site from their highest concentrations in the southwest corner of the Site at MW-2. The distribution of further breakdown products of TCE and TCA such as vinyl chloride is consistent with the existence of presumed current and historic off-site sources of these compounds. The cinder block wall along the southern property boundary of the Site diverts shallow ground water flow from south of the Site to the vicinity of MW-2, and from there, north across the Site. Preferential pathways, including buried utility lines, likely contribute to the spread of organic compounds, both to the east from MW-2 and to the north along South Pennsylvania Avenue. TCE, TCA and their breakdown products in shallow ground water in the vicinity of the former TCE AST primarily have resulted from the flow of contaminated ground water from the south and not from historic operations associated with the TCE AST. The investigation considered but did not identify any significant releases of TCE at the tank location. Therefore, any minor releases that may have occurred from the TCE AST have not exacerbated current shallow ground water conditions at the Site.

7.6 ABSENCE OF OTHER ON-SITE SOURCES OF CONTAMINATION

The analytical data developed during this investigation show that the concentrations of PVOCs, TCE, TCA and their breakdown products are higher in ground water samples than in soil samples obtained from the capillary fringe portions of the fill material in the upper and lower parking lots. Therefore, fill material placed in the upper and lower parking lots is not a source of the contamination identified in the shallow ground water between the Site.

8.0 *RECOMMENDATIONS*

This investigation has focused on the presence of contamination within the shallow ground water at the Site. Information should be obtained regarding the nature of the off-site sources of ground water contamination, the extent (lateral and vertical) of ground water contamination affecting the Site, and remedial actions, if any, by responsible parties necessary and acceptable for restoration of Site conditions.

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TABLE 3.2

MONITORING WELL GEOMETRY
D-F INCORPORATED
ST. FRANCIS, WISCONSIN

Well	Easting	Northing	Elevation TOC feet AMSL	Ground Surface feet AMSL	Well Screen				Sand Pack			
					Top feet BGS	Bottom feet BGS	Top feet AMSL	Bottom feet AMSL	Top feet BGS	Bottom feet BGS	Top feet AMSL	Bottom feet AMSL
MW-1	5322.99	4918.79	659.21	658.90	4	14	654.90	644.90	3	14	655.90	644.90
MW-2	4866.27	4852.51	665.58	666.12	4	14	662.12	652.12	3	14	663.12	652.12
MW-3	5041.79	4911.64	658.92	659.32	4	14	655.32	645.32	3	14	656.32	645.32
MW-4	4995.44	5052.72	660.81	658.57	4	14	654.57	644.57	3	14	655.57	644.57
MW-5	4833.94	5043.32	662.19	662.66	4	14	658.66	648.66	3	14	659.66	648.66
MW-6	4835.33	4962.79	663.60	663.85	5	15	658.85	648.85	3.5	15	660.35	648.85
MW-7	4940.16	4899.73	658.74	659.13	3	13	656.13	646.13	2	13	657.13	646.13
MW-8	5001.55	4852.52	663.08	659.96	3	8	656.96	651.96	2	8	657.96	651.96
MW-9	5316.51	5036.65	659.23	658.29	5	15	653.29	643.29	3.5	15	654.79	643.29
MW-14	4811.99	4778.76	666.69	667.22	6	16	661.22	651.22	3	16	664.22	651.22
MW-15	4812.48	4832.45	664.91	665.61	5.5	15.5	660.11	650.11	3	15.5	662.61	650.11

Notes:
1 MW-10 through MW-13 were temporary monitoring wells installed and abandoned by Maxim Technologies, Inc. in November, 1996.

Key:
TOC = Top of casing
BGS = Below ground surface
AMSL = Above mean sea level

TABLE 4.1

GROUND WATER LEVEL MEASUREMENT SUMMARY
D-F INCORPORATED
ST. FRANCIS, WISCONSIN

Well	Elevation of Water Table (feet above mean sea level)											
	4/24/96	4/25/96	9/13/96	11/14/96	2/25/97	7/24/97	8/22/97	9/11/97	10/10/97	11/25/97	2/24/98	3/23/98
MW-1	654.81	655.18	651.91	653.60	655.21	653.85	654.23	652.62	652.27	652.76	654.37	654.49
MW-2	660.70	661.02	659.65	659.42	659.53	660.37	659.99	660.04	659.96	659.46	661.28	661.50
MW-3	653.17	653.23	650.68	650.98	652.60	653.2	652.65	652.40	651.93	651.20	653.12	653.43
MW-4	653.70	653.90	652.36	652.96	653.81	653.91	653.85	653.12	653.07	652.49	654.19	654.04
MW-5	651.47	651.35	649.41	650.22	651.21	654.35	654.05	653.47	653.11	652.71	654.56	654.76
MW-6				653.96	654.95	655.67	654.67	654.44	653.90	653.45	655.88	656.09
MW-7				655.30	656.65	656.73	655.92	655.57	654.89	654.21	657.66	657.44
MW-8				657.23	656.92	657.63	657.69	656.83	656.58	656.02	658.26	658.12
MW-9				646.20	647.14	646.72	646.75	646.37	646.30	646.13	647.08	647.30
MW-14						657.88	656.96	656.88	656.37	656.37	657.13	657.43
MW-15						656.40	655.75	655.70	655.42	655.20	656.37	656.46
SUMP1												649.94
SUMP2												649.96
SUMP3												649.57

NOTES:

1 Elevations are in feet above mean sea level (amsl).

2 Sump top of rim elevations were determined from an approximate floor elevation of 650.65 feet.

KEY:

TOC = Top of Casing.

TABLE 4.2

HYDRAULIC CONDUCTIVITY TESTING RESULTS
D-F INCORPORATED
ST. FRANCIS, WISCONSIN

Well	Type of Test	Hydraulic Conductivity cm/s
MW-1 (1)	Rising Head	4.07E-05
MW-2 (1)	Rising Head	8.44E-04
MW-3 (1)	Rising Head	3.79E-05
MW-4 (1)	Rising Head	4.30E-05
MW-5 (1)	Rising Head	2.71E-05
MW-6 (1)	Rising Head	5.87E-05
MW-7 (1)	Rising Head	1.22E-04
MW-8 (1)	Rising Head	1.33E-04
MW-9 (1)	Rising Head	1.91E-04
MW-14 (2)	Rising Head	6.24E-05
MW-15 (2)	Rising Head	5.00E-05
GEOMETRIC MEAN		**8.00E-05**

Notes:

[1] Tests conducted by Maxim Technology, Inc. in February 1997.

[2] Tests conducted by ERM in September 1997.

TABLE 4.3

SOIL ANALYTICAL RESULTS[1]
D-F INCORPORATED
ST. FRANCIS, WISCONSIN
PAGE 1 OF 6

Sample Location[2]	SB01 (3)	SB02 (3)	SB03 (3)	SB04(3)	SB05 (3)	SB06 (3)	SB07 (3)	SB08 (3)	SB09 (3)	SB10 (3)	SB11 (3)
x-Coordinate	4869.91	4832.18	4833.91	4869.4	4870.54	4871.17	4873.34	4876.58	4838.1	4837.02	4835.91
y-Coordinate	4853.79	4852.9	4892.94	4893.13	4933.09	4973.05	5014	5052.49	5052.94	5013.15	4971.89
Ground Elevation	666.16	665.68	664.93	665.25	664.50	663.54	662.66	661.81	662.51	663.03	663.54
Date Sampled	7/21/97	7/21/97	7/21/97	7/22/97	7/22/97	7/22/97	7/22/97	7/22/97	7/22/97	7/22/97	7/22/97
Sample Depth	2-4'	2-4'	4-6'	4-6'	4-6'	1-2'	2-4'	4-6'	4-6'	2-4'	2-4'
Percent Solids	81	88	76	68	87	52	47	85	92	95	84
Parameters											
Diesel Range Organics (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Volatile Orgnic Compounds											
Benzene	<2.4	<4.6	<13	<15	<46	<48	<22	<2.4	<4.4	<11	<12
Toluene	<6.0	<12	<33	<37	<120	<120	<55	<6.0	<11	<27	<30
Ethyl Benzene	<6.0	<12	<33	<37	<120	<120	<55	<6.0	<11	<27	<30
Total Xylenes	<18	<35	<98	<110	<350	<360	<165	<18	<33	<80	<90
m,p-xylenes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene and Styrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	<12	<23	<65	<74	<230	<240	<110	<12	<22	<53	<60
1,3,5-Trimethylbenzene	<12	<23	<65	<74	<230	<240	<110	<12	<22	<53	<60
Chlorinated Ethenes											
Tetrachloroethene	35	44	86	<37	250	<120	<55	<6.0	<11	35	37
Trichloroethene	540	660	990	1,500	4,800	2,100	1,900	46	390	770	1,000
cis-1,2-Dichloroethene	120	160	250	1,600	3,300	1,700	<55	9.4	130	320	680
trans-1,2-Dichloroethene	<6.0	<12	<33	<37	<120	<120	<55	<6.0	<11	<27	<30
1,1-Dichloroethene	<6.0	<12	<33	<37	<120	<120	130	<6.0	<11	<27	<30
Vinyl Chloride	<6	<12	<33	<37	<120	<120	1,200	<6.0	<11	<27	<30
Chlorinated Ethanes											
1,1,1-Trichloroethane	40	41	140	59	140	<120	<55	<6.0	27	<27	<30
1,2-Dichloroethane	<6.0	<12	<33	<37	<120	<120	<55	<6.0	<11	<27	<30
1,1-Dichloroethane	27	13	72	130	<120	<120	1,500	<6.0	18	<27	<30
Chloroethane	<6.0	<12	<33	<37	<120	<120	<55	<6.0	<11	<27	<30
Other Volatile Organic Compounds											
Bromochloromethane	<6.0	<12	<33	<37	<120	<120	<55	<6.0	<11	<27	<30
Chloromethane	<6.0	<12	<33	<37	<120	<120	<55	<6.0	<11	<27	<30
Chloroform	<6.0	<12	<33	<37	<120	<120	<55	<6.0	<11	<27	<30
n-butylbenzene	<6.0	<12	<33	<37	<120	<120	<55	<6.0	<11	<27	<30
sec-Butylbenzene	<6.0	<12	<33	<37	<120	<120	<55	<6.0	<11	<27	<30
tert-Butylbenzene	<6.0	<12	<33	<37	<120	<120	<55	<6.0	<11	<27	<30
Isopropylbenzene	<6.0	<12	<33	<37	<120	<120	<55	<6.0	<11	<27	<30
n-Propylbenzene	<6.0	<12	<33	<37	<120	<120	<55	<6.0	<11	<27	<30
p-Isopropyltoluene	<6.0	<12	<33	<37	<120	<120	<55	<6.0	<11	<27	<30
Naphthalene	<30	<58	<160	<190	<580	<600	<275	<30	<55	<130	<150
Methylene Chloride	<6.0	<12	<33	<37	<120	<120	<55	<6.0	<11	<27	<30

Notes:

[1] All concentrations given in units of ug/kg (ppb).

[2] See Figure 2 for sampling location.

[3] Samples collected by ERM

[4] Samples collected by Maxim

Key:

NA = Not analyzed.

TABLE 4.3

SOIL ANALYTICAL RESULTS[1]
D-F INCORPORATED
ST. FRANCIS, WISCONSIN
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Sample Location[2]	SB12 (3)	SB13 (3)	SB14 (3)	SB15 (3)	SB15	SB16 (3)	SB17 (3)	SB18 (3)	SB19 (3)	SB20(3)	SB21(3)
x-Coordinate	4833.44	4919.39	4912.59	4900.54	4900.54	4936.32	4950.98	4965.83	4937.35	5040.94	4840.19
y-Coordinate	4932.56	5051.41	5012.41	4968.52	4968.52	4916.19	4923.58	4923.87	4899.18	4944.98	5010.92
Ground Elevation	664.22	660.81	661.91	663.52	663.52	658.88	658.80	658.81	659.14	659.23	663.10
Date Sampled	7/22/97	7/22/97	7/23/97	7/23/97	7/23/97	7/24/97	7/24/97	7/24/97	7/24/97	7/24/97	7/24/97
Sample Depth	0-2'	0-2'	2-4'	2-4'	9-11'	0-2'	0-2'	0-2'	0-2'	16-17'	10-12'
Percent Solids	78	89	49	63	82	87	92	90	91	82	74
Parameters										TOC=11,000	TOC=13,000
Diesel Range Organics (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Volatile Orgnic Compounds											
Benzene	<13	<2.0	<20	<2.0	<100	<2.3	<2.2	<2.2	<2.2	NA	NA
Toluene	<32	<5.0	<50	<5.0	600	<5.8	<5.5	<5.6	<5.5	NA	NA
Ethyl Benzene	<32	<5.0	220	<5.0	3,400	<5.8	<5.5	<5.6	<5.5	NA	NA
Total Xylenes	<96	<15	<150	<15	18,000	<17	<16	<17	<17	NA	NA
m,p-xylenes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene and Styrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	<64	<10	<100	<10	2,800	<12	<11	<11	<11	NA	NA
1,3,5-Trimethylbenzene	<64	<10	<100	<10	700	<12	<11	<11	<11	NA	NA
Chlorinated Ethenes											
Tetrachloroethene	110	<5.0	770	<5.0	<250	6.7	<5.5	<5.6	<5.5	NA	NA
Trichloroethene	1,100	6.2	<50	350	<250	560	200	210	340	NA	NA
cis-1,2-Dichloroethene	620	<5.0	220	9.2	<250	160	210	82	240	NA	NA
trans-1,2-Dichloroethene	<32	<5.0	<50	<5.0	<250	16	<5.5	<5.6	<5.5	NA	NA
1,1-Dichloroethene	<32	<5.0	<50	<5.0	<250	33	<5.5	<5.6	<5.5	NA	NA
Vinyl Chloride	<32	<5	<50	<5.0	<250	120	<5.5	<5.6	<5.5	NA	NA
Chlorinated Ethanes											
1,1,1-Trichloroethane	<32	<5.0	1,900	250	<250	6.9	8.9	<5.6	22	NA	NA
1,2-Dichloroethane	<32	<5.0	<50	<5.0	<250	<5.8	<5.5	<5.6	<5.5	NA	NA
1,1-Dichloroethane	<32	<5.0	590	290	<250	64	33	74	36	NA	NA
Chloroethane	<32	<5.0	<50	<5.0	<250	<5.8	<5.5	5.9	<5.5	NA	NA
Other Volatile Organic Compounds											
Bromochloromethane	<32	<5.0	<50	<5.0	<250	<5.8	<5.5	<5.6	<5.5	NA	NA
Chloromethane	<32	<5.0	<50	<5.0	<250	<5.8	<5.5	<5.6	<5.5	NA	NA
Chloroform	<32	<5.0	<50	<5.0	<250	<5.8	<5.5	<5.6	<5.5	NA	NA
n-butylbenzene	<32	<5.0	<50	<5.0	<250	<5.8	<5.5	<5.6	<5.5	NA	NA
sec-Butylbenzene	<32	<5.0	<50	<5.0	1,200	<5.8	<5.5	<5.6	<5.5	NA	NA
tert-Butylbenzene	<32	<5.0	<50	<5.0	1,300	<5.8	<5.5	<5.6	<5.5	NA	NA
Isopropylbenzene	<32	<5.0	<50	<5.0	700	<5.8	<5.5	<5.6	<5.5	NA	NA
n-Propylbenzene	<32	<5.0	<50	<5.0	2,000	<5.8	<5.5	<5.6	<5.5	NA	NA
p-Isopropyltoluene	<32	<5.0	<50	<5.0	1,500	<5.8	<5.5	<5.6	<5.5	NA	NA
Naphthalene	<160	<25	<250	<25	<1300	<29	<27	<28	<28	NA	NA
Methylene Chloride	<32	<5.0	<50	<5.0	<250	<5.8	<5.5	<5.6	<5.5	NA	NA

Notes:

[1] All concentrations given in units of ug/kg (ppb).

[2] See Figure 2 for sampling location.

[3] Samples collected by ERM

[4] Samples collected by Maxim

Key:

NA = Not analyzed.

TABLE 4.3

SOIL ANALYTICAL RESULTS[1]
D-F INCORPORATED
ST. FRANCIS, WISCONSIN
PAGE 3 OF 6

Sample Location[2]	GP1(4)	GP2(4)	GP3(4)	GP4(4)	GP5(4)	GP6(4)	GP7(4)	GP8(4)	GP9(4)	GP10(4)	GP11(4)
x-Coordinate	4941	4942	5317.42	5299.48	5314.9	5039	4871.27	4869.27	4865	4894	4926.4
y-Coordinate	4887	4897	4891	4870.9	4853.86	4852	4852.51	4874.01	4964	4963	5058
Ground Elevation	659.00	659.00	657.59	657.59	657.59	660.00	665.44	665.44	663.70	663.70	657.81
Date Sampled	1/22/96	1/22/96	1/22/96	1/22/96	1/22/96	1/22/96	11/11/96	11/11/96	11/11/96	11/11/96	11/11/96
Sample Depth	3.5-5.5'	3.5-5.5'	3.5-5.5'	3.0-5.0'	0-6'	0-4'	4-5'	4-5'	4-5'	4-6'	2-6'
Percent Solids	82	77	89	83	85	85	81	91	66	86	39
Parameters											
Diesel Range Organics (mg/kg)	NA	NA	<10	<10	<10	460	NA	NA	NA	NA	NA
Petroleum Volatile Orgnic Compounds											
Benzene	<5000	<5100	139	<30	<29	<60	30	31	41	460	<13
Toluene	43,100	96,500	<29	<30	<29	<60	160	150	200	960	<9.0
Ethyl Benzene	31,200	53,800	29	<30	<29	<60	28	28	33	320	<8.0
Total Xylenes	160,500	313,400	86	40	46	122	156	161	226	1,870	182
m,p-xylenes	114,000	221,000	39.5	<30	<29	<60	110	110	130	1,300	120
o-Xylene and Styrene	46,500	92,400	46.2	39.9	45.9	122	46	51	96	570	62
Styrene	NA	NA	NA	NA	NA	NA	<8.0	<8.0	<8.0	<120	<8.0
1,2,4-Trimethylbenzene	64,400	121,000	<29	<30	<29	<60	29	39	63	440	16
1,3,5-Trimethylbenzene	14,700	34,900	<29	<30	<29	<60	27	28	68	330	<10
Chlorinated Ethenes											
Tetrachloroethene	24,100	<5100	<29	<30	<29	133	240	31	200	1,900	<11
Trichloroethene	176,000	<5100	<29	<30	<29	2,010	2,800	990	2,900	36,000	140
cis-1,2-Dichloroethene	338,000	572,000	141	<30	<29	<60	300	300	9,300	13,000	370
trans-1,2-Dichloroethene	<5000	<5100	<29	<30	<29	<60	<24	<24	230	<360	<24
1,1-Dichloroethene	<5000	7,280	<29	<30	<29	<60	<10	<10	<10	<150	<10
Vinyl Chloride	<5000	<5100	59	<30	<29	<60	<6.0	<6.0	130	<90	<6.0
Chlorinated Ethanes											
1,1,1-Trichloroethane	84,700	76,100	<29	<30	40	<60	93	72	320	1,700	23
1,2-Dichloroethane	<5000	<5100	1,040	<30	<29	<60	<6.0	<6.0	<6	<90	<6.0
1,1-Dichloroethane	6,640	16,000	<29	<30	<29	<60	31	<7.0	740	430	580
Chloroethane	<5000	<5100	<29	<30	<29	<60	<5.0	<5.0	<5.0	<75	<5.0
Other Volatile Organic Compounds											
Bromochloromethane	<5000	<5100	<29	<30	<29	<60	<8.0	<8.0	380	<120	<8.0
Chloromethane	<5000	<5100	<29	<30	<29	<60	<22	<22	<22	<330	<22
Chloroform	<5000	<5100	<29	<30	<29	<60	<9.0	<9.0	<9.0	<140	<9.0
n-butylbenzene	45,000	71,000	<29	<30	<29	<60	<11	<11	<11	<170	<11
sec-Butylbenzene	12,300	14,500	<29	<30	<29	<60	<6.0	<6.0	120	510	<6.0
tert-Butylbenzene	<5000	<5100	<29	<30	<29	<60	50	54	92	<150	<10
Isopropylbenzene	<5000	8,870	<29	<30	<29	<60	<6.0	<6.0	100	<90	<6.0
n-Propylbenzene	14,700	25,500	<29	<30	<29	<60	65	57	87	860	<6.0
p-Isopropyltoluene	7,830	17,700	<29	<30	<29	<60	<8.0	<8.0	51	<120	<8.0
Naphthalene	10,300	11,700	<29	<30	59	2,580	110	140	150	1,600	230
Methylene Chloride	<5000	<5100	<29	<30	<29	<60	<6.0	<6.0	<6.0	<90	<6.0

Notes:

[1] All concentrations given in units of ug/kg (ppb).

[2] See Figure 2 for sampling location.

[3] Samples collected by ERM

[4] Samples collected by Maxim

Key:

NA = Not analyzed.

TABLE 4.3

SOIL ANALYTICAL RESULTS[1]
D-F INCORPORATED
ST. FRANCIS, WISCONSIN
PAGE 4 OF 6

Sample Location[2]	GP12(4)	GP13(4)	GP14(4)	GP15(4)	GP16(4)	GP17(4)	GP18(4)	GP19(4)	GP20(4)	GP21(4)	MW-1/B-01(4)
x-Coordinate	4959	4994	4919	4919	4963	4963	4995	5094	4951	4905.94	5313.22
y-Coordinate	5000.5	4945	4885	4908	4886.81	4908.81	5037	5047	4852	4853.02	4908.88
Ground Elevation	657.25	657.50	659.00	659.00	659.00	659.00	659.23	659.23	659.00	659.00	658.90
Date Sampled	11/11/96	11/11/96	11/11/96	11/11/96	11/11/96	11/11/96	11/11/96	11/11/96	11/12/96	11/12/96	4/23/96
Sample Depth	4	4'	2-4'	4'	4'	4'	4'	5'	2'	2.1	6-8'
Percent Solids	64	83	52	52	69	64	83	72	80	44	87
Parameters											
Diesel Range Organics (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	23	12,000	NA
Petroleum Volatile Orgnic Compounds											
Benzene	66	56	670	150	330	71	29	30	31	8,600	272
Toluene	270	250	1,100	840	17,000	300	150	45	200	270,000	<29
Ethyl Benzene	53	42	430	120	7,000	72	160	22	44	150,000	<29
Total Xylenes	224	232	2,390	690	42,000	370	1,430	139	290	570,000	NA
m,p-xylenes	160	160	1,600	470	23,000	260	940	90	180	340,000	NA
o-Xylene and Styrene	64	72	790	220	19,700	110	490	179	110	230,000	39
Styrene	<8.0	<16	<120	<32	700	<16	<8.0	130	<8.0	<800	NA
1,2,4-Trimethylbenzene	71	30	440	95	16,000	31	280	31	60	290,000	<29
1,3,5-Trimethylbenzene	76	50	600	140	9,100	62	170	28	41	83,000	<29
Chlorinated Ethenes											
Tetrachloroethene	<11	56	580	<44	<110	<22	73	<11	19	72,000	<29
Trichloroethene	1,100	4,800	56,000	13,000	<110	2,800	2,000	<11	180	1,100,000	69
cis-1,2-Dichloroethene	1,100	1,500	62,000	15,000	<790	2,800	210	<79	940	1,700,000	60
trans-1,2-Dichloroethene	<24	160	5,000	470	<240	140	<24	<24	<24	<240	<29
1,1-Dichloroethene	<10	210	17,000	1,400	<100	390	<10	<10	<10	17,000	<29
Vinyl Chloride	<6.0	460	17,000	2,900	<60	2,800	<6	<6	<6	9,400	<29
Chlorinated Ethanes											
1,1,1-Trichloroethane	110	99	1,300	1,000	230	97	<16	<16	1,100	<1600	NA
1,2-Dichloroethane	150	<12	7,000	4,000	<60	710	<6.0	<6.0	<6.0	17,000	587
1,1-Dichloroethane	790	1,000	11,000	12,000	2,000	2,700	<7.0	<7.0	63	91,000	<29
Chloroethane	<5.0	<10	<75	<20	<50	<10	<5.0	<5.0	<5.0	<500	<29
Other Volatile Organic Compounds											
Bromochloromethane	<8.0	<16	<120	890	<80	<16	<8.0	<8.0	<8.0	35,000	<29
Chloromethane	<22	<44	<330	<88	<220	<44	<22	<22	95	<2200	<44
Chloroform	<9.0	<18	<140	<36	<90	<18	<9.0	<9.0	<9.0	11,000	<18
n-butylbenzene	<11	<22	<170	<44	18,000	<22	46	<11	<11	100,000	<29
sec-Butylbenzene	120	<12	<90	<24	7,800	<12	77	56	50	48,000	<29
tert-Butylbenzene	62	<20	1,300	<40	6,700	130	75	73	<10	29,000	1,070
Isopropylbenzene	77	<12	<90	<24	6,300	<12	600	<6	<6	39,000	<29
n-Propylbenzene	94	120	1,500	370	5,700	<12	78	<6.0	68	56,000	<29
p-Isopropyltoluene	21	<16	<120	<32	20,000	<16	55	<8.0	<8.0	38,000	<29
Naphthalene	230	210	2,500	660	4,900	270	150	150	140	52,000	<29
Methylene Chloride	<6.0	<12	<90	<240	<60	<12	<6.0	<6.0	<6.0	<600	<29

Notes:

[1] All concentrations given in units of ug/kg (ppb).

[2] See Figure 2 for sampling location.

[3] Samples collected by ERM

[4] Samples collected by Maxim

Key:

NA = Not analyzed.

TABLE 4.3

SOIL ANALYTICAL RESULTS[1]
D-F INCORPORATED
ST. FRANCIS, WISCONSIN
PAGE 5 OF 6

Sample Location[2]	MW-1/B-01(4)	B-03/MW-2(4)	B-04(4)	B-05/MW-3(4)	B-06(4)	B-07(4)	B-08/MW-4(4)	B-09/MW-5(4)	B-09/MW-5(4)
x-Coordinate	5313.22	4866.27	4837.00	5041.79	4936.00	4994.86	4995.44	4833.94	4833.94
y-Coordinate	4908.88	4852.51	4858	4911.64	4960	5000.33	5052.72	5043.32	5043.32
Ground Elevation	658.90	666.12	665.44	659.32	659.00	659.00	658.57	662.66	662.66
Date Sampled	4/23/96	4/23/96	4/23/96	4/23/96	4/24/96	4/24/96	4/24/96	4/24/96	4/24/96
Sample Depth	12-14'	10-12'	6-8'	8-10'	2-4'	4-6'	12-14'	4-6'	12-14'
Percent Solids	77	71	71	88	46	68	83	90	85
Parameters									
Diesel Range Organics (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Volatile Orgnic Compounds									
Benzene	<28	<5,507	<2,841	<29	<8,726	<564	41	920	<29
Toluene	<28	132,000	5,720	<29	26,000	2,980	<30	1,160	817
Ethyl Benzene	<28	101,000	60,400	<29	60,700	13,500	<30	574	1,340
Total Xylenes	NA	NA	NA	NA	NA	NA	NA	NA	NA
m,p-xylenes	<28	334,000	253,000	<29	294,000	76,800	<30	396	1,580
o-Xylene and Styrene	40	205,000	193,000	92	380,000	29,700	<30	634	860
Styrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	<28	89,000	85,000	<29	114,000	27,300	<30	737	<29
1,3,5-Trimethylbenzene	<28	23,500	25,400	<29	38,300	10,000	>30	179	<29
Chlorinated Ethenes									
Tetrachloroethene	<28	93,100	<2,841	<29	<8,726	<564	<30	<29	<29
Trichloroethene	43	3,310,000	<2,841	40	<8,726	<564	75	509	79
cis-1,2-Dichloroethene	<28	131,000	<2,841	112	<8,726	761	17,700	722	5,100
trans-1,2-Dichloroethene	<28	<5,507	<2,841	<29	<8,726	<564	178	<28	<29
1,1-Dichloroethene	<28	20,700	<2,841	<29	<8,726	<564	40	<29	<29
Vinyl Chloride	<28	<5,507	<2,841	<29	<8,726	<564	939	<29	1,830
Chlorinated Ethanes									
1,1,1-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	<28	28,600	<2,841	<29	<8,726	<564	51	<29	33
1,1-Dichloroethane	<28	19,000	<2,841	<29	<8,726	<564	956	73	863
Chloroethane	<28	<5,507	<2,841	<29	<8,726	<564	<30	<28	<29
Other Volatile Organic Compounds									
Bromochloromethane	<28	<5507	<2,841	<29	<8,726	<564	<30	<28	<29
Chloromethane	<28	<5507	<2,841	<29	<8,726	<564	30	<28	<29
Chloroform	<28	<5507	<2,841	<29	<8,726	<564	<30	<28	<29
n-butylbenzene	<28	42,400	63,600	<29	67,800	25,000	<30	482	<29
sec-Butylbenzene	<28	10,700	22,300	<29	15,000	7,060	<30	357	<29
tert-Butylbenzene	545	17,000	12,300	<29	<8,726	2,810	<30	333	<29
Isopropylbenzene	<28	6,510	11,300	<29	11,600	3,780	<30	188	<29
n-Propylbenzene	<28	21,400	26,700	<29	30,900	8,780	<30	404	<29
p-Isopropyltoluene	<28	8,940	29,500	<29	17,900	6,250	<30	231	<29
Naphthalene	<28	10,700	6,760	<29	<8,726	1,590	<30	428	<29
Methylene Chloride	<28	11,300	<2,841	<29	<8,726	<564	<30	<29	<29

Notes:

[1] All concentrations given in units of ug/kg (ppb).

[2] See Figure 2 for sampling location.

[3] Samples collected by ERM

[4] Samples collected by Maxim

Key:

NA = Not analyzed.

TABLE 4.3

SOIL ANALYTICAL RESULTS[1]
D-F INCORPORATED
ST. FRANCIS, WISCONSIN
PAGE 6 OF 6

Sample Location[2]	MW-6 (4)	MW-7 (4)	MW-8 (4)	MW-9 (4)	MW-10 (4)	MW-11 (4)	MW-12 (4)	MW-13 (4)
x-Coordinate	4835.33	4940.16	5001.55	5318.49	4829	4768	4770	4770
y-Coordinate	4962.79	4899.73	4852.52	5044.04	4760	4810	4918	5045
Ground Elevation	663.85	659.13	663.35	659.2	668.4	667.8	665.2	664.9
Date Sampled	11/13/96	11/13/96	11/12/96	11/13/96	11/11/96	11/12/96	11/12/96	11/11/96
Sample Depth	6-8'	2-4'	4'	6-10'	4'	5-6'	4'	4'
Percent Solids	85	60	81	87	86	85	87	86
Parameters	TOC=69000					TOC = 142,000	TOC = 84,000	
Diesel Range Organics (mg/kg)	<0.61	NA	150	NA	NA	<0.61	130	NA
Petroleum Volatile Orgnic Compounds								
Benzene	52	2,900	240	23	27	29	27	42
Toluene	330	120,000	1,700	37	50	150	59	170
Ethyl Benzene	50	260,000	410	<8.0	25	25	32	31
Total Xylenes	306	430,000	3,700	111	NA	131	NA	NA
m,p-xylenes	210	1,000,000	2,000	71	95	91	120	130
o-Xylene and Styrene	96	430,000	2,390	120	108	41	114	63
Styrene	<16	<400	690	80	61	<8.0	48	<8.0
1,2,4-Trimethylbenzene	82	1,100,000	16,000	20	41	23	110	55
1,3,5-Trimethylbenzene	57	430,000	9,000	22	31	27	45	35
Chlorinated Ethenes								
Tetrachloroethene	410	2,600	<110	<11	150	<11	<11	20
Trichloroethene	6,200	5,800	<110	<11	530	<11	<11	<11
cis-1,2-Dichloroethene	2,000	370,000	<790	<79	99	<79	<79	<79
trans-1,2-Dichloroethene	<48	<1200	<240	<24	<24	<24	<24	<24
1,1-Dichloroethene	<20	5,300	<100	<10	<10	<10	<10	<10
Vinyl Chloride	<12	780	<60	<6.0	<6.0	<6.0	<6.0	<6.0
Chlorinated Ethanes								
1,1,1-Trichloroethane	780	120,000	<160	<16	<16	<16	<16	<16
1,2-Dichloroethane	<12	<300	<60	<6.0	<6.0	<6.0	<6.0	<6.0
1,1-Dichloroethane	450	16,000	<70	<7.0	<7.0	<7.0	<7.0	<7.0
Chloroethane	<10	<250	<50	<5.0	<5.0	<5.0	<5.0	<5.0
Other Volatile Organic Compounds								
Bromochloromethane	<16	18,000	<80	<8.0	<8.0	<8.0	<8.0	<8.0
Chloromethane	<44	<1100	<220	<22	<22	85	<22	94
Chloroform	<18	1,300	<90	<9.0	<9.0	<9.0	<9.0	<9.0
n-butylbenzene	<22	740,000	17,000	<11	<11	<11	<11	<11
sec-Butylbenzene	<12	420,000	22,000	<10	47	<6	41	40
tert-Butylbenzene	<20	210,000	8,800	53	72	<10	61	<10
Isopropylbenzene	<12	310,000	3,100	<6.0	<6	<6	57	54
n-Propylbenzene	130	280,000	7,100	<6.0	63	58	63	66
p-Isopropyltoluene	<16	690,000	25,000	<8.0	<8	<8	<8	<8
Naphthalene	230	170,000	4,900	120	160	110	220	250
Methylene Chloride	<12	<300	<60	<6.0	<6.0	<6.0	<6.0	<6.0

Notes:

[1] All concentrations given in units of ug/kg (ppb).

[2] See Figure 2 for sampling location.

[3] Samples collected by ERM

[4] Samples collected by Maxim

Key:

NA = Not analyzed.

TABLE 4.10

AVERAGE TOTAL CONCENTRATIONS OF PVOCS, CHLORINATED ETHENES AND CHLORINATED ETHANES IN GROUND WATER[1]

D-F INCORPORATED, ST. FRANCIS, WISCONSIN

MONITORING WELL	PVOCS	CHLORINATED ETHENES	CHLORINATED ETHANES
MW-2	12,730	155,611	65,255
MW-3	98	380	53
MW-4	314	533	575
MW-5	109	4,659	544
MW-6	6,486	18,898	2,324
MW-7	18,976	280,897	27,879
MW-8	180	83	58
MW-14	4	628	40
MW-15	18,067	9,605	3,048

NOTES

1 Average of the total concentration of each group of constituents. Non-detected concentrations for individual constituents are reported as one-half the detection limit. Units are in micrograms per liter (ug/l).

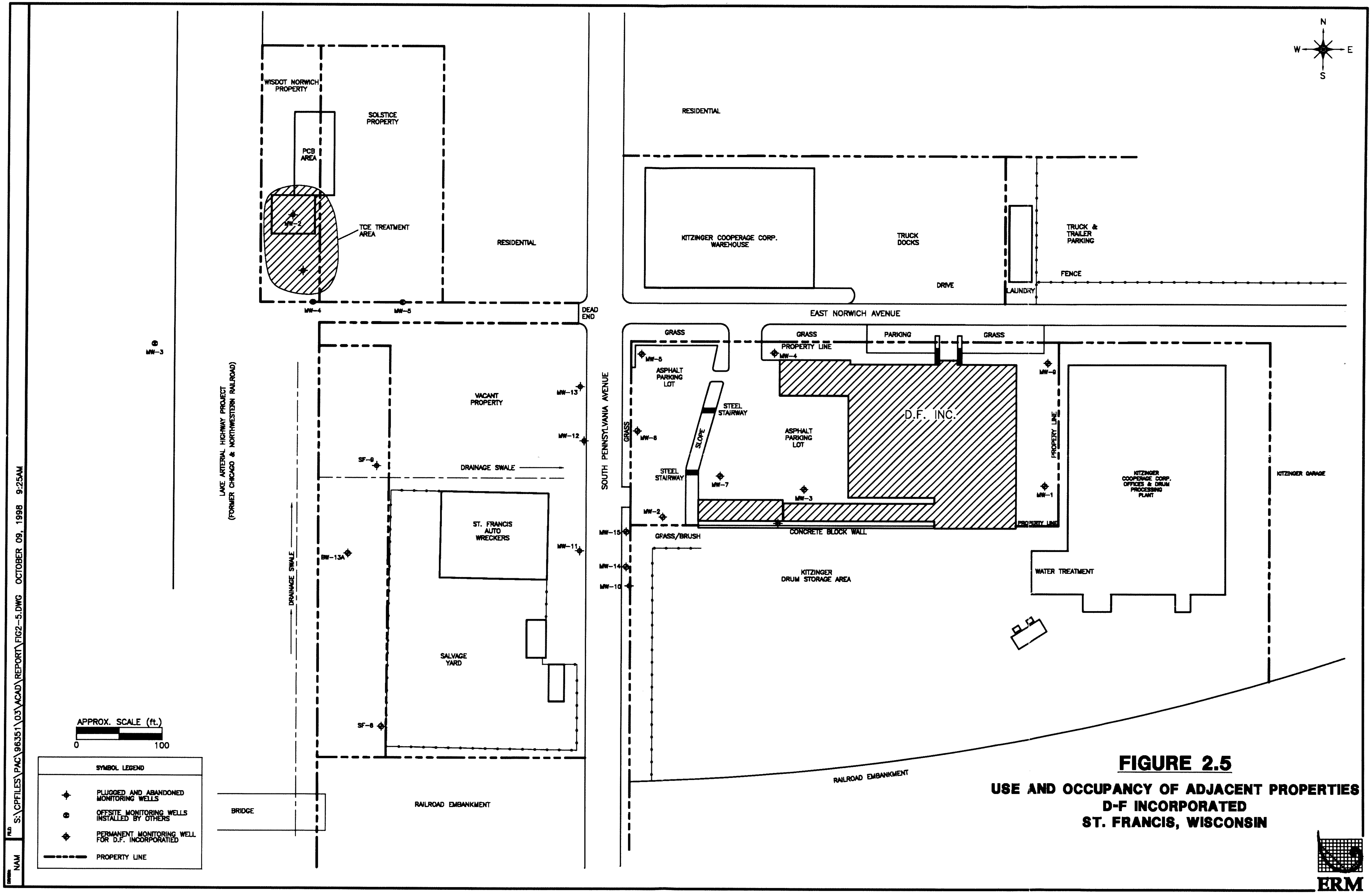


FIGURE 2.5

USE AND OCCUPANCY OF ADJACENT PROPERTIES
D-F INCORPORATED
ST. FRANCIS, WISCONSIN

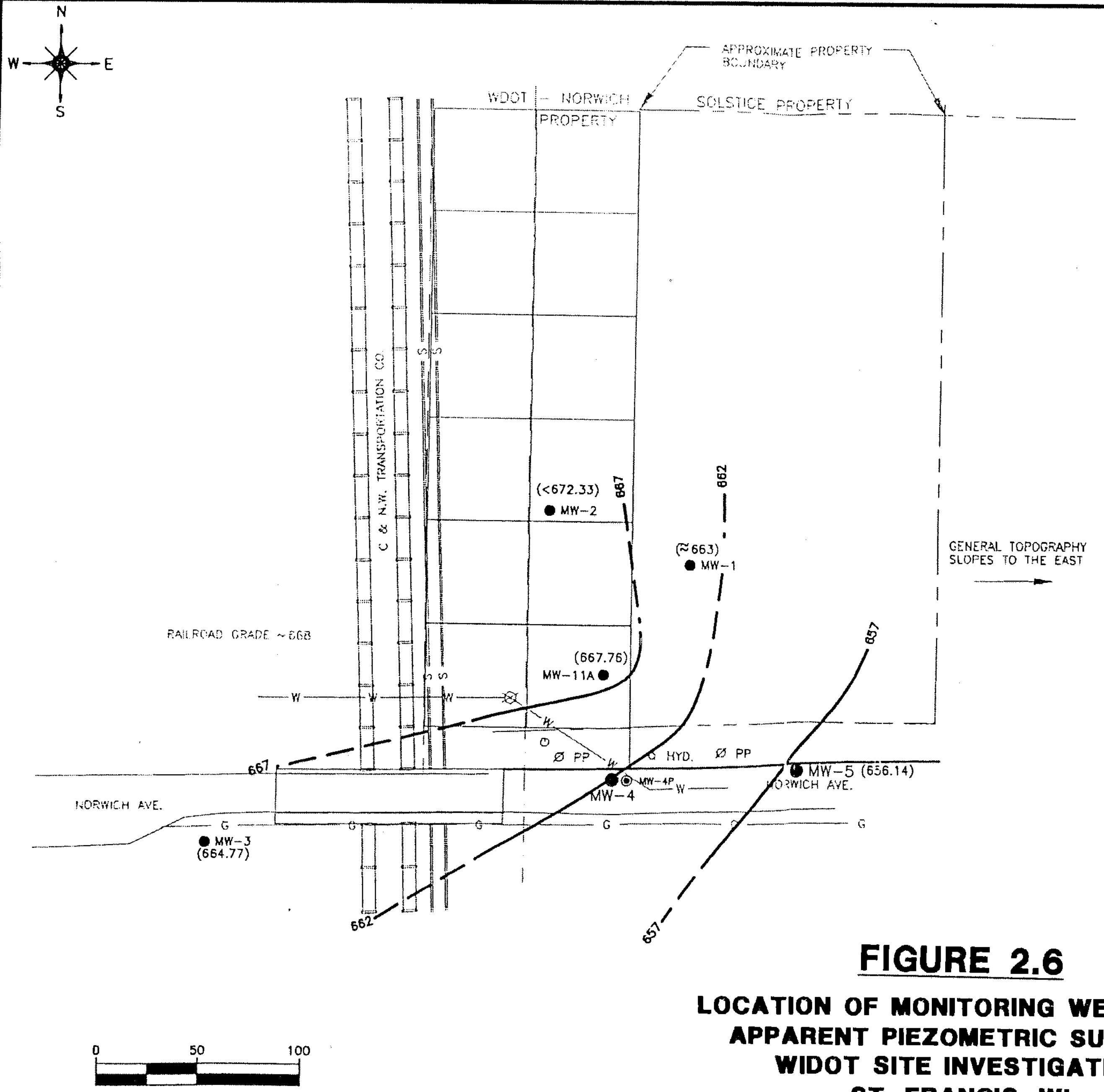
ERM

DRAWN: NAM

FILE: S:\CPFILES\PAC\96351\03\ACAD\REPORT\FIG2-5.DWG OCTOBER 09, 1998 9:25AM

DRAWN: NAM

FILE: S:\CPFILES\ERM\PAC\96351\07\ACAD\CBS\FIG2-5.DWG JUNE 19, 1998, 10:52 AM



NOTE: MAP OBTAINED FROM RMT INC. OF MADISON

LEGEND

—— S ——	SEWAGE LINE
—— W ——	WATER LINE
—— G ——	GAS LINE
HYD.	HYDRANT
PP	POWER POLE
(656.14) ● MW-5	MONITORING WELL LOCATION
⊙ MW-4P	PIEZOMETER LOCATION
657 ——	GROUNDWATER ELEVATION CONTOUR (CONTOUR INTERVAL = 5FT.)

NOTES

1. MONITORING WELL LOCATIONS ARE BASED ON SURVEYS PREFORMED BY RMT INC.
2. WATER LEVEL DATA BASED ON NOVEMBER 15, 1994 DATA.
3. WATER LEVEL IN MW-1 IS EXTRAPLATED FROM PREVIOUS GROUNDWATER ELEVATION DATA (SEE TEXT).

WATER TABLE CONTOUR MAP
NOVEMBER 15, 1994
WISDOT-NORWICH PROPERTY

RMT INC.

DWN. BY: RBN
APPROVED BY:
DATE: APRIL 1995
PROJ. # 10428.06
FILE # 0609

FIGURE 2.6

LOCATION OF MONITORING WELLS AND
APPARENT PIEZOMETRIC SURFACE
WIDOT SITE INVESTIGATION
ST. FRANCIS, WI

ERM

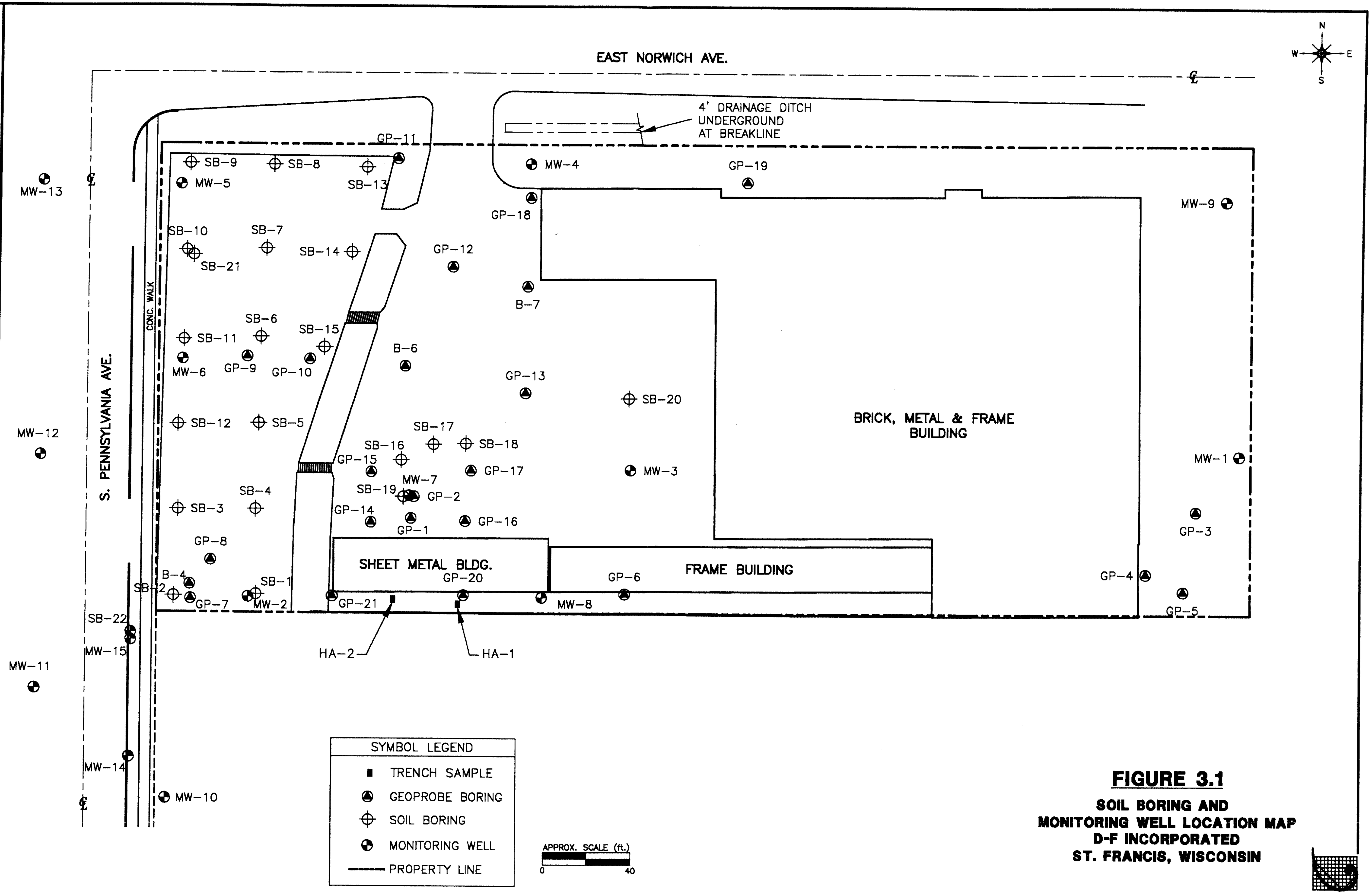
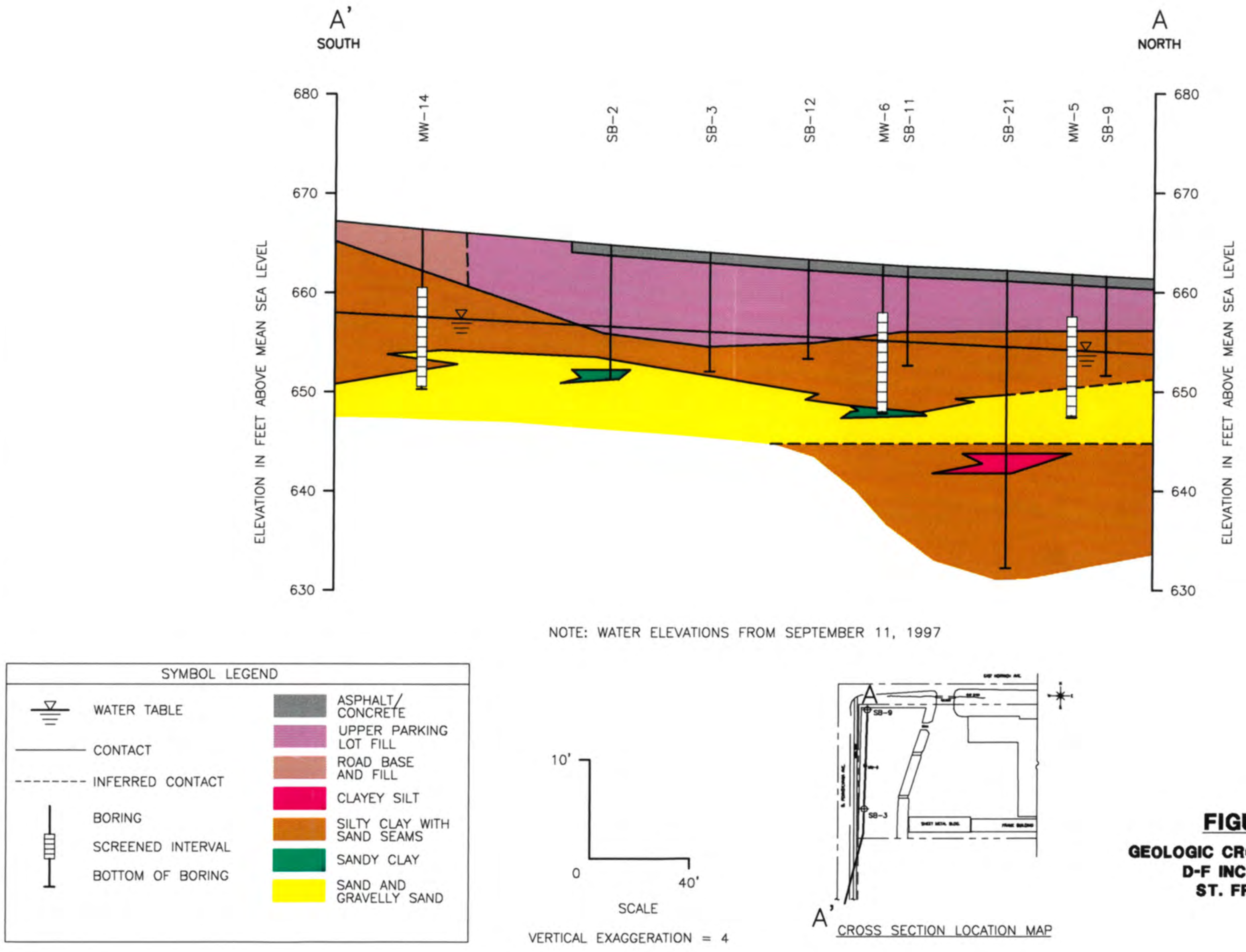


FIGURE 3.1

SOIL BORING AND MONITORING WELL LOCATION MAP
D-F INCORPORATED
ST. FRANCIS, WISCONSIN

FILE S:\CPFILES\PAC\96351\03\ACAD\REPORT\FIG3-1.DWG OCTOBER 09, 1998 9:25AM

DRAWN NAM



NOTE: WATER ELEVATIONS FROM SEPTEMBER 11, 1997

FIGURE 4.1

GEOLOGIC CROSS SECTION A-A'
D-F INCORPORATED
ST. FRANCIS, WI

ERM

S:\CPFILES\PAC\96351\03\ACAD\REPORT\FIG4-1.DWG OCTOBER 09, 1998 9:25AM
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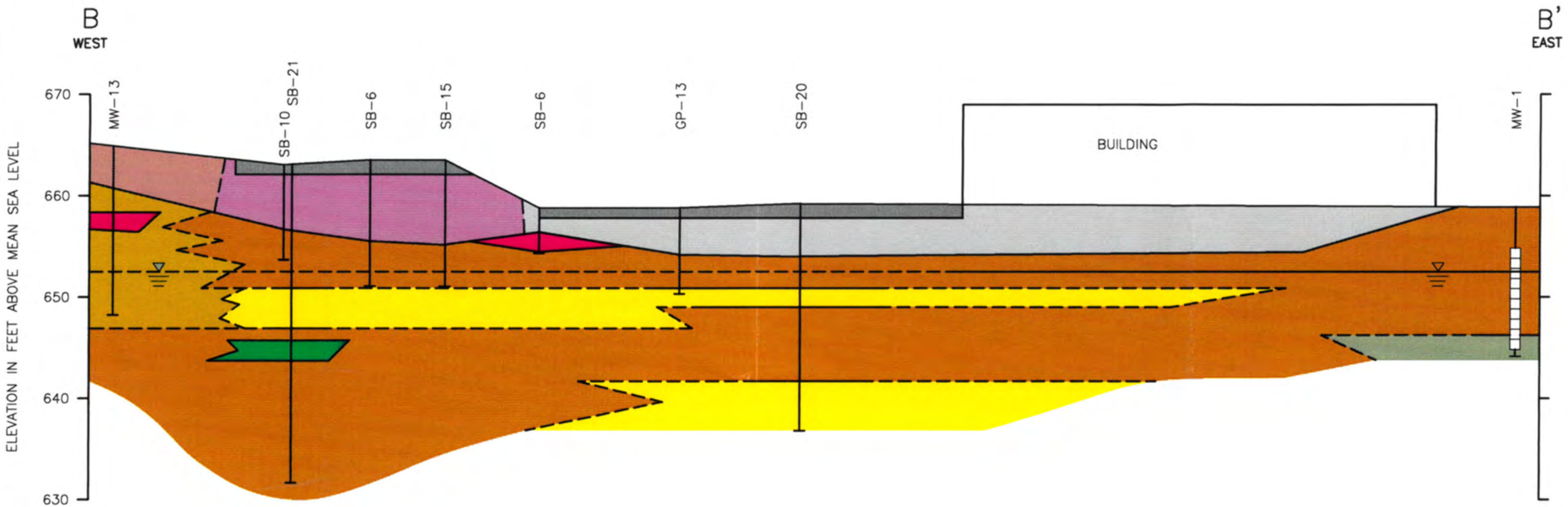
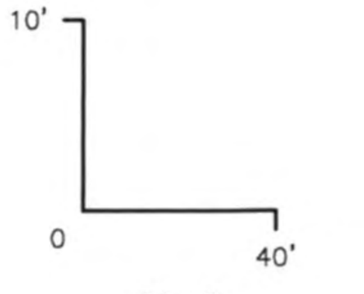


SYMBOL LEGEND

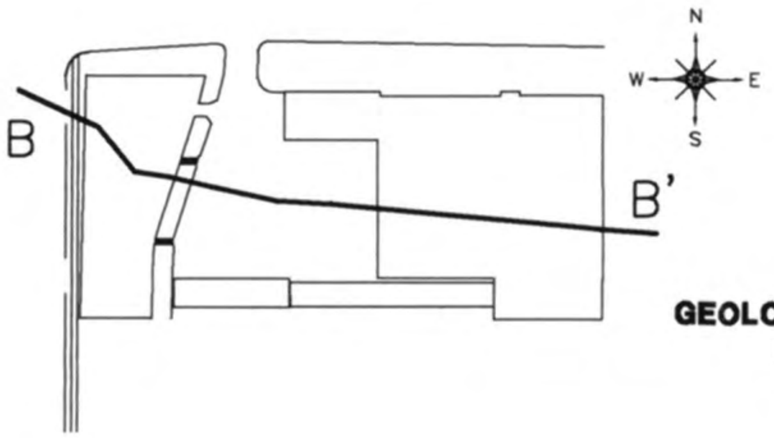
🟪	UPPER PARKING LOT FILL	▩	ASPHALT/ CONCRETE
🟫	ROAD BASE & FILL	▢	LOWER PARKING LOT FILL
▽	WATER TABLE	🟩	CLAY
———	CONTACT	🟥	CLAYEY SILT
- - - - - -	INFERRED CONTACT	🟧	SILTY CLAY
- - - - - -	INFERRED WATER TABLE	🟩	SANDY CLAY
┬	BORING	🟨	SILTY SAND
▤	SCREENED INTERVAL	🟨	SAND AND GRAVELLY SAND
┴	BOTTOM OF BORING		

NOTE: WATER ELEVATIONS FROM SEPTEMBER 11, 1997



SCALE

VERTICAL EXAGGERATION = 4



CROSS SECTION LOCATION MAP

FIGURE 4-2

GEOLOGIC CROSS SECTION B-B'
D-F INCORPORATED
ST. FRANCIS, WI

ERM

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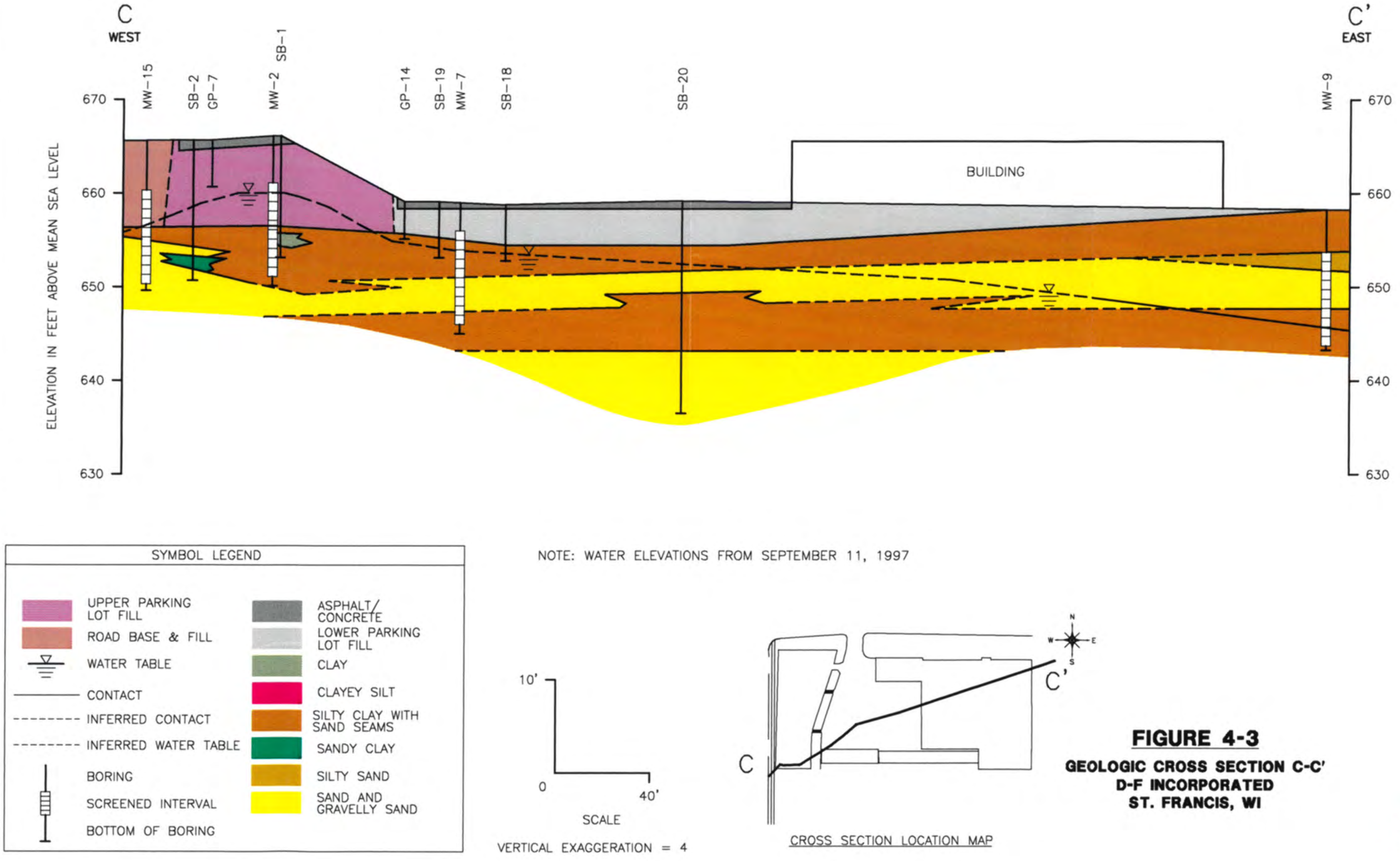
FILE: S:\CPFILES\PAC\96351\03\ACAD\REPORT\FIG4-2.DWG OCTOBER 09, 1998 9:25AM



NOTE: WATER ELEVATIONS FROM SEPTEMBER 11, 1997

FIGURE 4-3

GEOLOGIC CROSS SECTION C-C'
D-F INCORPORATED
ST. FRANCIS, WI

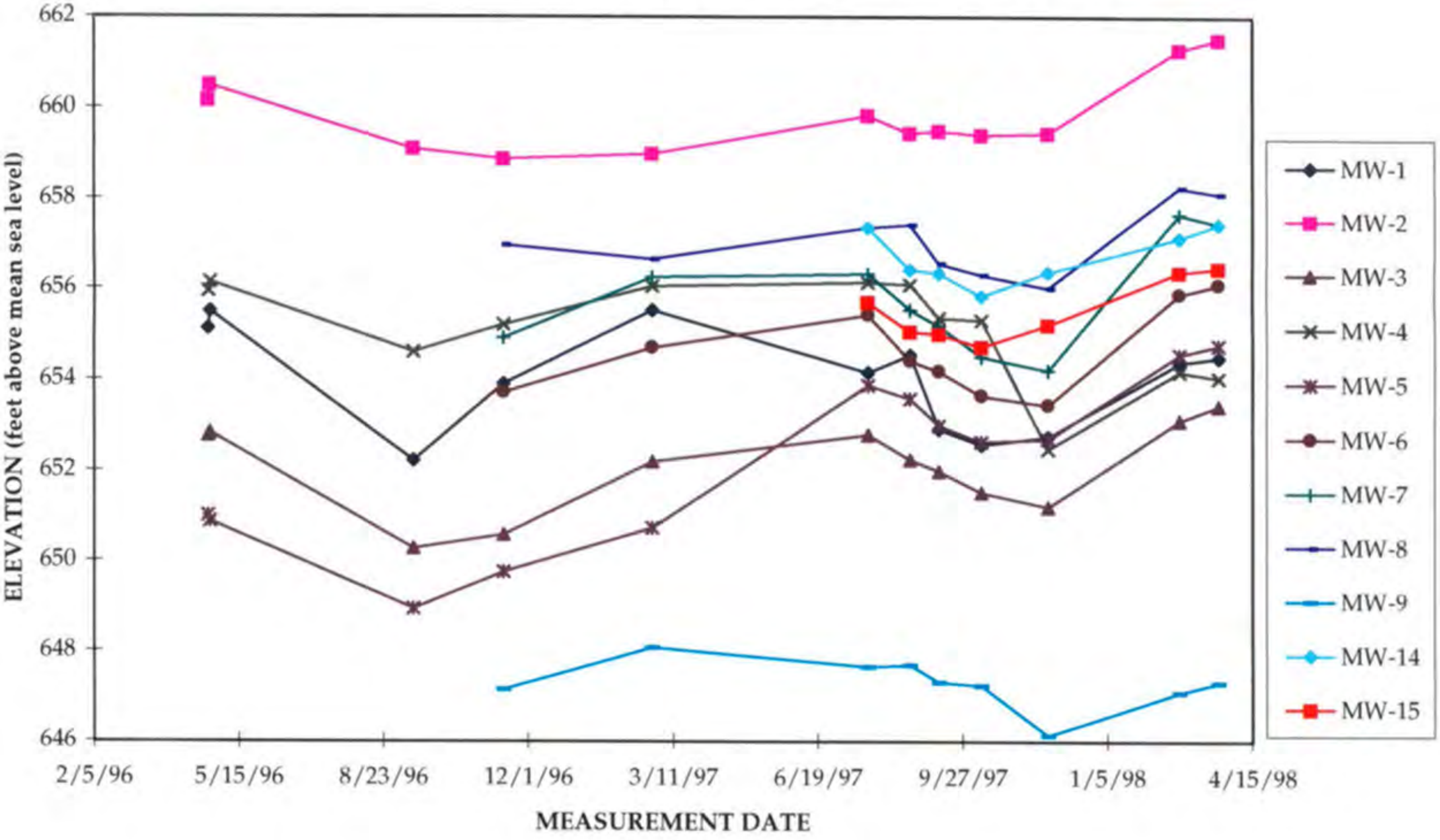
ERM

S:\CPFILES\PAC\96351\03\ACAD\REPORT\FIG4-3.DWG OCTOBER 09, 1998 9:25AM

NAM

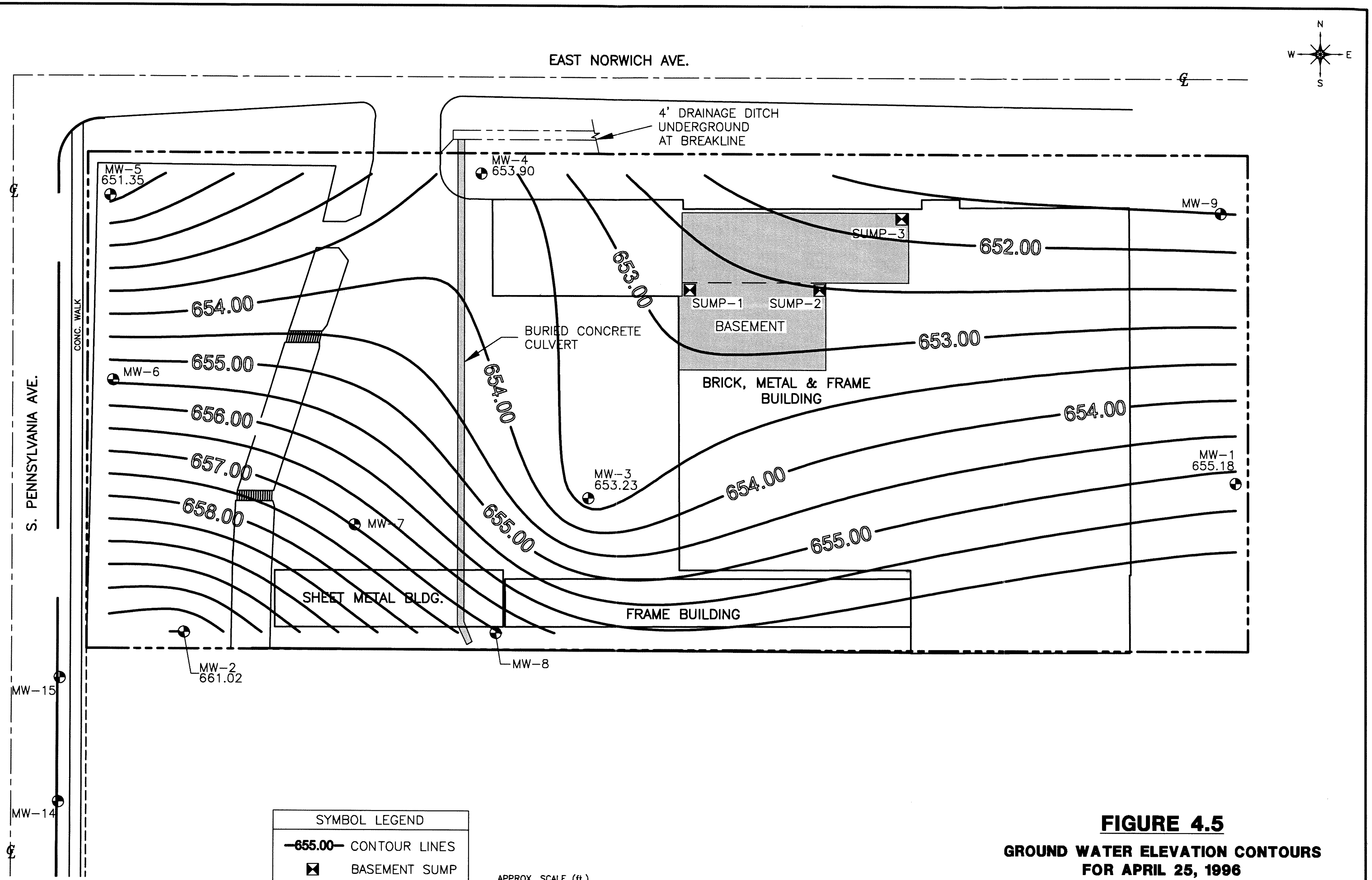
FIGURE 4.4

GROUND WATER ELEVATION HYDROGRAPHS
D-F INCORPORATED, ST. FRANCIS, WISCONSIN



LEVELS2.XLS

ERM



SYMBOL LEGEND

—655.00— CONTOUR LINES

⊠ BASEMENT SUMP

⊕ MONITORING WELL

------ PROPERTY LINE

APPROX. SCALE (ft.)
0 40

NOTE: ONLY MONITORING WELLS MW-1 THROUGH MW-5 EXISTED ON THIS DATE

FIGURE 4.5

GROUND WATER ELEVATION CONTOURS
FOR APRIL 25, 1996
D-F INCORPORATED
ST. FRANCIS, WISCONSIN

ERM

DRAWN: NAM
FILE: S:\CPFILES\PAC\96351\03\ACAD\REPORT\FIG4-5.DWG OCTOBER 09, 1998 9:25AM

ATTACHMENT C

SIGMA 2012 PHASE II (REF. 3)

THE SIGMA GROUP
Single Source. Sound Solutions.

November 30, 2012

Project Reference #13097

Ms. Jenna Soyer
Wisconsin Dept. of Natural Resources– RR/5
P.O. Box 7921
Madison, WI 53707

Mr. Andrew Boettcher
Wisconsin Dept. of Natural Resources
2300 Dr. Martin Luther King Jr. Drive
Milwaukee, WI 53212

Subject: **Phase II Environmental Assessment Activities**
Former D-F Inc.
2517 E. Norwich Avenue, St. Francis, Wisconsin

Dear Ms. Soyer and Mr. Boettcher:

Sigma Environmental Services, Inc. (Sigma) has prepared this letter report to document and discuss the Phase II Environmental Assessment activities completed at the former D-F Inc. and adjacent MidAmerica Steel Drum Company, Inc., (formerly Kitzinger Cooperage Corporation) facility located at the southeast corner of Pennsylvania Avenue and Norwich Avenue, St. Francis, Wisconsin. The Phase II activities presented below and completed to date were conducted as a part of the Wisconsin Department of Natural Resources (WDNR) US EPA Community Wide Brownfields Hazardous Assessment grant.

BACKGROUND

Sigma completed a Phase I Environmental Site Assessment (ESA) at the D-F Inc. property in April 2012 to determine the potential environmental concerns present at the site considering the City of St. Francis's interest in returning this blighted property to productive use. The Phase I ESA revealed evidence of the following recognized environmental conditions (RECs) in connection with the site:

- *The subject property was formerly utilized by Dittmore Freimuth/D.F. Corporation, a manufacturer of electronic and metal components for defense industry contracts from the late 1940's through 1996. While in use by D.F. Corporation, cutting oils, cooling fluids, solvents, degreasers and paint containing trichloroethene (TCE), trichloroethane (TCA), methylene chloride, xylene, toluene and methyl ethyl ketone (MET) were utilized and stored at the subject property in addition to a 200-gallon above ground storage tank containing TCE. Site investigation activities conducted to date and associated with the ERP case (02-41-097173) indicated that chlorinated and petroleum-related soil and groundwater impacts are present at the subject property. However, based on the location of the most contaminated area (southwest corner of the subject property) it appears that the chlorinated impacts may potentially be associated with an off-site source. As such, an off-site exemption was requested from the WDNR in 2003. The WDNR could not grant the off-site exemption due to insufficient information and requested that groundwater samples be collected from the adjacent Kitzinger drum storage site. Offsite samples* *were not collected and the ERP case remains "open" at this time. Given the status of the ERP case and the identified chlorinated and petroleum contamination, it appears that the subject property has been impacted by the historical use of the subject property and/or by the migration of off-site impacts.*

- *Fill material consisting of gravel, sand, silt, and clay with non-exempt material including metallic slag, foundry sand, cinders, paint chips, and/or sludge was encountered during the 1996 site investigation activities conducted by Environmental Resource Management (ERM) in various areas of the subject property (primarily the western parking lot) from ground surface to depths ranging from approximately one foot to ten feet below ground surface (bgs). Given the non-exempt fill material observed at the subject property, the historic filling activities have impacted the subject property.*

The following off-site REC was also identified during the course of the Phase I ESA:

- *Historic and current property uses adjoining the subject property include used drum storage by Kitzinger Cooperage Corporation to the south and an auto salvage yard operated by St. Francis Auto Wreckers to the west/southwest across South Pennsylvania Avenue. Given the potential for a release associated with the current and historic property uses and the documented on-site impacts which appear to be migrating from an off-site source (discussed above), the Kitzinger drum storage and St. Francis Auto Wreckers property use may have impacted the subject property.*

- *The St. Francis Auto Wreckers property located west/southwest of the subject property across South Pennsylvania Avenue was identified on the ERP database. The ERP listing pertains to documented metal, PCBs, and chlorinated solvent contamination to the soil and groundwater. The ERP listing remains open at this time. Given the status and the close proximity, the St. Francis Auto Wreckers property has the potential to impact the subject property.*

Based on the results of the Phase I ESA, Sigma prepared a Phase II Sampling and Analysis Plan (SAP) to further assess the identified RECs. In July 2012 Sigma was granted approval from the WDNR to proceed with the proposed Phase II investigation activities under the WDNR EPA Hazardous Assessment grant and on August 10, 2012 MidAmerica Steel Drum Company, Inc. (MidAmerica) granted access to this adjacent property. The Phase II investigation activities, as proposed in the June 13, 2012 SAP were initiated at the D-F Inc and MidAmerica properties in August 2012 and are described below.

SITE INVESTIGATION ACTIVITIES

The approved scope of work included: existing well location, evaluation and development, soil boring completion and soil sampling within the former DF-Inc. facility and soil boring and soil sampling and groundwater monitoring well and piezometer installation and groundwater sampling on the adjacent MidAmerica property.

Between the dates of September 17, 2012 and October 2, 2012, Sigma completed two soil borings within the footprint of the former D-F Inc. manufacturing building, and two soil borings, two ch. NR 141 compliant groundwater monitoring wells and one piezometer at the northwest corner of the adjoining MidAmerica property. On October 8, 2012, the existing D-F Inc. groundwater monitoring wells were located and their condition was evaluated and the pre-existing well network, two new wells and the installed piezometer were developed to ensure a good hydraulic connection within the saturated materials. The well development forms are included in **Appendix A**. Groundwater sampling included the pre-existing wells and the new wells and piezometer. The groundwater samples collected on October 15, 2012 were submitted for volatile organic compound (VOC) analysis.

Details of the investigation activities are presented as follows:

Soil Boring Completion
The specific soil boring locations are detailed below and presented on **Figure 1**:

- Geoprobe soil borings SGP-1 and SGP-2, and hollow stem auger soil borings completed as monitoring wells SMW-3 and SMW-4 and piezometer SPM-4 were positioned on the adjacent MidAmerica property just south of D-F-Inc. monitoring well MW-2;
- Geoprobe soil borings SGP-5 and SGP-6 were completed within the limits of the former D-F Inc. manufacturing facility.

The Geoprobe soil borings were advanced to 15 to 16 bgs. The groundwater monitoring well borings were advanced to a depth of 20 feet bgs and the piezometer boring was advanced to a depth of 35 feet bgs.

During soil boring advancement, soil samples were collected on a continuous basis and described on the basis of color, texture, grain size, and plasticity, and classified in accordance with the Unified Soil Classification System (USCS). Soil samples were screened in the field using a photoionization detector (PID) calibrated for direct response to isobutylene in air. The soil descriptions and field screening results were recorded on the soil boring logs provided in **Appendix B**.

Soil samples (two soil samples from each soil boring) were containerized and submitted for laboratory analysis. The soil samples collected for laboratory analysis were submitted for VOC analysis by EPA Method 8260.

Following the Geoprobe soil boring advancement and associated soil sample collection, soil borings SGP-1, SGP-2, SGP-5 and GP-6 were abandoned in accordance with Wisconsin Administrative Code Chapter NR 141. The borehole abandonment forms are included as **Appendix C.**

Soil boring advancement, soil sample collection, and borehole abandonment activities were conducted in accordance with the October 2010 EPA approved *Quality Assurance Project Plan* (QAPP) and subsequent updates.

Groundwater Monitoring Well and Piezometer Installations
Two hollow stem auger monitoring wells and one double-cased piezometer were advanced and completed at the MidAmerica property on September 17 and 19, 2012. The monitoring wells were completed to assess the potential groundwater impacts beneath the northwest corner of the MidAmerica property, just north of D-F Inc. monitoring well MW-2.

The monitoring wells were screened across the interpreted water table interval (8 to 18 feet bgs). The monitoring well construction form is included in **Appendix C**.

The 2-inch diameter piezometer was constructed within a 6-inch diameter grouted steel casing extending from the ground surface to a depth of 22 feet bgs. The 5-foot piezometer screen was set at a depth of 30 to 35 feet bgs.

The newly installed monitoring wells were developed on October 8, 2012 and sampled on October 15, 2012 in accordance with the QAPP. The collected groundwater samples were submitted for VOC analysis. The monitoring well development forms are included in **Appendix C**. Groundwater generated during the well development and sampling activities remains on-site pending proper disposal.

Existing Monitoring Well Network Evaluation and Development

The D-F Inc. site monitoring well network was evaluated on October 15, 2012 to: 1) locate existing motoring wells; 2) evaluate the viability and integrity of the existing wells; and 3) develop the viable wells in accordance with ch. NR 141 prior to completing groundwater sampling. The monitoring well development forms are included in **Appendix A.**

Survey

The completed soil borings, newly installed motoring wells, existing (and located) monitoring wells and the piezometer were surveyed to the State plane coordinate system and mean sea level per the QAPP.

SITE INVESTIGAITON RESULTS

The following summarizes the results of the site investigation activities.

Geology

The soil profile beneath the former manufacturing building at the D-F Inc. site consists of sand fill to a depth of approximately 3 to 4.5 feet bgs below which are interbedded units of silt, silty clay and fine to course sand units ranging in thickness from 1 to 3 feet.

The soil profile on the MidAmerica property consists of 6 to 7 feet of non-native fill materials including wood (some charred) debris, red and black sand, white and red gravel mixed with silt. Interbedded units of silt and fine sand units and a course sandy gravel at approximately 22 to 34 feet bgs were present below the fill material.

The soil beneath the former D-F Inc. building did not show obvious signs of impacts, either through visual (staining), olfactory or PID screening. The soil samples recovered at depths between 2 and 35 feet bgs from the soil borings completed on the MidAmerica property were noted to have elevated PID readings, a strong odor and at some locations a visual sheen. The soil boring descriptions are presented on the soil boring logs included in **Appendix B**.

Hydrogeology

Groundwater is present at the D-F Inc. and adjacent MidAmerica property at elevations ranging from 646.60 to 663.44 mean sea level (msl). The groundwater elevations are presented in **Table 1.** The groundwater flow direction based on the October 15, 2012 measuring event is generally to the north with an easterly component in the northeast area of the D-F Inc. site. The groundwater contours are presented in **Figure 2**.

Based on the groundwater level measurements the average horizontal gradient is calculated at 0.035 ft/ft across the site with a vertical downward gradient at monitoring well SMW-4 and piezometer SPW-4 of 0.8 ft/ft.

Soil Quality Results

Soil quality results generated during the site investigation indicated the presence of select low level impacts within the soil samples collected beneath the former D-F Inc. manufacturing building while much higher concentrations of both petroleum and chlorinated-related VOC impacts were present within the soil samples collected from the adjacent MidAmerica property. The following is a summary of the laboratory results completed to date. The soil quality results are presented on **Table 1**. The soil laboratory reports dated September 29, 2012 and October 12, 2012 are included as **Appendix D.**

D-F Inc Property Soil Samples – Detectable concentrations of only petroleum-related VOCs were reported within the soil samples collected from SGP-5 and SGP-6. The detected constituents, with the exception of ethylbenzene, toluene and total xylene at SGP-5 were present at concentrations flagged by the laboratory as present at concentrations between the Limit of Detection and the Limit of Quantitation. None of the constituents detected within the soil samples were present at concentrations greater than the published ch. NR 720 generic residual contaminant levels (RCLs).

MidAmerica Property Soil Samples – Elevated concentrations of both petroleum and chlorinated-related VOCs were reported within the soil samples collected from the adjacent MidAmerica property. The soil samples collected at the observed saturated/ unsaturated interface were observed to contain obvious impacts based on odor and visible sheen. The analytical results indicated the presence of several constituents at concentrations greater than the published ch. NR 720 generic residual contaminant levels (RCLs).

Specifically, concentrations of 1,1-dichlorethene (1,1-DCE) ranging from 3,300 ug/kg to 264,000 ug/kg, ethylbenzene ranging from 17,100 ug/kg to 106,000 ug/kg, tetrachloroethene (PCE) ranging from 2,500 ug/kg to 390,000 ug/kg, toluene ranging from 11,700 ug/kg to 126,000 ug/kg, 1,1,1-trichloroethane (1,1,1-TCA) ranging from 2,150 ug/kg to 305,000 ug/kg, 1,2,4-trimethylbenzene (1,2,4-TMB) ranging from 49,000 ug/kg to 112,000 ug/kg, 1,3,5-trimethylebenzene (1,3,5-TMB) ranging from 7,200 to 34,000 ug/kg and total xylene ranging from 80,200 ug/kg to 269,000 ug/kg were detected within each of the soil samples collected from the MidAmerica property. Additional constituents including: 1,2-dichloroethane (1,2-DCA) at 2,220 ug/kg (at SMW-3), 1,1-dichlorethene (1,1-DCE) at 4,400 ug/kg and 11,900 ug/kg (SGP-2 and SMW-3, respectively), 1,1-dichloroethane (1,1-DCA) 2,900 ug/kg (SMW-3), trichloroethene (TCE) at 3,300 ug/kg, 330,000 ug/kg and 3,400 ug/kg (SGP-1, SMW-3 and SMW-4, respectively), and vinyl chloride (VC) at 2,590 ug/kg and 11,300 ug/kg (SMW-3 and SGP-2, respectively) were detected within select soil samples at concentrations greater than their published ch. NR 720 generic RCLs.

Existing Monitoring Well Network Assessment and Development

The existing D-F Inc. groundwater monitoring well network established in the early 2000's and last sampled in 2003 was assessed to determine their location and viability/integrity for groundwater sampling. On October 8, 2012, monitoring wells MW-2, MW-5, MW-6, MW-7, MW-14 and MW-15 were located and determined to be viable for sampling activities. Monitoring wells MW-1, MW-12 and MW-13, located across S. Pennsylvania Avenue as indicated on previous site figures were not accessible due to a locked fence. The located monitoring wells were developed in accordance with ch. NR 141. The monitoring well development forms are included in **Appendix A.**

Groundwater Quality Results

One round of groundwater samples were collected from the viable monitoring well network on October 15, 2012. Review of the sampling and analytical results indicates that free floating product was present within groundwater monitoring wells MW-7 (0.04 feet thickness) and MW-15 (0.07 feet thickness) and that petroleum and chlorinated-related VOCs were detected within the groundwater samples collected from select on and off-site monitoring wells and piezometer at concentrations greater than ch. NR 140 enforcement standards (ESs).

> Petroleum VOCs – In addition to the free phase product at monitoring wells MW-7 and MW-15, groundwater with petroleum related impacts greater than ch. NR 140 ESs and/or preventative action limits (PALs) were detected at each of the monitoring wells except MW-2. More specifically, detected concentrations of benzene ranged from 0.91 ug/l (MW-3) to 5.8 ug/l (SMW-4), ethylbenzene ranged from 199 ug/l (SMW-3) to 950 ug/l (SMW-4), naphthalene ranged from 135 ug/l (SMW-4), toluene ranged from 320 ug/l (SMW-4) 19,000 ug/l (SPM-4), total trimethylbenzenes ranged from 333 ug/l (SMW-4) to 440 ug/l (SMW-3), and total xylenes ranged from 1,380 ug/l (SMW-4) to 8,800 ug/l (SPM-4).
>
> Chlorinated VOCs – Concentrations of select chlorinated VOCs greater than their respective ch. NR 140 ESs were reported within each of the groundwater samples collected from the site. Specifically, detected concentrations of chloroethane at 400 ug/l (MW-6), 1,2-DCA ranged from 0.55 ug/l (MW-3) to 320 ug/l (SMW-3), 1,1-DCA ranged from 116 ug/l (SMW-4) to 12,800 ug/l (SPM-4), cis-1,2-DCE ranged from 21.6 ug/l (MW-8) to 283,000 ug/l (SPM-4), PCE 820 ug/l (SMW-3), 1,1,1-trichlroethane (1,1,1-TCA) ranged from 77 ug/l (SMW-4) to 96,000 ug/l (SPM-4), TCE ranged from 3 ug/l (MW-8) to 26,000 ug/l (SPM-4) and vinyl chloride ranged from 1.27 ug/l (MW-1) to 12,600 ug/l (SPM-4).

The groundwater quality results are presented on **Table 3**. The groundwater laboratory report is included as **Appendix E**.

CONCLUSIONS

Based on the data collected during the recent Phase II site investigation activities conducted at the site, the following conclusions are presented:

- The soil profile at the former D-F Inc. site consists of interbedded units of silt, silty clay and fine to course seams.

- The soil profile at the adjacent MidAmerica property consists of approximately 6 feet of fill consisting of wood debris (some charred), silt, and varying amounts of white, red and black sands and gravels. Interbedded units of silty and fine to course sand and gravel units were present below the fill.

- Shallow groundwater is present within the site groundwater monitoring wells at elevations ranging from 646.60 to 663.44 msl. The groundwater flow direction is generally to the north with an easterly component within the northeast portion of the D-F Inc. site. The calculated average horizontal gradient is 0.035 ft/ft.

- Low level concentrations (less than State standards) of select petroleum VOCs were detected within soil samples collected from soil borings completed within the footprint of the former D-F Inc. manufacturing building.

- More elevated concentrations of petroleum and chlorinated-related VOCs were detected within the soil samples collected from the adjacent MidAmerica property. Several of the detected concentrations were greater than State Standards.

- Free phase petroleum-related product was observed and measured within monitoring wells MW-7 and MW-15.

- Concentrations of both petroleum and/or chlorinated VOCs were detected within each of the project groundwater monitoring wells and piezometer at concentrations greater than their respective ch. NR 140 ESs.

- Based on soil and groundwater quality laboratory data collected from both the D-F Inc and MidAmerica properties, similar constituents of concern were detected on both properties while the highest concentrations were generally detected on the MidAmerica property.

RECOMMENDATIONS

Sigma's review of soil and groundwater quality data identified petroleum and chlorinated related VOC compounds in the soil and groundwater collected from the former D-F Inc. site and adjacent MidAmerica property. Additional soil assessment activities are recommended to further evaluate the degree, extent and potential source of the identified impacts.

If you have any questions or need additional assistance, please call us at (414) 643-4200.

Sincerely,

THE SIGMA GROUP

Kristin Kurzka, P.E.
Senior Engineer

Enclosure

TABLES

TABLE 1
SUMMARY OF STATIC GROUNDWATER ELEVATIONS
Former D-F Incorporated Property
St. Francis, Wisconsin
Project Reference # 13097

Monitoring Well Identification	Date	Ground Surface Elevation (feet MSL)	Top of Casing Elevation (feet MSL)	Depth to Groundwater (feet from TOC)	Depth to Groundwater (feet bgs)	Groundwater Elevation (feet MSL)	Well Screen Interval (feet bgs) (feet MSL)
SMW-3	10/15/12	668.98	668.32	4.88	5.54	663.44	8 - 18 660.98 - 650.98
SMW-4	10/15/12	667.78	667.24	6.75	7.29	660.49	8 - 18 659.78 - 649.78
SPM-4	10/15/12	667.72	667.60	15.70	15.83	651.90	25 - 35 642.72 - 632.72
MW-1	10/15/12	657.10	659.23	5.85	3.73	653.38	
MW-2	10/15/12	666.17	665.55	6.50	7.12	659.05	
MW-3	10/15/12	659.30	658.87	7.00	7.43	651.87	
MW-4	10/15/12	658.47	660.75	6.85	4.57	653.90	
MW-5	10/15/12	662.64	662.16	9.31	9.79	652.85	
MW-6	10/15/12	663.83	663.61	10.50	10.72	653.11	
MW-7	10/15/12	659.10	658.97	3.92 (free product at 3.88) 0.04	4.05	655.05	
MW-8	10/15/12	659.76	663.40	5.93	2.30	657.47	
MW-9	10/15/12	656.94	659.17	12.57	10.34	646.60	
MW-11	10/15/12			well not found			
MW-12	10/15/12			well not found			
MW-13	10/15/12			well not found			
MW-14	10/15/12	667.23	666.76	14.76	15.23	652.00	
MW-15	10/15/12	665.60	665.00	11.70 (free product at 11.63) 0.07	12.30	653.30	

Notes:

feet MSL = feet above Mean Sea Level
feet from TOC = feet below top of casing
feet bgs = feet below ground surface

TABLE 1
SUMMARY OF SOIL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS
Former D-F Incorporated Property
St. Francis, Wisconsin
Project Reference #13097

Soil Boring Identification:					**SGP-1**	**SGP-2**	**SMW-3**	**SMW-4**	**SGP-5**	**SGP-6**
Sample Depth (ft):					9 -10	7.5 - 10	9 - 10	9 - 10	3.5 - 6.5	3 - 6
Parameter	Unit	NR 720 / NR 720.19	NR 746		Collection Date					
		(1) RCL	(2) Table 1	(3) Table 2	09/17/12	09/17/12	09/17/12	09/17/12	10/02/12	10/02/12
Benzene	µg/kg	5.5	8,500	1,100	<890	<890	<890	<890	<8.9	<8.9
Bromobenzene	µg/kg	NS	NS	NS	<1400	<1400	<1400	<1400	<14	<14
Bromodichloromethane	µg/kg	0.24 ^{GW}	NS	NS	<1200	<1200	<1200	<1200	<12	<12
Bromoform	µg/kg	45 ^{GW}	NS	NS	<2000	<2000	<2000	<2000	<20	<20
tert-Butylbenzene	µg/kg	NS	NS	NS	<5400	<5400	<5400	<5400	<54	<54
sec-Butylbenzene	µg/kg	NS	NS	NS	<5100	**10400** ^{J}	<5100	**6800** ^{J}	<51	<51
n-Butylbenzene	µg/kg	NS	NS	NS	**6600** ^{J}	**19900**	**8000** ^{J}	**13900** ^{J}	<48	<48
Carbon tetrachloride	µg/kg	5.0 ^{GW}	NS	NS	<1200	<1200	<1200	<1200	<12	<12
Chlorobenzene	µg/kg	150 ^{GW}	NS	NS	<940	<940	<940	<940	<9.4	<9.4
Chloroethane	µg/kg	NS	NS	NS	<14200	<14200	<14200	<14200	<142	<142
Chloroform	µg/kg	39 ^{GW}	NS	NS	<4600	<4600	<4600	<4600	<46	<46
Chloromethane	µg/kg	2.7 ^{GW}	NS	NS	<20700	<20700	<20700	<20700	<207	<207
2-Chlorotoluene	µg/kg	2700 ^{GW}	NS	NS	<8400	<8400	<8400	<8400	<84	<84
4-Chlorotoluene	µg/kg	2700 ^{GW}	NS	NS	<7600	<7600	<7600	<7600	<76	<76
1,2-Dibromo-3-chloropropane	µg/kg	24 ^{GW}	NS	NS	<7700	<7700	<7700	<7700	<77	<77
Dibromochloromethane	µg/kg	760 ^{DC}	NS	NS	<950	<950	<950	<950	<9.5	<9.5
1,4-Dichlorobenzene	µg/kg	110 ^{GW}	NS	NS	<5200	<5200	<5200	<5200	<52	<52
1,3-Dichlorobenzene	µg/kg	NS	NS	NS	<5300	<5300	<5300	<5300	<53	<53
1,2-Dichlorobenzene	µg/kg	1800 ^{GW}	NS	NS	<5100	<5100	<5100	<5100	<51	<51
Dichlorodifluoromethane	µg/kg	21972 ^{GW}	NS	NS	<1200	<1200	<1200	<1200	<12	<12
1,2-Dichloroethane	µg/kg	4.9	600	540	<1300	<1300	**(1,2,3) 2220** ^{J}	<1300	<13	<13
1,1-Dichloroethane	µg/kg	2900 ^{GW}	NS	NS	<1100	**(1) 4400**	**(1) 11900**	<1100	<11	<11
1,1-Dichloroethene	µg/kg	5.0 ^{GW}	NS	NS	<2200	<2200	**(1) 2900** ^{J}	<2200	<22	<22
cis-1,2-Dichloroethene	µg/kg	55 ^{GW}	NS	NS	**(1) 17400**	**(1) 116000**	**(1) 264000**	**(1) 3300** ^{J}	<14	**25.8** ^{J}
trans-1,2-Dichloroethene	µg/kg	98 ^{GW}	NS	NS	<2200	<2200	<2200	<2200	<22	<22
1,2-Dichloropropane	µg/kg	1.9 ^{GW}	NS	NS	<1100	<1100	<1100	<1100	<11	<11
2,2-Dichloropropane	µg/kg	NS	NS	NS	<3300	<3300	<3300	<3300	<33	<33
1,3-Dichloropropane	µg/kg	640 ^{GW}	NS	NS	<1100	<1100	<1100	<1100	<11	<11
Di-isopropyl ether	µg/kg	NS	NS	NS	<4700	<4700	<4700	<4700	<47	<47
EDB (1,2-Dibromoethane)	µg/kg	0.033 ^{GW}	NS	NS	<1700	<1700	<1700	<1700	<17	<17
Ethylbenzene	µg/kg	2,900	4,600	NS	**(1,2) 17100** ^{J}	**(1,2) 106000**	**(1,2) 55000**	**(1,2) 21300**	**205**	<55
Hexachlorobutadiene	µg/kg	120 ^{GW}	NS	NS	<9500	<9500	<9500	<9500	<95	<95
Isopropylbenzene	µg/kg	NS	NS	NS	<5300	**9600** ^{J}	<5300	<5300	<53	<53
p-Isopropyltoluene	µg/kg	NS	NS	NS	<4500	**11500** ^{J}	<4500	**5300** ^{J}	<45	<45
Methylene chloride	µg/kg	1.6 ^{GW}	NS	NS	<11900	<11900	<11900	<11900	<119	<119
Methyl-tert-butyl-ether	µg/kg	6270000 ^{DC}	NS	NS	<1200	<1200	<1200	<1200	<12	<12
Naphthalene	µg/kg	427 ^{GW}	2,700	NS	<10700	**(1,2) 14700** ^{J}	**(1,2) 11100** ^{J}	**(1,2) 16000** ^{J}	<107	<107
n-Propylbenzene	µg/kg	NS	NS	NS	<5300	**18800**	**8100** ^{J}	**10400** ^{J}	<53	<53
1,1,2,2-Tetrachloroethane	µg/kg	0.1 ^{GW}	NS	NS	<2000	<2000	<2000	<2000	<20	<20
1,1,1,2-Tetrachloroethane	µg/kg	7.4 ^{GW}	NS	NS	<4100	<4100	<4100	<4100	<41	<41
Tetrachloroethene	µg/kg	4.1 ^{GW}	NS	NS	**(1) 2500** ^{J}	**(1) 4200** ^{J}	**(1) 390000**	**(1) 4200** ^{J}	<24	<24
Toluene	µg/kg	1,500	38,000	NS	**(1) 30400**	**(1,2) 126000**	**(1,2) 70000**	**(1) 11700** ^{J}	**189**	<50
1,2,4-Trichlorobenzene	µg/kg	540 ^{GW}	NS	NS	<7400	<7400	<7400	<7400	<74	<74
1,2,3-Trichlorobenzene	µg/kg	NS	NS	NS	<12900	<12900	<12900	<12900	<129	<129
1,1,1-Trichloroethane	µg/kg	280 ^{GW}	NS	NS	**(1) 62000**	**(1) 3400** ^{J}	**(1) 305000**	**(1) 2150** ^{J}	<11	<11
1,1,2-Trichloroethane	µg/kg	11 ^{GW}	NS	NS	<1600	<1600	<1600	<1600	<16	<16
Trichloroethene	µg/kg	3.7 ^{GW}	NS	NS	**(1) 3300** ^{J}	<1700	**(1) 330000**	**(1) 3400** ^{J}	<17	<17
Trichlorofluoromethane	µg/kg	29000 ^{GW}	NS	NS	<4300	<4300	<4300	<4300	<43	<43
1,2,4-Trimethylbenzene	µg/kg	28000 ^{GW}	83,000	NS	**(1) 29400**	**(1,2) 112000**	**(1) 59000**	**(1) 49000**	**182** ^{J}	<80
1,3,5-Trimethylbenzene	µg/kg	13000 ^{GW}	11,000	NS	**7200** ^{J}	**(1,2) 34000**	**(1,2) 16000**	**(1,2) 14300** ^{J}	**70** ^{J}	<48
Vinyl chloride	µg/kg	0.13 ^{GW}	NS	NS	<1600	**(1) 11300**	**(1) 2590** ^{J}	<1600	<16	<16
Total Xylenes	µg/kg	4,100	42,000	NS	**(1,2) 80200**	**(1,2) 415000**	**(1,2) 269000**	**(1,2) 91900**	**1170**	<86

Notes:

J = analyte detected between Limit of Detection and Limit of Quantitation
µg/kg = micrograms per kilogram (equivalent to parts per billion)
NA = Not Analyzed NS = No Standard
NR 720 RCL = DNR, Chapter NR 720, Generic Residual Contaminat Levels Based on Protection of Groundwater Quality.
NR 746 Table 1 = DNR, Chapter NR 746, Table 1 soil screening level: Indicators of Residual Petroleum Products in Soil Pores.
NR 746 Table 2 = DNR, Chapter NR 746, Table 2: Protection of Human Health from Direct Contact with Contaminated Soil.
NR 720.19 RCL = RCLs calculated in accordance with Ch. NR 720.19 and WDNR document PUB-RR-682 and present in EPA approved QAPP (October 2010). Most strigent pathway (**groundwater [GW]** or **direct contact [DC]**) presented when state standards are not available.

Exceedances:
BOLD **= detected compound**
(1) **= concentration exceeds suggested NR 720 Generic RCLs for VOC Compounds in Soil**
(2) **= concentration exceeds suggested NR 746 Indicators of Residual Petroleum Product in Soil Pores (Table 1)**
(3) **= concentration exceeds suggested NR 746 Protection of Human Health from Direct Contact with Contaminated Soil (Table 2)**

TABLE 3
SUMMARY OF GROUNDWATER BIOCHEMICAL RESULTS
Former D-F Incorporated Property
St. Francis, Wisconsin
Project Reference # 13097

Monitoring Well Identification:		**SMW-3**	**SMW-4**	**SPM-4**	**MW-1**	**MW-2**	**MW-3**	**MW-4**	**MW-5**	**MW-6**	**MW-7**	**MW-8**	**MW-9**	**MW-11**	**MW-12**	**MW-13**	**MW-14**	**MW-15**
Field Parameters	Unit	Collection Date																
		10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12
Dissolved Oxygen	mg/L	0.60	0.90	0.70	1.00	0.90	0.50	1.20	1.20	0.90	Free Product - Not Tested	0.90	1.30	Well Not Found - No Site Access	Well Not Found - No Site Access	Well Not Found - No Site Access	not enough	Free Product - Not Tested
Redox	mV	-93	-80	-78	-20	-71	-113	-155	-76	-115		-100	-22				not enough	
pH	S.U.	6.8	7.3	6.7	7.0	6.8	7.0	7.8	7.3	7.2		6.9	6.9				not enough	
Ferrous Fe	mg/L	2.0	1.6	5.0	2.8	4.0	4.0	4.6	0.0	3.8		4.6	0.0				not enough	
Temperature	°C	12.0	11.9	10.5	14.6	13.5	19.0	15.0	6.5	15.7		12.7	13.3				not enough	

Notes:

mg/l = milligrams per liter
mV = millivolts
S.U. = standard pH unit
Degree C = Degree Celsius
NA = Not Analyzed

TABLE 3
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS
Former D-F Incorporated Property
St. Francis, Wisconsin
Project Reference # 13097

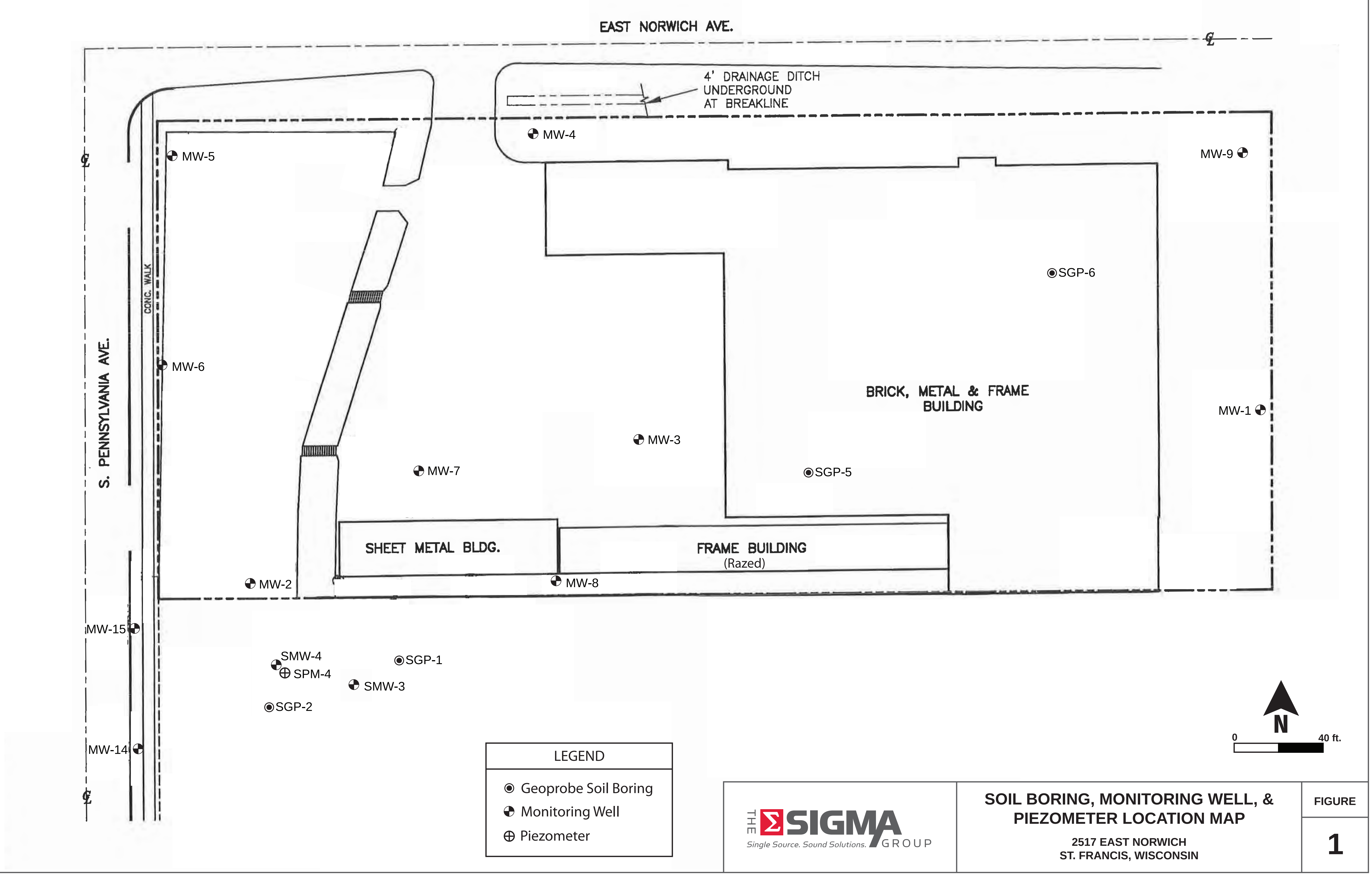
Monitoring Well Identification:				SMW-3	SMW-4	SPM-4	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-11	MW-12	MW-13	MW-14	MW-15
Parameter	Unit	NR 140		Collection Date																
		ES	PAL	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12	10/15/12
Benzene	µg/L	5.0	0.5	<250	**(1,2) 5.8** ^{J}	<2500	<0.5	<1000	**(2) 0.91** ^{J}	**(2) 2.22**	**(2) 1.96**	**(1,2) 5.4** ^{J}	Free Product - Not Sampled	<2.5	<0.5	Well Not Found - No Site Access	Well Not Found - No Site Access	Well Not Found - No Site Access	<50	Free Product - Not Sampled
Bromobenzene	µg/L	NS	NS	<370	<7.4	<3700	<0.74	<1480	<0.74	<0.74	<0.74	<7.4		<3.7	<0.74				<74	
Bromodichloromethane	µg/L	0.6	0.06	<340	<6.8	<3400	<0.68	<1360	<0.68	<0.68	<0.68	<6.8		<3.4	<0.68				<68	
Bromoform	µg/L	4.4	0.44	<215	<4.3	<2150	<0.43	<860	<0.43	<0.43	<0.43	<4.3		<2.15	<0.43				<43	
tert-Butylbenzene	µg/L	NS	NS	<355	<7.1	<3550	<0.71	<1420	**1.48** ^{J}	<0.71	<0.71	<7.1		<3.55	<0.71				<71	
sec-Butylbenzene	µg/L	NS	NS	<500	<10	<5000	<1	<2000	<1	<1	<1	<10		**16.9**	<1				<100	
n-Butylbenzene	µg/L	NS	NS	<450	**17.9** ^{J}	<4500	<0.9	<1800	<0.9	<0.9	<0.9	<9		**5.7** ^{J}	<0.9				<90	
Carbon Tetrachloride	µg/L	5.0	0.5	<235	<4.7	<2350	<0.47	<940	<0.47	<0.47	<0.47	<4.7		<2.35	<0.47				<47	
Chlorobenzene	µg/L	100	10	<255	<5.1	<2550	<0.51	<1020	<0.51	**2.8**	<0.51	<5.1		<2.35	<0.51				<51	
Chloroethane	µg/L	400	80	<700	**48**	<7000	<1.4	<2800	**2.93** ^{J}	**27**	<1.4	**(1,2) 400**		**9.8** ^{J}	<1.4				<140	
Chloroform	µg/L	6.0	0.6	<245	<4.9	<2450	<0.49	<980	<0.49	<0.49	<0.49	<4.9		<2.45	<0.49				<49	
Chloromethane	µg/L	30	3.0	<950	<19	<9500	<1.9	<3800	<1.9	<1.9	<1.9	<19		<9.5	<1.9				<190	
2-Chlorotoluene	µg/L	NS	NS	<350	<7	<3500	<0.7	<1400	<0.7	<0.7	<0.7	<7		<3.5	<0.7				<70	
4-Chlorotoluene	µg/L	NS	NS	<220	<4.4	<2200	<0.44	<880	<0.44	<0.44	<0.44	<4.4		<2.2	<0.44				<44	
1,2-Dibromo-3-Chloropropane	µg/L	0.2	0.02	<1400	<28	<14000	<2.8	<5600	<2.8	<2.8	<2.8	<28		<14	<2.8				<280	
Dibromochloromethane	µg/L	60	6.0	<275	<5.5	<2750	<0.55	<1100	<0.55	<0.55	<0.55	<5.5		<2.75	<0.55				<55	
1,4-Dichlorobenzene	µg/L	75	15	<490	<9.8	<4900	<0.98	<1960	<0.98	<0.98	<0.98	<9.8		<4.9	<0.98				<98	
1,3-Dichlorobenzene	µg/L	600	120	<435	<8.7	<4350	<0.87	<1740	<0.87	<0.87	<0.87	<8.7		<4.35	<0.87				<87	
1,2-Dichlorobenzene	µg/L	600	60	<380	<7.6	<3800	<0.76	<1520	<0.76	<0.76	<0.76	<7.6		<3.8	<0.76				<76	
Dichlorodifluoromethane	µg/L	1,000	200	<900	<18	<9000	<1.8	<3600	<1.8	<1.8	<1.8	<18		<9	<1.8				<180	
1,2-Dichloroethane	µg/L	5.0	0.5	**(1,2) 320** ^{J}	**(1,2) 30.1**	<2500	**(1,2) 9.3**	<1000	**(2) 0.55** ^{J}	**(2) 2.31**	**(2) 0.92** ^{J}	<5		<2.5	<0.5				<50	
1,1-Dichloroethane	µg/L	850	85	**(1,2) 1840**	**(2) 116**	**(1,2) 12800** ^{J}	<0.98	**(1,2) 4500** ^{J}	**2.59** ^{J}	**14.1**	**35**	<9.8		**67**	<0.98				<98	
1,1-Dichloroethene	µg/L	7.0	0.7	<300	<6	<3000	<0.6	<1200	<0.6	<0.6	<0.6	<6		<3	<0.6				<60	
cis-1,2-Dichloroethene	µg/L	70	7.0	**(1,2) 31100**	**(1,2) 640**	**(1,2) 283000**	<0.74	**(1,2) 120000**	**6.4**	**1.75** ^{J}	**(2) 30.7**	<7.4		**(2) 21.6**	<0.74				<74	
trans-1,2-Dichloroethene	µg/L	100	20	<395	**16.6** ^{J}	<3950	<0.79	<1580	<0.79	<0.79	<0.79	<7.9		<3.95	<0.79				<79	
1,2-Dichloropropane	µg/L	5.0	0.5	<200	<4	<2000	<0.4	<800	<0.4	<0.4	<0.4	<4		<2	<0.4				<40	
2,2-Dichloropropane	µg/L	NS	NS	<950	<19	<9500	<1.9	<3800	<1.9	<1.9	<1.9	<19		<9.5	<1.9				<190	
1,3-Dichloropropane	µg/L	NS	NS	<355	<7.1	<3550	<0.71	<1420	<0.71	<0.71	<0.71	<7.1		<3.55	<0.71				<71	
Di-isopropyl ether	µg/L	NS	NS	<345	<6.9	<3450	<0.69	<1380	<0.69	<0.69	<0.69	<6.9		<3.45	<0.69				<69	
EDB (1,2-Dibromoethane)	µg/L	0.05	0.005	<315	<6.3	<3150	<0.63	<1260	<0.63	<0.63	<0.63	<6.3		<3.15	<0.63				<63	
Ethylbenzene	µg/L	700	140	**(1,2) 950** ^{J}	**(2) 199**	<3900	<0.78	<1560	<0.78	<0.78	<0.78	<7.8		<3.9	<0.78				<78	
Hexachlorobutadiene	µg/L	NS	NS	<1100	<22	<11000	<2.2	<4400	<2.2	<2.2	<2.2	<22		<11	<2.2				<220	
Isopropylbenzene	µg/L	NS	NS	<460	**15.2** ^{J}	<4600	<0.92	<1840	**1.44** ^{J}	**0.95** ^{J}	<0.92	<9.2		**11.8** ^{J}	<0.92				<92	
p-Isopropyltoluene	µg/L	NS	NS	<460	**12.8** ^{J}	<4600	<0.92	<1840	<0.92	<0.92	<0.92	<9.2		<4.6	<0.92				<92	
Methylene Chloride	µg/L	5.0	0.5	<550	<11	<5500	<1.1	<2200	<1.1	<1.1	<1.1	<11		<5.5	<1.1				<110	
Methyl Tert Butyl Ether (MTBE)	µg/L	60	12	<400	<8	<4000	<0.8	<1600	<0.8	<0.8	<0.8	<8		<4	<0.8				<80	
Naphthalene	µg/L	100	10	<1050	**(1,2) 135**	<10500	<2.1	<4200	<2.1	<2.1	<2.1	<21		<10.5	<2.1				<210	
n-Propylbenzene	µg/L	NS	NS	<295	**22.7**	<2950	<0.59	<1180	<0.59	<0.59	<0.59	<5.9		**9.4** ^{J}	<0.59				<59	
1,1,2,2-Tetrachloroethane	µg/L	0.2	0.02	<265	<5.3	<2650	<0.53	<1060	<0.53	<0.53	<0.53	<5.3		<2.65	<0.53				<53	
1,1,1,2-Tetrachloroethane	µg/L	70	7.0	<500	<10	<5000	<1	<2000	<1	<1	<1	<10		<5	<1				<100	
Tetrachloroethene	µg/L	5.0	0.5	**(1,2) 820**	<4.4	<2200	<0.44	<880	<0.44	<0.44	<0.44	<4.4		<2.2	<0.44				<44	
Toluene	µg/L	800	160	**(1,2) 2500**	**(2) 320**	**(1,2) 19000**	<0.53	**(1,2) 1740** ^{J}	<0.53	<0.53	<0.53	<5.3		<2.65	<0.53				<53	
1,2,4-Trichlorobenzene	µg/L	70	14	<750	<15	<7500	<1.5	<3000	<1.5	<1.5	<1.5	<15		<7.5	<1.5				<150	
1,2,3-Trichlorobenzene	µg/L	NS	NS	<650	<13	<6500	<1.3	<2600	<1.3	<1.3	<1.3	<13		<6.5	<1.3				<130	
1,1,1-Trichloroethane	µg/L	200	40	**(1,2) 6700**	**(2) 77**	**(1,2) 96000**	<0.85	**(1,2) 17900**	<0.85	**1.28** ^{J}	**3.3**	<8.5		<4.25	<0.85				<85	
1,1,2-Trichloroethane	µg/L	5.0	0.5	<235	<4.7	<2350	<0.47	<940	<0.47	<0.47	<0.47	<4.7		<2.35	<0.47				<47	
Trichloroethene (TCE)	µg/L	5.0	0.5	**(1,2) 1600**	**(1,2) 36**	**(1,2) 26000**	<0.47	**(1,2) 1820** ^{J}	<0.47	**(1,2) 6.5**	**(1,2) 35**	<4.7		**(2) 3** ^{J}	<0.47				**(1,2) 102** ^{J}	
Trichlorofluoromethane	µg/L	3,490	698	<850	<17	<8500	<1.7	<3400	<1.7	<1.7	<1.7	<17		<8.5	<1.7				<170	
1,2,4-Trimethylbenzene	µg/L	**	**	**440** ^{J}	**257**	<4000	<0.8	<1600	<0.8	<0.8	<0.8	**13.9** ^{J}		<4	<0.8				<80	
1,3,5-Trimethylbenzene	µg/L	**	**	<370	**76**	<3700	<0.74	<1480	<0.74	<0.74	<0.74	<7.4		<3.7	<0.74				<74	
Total Trimethylbenzenes	µg/L	480	96	**(1,2) 440** ^{J}	**(2) 333**	<4000	<0.8	<1600	<0.8	<0.8	<0.8	**13.9** ^{J}		<4	<0.8				<80	
Vinyl Chloride	µg/L	0.2	0.02	**(1,2) 9700**	**(1,2) 122**	**(1,2) 12600**	**(1,2) 1.27**	**(1,2) 1820**	**(1,2) 35**	**(1,2) 2.73**	**(1,2) 17.5**	**(1,2) 2.2** ^{J}		**(1,2) 160**	<0.18				<18	
Xylenes (total)	µg/L	2,000	400	**(1,2) 4790**	**(2) 1380**	**(1,2) 8800** ^{J}	<1.1	<2200	<1.1	<1.1	<1.1	**92**		<5.5	<1.1				<110	

Notes:

J = analyte detected between Limit of Detection and Limit of Quantitation
µg/L = micrograms per liter (equivalent to parts per billion)
NA = Not Analyzed NS =No Standard
NR 140 ES = Wisconsin Administrative Code, Chapter NR 140 Enforcement Standard
NR 140 PAL = Wisconsin Administrative Code, Chapter NR 140 Preventive Action Limit

Exceedances: **BOLD** **= detected compound**
(1) **= concentration exceeds Chapter NR 140 ES**
(2) **= concentration exceeds Chapter NR 140 PAL**

FIGURES



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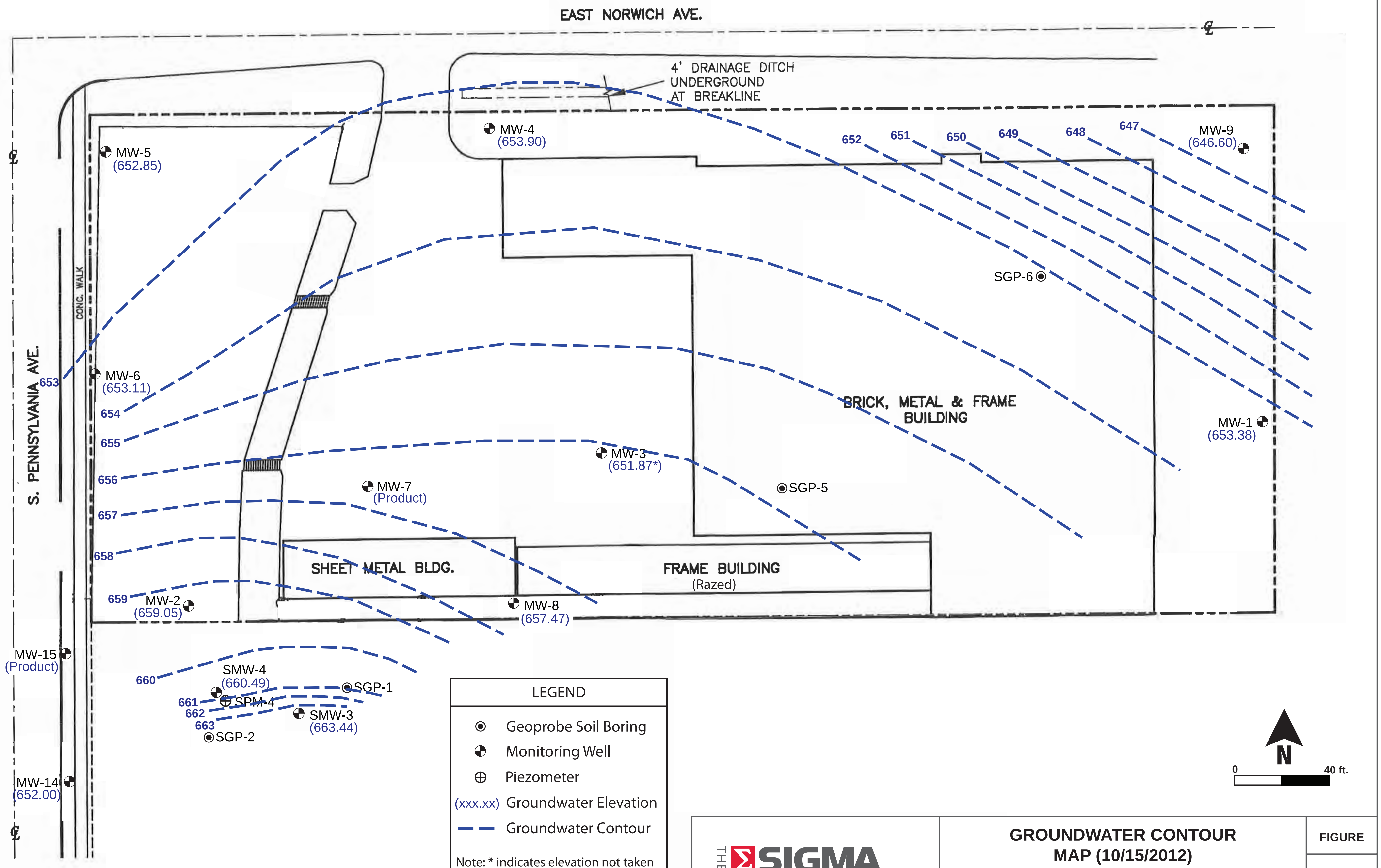
SOIL BORING, MONITORING WELL, & PIEZOMETER LOCATION MAP

2517 EAST NORWICH
ST. FRANCIS, WISCONSIN

FIGURE

1

Project : 13097
Directory: WDNR/DF
Filename: 13097_FIG 1.PDF
Created By: SLO
Date: 11/09/2012



LEGEND

◉ Geoprobe Soil Boring

◕ Monitoring Well

⊕ Piezometer

(xxx.xx) Groundwater Elevation

— — Groundwater Contour

Note: * indicates elevation not taken into account for contours

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GROUNDWATER CONTOUR MAP (10/15/2012)

2517 EAST NORWICH
ST. FRANCIS, WISCONSIN

FIGURE

2

Project : 13097 | Directory: WDNR/DF | Filename: 13097_FIG 1.PDF | Created By: SLO | Date: 11/09/2012

APPENDIX A

Monitoring Well Construction and Development Forms

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐ ______

Facility/Project Name Former DF	County Name Milwaukee	Well Name MW-1
Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number
DNR Well ID Number		

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method
- surged with bailer and bailed ☒ 41
- surged with bailer and pumped ☐ 61
- surged with block and bailed ☐ 42
- surged with block and pumped ☐ 62
- surged with block, bailed and pumped ☐ 70
- compressed air ☐ 20
- bailed only ☐ 10
- pumped only ☐ 51
- pumped slowly ☐ 50
- Other ______ ☐

3. Time spent developing well 20 min.

4. Depth of well (from top of well casisng) 15.90 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 12.75 gal.

7. Volume of water removed from well 7.0 gal.

8. Volume of water added (if any) None gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing) a.	7.50 ft.	12.50 ft.
Date b. (mm/dd/yyyy)	10/08/2012	10/08/2012
Time c.	3:00 ☐ a.m. ☒ p.m.	3:20 ☐ a.m. ☒ p.m.
12. Sediment in well bottom	0.0 inches	0.0 inches
13. Water clarity	Clear ☒ 10 Turbid ☐ 15	Clear ☒ 20 Turbid ☐ 25
(Describe)	Reddish Brown	clear

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____ mg/l	____ mg/l
15. COD	____ mg/l	____ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: David Last Name: Dailey
Firm: Sigma Env.

17. Additional comments on development:

1st = 5.0 gals
2nd = 2.0 gals
10 min. intervals
Clear

Name and Address of Facility Contact/Owner/Responsible Party
First Name: ______ Last Name: ______
Facility/Firm: ______
Street: ______
City/State/Zip: ______

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: David Dailey
Print Name: David Dailey
Firm: Sigma Env.

NOTE: See instructions for more information including a list of county codes and well type codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

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Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐ ______

Facility/Project Name: Former DF	County Name: Milwaukee	Well Name: MW-2
Facility License, Permit or Monitoring Number:	County Code: __	Wis. Unique Well Number: ______ / DNR Well ID Number: ___

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method
   - surged with bailer and bailed ☒ 41
   - surged with bailer and pumped ☐ 61
   - surged with block and bailed ☐ 42
   - surged with block and pumped ☐ 62
   - surged with block, bailed and pumped ☐ 70
   - compressed air ☐ 20
   - bailed only ☐ 10
   - pumped only ☐ 51
   - pumped slowly ☐ 50
   - Other ______ ☐

3. Time spent developing well 30 min.

4. Depth of well (from top of well casisng) 13.70 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 4.66 gal.

7. Volume of water removed from well 2.0 gal.

8. Volume of water added (if any) None gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 10.63 ft.	12.70 ft.
Date	b. 10/08/2012 (mm dd yyyy)	10/08/2012 (mm dd yyyy)
Time	c. 2:50 ☐ a.m. ☒ p.m.	3:20 ☐ a.m. ☒ p.m.
12. Sediment in well bottom	0.0 inches	0.0 inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe) Slight turb	Clear ☒ 20 Turbid ☐ 25 (Describe) Clear

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	______ mg/l	______ mg/l
15. COD	______ mg/l	______ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: David Last Name: Dailey
Firm: Sigma Env.

17. Additional comments on development:

1st = 1.5 gals.
2nd = 0.25 gal
3rd = 0.25 gal.
10 min. interval
Clear

Name and Address of Facility Contact /Owner/Responsible Party
First Name: ______ Last Name: ______
Facility/Firm: ______
Street: ______
City/State/Zip: ______

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: David Dailey
Print Name: David Dailey
Firm: Sigma Env.

NOTE: See instructions for more information including a list of county codes and well type codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐ ______

Facility/Project Name Former DF	County Name Milwaukee	Well Name MW-3	
Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well ID Number

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method
   - surged with bailer and bailed ☒ 41
   - surged with bailer and pumped ☐ 61
   - surged with block and bailed ☐ 42
   - surged with block and pumped ☐ 62
   - surged with block, bailed and pumped ☐ 70
   - compressed air ☐ 20
   - bailed only ☐ 10
   - pumped only ☐ 51
   - pumped slowly ☐ 50
   - Other ______ ☐

3. Time spent developing well 30 min.

4. Depth of well (from top of well casisng) 14.25 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 1[illegible].5 gal.

7. Volume of water removed from well 10.0 gal.

8. Volume of water added (if any) None gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No (If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 6.92 ft.	11.00 ft.
Date	b. 10/08/2012 (mm dd yyyy)	10/08/2012 (mm dd yyyy)
Time	c. 12:35 ☐ a.m. ☐ p.m.	1:05 ☐ a.m. ☐ p.m.
12. Sediment in well bottom	0.5 inches	0.0 inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe) Slight turbid	Clear ☒ 20 Turbid ☐ 25 (Describe)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	______ mg/l	______ mg/l
15. COD	______ mg/l	______ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: David Last Name: Dailey
Firm: Sigma Env.

17. Additional comments on development:

1st=8.0 gals. Clear
2nd=2.0 gals Clear

Name and Address of Facility Contact /Owner/Responsible Party
First Name: ______ Last Name: ______
Facility/Firm: ______
Street: ______
City/State/Zip: ______

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: David Dailey
Print Name: David Dailey
Firm: Sigma Env.

NOTE: See instructions for more information including a list of county codes and well type codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 7-98

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐ ____________

Facility/Project Name Former DF	County Name Milwaukee	Well Name MW-4

Facility License, Permit or Monitoring Number	County Code __ __	Wis. Unique Well Number __ __ __ __ __ __	DNR Well ID Number __ __ __

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method
- surged with bailer and bailed ☒ 41
- surged with bailer and pumped ☐ 61
- surged with block and bailed ☐ 42
- surged with block and pumped ☐ 62
- surged with block, bailed and pumped ☐ 70
- compressed air ☐ 20
- bailed only ☐ 10
- pumped only ☐ 51
- pumped slowly ☐ 50
- Other ____________ ☐ ▨

3. Time spent developing well 30 min.

4. Depth of well (from top of well casisng) 16.55 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 12.3 gal.

7. Volume of water removed from well 14.0 gal.

8. Volume of water added (if any) None gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 8.46 ft.	10.42 ft.
Date	b. 10/08/2012 (mm dd yyyy)	10/08/2012 (mm dd yyyy)
Time	c. 2:20 ☐ a.m. ☒ p.m.	2:50 ☐ a.m. ☒ p.m.
12. Sediment in well bottom	0.5 inches	0.0 inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe) Slight turbid	Clear ☒ 20 Turbid ☐ 25 (Describe) clear

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____ mg/l	____ mg/l
15. COD	____ mg/l	____ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: David Last Name: Dailey
Firm: Sigma Env.

17. Additional comments on development:

1st = 10.0 } clear
2nd = 4.0 } clear
10 min. interval

Name and Address of Facility Contact /Owner/Responsible Party
First Name: ____________ Last Name: ____________
Facility/Firm: ____________
Street: ____________
City/State/Zip: ____________

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: David Dailey
Print Name: David Dailey
Firm: Sigma Env.

NOTE: See instructions for more information including a list of county codes and well type codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

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Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐ ______

Facility/Project Name Former DF	County Name Milwaukee	Well Name MW-5

Facility License, Permit or Monitoring Number	County Code __	Wis. Unique Well Number ______	DNR Well ID Number ___

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method

surged with bailer and bailed	☒	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other ______	☐	▨

3. Time spent developing well 30 min.

4. Depth of well (from top of well casisng) 13.85 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 6.0 gal.

7. Volume of water removed from well 4.0 gal.

8. Volume of water added (if any) None gal.

9. Source of water added None

10. Analysis performed on water added? (If yes, attach results) ☐ Yes ☒ No

		Before Development	After Development
11. Depth to Water (from top of well casing)	a.	9.84 ft.	12.60 ft.
Date	b.	10/08/2012 (mm dd yyyy)	10/08/2012 (mm dd yyyy)
Time	c.	2:00 ☐ a.m. ☒ p.m.	2:30 ☐ a.m. ☒ p.m.
12. Sediment in well bottom		0.0 inches	0.0 inches
13. Water clarity		Clear ☒ 10 Turbid ☐ 15 (Describe)	Clear ☒ 20 Turbid ☐ 25 (Describe)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____ mg/l	____ mg/l
15. COD	____ mg/l	____ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: David Last Name: Dailey
Firm: Sigma Env.

17. Additional comments on development:

1st = 3.0 gals. Clear
2nd = 1.0 Clear
3rd = Dry
10 min. intervals

Name and Address of Facility Contact/Owner/Responsible Party
First Name: ______ Last Name: ______
Facility/Firm: ______
Street: ______
City/State/Zip: ______

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: David Dailey
Print Name: David Dailey
Firm: Sigma Env.

NOTE: See instructions for more information including a list of county codes and well type codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

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Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐ ____________

Facility/Project Name Former DF	County Name Milwaukee	Well Name MW-6	
Facility License, Permit or Monitoring Number	County Code __	Wis. Unique Well Number ______	DNR Well ID Number __

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method
   - surged with bailer and bailed ☒ 41
   - surged with bailer and pumped ☐ 61
   - surged with block and bailed ☐ 42
   - surged with block and pumped ☐ 62
   - surged with block, bailed and pumped ☐ 70
   - compressed air ☐ 20
   - bailed only ☐ 10
   - pumped only ☐ 51
   - pumped slowly ☐ 50
   - Other ____________ ☐ ▨

3. Time spent developing well 30 min.

4. Depth of well (from top of well casisng) 15.30 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 7.7 gal.

7. Volume of water removed from well 9.0 gal.

8. Volume of water added (if any) None gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

		Before Development	After Development
11. Depth to Water (from top of well casing)	a.	10.20 ft.	13.70 ft.
Date	b.	10/08/2012 (mm dd yyyy)	10/08/2012 (mm dd yyyy)
Time	c.	2:00 ☐ a.m. ☒ p.m.	2:30 ☐ a.m. ☒ p.m.
12. Sediment in well bottom		0.0 inches	0.0 inches
13. Water clarity		Clear ☒ 10 Turbid ☐ 15 (Describe) Slight turbid	Clear ☒ 20 Turbid ☐ 25 (Describe) Clear

Fill in if drilling fluids were used and well is at solid waste facility:

	Before Development	After Development
14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: David Last Name: Dailey
Firm: Sigma Env.

17. Additional comments on development:

1st = 5.0 gals
2nd = 4.0 gals } 15 min. intervals

Clear

Name and Address of Facility Contact /Owner/Responsible Party
First Name: ____________ Last Name: ____________
Facility/Firm: ____________
Street: ____________
City/State/Zip: ____________

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: David Dailey
Print Name: David Dailey
Firm: Sigma Env.

NOTE: See instructions for more information including a list of county codes and well type codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐ ____

Facility/Project Name Former OF	County Name Milwaukee	Well Name MW-7	
Facility License, Permit or Monitoring Number	County Code __ __	Wis. Unique Well Number __ __ __ __ __	DNR Well ID Number __ __ __

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method

surged with bailer and bailed	☒	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other ____	☐	▨

3. Time spent developing well 60 min.

4. Depth of well (from top of well casisng) 12.85 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 11.7 gal.

7. Volume of water removed from well 15.0 gal.

8. Volume of water added (if any) None gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 5.11 ft.	9.66 ft.
Date	b. 10/08/2012 (mm dd yyyy)	10/08/2012 (mm dd yyyy)
Time	c. 1:10 ☐ a.m. ☒ p.m.	2:10 ☐ a.m. ☒ p.m.
12. Sediment in well bottom	1.0 inches	0.0 inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15	Clear ☒ 20 Turbid ☐ 25
(Describe)	gray with product Blebs	~~[illegible]~~ clear sheen

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____ mg/l	____ mg/l
15. COD	____ mg/l	____ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: David Last Name: Dailey
Firm: Sigma Env.

17. Additional comments on development:

1st = 8 gals
2nd = 5.0 gals
3rd = 2.0 gal
} 15 min. intervals

* product blebs

Name and Address of Facility Contact /Owner/Responsible Party
First Name: ____ Last Name: ____
Facility/Firm: ____
Street: ____
City/State/Zip: ____

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: David Dailey
Print Name: David Dailey
Firm: Sigma Env.

NOTE: See instructions for more information including a list of county codes and well type codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

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Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐ ____________

Facility/Project Name Former DF	County Name Milwaukee	Well Name MW-8	
Facility License, Permit or Monitoring Number	County Code __ __	Wis. Unique Well Number __ __ __ __ __	DNR Well ID Number __ __ __

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method

surged with bailer and bailed	☒	4 1
surged with bailer and pumped	☐	6 1
surged with block and bailed	☐	4 2
surged with block and pumped	☐	6 2
surged with block, bailed and pumped	☐	7 0
compressed air	☐	2 0
bailed only	☐	1 0
pumped only	☐	5 1
pumped slowly	☐	5 0
Other ____________	☐	▨

3. Time spent developing well 30 min.

4. Depth of well (from top of well casisng) 10.95 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 5.7 gal.

7. Volume of water removed from well 1.25 gal.

8. Volume of water added (if any) None gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 7.13 ft.	10.80 ft.
Date	b. 10/08/2012 (mm dd yyyy)	10/08/2012 (mm dd yyyy)
Time	c. 1:20 ☐ a.m. ☒ p.m.	1:50 ☐ a.m. ☒ p.m.
12. Sediment in well bottom	0.0 inches	0.0 inches
13. Water clarity	Clear ☐ 1 0 Turbid ☐ 1 5	Clear ☒ 2 0 Turbid ☐ 2 5
(Describe)	Slight turbid	Clear

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	______ mg/l	______ mg/l
15. COD	______ mg/l	______ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: David Last Name: Dailey
Firm: Sigma Env.

17. Additional comments on development:

1st = 1.0 gal
2nd = 0.25
3rd = Dry

Clear
15 min. intervals

Name and Address of Facility Contact /Owner/Responsible Party
First Name: ____________ Last Name: ____________
Facility/Firm: ____________
Street: ____________
City/State/Zip: ____________

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: David Dailey
Print Name: David Dailey
Firm: Sigma Env.

NOTE: See instructions for more information including a list of county codes and well type codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
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Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐ ____________

Facility/Project Name Former DF	County Name Milwaukee	Well Name MW-9	
Facility License, Permit or Monitoring Number	County Code __ __	Wis. Unique Well Number __ __ __ __ __	DNR Well ID Number __ __ __

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method
   - surged with bailer and bailed ☒ 41
   - surged with bailer and pumped ☐ 61
   - surged with block and bailed ☐ 42
   - surged with block and pumped ☐ 62
   - surged with block, bailed and pumped ☐ 70
   - compressed air ☐ 20
   - bailed only ☐ 10
   - pumped only ☐ 51
   - pumped slowly ☐ 50
   - Other ____________ ☐

3. Time spent developing well 20 min.

4. Depth of well (from top of well casisng) 15.50 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 3.6 gal.

7. Volume of water removed from well 6.0 gal.

8. Volume of water added (if any) None gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

		Before Development	After Development
11. Depth to Water (from top of well casing)	a.	13.12 ft.	15.00 ft.
Date	b.	10/08/2012 (mm dd yyyy)	10/08/2012 (mm dd yyyy)
Time	c.	3:00 ☐ a.m. ☒ p.m.	3:20 ☐ a.m. ☒ p.m.
12. Sediment in well bottom		0.0 inches	0.0 inches
13. Water clarity		Clear ☐ 10 Turbid ☒ 15	Clear ☒ 20 Turbid ☐ 25
		(Describe) light Brown	(Describe) clear

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	______ mg/l	______ mg/l
15. COD	______ mg/l	______ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: David Last Name: Dailey
Firm: Sigma Env.

17. Additional comments on development: purged well dry 2 times clear

1st = 4.0 gals. clear
2nd = 2.0 gals clear

Name and Address of Facility Contact /Owner/Responsible Party
First Name: ____________ Last Name: ____________
Facility/Firm: ____________
Street: ____________
City/State/Zip: ____________

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: David Dailey
Print Name: David Dailey
Firm: Sigma Env.

NOTE: See instructions for more information including a list of county codes and well type codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 7-98

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐ ____________

Facility/Project Name Former DF	County Name Milwaukee	Well Name MW-14

Facility License, Permit or Monitoring Number	County Code __ __	Wis. Unique Well Number __ __ __ __ __	DNR Well ID Number __ __ __

1. Can this well be purged dry? ■ Yes ☐ No

2. Well development method

surged with bailer and bailed	■	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other ____________	☐	▨

3. Time spent developing well 30 min.

4. Depth of well (from top of well casisng) 15.10 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 00.38 gal.

7. Volume of water removed from well 00.25 gal.

8. Volume of water added (if any) None gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ■ No
(If yes, attach results)

		Before Development	After Development
11. Depth to Water (from top of well casing)	a.	14.76 ft.	Dry ft.
Date	b.	10/08/2012 (mm dd yyyy)	10/08/2012 (mm dd yyyy)
Time	c.	12:00 ☐ a.m. ☒ p.m.	12:30 ☐ a.m. ■ p.m.
12. Sediment in well bottom		0.0 inches	0.0 inches
13. Water clarity		Clear ☐ 10 Turbid ☐ 15 (Describe) ?	Clear ☐ 20 Turbid ☐ 25 (Describe) ?

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____ mg/l	____ mg/l
15. COD	____ mg/l	____ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: David Last Name: Dailey
Firm: Sigma Env.

17. Additional comments on development:

1/4 gal.; well did not recharge in 30 min

Name and Address of Facility Contact /Owner/Responsible Party
First Name: ____________ Last Name: ____________
Facility/Firm: ____________
Street: ____________
City/State/Zip: ____________

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: David Dailey
Print Name: David Dailey
Firm: Sigma Env.

NOTE: See instructions for more information including a list of county codes and well type codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
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Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐ ______

Facility/Project Name Former DF	County Name Milwaukee	Well Name MW-15	
Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well ID Number

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method

surged with bailer and bailed	☒	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other ______	☐	

3. Time spent developing well 30 min.

4. Depth of well (from top of well casisng) 15.20 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 3.6 gal.

7. Volume of water removed from well 1.0 gal.

8. Volume of water added (if any) None gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 12.77 ft.	Dry ft.
Date	b. 10/08/2012 (mm dd yyyy)	10/08/2012 (mm dd yyyy)
Time	c. 12:00 ☐ a.m. ☒ p.m.	12:30 ☐ a.m. ☒ p.m.
12. Sediment in well bottom	0.0 inches	0.0 inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15	Clear ☒ 20 Turbid ☐ 25
(Describe)	product & water	Slight turbid product & water

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____ mg/l	____ mg/l
15. COD	____ mg/l	____ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: David Last Name: Dailey
Firm: Sigma Env.

17. Additional comments on development:

1st = 0.75 gal.
2nd = 0.25
3rd = Dry
} 10 min. intervals

product in this well
product = 12.18 water = 12.77

Name and Address of Facility Contact/Owner/Responsible Party
First Name: ______ Last Name: ______
Facility/Firm: ______
Street: ______
City/State/Zip: ______

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: David Dailey
Print Name: David Dailey
Firm: Sigma Env.

NOTE: See instructions for more information including a list of county codes and well type codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐ ______

Facility/Project Name Former DF	County Name Milwaukee	Well Name SMW-3	
Facility License, Permit or Monitoring Number	County Code __	Wis. Unique Well Number VN600	DNR Well ID Number ___

1. Can this well be purged dry? ☐ Yes ■ No

2. Well development method
- surged with bailer and bailed ☐ 41
- surged with bailer and pumped ☐ 61
- surged with block and bailed ☐ 42
- surged with block and pumped ☐ 62
- surged with block, bailed and pumped ☐ 70
- compressed air ☐ 20
- bailed only ☐ 10
- pumped only ☐ 51
- pumped slowly ☐ 50
- Other ______ ☐ ▨

3. Time spent developing well 180 min.

4. Depth of well (from top of well casisng) 17.25 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 17.95 gal.

7. Volume of water removed from well 550 gal.

8. Volume of water added (if any) None gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ■ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 5.41 ft.	6.44 ft.
Date	b. 10/08/2012 (mm dd yyyy)	10/08/2012 (mm dd yyyy)
Time	c. 8:45 ■ a.m. ☐ p.m.	11:45 ■ a.m. ☐ p.m.
12. Sediment in well bottom	1.0 inches	0.0 inches
13. Water clarity	Clear ☐ 10 Turbid ■ 15	Clear ■ 20 Turbid ☐ 25
(Describe)	gray	Slight turbid

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: David Last Name: Dailey
Firm: Sigma Env.

17. Additional comments on development:

Name and Address of Facility Contact /Owner/Responsible Party
First Name: ______ Last Name: ______
Facility/Firm: ______
Street: ______
City/State/Zip: ______

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: David Dailey
Print Name: David Dailey
Firm: Sigma Env.

NOTE: See instructions for more information including a list of county codes and well type codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐ ________

Facility/Project Name: Former DF
County Name: Milwaukee
Well Name: SMW-4
Facility License, Permit or Monitoring Number:
County Code: __
Wis. Unique Well Number: VM607
DNR Well ID Number: ___

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method
- surged with bailer and bailed ☒ 41
- surged with bailer and pumped ☐ 61
- surged with block and bailed ☐ 42
- surged with block and pumped ☐ 62
- surged with block, bailed and pumped ☐ 70
- compressed air ☐ 20
- bailed only ☐ 10
- pumped only ☐ 51
- pumped slowly ☐ 50
- Other ________ ☐

3. Time spent developing well: 60 min.

4. Depth of well (from top of well casisng): 17.85 ft.

5. Inside diameter of well: 2.0 in.

6. Volume of water in filter pack and well casing: 15.81 gal.

7. Volume of water removed from well: 9.5 gal.

8. Volume of water added (if any): None gal.

9. Source of water added: None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 7.46 ft.	16.41 ft.
Date	b. 10/08/2012 (mm dd yyyy)	10/08/2012 (mm dd yyyy)
Time	c. 8:30 ☒ a.m. ☐ p.m.	9:30 ☒ a.m. ☐ p.m.
12. Sediment in well bottom	1.0 inches	0.0 inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe) gray	Clear ☒ 20 Turbid ☐ 25 (Describe) Slight turbid

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____ mg/l	____ mg/l
15. COD	____ mg/l	____ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: David Last Name: Dailey
Firm: Sigma Env.

17. Additional comments on development:

1st = 9.0 gals
2nd = 0.25 gal
3rd = 0.25 gl

15 min. intervals
30 min. interval.

Name and Address of Facility Contact /Owner/Responsible Party
First Name: ________ Last Name: ________
Facility/Firm: ________
Street: ________
City/State/Zip: ________

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: David Dailey
Print Name: David Dailey
Firm: Sigma Env.

NOTE: See instructions for more information including a list of county codes and well type codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐ ____________

Facility/Project Name Former D.F.	County Name Milwaukee	Well Name SPM-4

Facility License, Permit or Monitoring Number	County Code __	Wis. Unique Well Number VY786	DNR Well ID Number ___

1. Can this well be purged dry? ☐ Yes ☒ No

2. Well development method

surged with bailer and bailed	☐	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other ____________	☐	▨

3. Time spent developing well 90 min.

4. Depth of well (from top of well casisng) 34.60 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 29.10 gal.

7. Volume of water removed from well 50.0 gal.

8. Volume of water added (if any) None gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 15.47 ft.	15.70 ft.
Date	b. 10/08/2012 (mm dd yyyy)	10/08/2012 (mm dd yyyy)
Time	c. 9:00 ☒ a.m. ☐ p.m.	10:30 ☒ a.m. ☐ p.m.
12. Sediment in well bottom	1.0 inches	0.0 inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe) gray	Clear ☒ 20 Turbid ☐ 25 (Describe) clear

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	_____ mg/l	_____ mg/l
15. COD	_____ mg/l	_____ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: David Last Name: Dailey
Firm: Sigma Env.

17. Additional comments on development:

Name and Address of Facility Contact /Owner/Responsible Party
First Name: ____________ Last Name: ____________
Facility/Firm: ____________
Street: ____________
City/State/Zip: ____________

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: David Dailey
Print Name: David Dailey
Firm: Sigma Env.

NOTE: See instructions for more information including a list of county codes and well type codes.

APPENDIX B

Soil Boring Logs

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐

Page 1 of 1

Facility/Project Name Former DF Property	License/Permit/Monitoring Number -	Boring Number SGP-1

Boring Drilled By: Name of crew chief (first, last) and Firm Tony Kapugi On-Site Environmental Services	Date Drilling Started 9/17/2012	Date Drilling Completed 9/17/2012	Drilling Method direct push

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level Feet Site	Surface Elevation Feet Site	Borehole Diameter 2.0 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane N, E S/C/N
NW 1/4 of NE 1/4 of Section 22, T 6 N, R 22 E
Lat ____ ° ____ ' ____ "
Long ____ ° ____ ' ____ "
Local Grid Location
Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County Milwaukee	County Code 41	Civil Town/City/ or Village St. Francis

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 GP	60 23	PUSH	1	TOPSOIL, dk brown, few stones, loose, dry	ML			0						
				CHARRED WOOD, dk black-brown, dry		▩								
			2 3 4	FILL, white gravel, dk red wood chips	GP	▩		17						
2 GP	60 36	PUSH	5 6			▩								
			7	SILTY FILL, lt grey, some fiberous pieces and glass, dry	ML	▩		493						
			8 9	SILT, med brown-grey, med dense, damp	ML			399						Lab sample
3 GP	60 36	PUSH	10 11	SILT, lt tan-brown, some red mottling, med dense, moist	ML			268						
			12	Groundwater at approx. 12'										
			13 14	FINE SANDY SILT, lt tan-brown, med dense, wet	SM			485						
			15	EOB at 15'. Abandoned with 3/8" bentonite chips.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm Sigma Environmental
1300 W Canal St Milwaukee WI 53233
Tel: 414-643-4200
Fax: 414-643-4210

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐

Page 1 of 1

Facility/Project Name Former DF Property	License/Permit/Monitoring Number -	Boring Number SGP-2

Boring Drilled By: Name of crew chief (first, last) and Firm Tony Kapugi On-Site Environmental Services	Date Drilling Started 9/17/2012	Date Drilling Completed 9/17/2012	Drilling Method direct push

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level Feet Site	Surface Elevation Feet Site	Borehole Diameter 2.0 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane N, E S/C/N
NW 1/4 of NE 1/4 of Section 22, T 6 N, R 22 E
Lat ° ' "
Long ° ' "
Local Grid Location
Feet ☐ N ☐ S
Feet ☐ E ☐ W

Facility ID	County Milwaukee	County Code 41	Civil Town/City/ or Village St. Francis

Sample										Soil Properties				
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 GP	60 23	P U S H		SANDY GRAVEL, med grey, loose, dry	SW									
			1 2 3 4	FILL, debris, wood chunks, white gravel, brown-red sand, stones, tan-white fiberous stones	GP									
2 GP	60 42	P U S H	5											
			6	SILT, black, organic, dry	OL									
			7 8 9	SILT, med red-brown, some stones, med dense, crumbles, dry	ML									Lab sample
3 GP	60 42	P U S H	10 11 12 13 14	FINE SANDY SILT, med grey, red and black spots, some stones, product saturated Groundwater at approx. 12'	SM									
			15	EOB at 15'. Abandoned with 3/8" bentonite chips.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm Sigma Environmental
1300 W Canal St Milwaukee WI 53233
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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION
Form 4400-122 Rev. 7-98

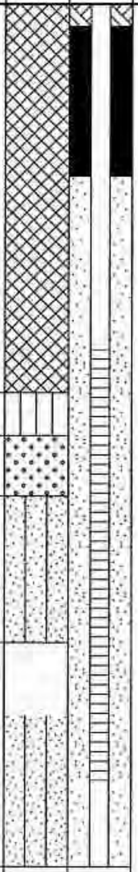
Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐

Page 1 of 1

Facility/Project Name Former DF Property			License/Permit/Monitoring Number -		Boring Number SMW-3
Boring Drilled By: Name of crew chief (first, last) and Firm Tony Kapugi On-Site Environmental Services			Date Drilling Started 9/17/2012	Date Drilling Completed 9/17/2012	Drilling Method hollow stem auger
WI Unique Well No. VN600	DNR Well ID No.	Common Well Name SMW-3	Final Static Water Level Feet Site	Surface Elevation Feet Site	Borehole Diameter 8.3 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane N, E S/C/N
NW 1/4 of NE 1/4 of Section 22, T 6 N, R 22 E
Lat ____ ° ____ ' ____ "
Long ____ ° ____ ' ____ "
Local Grid Location
Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County Milwaukee	County Code 41	Civil Town/City/ or Village St. Francis



Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
1 GP	60 18	PUSH	1.5 3.0 4.5	FILL, debris (red, green, brown, and black), some brown sand and rocks, some fiberous grey material	GP			43						
2 GP	60 22	PUSH	6.0 7.5 9.0	moist with product				617						
				SILT, med brown-grey, some stones, slightly dense, product saturated	ML			655						Lab sample
3 GP	60 57	PUSH	10.5	FINE-MED SAND, med tan-brown, product saturated	SW			595						
			12.0 13.5	SILT with interbedded med sand, med tan-brown, small red mottles, very dense Groundwater at approx. 12'	SM			322						
4 GP	60 40	PUSH	15.0 16.5 18.0 19.5	SILT with interbedded fine sand, med grey, trace stones, very dense	SM			156						
				EOB at 20'. Monitoring well SMW-3 installed with bottom of casing at 18'.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm Sigma Environmental
1300 W Canal St Milwaukee WI 53233
Tel: 414-643-4200
Fax: 414-643-4210

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State of Wisconsin
Department of Natural Resources

SOIL BOORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Remediation/Redevelopment ☒ Waste Management ☐ Other ☐

Page 1 of 1

Facility/Project Name Former DF Property	License/Permit/Monitoring Number -	Boring Number SMW-4

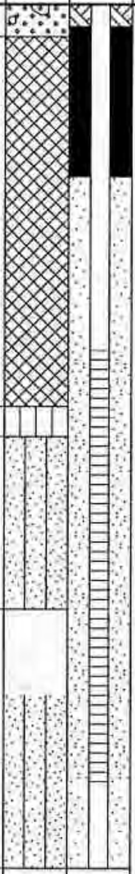
Boring Drilled By: Name of crew chief (first, last) and Firm Tony Kapugi On-Site Environmental Services	Date Drilling Started 9/17/2012	Date Drilling Completed 9/17/2012	Drilling Method hollow stem auger

WI Unique Well No. VM607	DNR Well ID No.	Common Well Name SMW-4	Final Static Water Level Feet Site	Surface Elevation Feet Site	Borehole Diameter 8.3 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane N, E S/C/N
NW 1/4 of NE 1/4 of Section 22, T 6 N, R 22 E
Lat ° ' "
Long ° ' "
Local Grid Location
Feet ☐ N ☐ S
Feet ☐ E ☐ W

Facility ID	County Milwaukee	County Code 41	Civil Town/City/ or Village St. Francis

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
1 GP	60 32	P U S H		SANDY GRAVEL, med grey, loose, dry	SW			193						
			1.5 3.0 4.5	FILL, debris, dk black-brown charred wood, white gravel, brown-red sand, lt grey fiberous material, stones										
2 GP	60 23	P U S H	6.0 7.5		GP			123						
			9.0	product saturated										
				SILT, med grey, med dense, wood pieces	ML			278						Lab sample
3 GP	60 34	P U S H	10.5 12.0 13.5	SILT with interbedded med sand, med tan-brown, very dense Groundwater at approx. 12'	SM			402						
4 GP	60 36	P U S H	15.0 16.5 18.0 19.5	SILT with interbedded fine sand, med grey, trace stones, extremely dense	SM			59						
				EOB at 20'. Monitoring well SMW-4 installed with bottom of casing at 18'.										



I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm Sigma Environmental
1300 W Canal St Milwaukee WI 53233
Tel: 414-643-4200
Fax: 414-643-4210

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐

Page 1 of 1

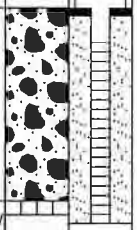
Facility/Project Name Former DF Property	License/Permit/Monitoring Number -	Boring Number SPM-4

Boring Drilled By: Name of crew chief (first, last) and Firm Alex Plumer Badger Drilling	Date Drilling Started 9/18/2012	Date Drilling Completed 9/19/2012	Drilling Method hollow stem auger

WI Unique Well No. VY786	DNR Well ID No.	Common Well Name SPM-4	Final Static Water Level Feet Site	Surface Elevation Feet Site	Borehole Diameter 8.3 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane N, E S/C/N
NW 1/4 of NE 1/4 of Section 22, T 6 N, R 22 E
Lat ____ ° ____ ' ______ "
Long ____ ° ____ ' ______ "
Local Grid Location
Feet ☐ N ☐ S
Feet ☐ E ☐ W

Facility ID	County Milwaukee	County Code 41	Civil Town/City/ or Village St. Francis

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				Blind Drill; Cased with 6" steel pipe										
			4.5											
			9.0											
			13.5											
			18.0											
			22.5											
1	24	17		FINE-COARSE SANDY GRAVEL, med				395						
SS	9	20		brown-grey, loose, wet				533						
2	24	26	27.0	coarse sand, lots of stones										
SS	8	25						461						
3	24	24			GW									
SS	9	27						445						
4	24	24	31.5					393						
SS	8	24		more frequent and larger stones				499						
5	24	25		SILT, lt to med brown, some black areas,	ML			435						
SS	8	22		very dense, wet										
6	24	16		EOB at 35.5'. Piezometer SPM-4 installed										
SS	15	12		with bottom of casing at 35'.										
		25												
		19												
		28												
		24												
		25												
		17												
		15												
		18												
		25												
		20												
		16												
		17												

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm Sigma Environmental
1300 W Canal St Milwaukee WI 53233
Tel: 414-643-4200
Fax: 414-643-4210

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Remediation/Redevelopment ☒ Waste Management ☐ Other ☐

Page 1 of 1

Facility/Project Name Former DF Property		License/Permit/Monitoring Number -		Boring Number SGP-5
Boring Drilled By: Name of crew chief (first, last) and Firm Josh Bartolomey Sigma		Date Drilling Started 10/2/2012	Date Drilling Completed 10/2/2012	Drilling Method direct push
WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level Feet Site	Surface Elevation Feet Site
				Borehole Diameter 2.0 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane N, E S/C/N
NW 1/4 of NE 1/4 of Section 22, T 6 N, R 22 E
Lat ___° ___' ___"
Long ___° ___' ___"
Local Grid Location ☐ N Feet ☐ S ☐ E Feet ☐ W

Facility ID	County Milwaukee	County Code 41	Civil Town/City/ or Village St. Francis

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 GP	48 22	P U S H		CONCRETE, building slab	GW			0						
				COARSE SAND (fill), lt tan-brown, loose	SW									
			1.5	COARSE SAND, black, loose	SW									
				FINE SAND, black, slightly dense										
			3.0		SW									
								0						Lab sample
2 GP	48 43	P U S H	4.5	wet				0						
				SILT, black, med dense, wet	ML									
			6.0	SILTY CLAY (possibly native), lt grey-brown, some red-brown mottles, trace gravel, very dense, wet				0						
			7.5											
3 GP	48 48	P U S H		less mottles				0						
			9.0	no mottles, no gravel	CL-MI			0						
			10.5											
4 GP	48 48	P U S H	12.0	Groundwater at approx. 12'	ML			0						
				SILT, lt-med brown, supersaturated (flows)				0						
			13.5	COARSE-MED SAND, med grey-brown, med dense, wet	SW									
			15.0											
				EOB at 16'. Abandoned with 3/8" bentonite chips.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm Sigma Environmental
1300 W Canal St Milwaukee WI 53233
Tel: 414-643-4200
Fax: 414-643-4210

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐

Page 1 of 1

Facility/Project Name Former DF Property	License/Permit/Monitoring Number -	Boring Number SGP-6

Boring Drilled By: Name of crew chief (first, last) and Firm Josh Bartolomey Sigma	Date Drilling Started 10/2/2012	Date Drilling Completed 10/2/2012	Drilling Method direct push

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level Feet Site	Surface Elevation Feet Site	Borehole Diameter 2.0 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane N, E S/C/N
NW 1/4 of NE 1/4 of Section 22, T 6 N, R 22 E
Lat ° ' "
Long ° ' "
Local Grid Location Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County Milwaukee	County Code 41	Civil Town/City/ or Village St. Francis

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 GP	48 38	P U S H		CONCRETE, building slab	GW	░								
			1.5	COARSE SAND (fill), med brown-tan, loose, dry	SW	░		0						
			3.0	SILTY CLAY, med grey-brown, some red-brown mottles, very dense, dry	CL-MI	▨		0						
				FINE SAND (fill - possible foundry sand), black, loose, dry	SW	░								
2 GP	48 42	P U S H	4.5	SILTY CLAY, lt and med grey, some gravel, med dense, dry	CL-MI	▨		0						Lab sample
			6.0	FINE SAND, med brown-red, some gravel, loose, dry		░		0						
3 GP	48 41	P U S H	7.5 9.0	damp, coarser sand	SW	░		0						
			10.5	COARSE SAND, med brown-grey, loose, wet Groundwater at approx. 10.5'	SW	░		0						
4 GP	48 48	P U S H	12.0	SILT, lt-med brown, supersaturated (flows)	ML	| | |		0						
			13.5	COARSE SAND, med brown-grey, loose, wet	SW	░		0						
			15.0	FINE SAND, med grey, loose, wet	SW	░		0						
				EOB at 16'. Abandoned with 3/8" bentonite chips.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm Sigma Environmental
1300 W Canal St Milwaukee WI 53233
Tel: 414-643-4200
Fax: 414-643-4210

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

APPENDIX C

Borehole Abandonment Forms

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT
Form 3300-5 2/2000 Page 1 of 2

Notice: Please complete Form 3300-5 and return it to the appropriate DNR office and bureau Completion of this report is required by chs 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis Stats , and ch NR 141, Wis Adm Code In accordance with chs 281, 289, 291, 292, 293, 295, and 299, Wis. Stats , failure to file this form may result in a forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved Personally identifiable information on this form is not intended to be used for any other purpose NOTE: See the instructions for more information

Route to: ☐ Drinking Water ☐ Watershed/Wastewater ☐ Waste Management ☒ Remediation/Redevelopment ☐ Other

(1) GENERAL INFORMATION

WI Unique Well No.
DNR Well ID No.
County: Milwaukee
Common Well Name: SGP-1 Gov't Lot (if applicable)
NW 1/4 of NE 1/4 of Sec 22 ; T 6 N; R 22 ☒ E ☐ W
Grid Location
ft ☐ N ☐ S, ft. ☐ E. ☐ W.
Local Grid Origin ☐ (estimated: ☐) or Well Location ☐
Lat ° ' " Long ° ' " or
State Plane ft N ft E. ☐ S ☐ C ☐ N Zone
Reason For Abandonment: Investigative Boring
WI Unique Well No. of Replacement Well

(2) FACILITY /OWNER INFORMATION

Facility Name: Former DF Property
Facility ID
License/Permit/Monitoring No: -
Street Address of Well: 2517 E. Norwich Avenue
City, Village, or Town: St. Francis
Present Well Owner
Original Owner: Former D-F Inc.
Street Address or Route of Owner
City, State, Zip Code

(3) WELL/DRILLHOLE/BOREHOLE INFORMATION

Original Construction Date
☐ Monitoring Well
☐ Water Well
☐ Drillhole / Borehole
If a Well Construction Report is available, please attach

Construction Type:
☐ Drilled ☐ Driven (Sandpoint) ☐ Dug
☒ Other (Specify) Geoprobe

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From ground surface)
Casing Diameter (in.)
Casing Depth (ft.)
Lower Drillhole Diameter (in) 2.0
Was Well Annular Space Grouted? ☐ Yes ☐ No ☐ Unknown
If Yes, To What Depth? Feet
Depth to Water (Feet)

(4) PUMP, LINER, SCREEN, CASING, & SEALING MATERIAL

Pump & Piping Removed? ☐ Yes ☐ No ☒ Not Applicable
Liner(s) Removed? ☐ Yes ☐ No ☒ Not Applicable
Screen Removed? ☐ Yes ☐ No ☒ Not Applicable
Casing Left in Place? ☐ Yes ☒ No
Was Casing Cut Off Below Surface? ☐ Yes ☐ No
Did Sealing Material Rise to Surface? ☒ Yes ☐ No
Did Material Settle After 24 Hours? ☐ Yes ☒ No
If Yes, Was Hole Retopped? ☐ Yes ☒ No

Required Method of Placing Sealing Material
☐ Conductor Pipe - Gravity ☐ Conductor Pipe - Pumped
☐ Screened & Poured (Bentonite Chips) ☒ Other (Explain) Gravity Pour

Sealing Materials
☐ Neat Cement Grout
☐ Sand-Cement (Concrete) Grout
☐ Concrete
☐ Clay-Sand Slurry
☐ Bentonite-Sand Slurry
☒ Chipped Bentonite

For monitoring wells and monitoring well boreholes only
☐ Bentonite Chips
☐ Granular Bentonite
☐ Bentonite-Cement Grout
☐ Bentonite - Sand Slurry

(5) Sealing Material Used	From (Ft.)	To (Ft.)		Mix Ratio or Mud Weight
3/8" Bentonite Chips	Surface	15.0		

(6) Comments

(7) Name of Person or Firm Doing Sealing Work: Sigma Environmental Services
Date of Abandonment: 9/17/12
Signature of Person Doing Work
Date Signed: 11/30/12
Street or Route: 1300 W. Canal St.
Telephone Number: 414-643-4200
City, State, Zip Code: Milwaukee, WI 53233

FOR DNR OR COUNTY USE ONLY
Date Received
Noted By
Comments

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT

Form 3300-5 2/2000 Page 1 of 2

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Route to: ☐ Drinking Water ☐ Watershed/Wastewater ☐ Waste Management ☒ Remediation/Redevelopment ☐ Other

(1) GENERAL INFORMATION

WI Unique Well No.
DNR Well ID No.
County: Milwaukee

Common Well Name: SGP-2 Gov't Lot (if applicable)

NW 1/4 of NE 1/4 of Sec 22 ; T 6 N; R 22 ☒ E ☐ W

Grid Location

ft ☐ N ☐ S, ft ☐ E. ☐ W.

Local Grid Origin ☐ (estimated: ☐) or Well Location ☐

Lat ° ' " Long ° ' " or

State Plane ft N ft E ☐ S ☐ C ☐ N Zone

Reason For Abandonment: Investigative Boring

WI Unique Well No. of Replacement Well

(2) FACILITY /OWNER INFORMATION

Facility Name: Former DF Property

Facility ID

License/Permit/Monitoring No.: -

Street Address of Well: 2517 E. Norwich Avenue

City, Village, or Town: St. Francis

Present Well Owner

Original Owner: Former D-F Inc.

Street Address or Route of Owner

City, State, Zip Code

(3) WELL/DRILLHOLE/BOREHOLE INFORMATION

Original Construction Date

☐ Monitoring Well
☐ Water Well
☐ Drillhole / Borehole

If a Well Construction Report is available, please attach.

Construction Type:

☐ Drilled ☐ Driven (Sandpoint) ☐ Dug
☒ Other (Specify) Geoprobe

Formation Type:

☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From ground surface)

Casing Diameter (in)

Casing Depth (ft.)

Lower Drillhole Diameter (in) 2.0

Was Well Annular Space Grouted? ☐ Yes ☐ No ☐ Unknown

If Yes, To What Depth? Feet

Depth to Water (Feet)

(4) PUMP, LINER, SCREEN, CASING, & SEALING MATERIAL

Pump & Piping Removed? ☐ Yes ☐ No ☒ Not Applicable
Liner(s) Removed? ☐ Yes ☐ No ☒ Not Applicable
Screen Removed? ☐ Yes ☐ No ☒ Not Applicable
Casing Left in Place? ☐ Yes ☒ No

Was Casing Cut Off Below Surface? ☐ Yes ☐ No
Did Sealing Material Rise to Surface? ☒ Yes ☐ No
Did Material Settle After 24 Hours? ☐ Yes ☒ No
If Yes, Was Hole Retopped? ☐ Yes ☒ No

Required Method of Placing Sealing Material

☐ Conductor Pipe - Gravity ☐ Conductor Pipe - Pumped
☐ Screened & Poured (Bentonite Chips) ☒ Other (Explain) Gravity Pour

Sealing Materials

☐ Neat Cement Grout
☐ Sand-Cement (Concrete) Grout
☐ Concrete
☐ Clay-Sand Slurry
☐ Bentonite-Sand Slurry
☒ Chipped Bentonite

For monitoring wells and monitoring well boreholes only

☐ Bentonite Chips
☐ Granular Bentonite
☐ Bentonite-Cement Grout
☐ Bentonite - Sand Slurry

(5) Sealing Material Used	From (Ft)	To (Ft)		Mix Ratio or Mud Weight
3/8" Bentonite Chips	Surface	15.0		

(6) Comments

(7) Name of Person or Firm Doing Sealing Work: Sigma Environmental Services

Date of Abandonment: 9/17/12

Signature of Person Doing Work

Date Signed: 11/30/12

Street or Route: 1300 W. Canal St.

Telephone Number: 414-643-4200

City, State, Zip Code: Milwaukee, WI 53233

FOR DNR OR COUNTY USE ONLY

Date Received

Noted By

Comments

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT

Form 3300-5 2/2000 Page 1 of 2

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Route to ☐ Drinking Water ☐ Watershed/Wastewater ☐ Waste Management ☒ Remediation/Redevelopment ☐ Other

(1) GENERAL INFORMATION

WI Unique Well No
DNR Well ID No
County: Milwaukee

Common Well Name: SGP-5
Gov't Lot (if applicable):

NW 1/4 of NE 1/4 of Sec 22 ; T 6 N; R 22 ☒ E ☐ W

Grid Location
ft ☐ N. ☐ S, ft ☐ E. ☐ W.

Local Grid Origin ☐ (estimated: ☐) or Well Location ☐

Lat ° ' " Long ° ' " or

State Plane ft. N. ft. E. S ☐ C ☐ N ☐ Zone

Reason For Abandonment: Investigative Boring
WI Unique Well No of Replacement Well

(2) FACILITY /OWNER INFORMATION

Facility Name: Former DF Property
Facility ID
License/Permit/Monitoring No: -
Street Address of Well: 2517 E. Norwich Avenue
City, Village, or Town: St. Francis
Present Well Owner
Original Owner: Former D-F Inc.
Street Address or Route of Owner
City, State, Zip Code

(3) WELL/DRILLHOLE/BOREHOLE INFORMATION

Original Construction Date

☐ Monitoring Well
☐ Water Well
☐ Drillhole / Borehole

If a Well Construction Report is available, please attach.

Construction Type:
☐ Drilled ☐ Driven (Sandpoint) ☐ Dug
☒ Other (Specify) Geoprobe

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From ground surface)
Casing Diameter (in.)
Casing Depth (ft)
Lower Drillhole Diameter (in.) 2.0

Was Well Annular Space Grouted? ☐ Yes ☐ No ☐ Unknown
If Yes, To What Depth? Feet
Depth to Water (Feet)

(4) PUMP, LINER, SCREEN, CASING, & SEALING MATERIAL

Pump & Piping Removed? ☐ Yes ☐ No ☒ Not Applicable
Liner(s) Removed? ☐ Yes ☐ No ☒ Not Applicable
Screen Removed? ☐ Yes ☐ No ☒ Not Applicable
Casing Left in Place? ☐ Yes ☒ No

Was Casing Cut Off Below Surface? ☐ Yes ☐ No
Did Sealing Material Rise to Surface? ☒ Yes ☐ No
Did Material Settle After 24 Hours? ☐ Yes ☒ No
If Yes, Was Hole Retopped? ☐ Yes ☒ No

Required Method of Placing Sealing Material
☐ Conductor Pipe - Gravity ☐ Conductor Pipe - Pumped
☐ Screened & Poured (Bentonite Chips) ☒ Other (Explain) Gravity Pour

Sealing Materials
☐ Neat Cement Grout
☐ Sand-Cement (Concrete) Grout
☐ Concrete
☐ Clay-Sand Slurry
☐ Bentonite-Sand Slurry
☒ Chipped Bentonite

For monitoring wells and monitoring well boreholes only
☐ Bentonite Chips
☐ Granular Bentonite
☐ Bentonite-Cement Grout
☐ Bentonite - Sand Slurry

(5) Sealing Material Used	From (Ft.)	To (Ft)		Mix Ratio or Mud Weight
3/8" Bentonite Chips	Surface	16.0		

(6) Comments

(7) Name of Person or Firm Doing Sealing Work: Sigma Environmental Services
Date of Abandonment: 10/2/12
Signature of Person Doing Work
Date Signed: 11/30/12
Street or Route: 1300 W. Canal St.
Telephone Number: 414-643-4200
City, State, Zip Code: Milwaukee, WI 53233

FOR DNR OR COUNTY USE ONLY
Date Received
Noted By
Comments

State of Wisconsin
Department of Natural Resources

WELL/DRILLHOLE/BOREHOLE ABANDONMENT
Form 3300-5 2/2000 Page 1 of 2

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Route to: ☐ Drinking Water ☐ Watershed/Wastewater ☐ Waste Management ☒ Remediation/Redevelopment ☐ Other

(1) GENERAL INFORMATION

WI Unique Well No.
DNR Well ID No.
County: Milwaukee
Common Well Name: SGP-6
Gov't Lot (if applicable):
Grid Location: NW 1/4 of NE 1/4 of Sec 22 ; T 6 N; R 22 ☒ E ☐ W
ft ☐ N ☐ S, ft ☐ E ☐ W.
Local Grid Origin ☐ (estimated: ☐) or Well Location ☐
Lat ° ' " Long ° ' " or
State Plane ft N ft. E. S ☐ C ☐ N ☐ Zone
Reason For Abandonment: Investigative Boring
WI Unique Well No. of Replacement Well:

(2) FACILITY /OWNER INFORMATION

Facility Name: Former DF Property
Facility ID:
License/Permit/Monitoring No. -
Street Address of Well: 2517 E. Norwich Avenue
City, Village, or Town: St. Francis
Present Well Owner:
Original Owner: Former D-F Inc.
Street Address or Route of Owner:
City, State, Zip Code:

(3) WELL/DRILLHOLE/BOREHOLE INFORMATION

Original Construction Date:
☐ Monitoring Well
☐ Water Well
☐ Drillhole / Borehole
If a Well Construction Report is available, please attach.

Construction Type:
☐ Drilled ☐ Driven (Sandpoint) ☐ Dug
☒ Other (Specify) Geoprobe

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) (From ground surface):
Casing Diameter (in.):
Casing Depth (ft.):
Lower Drillhole Diameter (in.): 2.0
Was Well Annular Space Grouted? ☐ Yes ☐ No ☐ Unknown
If Yes, To What Depth? Feet
Depth to Water (Feet):

(4) PUMP, LINER, SCREEN, CASING, & SEALING MATERIAL

Pump & Piping Removed? ☐ Yes ☐ No ☒ Not Applicable
Liner(s) Removed? ☐ Yes ☐ No ☒ Not Applicable
Screen Removed? ☐ Yes ☐ No ☒ Not Applicable
Casing Left in Place? ☐ Yes ☒ No
Was Casing Cut Off Below Surface? ☐ Yes ☐ No
Did Sealing Material Rise to Surface? ☒ Yes ☐ No
Did Material Settle After 24 Hours? ☐ Yes ☒ No
If Yes, Was Hole Retopped? ☐ Yes ☒ No

Required Method of Placing Sealing Material
☐ Conductor Pipe - Gravity ☐ Conductor Pipe - Pumped
☐ Screened & Poured (Bentonite Chips) ☒ Other (Explain) Gravity Pour

Sealing Materials
☐ Neat Cement Grout
☐ Sand-Cement (Concrete) Grout
☐ Concrete
☐ Clay-Sand Slurry
☐ Bentonite-Sand Slurry
☒ Chipped Bentonite

For monitoring wells and monitoring well boreholes only
☐ Bentonite Chips
☐ Granular Bentonite
☐ Bentonite-Cement Grout
☐ Bentonite - Sand Slurry

(5) Sealing Material Used	From (Ft.)	To (Ft.)		Mix Ratio or Mud Weight
3/8" Bentonite Chips	Surface	16.0		

(6) Comments

(7) Name of Person or Firm Doing Sealing Work: Sigma Environmental Services
Date of Abandonment: 10/2/12
Signature of Person Doing Work:
Date Signed: 11/30/12
Street or Route: 1300 W. Canal St.
Telephone Number: 414-643-4200
City, State, Zip Code: Milwaukee, WI 53233

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Date Received
Noted By
Comments

APPENDIX D

Laboratory Reports – Soil

Synergy Environmental Lab, INC.

1990 Prospect Ct., Appleton, WI 54914 *P 920-830-2455 * F 920-733-0631

KRISTIN KURZKA
SIGMA ENVIRONMMENTAL
1300 W. CANAL STREET
MILWAUKEE, WI 53233

Report Date *21-Nov-12*

Project Name 2529 E. NORWICH AVE. **Invoice #** E24505
Project # 13097

Lab Code 5024505A
Sample ID COMPOSITE 1
Sample Matrix Soil
Sample Date 11/7/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Inorganic										
Metals										
TCLP Arsenic	< 0.05	mg/l	0.05		1	6010B		11/14/2012	ESC	1
TCLP Barium	0.88	mg/l	0.15		1	6010B		11/14/2012	ESC	1
TCLP Cadmium	< 0.05	mg/l	0.05		1	6010B		11/14/2012	ESC	1
TCLP Chromium	< 0.05	mg/l	0.05		1	6010B		11/14/2012	ESC	1
TCLP Copper	0.12	mg/l	0.05		1	6010B		11/14/2012	ESC	1
TCLP Lead	0.17	mg/l	0.05		1	6010B		11/14/2012	ESC	1
TCLP Mercury	< 0.001	mg/l	0.001		1	7470A		11/14/2012	ESC	1
TCLP Nickel	0.067	mg/l	0.05		1	6010B		11/14/2012	ESC	1
TCLP Selenium	< 0.05	mg/l	0.05		1	6010B		11/14/2012	ESC	1
TCLP Silver	< 0.05	mg/l	0.05		1	6010B		11/14/2012	ESC	1
TCLP Zinc	8.4	mg/l	0.05		1	6010B		11/14/2012	ESC	1
Organic										
PCB'S										
PCB-1016	< 0.0065	mg/kg	0.0065	0.017	1	EPA 8082A		11/20/2012	ESC	1
PCB-1221	< 0.0054	mg/kg	0.0054	0.017	1	EPA 8082A		11/20/2012	ESC	1
PCB-1232	< 0.0042	mg/kg	0.0042	0.017	1	EPA 8082A		11/20/2012	ESC	1
PCB-1242	< 0.0032	mg/kg	0.0032	0.017	1	EPA 8082A		11/20/2012	ESC	1
PCB-1248	< 0.0032	mg/kg	0.0032	0.017	1	EPA 8082A		11/20/2012	ESC	1
PCB-1254	< 0.0047	mg/kg	0.0047	0.017	1	EPA 8082A		11/20/2012	ESC	1
PCB-1260	< 0.0049	mg/kg	0.0049	0.017	1	EPA 8082A		11/20/2012	ESC	1
TCLP SVOC's										
TCLP o-Cresol	< 0.1	mg/l	0.1		1	8270C		11/14/2012	ESC	1
TCLP m & p-Cresol	< 0.1	mg/l	0.1		1	8270C		11/14/2012	ESC	1
TCLP 1,4-Dichlorobenzene	< 0.1	mg/l	0.1		1	8270C		11/14/2012	ESC	1
TCLP 2,4-Dinitrotoluene	< 0.1	mg/l	0.1		1	8270C		11/14/2012	ESC	1
TCLP Hexachlorobenzene	< 0.1	mg/l	0.1		1	8270C		11/14/2012	ESC	1
TCLP Hexachlorobutadiene	< 0.1	mg/l	0.1		1	8270C		11/14/2012	ESC	1
TCLP Hexachloroethane	< 0.1	mg/l	0.1		1	8270C		11/14/2012	ESC	1

Project Name 2529 E. NORWICH AVE. **Invoice #** E24505
Project # 13097

Lab Code 5024505A
Sample ID COMPOSITE 1
Sample Matrix Soil
Sample Date 11/7/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
TCLP Nitrobenzene	< 0.1	mg/l	0.1		1	8270C		11/14/2012	ESC	1
TCLP Pentachlorophenol	< 0.1	mg/l	0.1		1	8270C		11/14/2012	ESC	1
TCLP Phenol	< 0.1	mg/l	0.1		1	8270C		11/14/2012	ESC	1
TCLP Pyridine	< 0.1	mg/l	0.1		1	8270C		11/14/2012	ESC	1
TCLP 2,4,6-Trichlorophenol	< 0.1	mg/l	0.1		1	8270C		11/14/2012	ESC	1
TCLP 2,4,5-Trichlorophenol	< 0.1	mg/l	0.1		1	8270C		11/14/2012	ESC	1
TCLP VOC's										
TCLP Benzene	< 0.05	mg/l	0.05		1	8260B		11/13/2012	ESC	1
TCLP Carbon Tetrachloride	< 0.05	mg/l	0.05		1	8260B		11/13/2012	ESC	1
TCLP Chlorobenzene	< 0.05	mg/l	0.05		1	8260B		11/13/2012	ESC	1
TCLP Chloroform	< 0.25	mg/l	0.25		1	8260B		11/13/2012	ESC	1
TCLP 1,2-Dichloroethane	< 0.05	mg/l	0.05		1	8260B		11/13/2012	ESC	1
TCLP 1,1-Dichloroethene	< 0.05	mg/l	0.05		1	8260B		11/13/2012	ESC	1
TCLP Methyl Ethyl Ketone	< 0.5	mg/l	0.5		1	8260B		11/13/2012	ESC	1
TCLP Tetrachloroethene	< 0.05	mg/l	0.05		1	8260B		11/13/2012	ESC	1
TCLP Trichloroethene	0.10	mg/l	0.05		1	8260B		11/13/2012	ESC	1
TCLP Vinyl Chloride	< 0.05	mg/l	0.05		1	8260B		11/13/2012	ESC	1
Wet Chemistry										
General										
Specific Gravity	1.9	g/cm3			1	2710F		11/12/2012	ESC	1
Reactive Sulfide	< 25	mg/kg	25	25	1	EPA 9034		11/11/2012	ESC	1
Free Liquid	none				1	9095A		11/15/2012	ESC	1
Reactive Cyanide	< 0.125	mg/kg	0.125	0.125	1	9012B		11/13/2012	ESC	1
Solids, Total %	81.9	%	0.033	0.1	1	2540G		11/16/2012	ESC	1
pH	8.5	su			1	EPA 9045D		11/16/2012	ESC	1
Chlorides	81	mg/kg	0.8	10	1	9056		11/14/2012	ESC	1
Flash Point	> 170	Deg. F			1	D93		11/15/2012	ESC	1

"J" Flag: Analyte detected between LOD and LOQ LOD Limit of Detection LOQ Limit of Quantitation

Code	***Comment***
1	Laboratory QC within limits.

ESC denotes sub contract lab - Certification #998093910

All solid sample results reported on a dry weight basis unless otherwise indicated. All LOD's and LOQ's are adjusted for dilutions but not dry weight. Subcontracted results are denoted by SUB in the analyst field.

Authorized Signature Michael J. Ricker

CHAIN O CUSTODY RECORD

Synergy

Environmental Lab, Inc.

1990 Prospect Ct. • Appleton, WI 54914
920-830-2455 • FAX 920-733-0631

Chain # № 349

Page 1 of 1

Sample Handling Request
___ Rush Analysis Date Required ___
(Rushes accepted only with prior authorization)
X Normal Turn Around

Lab I.D. #

Account No. :

Quote No.:

Project #: 13097

Sampler: (signature) Stacy Oszewski

Project (Name / Location): 2529 E. Norwich Ave., St Francis, WI / Former DF

Reports To: Kristin Kurzka	Invoice To: SAME
Company Sigma	Company
Address 1300 W. Canal St.	Address
City State Zip MKE, WI 53233	City State Zip
Phone 414-643-4200	Phone
FAX 414-643-4210	FAX

Lab I.D.	Sample I.D.	Collection Date	Collection Time	Comp	Grab	Filtered Y/N	No. of Containers	Sample Type (Matrix)*	Preservation	DRO (Mod DRO Sep 95)	GRO (Mod GRO Sep 95)	IRON	LEAD	NITRATE / NITRITE	PAH (EPA 8270)	PVOC (EPA 8021)	PVOC + NAPHTHALENE	SULFATE	VOC DW (EPA 524.2)	VOC (EPA 8260)	8-RCRA METALS	Protocol B										PID/ FID
5024505A	Composite 1	11-7	12:30 pm	X		N	6	Soil	—													X										

Analysis Requested — Other Analysis

Comments/Special Instructions (*Specify groundwater "GW", Drinking Water "DW", Waste Water "WW", Soil "S", Air "A", Oil, Sludge etc.)

Sample Integrity - To be completed by receiving lab.
Method of Shipment : Dunham
Temp. of Temp. Blank. ____ °C On Ice: X
Cooler seal intact upon receipt: X Yes ____ No

Relinquished By: (sign)	Time	Date	Received By: (sign)	Time	Date
Stacy Oszewski	8:30 am	11-8-12			

Received in Laboratory By: Mark Ro Time: 8:00 Date: 11.9.12

Synergy Environmental Lab, INC.

1990 Prospect Ct., Appleton, WI 54914 *P 920-830-2455 * F 920-733-0631

KRISTIN KURZKA
SIGMA ENVIRONMMENTAL
1300 W. CANAL STREET
MILWAUKEE, WI 53233

Report Date *12-Oct-12*

Project Name FMR D-F INC.
Project # 13097

Invoice # E24349

Lab Code 5024349A
Sample ID SGP-5 (3.5-6.5')
Sample Matrix Soil
Sample Date 10/2/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
General										
General										
Solids Percent	82.8	%			1	5021		10/4/2012	MDK	1
Organic										
VOC's										
Benzene	< 8.9	ug/kg	8.9	28	1	8260B		10/10/2012	CJR	1
Bromobenzene	< 14	ug/kg	14	43	1	8260B		10/10/2012	CJR	1
Bromodichloromethane	< 12	ug/kg	12	37	1	8260B		10/10/2012	CJR	1
Bromoform	< 20	ug/kg	20	62	1	8260B		10/10/2012	CJR	1
tert-Butylbenzene	< 54	ug/kg	54	173	1	8260B		10/10/2012	CJR	1
sec-Butylbenzene	< 51	ug/kg	51	162	1	8260B		10/10/2012	CJR	1
n-Butylbenzene	< 48	ug/kg	48	152	1	8260B		10/10/2012	CJR	1
Carbon Tetrachloride	< 12	ug/kg	12	39	1	8260B		10/10/2012	CJR	1
Chlorobenzene	< 9.4	ug/kg	9.4	30	1	8260B		10/10/2012	CJR	1
Chloroethane	< 142	ug/kg	142	452	1	8260B		10/10/2012	CJR	1
Chloroform	< 46	ug/kg	46	146	1	8260B		10/10/2012	CJR	1
Chloromethane	< 207	ug/kg	207	658	1	8260B		10/10/2012	CJR	1
2-Chlorotoluene	< 84	ug/kg	84	267	1	8260B		10/10/2012	CJR	1
4-Chlorotoluene	< 76	ug/kg	76	241	1	8260B		10/10/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 77	ug/kg	77	245	1	8260B		10/10/2012	CJR	1
Dibromochloromethane	< 9.5	ug/kg	9.5	30	1	8260B		10/10/2012	CJR	1
1,4-Dichlorobenzene	< 52	ug/kg	52	167	1	8260B		10/10/2012	CJR	1
1,3-Dichlorobenzene	< 53	ug/kg	53	170	1	8260B		10/10/2012	CJR	1
1,2-Dichlorobenzene	< 51	ug/kg	51	164	1	8260B		10/10/2012	CJR	1
Dichlorodifluoromethane	< 12	ug/kg	12	37	1	8260B		10/10/2012	CJR	1
1,2-Dichloroethane	< 13	ug/kg	13	42	1	8260B		10/10/2012	CJR	1
1,1-Dichloroethane	< 11	ug/kg	11	33	1	8260B		10/10/2012	CJR	1
1,1-Dichloroethene	< 22	ug/kg	22	69	1	8260B		10/10/2012	CJR	1
cis-1,2-Dichloroethene	< 14	ug/kg	14	44	1	8260B		10/10/2012	CJR	1
trans-1,2-Dichloroethene	< 22	ug/kg	22	69	1	8260B		10/10/2012	CJR	1

Project Name FMR D-F INC. **Invoice #** E24349
Project # 13097

Lab Code 5024349A
Sample ID SGP-5 (3.5-6.5')
Sample Matrix Soil
Sample Date 10/2/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
1,2-Dichloropropane	< 11	ug/kg	11	36	1	8260B		10/10/2012	CJR	1
2,2-Dichloropropane	< 33	ug/kg	33	104	1	8260B		10/10/2012	CJR	1
1,3-Dichloropropane	< 11	ug/kg	11	35	1	8260B		10/10/2012	CJR	1
Di-isopropyl ether	< 47	ug/kg	47	148	1	8260B		10/10/2012	CJR	1
EDB (1,2-Dibromoethane)	< 17	ug/kg	17	54	1	8260B		10/10/2012	CJR	1
Ethylbenzene	205	ug/kg	55	175	1	8260B		10/10/2012	CJR	1
Hexachlorobutadiene	< 95	ug/kg	95	303	1	8260B		10/10/2012	CJR	1
Isopropylbenzene	< 53	ug/kg	53	168	1	8260B		10/10/2012	CJR	1
p-Isopropyltoluene	< 45	ug/kg	45	143	1	8260B		10/10/2012	CJR	1
Methylene chloride	< 119	ug/kg	119	380	1	8260B		10/10/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 12	ug/kg	12	38	1	8260B		10/10/2012	CJR	1
Naphthalene	< 107	ug/kg	107	340	1	8260B		10/10/2012	CJR	1
n-Propylbenzene	< 53	ug/kg	53	169	1	8260B		10/10/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 20	ug/kg	20	64	1	8260B		10/10/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 41	ug/kg	41	132	1	8260B		10/10/2012	CJR	1
Tetrachloroethene	< 24	ug/kg	24	78	1	8260B		10/10/2012	CJR	1
Toluene	189	ug/kg	50	159	1	8260B		10/10/2012	CJR	1
1,2,4-Trichlorobenzene	< 74	ug/kg	74	237	1	8260B		10/10/2012	CJR	1
1,2,3-Trichlorobenzene	< 129	ug/kg	129	409	1	8260B		10/10/2012	CJR	1
1,1,1-Trichloroethane	< 11	ug/kg	11	34	1	8260B		10/10/2012	CJR	1
1,1,2-Trichloroethane	< 16	ug/kg	16	52	1	8260B		10/10/2012	CJR	1
Trichloroethene (TCE)	< 17	ug/kg	17	53	1	8260B		10/10/2012	CJR	1
Trichlorofluoromethane	< 43	ug/kg	43	137	1	8260B		10/10/2012	CJR	1
1,2,4-Trimethylbenzene	182 "J"	ug/kg	80	253	1	8260B		10/10/2012	CJR	1
1,3,5-Trimethylbenzene	70 "J"	ug/kg	48	151	1	8260B		10/10/2012	CJR	1
Vinyl Chloride	< 16	ug/kg	16	49	1	8260B		10/10/2012	CJR	1
m&p-Xylene	840	ug/kg	86	274	1	8260B		10/10/2012	CJR	1
o-Xylene	330	ug/kg	50	159	1	8260B		10/10/2012	CJR	1
SUR - Dibromofluoromethane	93	Rec %			1	8260B		10/10/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	106	Rec %			1	8260B		10/10/2012	CJR	1
SUR - 4-Bromofluorobenzene	97	Rec %			1	8260B		10/10/2012	CJR	1
SUR - Toluene-d8	96	Rec %			1	8260B		10/10/2012	CJR	1

Lab Code 5024349B
Sample ID SGP-6 (3-6')
Sample Matrix Soil
Sample Date 10/2/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
General										
General										
Solids Percent	87.6	%			1	5021		10/4/2012	MDK	1
Organic										
VOC's										
Benzene	< 8.9	ug/kg	8.9	28	1	8260B		10/10/2012	CJR	1
Bromobenzene	< 14	ug/kg	14	43	1	8260B		10/10/2012	CJR	1
Bromodichloromethane	< 12	ug/kg	12	37	1	8260B		10/10/2012	CJR	1
Bromoform	< 20	ug/kg	20	62	1	8260B		10/10/2012	CJR	1
tert-Butylbenzene	< 54	ug/kg	54	173	1	8260B		10/10/2012	CJR	1
sec-Butylbenzene	< 51	ug/kg	51	162	1	8260B		10/10/2012	CJR	1
n-Butylbenzene	< 48	ug/kg	48	152	1	8260B		10/10/2012	CJR	1
Carbon Tetrachloride	< 12	ug/kg	12	39	1	8260B		10/10/2012	CJR	1

Project Name FMR D-F INC. **Invoice #** E24349
Project # 13097

Lab Code 5024349B
Sample ID SGP-6 (3-6')
Sample Matrix Soil
Sample Date 10/2/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Chlorobenzene	< 9.4	ug/kg	9.4	30	1	8260B		10/10/2012	CJR	1
Chloroethane	< 142	ug/kg	142	452	1	8260B		10/10/2012	CJR	1
Chloroform	< 46	ug/kg	46	146	1	8260B		10/10/2012	CJR	1
Chloromethane	< 207	ug/kg	207	658	1	8260B		10/10/2012	CJR	1
2-Chlorotoluene	< 84	ug/kg	84	267	1	8260B		10/10/2012	CJR	1
4-Chlorotoluene	< 76	ug/kg	76	241	1	8260B		10/10/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 77	ug/kg	77	245	1	8260B		10/10/2012	CJR	1
Dibromochloromethane	< 9.5	ug/kg	9.5	30	1	8260B		10/10/2012	CJR	1
1,4-Dichlorobenzene	< 52	ug/kg	52	167	1	8260B		10/10/2012	CJR	1
1,3-Dichlorobenzene	< 53	ug/kg	53	170	1	8260B		10/10/2012	CJR	1
1,2-Dichlorobenzene	< 51	ug/kg	51	164	1	8260B		10/10/2012	CJR	1
Dichlorodifluoromethane	< 12	ug/kg	12	37	1	8260B		10/10/2012	CJR	1
1,2-Dichloroethane	< 13	ug/kg	13	42	1	8260B		10/10/2012	CJR	1
1,1-Dichloroethane	< 11	ug/kg	11	33	1	8260B		10/10/2012	CJR	1
1,1-Dichloroethene	< 22	ug/kg	22	69	1	8260B		10/10/2012	CJR	1
cis-1,2-Dichloroethene	25.8 "J"	ug/kg	14	44	1	8260B		10/10/2012	CJR	1
trans-1,2-Dichloroethene	< 22	ug/kg	22	69	1	8260B		10/10/2012	CJR	1
1,2-Dichloropropane	< 11	ug/kg	11	36	1	8260B		10/10/2012	CJR	1
2,2-Dichloropropane	< 33	ug/kg	33	104	1	8260B		10/10/2012	CJR	1
1,3-Dichloropropane	< 11	ug/kg	11	35	1	8260B		10/10/2012	CJR	1
Di-isopropyl ether	< 47	ug/kg	47	148	1	8260B		10/10/2012	CJR	1
EDB (1,2-Dibromoethane)	< 17	ug/kg	17	54	1	8260B		10/10/2012	CJR	1
Ethylbenzene	< 55	ug/kg	55	175	1	8260B		10/10/2012	CJR	1
Hexachlorobutadiene	< 95	ug/kg	95	303	1	8260B		10/10/2012	CJR	1
Isopropylbenzene	< 53	ug/kg	53	168	1	8260B		10/10/2012	CJR	1
p-Isopropyltoluene	< 45	ug/kg	45	143	1	8260B		10/10/2012	CJR	1
Methylene chloride	< 119	ug/kg	119	380	1	8260B		10/10/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 12	ug/kg	12	38	1	8260B		10/10/2012	CJR	1
Naphthalene	< 107	ug/kg	107	340	1	8260B		10/10/2012	CJR	1
n-Propylbenzene	< 53	ug/kg	53	169	1	8260B		10/10/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 20	ug/kg	20	64	1	8260B		10/10/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 41	ug/kg	41	132	1	8260B		10/10/2012	CJR	1
Tetrachloroethene	< 24	ug/kg	24	78	1	8260B		10/10/2012	CJR	1
Toluene	< 50	ug/kg	50	159	1	8260B		10/10/2012	CJR	1
1,2,4-Trichlorobenzene	< 74	ug/kg	74	237	1	8260B		10/10/2012	CJR	1
1,2,3-Trichlorobenzene	< 129	ug/kg	129	409	1	8260B		10/10/2012	CJR	1
1,1,1-Trichloroethane	< 11	ug/kg	11	34	1	8260B		10/10/2012	CJR	1
1,1,2-Trichloroethane	< 16	ug/kg	16	52	1	8260B		10/10/2012	CJR	1
Trichloroethene (TCE)	< 17	ug/kg	17	53	1	8260B		10/10/2012	CJR	1
Trichlorofluoromethane	< 43	ug/kg	43	137	1	8260B		10/10/2012	CJR	1
1,2,4-Trimethylbenzene	< 80	ug/kg	80	253	1	8260B		10/10/2012	CJR	1
1,3,5-Trimethylbenzene	< 48	ug/kg	48	151	1	8260B		10/10/2012	CJR	1
Vinyl Chloride	< 16	ug/kg	16	49	1	8260B		10/10/2012	CJR	1
m&p-Xylene	< 86	ug/kg	86	274	1	8260B		10/10/2012	CJR	1
o-Xylene	< 50	ug/kg	50	159	1	8260B		10/10/2012	CJR	1
SUR - Toluene-d8	98	Rec %			1	8260B		10/10/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	101	Rec %			1	8260B		10/10/2012	CJR	1
SUR - 4-Bromofluorobenzene	96	Rec %			1	8260B		10/10/2012	CJR	1
SUR - Dibromofluoromethane	91	Rec %			1	8260B		10/10/2012	CJR	1

"J" Flag: Analyte detected between LOD and LOQ LOD Limit of Detection LOQ Limit of Quantitation

Code	***Comment***
1	Laboratory QC within limits.

All solid sample results reported on a dry weight basis unless otherwise indicated. All LOD's and LOQ's are adjusted for dilutions but not dry weight. Subcontracted results are denoted by SUB in the analyst field.

Authorized Signature Michael J. Ricker

CHAIN OF CUSTODY RECORD

Synergy Environmental Lab, Inc.

1990 Prospect Ct. • Appleton, WI 54914
920-830-2455 • FAX 920-733-0631

Chain # № 675

Page 1 of 1

Sample Handling Request
___ Rush Analysis Date Required ___
(Rushes accepted only with prior authorization)
X Normal Turn Around

Lab I.D. #
Account No. :
Quote No.:
Project #: 13097
Sampler: (signature) Stacy Oszuscik
Project (Name / Location): Former D-F Incorporated / St. Francis, WI

Reports To: Kristin Kurzka	Invoice To: SAME
Company Sigma	Company
Address 1300 W. Canal St.	Address
City State Zip MKE, WI 53233	City State Zip
Phone 414-643-4200	Phone
FAX -4210	FAX

Lab I.D.	Sample I.D.	Collection Date	Collection Time	Comp	Grab	Filtered Y/N	No. of Containers	Sample Type (Matrix)*	Preservation	DRO (Mod DRO Sep 95)	GRO (Mod GRO Sep 95)	IRON	LEAD	NITRATE / NITRITE	PAH (EPA 8270)	PVOC (EPA 8021)	PVOC + NAPHTHALENE	SULFATE	VOC DW (EPA 524.2)	VOC (EPA 8260)	8-RCRA METALS	PID/ FID
5024349A	SGP-5 (3.5-6.5')	10-2-12	11:20am		X	N	2	Soil	1-meth											X		
B	SGP-6 (3-6')	10-2-12	11:20pm		X	N	2	Soil	1-meth											X		

Comments/Special Instructions (*Specify groundwater "GW", Drinking Water "DW", Waste Water "WW", Soil "S", Air "A", Oil, Sludge etc.)

Sample Integrity - To be completed by receiving lab.
Method of Shipment : Dunham
Temp. of Temp. Blank. ___ °C On Ice: X
Cooler seal intact upon receipt: X Yes ___ No

Relinquished By: (sign)	Time	Date	Received By: (sign)	Time	Date
Stacy Oszuscik	4pm	10-2-12			

Received in Laboratory By: Time: 8:00 Date: 10/4/12

KRISTIN KURZKA
SIGMA ENVIRONMMENTAL
1300 W. CANAL STREET
MILWAUKEE, WI 53233

Report Date *25-Sep-12*

Project Name FMR D-F INC. **Invoice #** E24280
Project # 13097

Lab Code 5024280A
Sample ID SGP-1 (9-10')
Sample Matrix Soil
Sample Date 9/17/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
General										
General										
Solids Percent	82.0	%			1	5021		9/20/2012	MDK	1
Organic										
VOC's										
Benzene	< 890	ug/kg	890	2800	100	8260B		9/20/2012	CJR	1
Bromobenzene	< 1400	ug/kg	1400	4300	100	8260B		9/20/2012	CJR	1
Bromodichloromethane	< 1200	ug/kg	1200	3700	100	8260B		9/20/2012	CJR	1
Bromoform	< 2000	ug/kg	2000	6200	100	8260B		9/20/2012	CJR	1
tert-Butylbenzene	< 5400	ug/kg	5400	17300	100	8260B		9/20/2012	CJR	1
sec-Butylbenzene	< 5100	ug/kg	5100	16200	100	8260B		9/20/2012	CJR	1
n-Butylbenzene	6600 "J"	ug/kg	4800	15200	100	8260B		9/20/2012	CJR	1
Carbon Tetrachloride	< 1200	ug/kg	1200	3900	100	8260B		9/20/2012	CJR	1
Chlorobenzene	< 940	ug/kg	940	3000	100	8260B		9/20/2012	CJR	1
Chloroethane	< 14200	ug/kg	14200	45200	100	8260B		9/20/2012	CJR	1
Chloroform	< 4600	ug/kg	4600	14600	100	8260B		9/20/2012	CJR	1
Chloromethane	< 20700	ug/kg	20700	65800	100	8260B		9/20/2012	CJR	1
2-Chlorotoluene	< 8400	ug/kg	8400	26700	100	8260B		9/20/2012	CJR	1
4-Chlorotoluene	< 7600	ug/kg	7600	24100	100	8260B		9/20/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 7700	ug/kg	7700	24500	100	8260B		9/20/2012	CJR	1
Dibromochloromethane	< 950	ug/kg	950	3000	100	8260B		9/20/2012	CJR	1
1,4-Dichlorobenzene	< 5200	ug/kg	5200	16700	100	8260B		9/20/2012	CJR	1
1,3-Dichlorobenzene	< 5300	ug/kg	5300	17000	100	8260B		9/20/2012	CJR	1
1,2-Dichlorobenzene	< 5100	ug/kg	5100	16400	100	8260B		9/20/2012	CJR	1
Dichlorodifluoromethane	< 1200	ug/kg	1200	3700	100	8260B		9/20/2012	CJR	1
1,2-Dichloroethane	< 1300	ug/kg	1300	4200	100	8260B		9/20/2012	CJR	1
1,1-Dichloroethane	< 1100	ug/kg	1100	3300	100	8260B		9/20/2012	CJR	1
1,1-Dichloroethene	< 2200	ug/kg	2200	6900	100	8260B		9/20/2012	CJR	1
cis-1,2-Dichloroethene	17400	ug/kg	1400	4400	100	8260B		9/20/2012	CJR	1
trans-1,2-Dichloroethene	< 2200	ug/kg	2200	6900	100	8260B		9/20/2012	CJR	1

Lab Code 5024280A
Sample ID SGP-1 (9-10')
Sample Matrix Soil
Sample Date 9/17/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
1,2-Dichloropropane	< 1100	ug/kg	1100	3600	100	8260B		9/20/2012	CJR	1
2,2-Dichloropropane	< 3300	ug/kg	3300	10400	100	8260B		9/20/2012	CJR	1
1,3-Dichloropropane	< 1100	ug/kg	1100	3500	100	8260B		9/20/2012	CJR	1
Di-isopropyl ether	< 4700	ug/kg	4700	14800	100	8260B		9/20/2012	CJR	1
EDB (1,2-Dibromoethane)	< 1700	ug/kg	1700	5400	100	8260B		9/20/2012	CJR	1
Ethylbenzene	17100 "J"	ug/kg	5500	17500	100	8260B		9/20/2012	CJR	1
Hexachlorobutadiene	< 9500	ug/kg	9500	30300	100	8260B		9/20/2012	CJR	1
Isopropylbenzene	< 5300	ug/kg	5300	16800	100	8260B		9/20/2012	CJR	1
p-Isopropyltoluene	< 4500	ug/kg	4500	14300	100	8260B		9/20/2012	CJR	1
Methylene chloride	< 11900	ug/kg	11900	38000	100	8260B		9/20/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 1200	ug/kg	1200	3800	100	8260B		9/20/2012	CJR	1
Naphthalene	< 10700	ug/kg	10700	34000	100	8260B		9/20/2012	CJR	1
n-Propylbenzene	< 5300	ug/kg	5300	16900	100	8260B		9/20/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 2000	ug/kg	2000	6400	100	8260B		9/20/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 4100	ug/kg	4100	13200	100	8260B		9/20/2012	CJR	1
Tetrachloroethene	2500 "J"	ug/kg	2400	7800	100	8260B		9/20/2012	CJR	1
Toluene	30400	ug/kg	5000	15900	100	8260B		9/20/2012	CJR	1
1,2,4-Trichlorobenzene	< 7400	ug/kg	7400	23700	100	8260B		9/20/2012	CJR	1
1,2,3-Trichlorobenzene	< 12900	ug/kg	12900	40900	100	8260B		9/20/2012	CJR	1
1,1,1-Trichloroethane	62000	ug/kg	1100	3400	100	8260B		9/20/2012	CJR	1
1,1,2-Trichloroethane	< 1600	ug/kg	1600	5200	100	8260B		9/20/2012	CJR	1
Trichloroethene (TCE)	3300 "J"	ug/kg	1700	5300	100	8260B		9/20/2012	CJR	1
Trichlorofluoromethane	< 4300	ug/kg	4300	13700	100	8260B		9/20/2012	CJR	1
1,2,4-Trimethylbenzene	29400	ug/kg	8000	25300	100	8260B		9/20/2012	CJR	1
1,3,5-Trimethylbenzene	7200 "J"	ug/kg	4800	15100	100	8260B		9/20/2012	CJR	1
Vinyl Chloride	< 1600	ug/kg	1600	4900	100	8260B		9/20/2012	CJR	1
m&p-Xylene	57000	ug/kg	8600	27400	100	8260B		9/20/2012	CJR	1
o-Xylene	23200	ug/kg	5000	15900	100	8260B		9/20/2012	CJR	1
SUR - Toluene-d8	95	Rec %			100	8260B		9/20/2012	CJR	1
SUR - Dibromofluoromethane	99	Rec %			100	8260B		9/20/2012	CJR	1
SUR - 4-Bromofluorobenzene	106	Rec %			100	8260B		9/20/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	100	Rec %			100	8260B		9/20/2012	CJR	1

Lab Code 5024280B
Sample ID SGP-2 (7.5-10')
Sample Matrix Soil
Sample Date 9/17/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
General										
General										
Solids Percent	86.7	%			1	5021		9/20/2012	MDK	1
Organic										
VOC's										
Benzene	< 890	ug/kg	890	2800	100	8260B		9/21/2012	CJR	1
Bromobenzene	< 1400	ug/kg	1400	4300	100	8260B		9/21/2012	CJR	1
Bromodichloromethane	< 1200	ug/kg	1200	3700	100	8260B		9/21/2012	CJR	1
Bromoform	< 2000	ug/kg	2000	6200	100	8260B		9/21/2012	CJR	1
tert-Butylbenzene	< 5400	ug/kg	5400	17300	100	8260B		9/21/2012	CJR	1
sec-Butylbenzene	10400 "J"	ug/kg	5100	16200	100	8260B		9/21/2012	CJR	1
n-Butylbenzene	19900	ug/kg	4800	15200	100	8260B		9/21/2012	CJR	1
Carbon Tetrachloride	< 1200	ug/kg	1200	3900	100	8260B		9/21/2012	CJR	1

Lab Code 5024280B
Sample ID SGP-2 (7.5-10')
Sample Matrix Soil
Sample Date 9/17/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Chlorobenzene	< 940	ug/kg	940	3000	100	8260B		9/21/2012	CJR	1
Chloroethane	< 14200	ug/kg	14200	45200	100	8260B		9/21/2012	CJR	1
Chloroform	< 4600	ug/kg	4600	14600	100	8260B		9/21/2012	CJR	1
Chloromethane	< 20700	ug/kg	20700	65800	100	8260B		9/21/2012	CJR	1
2-Chlorotoluene	< 8400	ug/kg	8400	26700	100	8260B		9/21/2012	CJR	1
4-Chlorotoluene	< 7600	ug/kg	7600	24100	100	8260B		9/21/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 7700	ug/kg	7700	24500	100	8260B		9/21/2012	CJR	1
Dibromochloromethane	< 950	ug/kg	950	3000	100	8260B		9/21/2012	CJR	1
1,4-Dichlorobenzene	< 5200	ug/kg	5200	16700	100	8260B		9/21/2012	CJR	1
1,3-Dichlorobenzene	< 5300	ug/kg	5300	17000	100	8260B		9/21/2012	CJR	1
1,2-Dichlorobenzene	< 5100	ug/kg	5100	16400	100	8260B		9/21/2012	CJR	1
Dichlorodifluoromethane	< 1200	ug/kg	1200	3700	100	8260B		9/21/2012	CJR	1
1,2-Dichloroethane	< 1300	ug/kg	1300	4200	100	8260B		9/21/2012	CJR	1
1,1-Dichloroethane	4400	ug/kg	1100	3300	100	8260B		9/21/2012	CJR	1
1,1-Dichloroethene	< 2200	ug/kg	2200	6900	100	8260B		9/21/2012	CJR	1
cis-1,2-Dichloroethene	116000	ug/kg	1400	4400	100	8260B		9/21/2012	CJR	1
trans-1,2-Dichloroethene	< 2200	ug/kg	2200	6900	100	8260B		9/21/2012	CJR	1
1,2-Dichloropropane	< 1100	ug/kg	1100	3600	100	8260B		9/21/2012	CJR	1
2,2-Dichloropropane	< 3300	ug/kg	3300	10400	100	8260B		9/21/2012	CJR	1
1,3-Dichloropropane	< 1100	ug/kg	1100	3500	100	8260B		9/21/2012	CJR	1
Di-isopropyl ether	< 4700	ug/kg	4700	14800	100	8260B		9/21/2012	CJR	1
EDB (1,2-Dibromoethane)	< 1700	ug/kg	1700	5400	100	8260B		9/21/2012	CJR	1
Ethylbenzene	106000	ug/kg	5500	17500	100	8260B		9/21/2012	CJR	1
Hexachlorobutadiene	< 9500	ug/kg	9500	30300	100	8260B		9/21/2012	CJR	1
Isopropylbenzene	9600 "J"	ug/kg	5300	16800	100	8260B		9/21/2012	CJR	1
p-Isopropyltoluene	11500 "J"	ug/kg	4500	14300	100	8260B		9/21/2012	CJR	1
Methylene chloride	< 11900	ug/kg	11900	38000	100	8260B		9/21/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 1200	ug/kg	1200	3800	100	8260B		9/21/2012	CJR	1
Naphthalene	14700 "J"	ug/kg	10700	34000	100	8260B		9/21/2012	CJR	1
n-Propylbenzene	18800	ug/kg	5300	16900	100	8260B		9/21/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 2000	ug/kg	2000	6400	100	8260B		9/21/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 4100	ug/kg	4100	13200	100	8260B		9/21/2012	CJR	1
Tetrachloroethene	4200 "J"	ug/kg	2400	7800	100	8260B		9/21/2012	CJR	1
Toluene	126000	ug/kg	5000	15900	100	8260B		9/21/2012	CJR	1
1,2,4-Trichlorobenzene	< 7400	ug/kg	7400	23700	100	8260B		9/21/2012	CJR	1
1,2,3-Trichlorobenzene	< 12900	ug/kg	12900	40900	100	8260B		9/21/2012	CJR	1
1,1,1-Trichloroethane	3400 "J"	ug/kg	1100	3400	100	8260B		9/21/2012	CJR	1
1,1,2-Trichloroethane	< 1600	ug/kg	1600	5200	100	8260B		9/21/2012	CJR	1
Trichloroethene (TCE)	< 1700	ug/kg	1700	5300	100	8260B		9/21/2012	CJR	1
Trichlorofluoromethane	< 4300	ug/kg	4300	13700	100	8260B		9/21/2012	CJR	1
1,2,4-Trimethylbenzene	112000	ug/kg	8000	25300	100	8260B		9/21/2012	CJR	1
1,3,5-Trimethylbenzene	34000	ug/kg	4800	15100	100	8260B		9/21/2012	CJR	1
Vinyl Chloride	11300	ug/kg	1600	4900	100	8260B		9/21/2012	CJR	1
m&p-Xylene	301000	ug/kg	8600	27400	100	8260B		9/21/2012	CJR	1
o-Xylene	114000	ug/kg	5000	15900	100	8260B		9/21/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	99	Rec %			100	8260B		9/21/2012	CJR	1
SUR - 4-Bromofluorobenzene	108	Rec %			100	8260B		9/21/2012	CJR	1
SUR - Dibromofluoromethane	94	Rec %			100	8260B		9/21/2012	CJR	1
SUR - Toluene-d8	97	Rec %			100	8260B		9/21/2012	CJR	1

Project Name FMR D-F INC. **Invoice #** E24280
Project # 13097

Lab Code 5024280C
Sample ID SMW-3 (9-10')
Sample Matrix Soil
Sample Date 9/17/2012

	Result	**Unit**	**LOD**	**LOQ**	**Dil**	**Method**	**Ext Date**	**Run Date**	**Analyst**	**Code**
General										
General										
Solids Percent	79.8	%			1	5021		9/20/2012	MDK	1
Organic										
VOC's										
Benzene	< 890	ug/kg	890	2800	100	8260B		9/21/2012	CJR	1
Bromobenzene	< 1400	ug/kg	1400	4300	100	8260B		9/21/2012	CJR	1
Bromodichloromethane	< 1200	ug/kg	1200	3700	100	8260B		9/21/2012	CJR	1
Bromoform	< 2000	ug/kg	2000	6200	100	8260B		9/21/2012	CJR	1
tert-Butylbenzene	< 5400	ug/kg	5400	17300	100	8260B		9/21/2012	CJR	1
sec-Butylbenzene	< 5100	ug/kg	5100	16200	100	8260B		9/21/2012	CJR	1
n-Butylbenzene	8000 "J"	ug/kg	4800	15200	100	8260B		9/21/2012	CJR	1
Carbon Tetrachloride	< 1200	ug/kg	1200	3900	100	8260B		9/21/2012	CJR	1
Chlorobenzene	< 940	ug/kg	940	3000	100	8260B		9/21/2012	CJR	1
Chloroethane	< 14200	ug/kg	14200	45200	100	8260B		9/21/2012	CJR	1
Chloroform	< 4600	ug/kg	4600	14600	100	8260B		9/21/2012	CJR	1
Chloromethane	< 20700	ug/kg	20700	65800	100	8260B		9/21/2012	CJR	1
2-Chlorotoluene	< 8400	ug/kg	8400	26700	100	8260B		9/21/2012	CJR	1
4-Chlorotoluene	< 7600	ug/kg	7600	24100	100	8260B		9/21/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 7700	ug/kg	7700	24500	100	8260B		9/21/2012	CJR	1
Dibromochloromethane	< 950	ug/kg	950	3000	100	8260B		9/21/2012	CJR	1
1,4-Dichlorobenzene	< 5200	ug/kg	5200	16700	100	8260B		9/21/2012	CJR	1
1,3-Dichlorobenzene	< 5300	ug/kg	5300	17000	100	8260B		9/21/2012	CJR	1
1,2-Dichlorobenzene	< 5100	ug/kg	5100	16400	100	8260B		9/21/2012	CJR	1
Dichlorodifluoromethane	< 1200	ug/kg	1200	3700	100	8260B		9/21/2012	CJR	1
1,2-Dichloroethane	2220 "J"	ug/kg	1300	4200	100	8260B		9/21/2012	CJR	1
1,1-Dichloroethane	11900	ug/kg	1100	3300	100	8260B		9/21/2012	CJR	1
1,1-Dichloroethene	2900 "J"	ug/kg	2200	6900	100	8260B		9/21/2012	CJR	1
cis-1,2-Dichloroethene	264000	ug/kg	1400	4400	100	8260B		9/21/2012	CJR	1
trans-1,2-Dichloroethene	< 2200	ug/kg	2200	6900	100	8260B		9/21/2012	CJR	1
1,2-Dichloropropane	< 1100	ug/kg	1100	3600	100	8260B		9/21/2012	CJR	1
2,2-Dichloropropane	< 3300	ug/kg	3300	10400	100	8260B		9/21/2012	CJR	1
1,3-Dichloropropane	< 1100	ug/kg	1100	3500	100	8260B		9/21/2012	CJR	1
Di-isopropyl ether	< 4700	ug/kg	4700	14800	100	8260B		9/21/2012	CJR	1
EDB (1,2-Dibromoethane)	< 1700	ug/kg	1700	5400	100	8260B		9/21/2012	CJR	1
Ethylbenzene	55000	ug/kg	5500	17500	100	8260B		9/21/2012	CJR	1
Hexachlorobutadiene	< 9500	ug/kg	9500	30300	100	8260B		9/21/2012	CJR	1
Isopropylbenzene	< 5300	ug/kg	5300	16800	100	8260B		9/21/2012	CJR	1
p-Isopropyltoluene	< 4500	ug/kg	4500	14300	100	8260B		9/21/2012	CJR	1
Methylene chloride	< 11900	ug/kg	11900	38000	100	8260B		9/21/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 1200	ug/kg	1200	3800	100	8260B		9/21/2012	CJR	1
Naphthalene	11100 "J"	ug/kg	10700	34000	100	8260B		9/21/2012	CJR	1
n-Propylbenzene	8100 "J"	ug/kg	5300	16900	100	8260B		9/21/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 2000	ug/kg	2000	6400	100	8260B		9/21/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 4100	ug/kg	4100	13200	100	8260B		9/21/2012	CJR	1
Tetrachloroethene	390000	ug/kg	2400	7800	100	8260B		9/21/2012	CJR	1
Toluene	70000	ug/kg	5000	15900	100	8260B		9/21/2012	CJR	1
1,2,4-Trichlorobenzene	< 7400	ug/kg	7400	23700	100	8260B		9/21/2012	CJR	1
1,2,3-Trichlorobenzene	< 12900	ug/kg	12900	40900	100	8260B		9/21/2012	CJR	1
1,1,1-Trichloroethane	305000	ug/kg	1100	3400	100	8260B		9/21/2012	CJR	1
1,1,2-Trichloroethane	< 1600	ug/kg	1600	5200	100	8260B		9/21/2012	CJR	1

Lab Code 5024280C
Sample ID SMW-3 (9-10')
Sample Matrix Soil
Sample Date 9/17/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Trichloroethene (TCE)	330000	ug/kg	1700	5300	100	8260B		9/21/2012	CJR	1
Trichlorofluoromethane	< 4300	ug/kg	4300	13700	100	8260B		9/21/2012	CJR	1
1,2,4-Trimethylbenzene	59000	ug/kg	8000	25300	100	8260B		9/21/2012	CJR	1
1,3,5-Trimethylbenzene	16000	ug/kg	4800	15100	100	8260B		9/21/2012	CJR	1
Vinyl Chloride	2590 "J"	ug/kg	1600	4900	100	8260B		9/21/2012	CJR	1
m&p-Xylene	198000	ug/kg	8600	27400	100	8260B		9/21/2012	CJR	1
o-Xylene	71000	ug/kg	5000	15900	100	8260B		9/21/2012	CJR	1
SUR - 4-Bromofluorobenzene	103	Rec %			100	8260B		9/21/2012	CJR	1
SUR - Dibromofluoromethane	96	Rec %			100	8260B		9/21/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	103	Rec %			100	8260B		9/21/2012	CJR	1
SUR - Toluene-d8	93	Rec %			100	8260B		9/21/2012	CJR	1

Lab Code 5024280D
Sample ID SMW-4 (9-10')
Sample Matrix Soil
Sample Date 9/17/2012

General

General

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Solids Percent	77.3	%			1	5021		9/20/2012	MDK	1

Organic

VOC's

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Benzene	< 890	ug/kg	890	2800	100	8260B		9/21/2012	CJR	1
Bromobenzene	< 1400	ug/kg	1400	4300	100	8260B		9/21/2012	CJR	1
Bromodichloromethane	< 1200	ug/kg	1200	3700	100	8260B		9/21/2012	CJR	1
Bromoform	< 2000	ug/kg	2000	6200	100	8260B		9/21/2012	CJR	1
tert-Butylbenzene	< 5400	ug/kg	5400	17300	100	8260B		9/21/2012	CJR	1
sec-Butylbenzene	6800 "J"	ug/kg	5100	16200	100	8260B		9/21/2012	CJR	1
n-Butylbenzene	13900 "J"	ug/kg	4800	15200	100	8260B		9/21/2012	CJR	1
Carbon Tetrachloride	< 1200	ug/kg	1200	3900	100	8260B		9/21/2012	CJR	1
Chlorobenzene	< 940	ug/kg	940	3000	100	8260B		9/21/2012	CJR	1
Chloroethane	< 14200	ug/kg	14200	45200	100	8260B		9/21/2012	CJR	1
Chloroform	< 4600	ug/kg	4600	14600	100	8260B		9/21/2012	CJR	1
Chloromethane	< 20700	ug/kg	20700	65800	100	8260B		9/21/2012	CJR	1
2-Chlorotoluene	< 8400	ug/kg	8400	26700	100	8260B		9/21/2012	CJR	1
4-Chlorotoluene	< 7600	ug/kg	7600	24100	100	8260B		9/21/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 7700	ug/kg	7700	24500	100	8260B		9/21/2012	CJR	1
Dibromochloromethane	< 950	ug/kg	950	3000	100	8260B		9/21/2012	CJR	1
1,4-Dichlorobenzene	< 5200	ug/kg	5200	16700	100	8260B		9/21/2012	CJR	1
1,3-Dichlorobenzene	< 5300	ug/kg	5300	17000	100	8260B		9/21/2012	CJR	1
1,2-Dichlorobenzene	< 5100	ug/kg	5100	16400	100	8260B		9/21/2012	CJR	1
Dichlorodifluoromethane	< 1200	ug/kg	1200	3700	100	8260B		9/21/2012	CJR	1
1,2-Dichloroethane	< 1300	ug/kg	1300	4200	100	8260B		9/21/2012	CJR	1
1,1-Dichloroethane	< 1100	ug/kg	1100	3300	100	8260B		9/21/2012	CJR	1
1,1-Dichloroethene	< 2200	ug/kg	2200	6900	100	8260B		9/21/2012	CJR	1
cis-1,2-Dichloroethene	3300 "J"	ug/kg	1400	4400	100	8260B		9/21/2012	CJR	1
trans-1,2-Dichloroethene	< 2200	ug/kg	2200	6900	100	8260B		9/21/2012	CJR	1
1,2-Dichloropropane	< 1100	ug/kg	1100	3600	100	8260B		9/21/2012	CJR	1
2,2-Dichloropropane	< 3300	ug/kg	3300	10400	100	8260B		9/21/2012	CJR	1
1,3-Dichloropropane	< 1100	ug/kg	1100	3500	100	8260B		9/21/2012	CJR	1
Di-isopropyl ether	< 4700	ug/kg	4700	14800	100	8260B		9/21/2012	CJR	1

Lab Code 5024280D
Sample ID SMW-4 (9-10')
Sample Matrix Soil
Sample Date 9/17/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
EDB (1,2-Dibromoethane)	< 1700	ug/kg	1700	5400	100	8260B		9/21/2012	CJR	1
Ethylbenzene	21300	ug/kg	5500	17500	100	8260B		9/21/2012	CJR	1
Hexachlorobutadiene	< 9500	ug/kg	9500	30300	100	8260B		9/21/2012	CJR	1
Isopropylbenzene	< 5300	ug/kg	5300	16800	100	8260B		9/21/2012	CJR	1
p-Isopropyltoluene	5300 "J"	ug/kg	4500	14300	100	8260B		9/21/2012	CJR	1
Methylene chloride	< 11900	ug/kg	11900	38000	100	8260B		9/21/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 1200	ug/kg	1200	3800	100	8260B		9/21/2012	CJR	1
Naphthalene	16000 "J"	ug/kg	10700	34000	100	8260B		9/21/2012	CJR	1
n-Propylbenzene	10400 "J"	ug/kg	5300	16900	100	8260B		9/21/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 2000	ug/kg	2000	6400	100	8260B		9/21/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 4100	ug/kg	4100	13200	100	8260B		9/21/2012	CJR	1
Tetrachloroethene	4200 "J"	ug/kg	2400	7800	100	8260B		9/21/2012	CJR	1
Toluene	11700 "J"	ug/kg	5000	15900	100	8260B		9/21/2012	CJR	1
1,2,4-Trichlorobenzene	< 7400	ug/kg	7400	23700	100	8260B		9/21/2012	CJR	1
1,2,3-Trichlorobenzene	< 12900	ug/kg	12900	40900	100	8260B		9/21/2012	CJR	1
1,1,1-Trichloroethane	2150 "J"	ug/kg	1100	3400	100	8260B		9/21/2012	CJR	1
1,1,2-Trichloroethane	< 1600	ug/kg	1600	5200	100	8260B		9/21/2012	CJR	1
Trichloroethene (TCE)	3400 "J"	ug/kg	1700	5300	100	8260B		9/21/2012	CJR	1
Trichlorofluoromethane	< 4300	ug/kg	4300	13700	100	8260B		9/21/2012	CJR	1
1,2,4-Trimethylbenzene	49000	ug/kg	8000	25300	100	8260B		9/21/2012	CJR	1
1,3,5-Trimethylbenzene	14300 "J"	ug/kg	4800	15100	100	8260B		9/21/2012	CJR	1
Vinyl Chloride	< 1600	ug/kg	1600	4900	100	8260B		9/21/2012	CJR	1
m&p-Xylene	70000	ug/kg	8600	27400	100	8260B		9/21/2012	CJR	1
o-Xylene	21900	ug/kg	5000	15900	100	8260B		9/21/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	93	Rec %			100	8260B		9/21/2012	CJR	1
SUR - 4-Bromofluorobenzene	109	Rec %			100	8260B		9/21/2012	CJR	1
SUR - Dibromofluoromethane	92	Rec %			100	8260B		9/21/2012	CJR	1
SUR - Toluene-d8	98	Rec %			100	8260B		9/21/2012	CJR	1

Lab Code 5024280E
Sample ID DUP
Sample Matrix Soil
Sample Date 9/17/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
General										
General										
Solids Percent	82.0	%			1	5021		9/20/2012	MDK	1
Organic										
VOC's										
Benzene	< 890	ug/kg	890	2800	100	8260B		9/21/2012	CJR	1
Bromobenzene	< 1400	ug/kg	1400	4300	100	8260B		9/21/2012	CJR	1
Bromodichloromethane	< 1200	ug/kg	1200	3700	100	8260B		9/21/2012	CJR	1
Bromoform	< 2000	ug/kg	2000	6200	100	8260B		9/21/2012	CJR	1
tert-Butylbenzene	< 5400	ug/kg	5400	17300	100	8260B		9/21/2012	CJR	1
sec-Butylbenzene	< 5100	ug/kg	5100	16200	100	8260B		9/21/2012	CJR	1
n-Butylbenzene	4900 "J"	ug/kg	4800	15200	100	8260B		9/21/2012	CJR	1
Carbon Tetrachloride	< 1200	ug/kg	1200	3900	100	8260B		9/21/2012	CJR	1
Chlorobenzene	< 940	ug/kg	940	3000	100	8260B		9/21/2012	CJR	1
Chloroethane	< 14200	ug/kg	14200	45200	100	8260B		9/21/2012	CJR	1
Chloroform	< 4600	ug/kg	4600	14600	100	8260B		9/21/2012	CJR	1
Chloromethane	< 20700	ug/kg	20700	65800	100	8260B		9/21/2012	CJR	1

Project Name FMR D-F INC. **Invoice #** E24280
Project # 13097

Lab Code 5024280E
Sample ID DUP
Sample Matrix Soil
Sample Date 9/17/2012

	Result	**Unit**	**LOD**	**LOQ**	**Dil**	**Method**	**Ext Date**	**Run Date**	**Analyst**	**Code**
2-Chlorotoluene	< 8400	ug/kg	8400	26700	100	8260B		9/21/2012	CJR	1
4-Chlorotoluene	< 7600	ug/kg	7600	24100	100	8260B		9/21/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 7700	ug/kg	7700	24500	100	8260B		9/21/2012	CJR	1
Dibromochloromethane	< 950	ug/kg	950	3000	100	8260B		9/21/2012	CJR	1
1,4-Dichlorobenzene	< 5200	ug/kg	5200	16700	100	8260B		9/21/2012	CJR	1
1,3-Dichlorobenzene	< 5300	ug/kg	5300	17000	100	8260B		9/21/2012	CJR	1
1,2-Dichlorobenzene	< 5100	ug/kg	5100	16400	100	8260B		9/21/2012	CJR	1
Dichlorodifluoromethane	< 1200	ug/kg	1200	3700	100	8260B		9/21/2012	CJR	1
1,2-Dichloroethane	< 1300	ug/kg	1300	4200	100	8260B		9/21/2012	CJR	1
1,1-Dichloroethane	< 1100	ug/kg	1100	3300	100	8260B		9/21/2012	CJR	1
1,1-Dichloroethene	< 2200	ug/kg	2200	6900	100	8260B		9/21/2012	CJR	1
cis-1,2-Dichloroethene	5700	ug/kg	1400	4400	100	8260B		9/21/2012	CJR	1
trans-1,2-Dichloroethene	< 2200	ug/kg	2200	6900	100	8260B		9/21/2012	CJR	1
1,2-Dichloropropane	< 1100	ug/kg	1100	3600	100	8260B		9/21/2012	CJR	1
2,2-Dichloropropane	< 3300	ug/kg	3300	10400	100	8260B		9/21/2012	CJR	1
1,3-Dichloropropane	< 1100	ug/kg	1100	3500	100	8260B		9/21/2012	CJR	1
Di-isopropyl ether	< 4700	ug/kg	4700	14800	100	8260B		9/21/2012	CJR	1
EDB (1,2-Dibromoethane)	< 1700	ug/kg	1700	5400	100	8260B		9/21/2012	CJR	1
Ethylbenzene	11900 "J"	ug/kg	5500	17500	100	8260B		9/21/2012	CJR	1
Hexachlorobutadiene	< 9500	ug/kg	9500	30300	100	8260B		9/21/2012	CJR	1
Isopropylbenzene	< 5300	ug/kg	5300	16800	100	8260B		9/21/2012	CJR	1
p-Isopropyltoluene	< 4500	ug/kg	4500	14300	100	8260B		9/21/2012	CJR	1
Methylene chloride	< 11900	ug/kg	11900	38000	100	8260B		9/21/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 1200	ug/kg	1200	3800	100	8260B		9/21/2012	CJR	1
Naphthalene	< 10700	ug/kg	10700	34000	100	8260B		9/21/2012	CJR	1
n-Propylbenzene	< 5300	ug/kg	5300	16900	100	8260B		9/21/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 2000	ug/kg	2000	6400	100	8260B		9/21/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 4100	ug/kg	4100	13200	100	8260B		9/21/2012	CJR	1
Tetrachloroethene	4800 "J"	ug/kg	2400	7800	100	8260B		9/21/2012	CJR	1
Toluene	14100 "J"	ug/kg	5000	15900	100	8260B		9/21/2012	CJR	1
1,2,4-Trichlorobenzene	< 7400	ug/kg	7400	23700	100	8260B		9/21/2012	CJR	1
1,2,3-Trichlorobenzene	< 12900	ug/kg	12900	40900	100	8260B		9/21/2012	CJR	1
1,1,1-Trichloroethane	20400	ug/kg	1100	3400	100	8260B		9/21/2012	CJR	1
1,1,2-Trichloroethane	< 1600	ug/kg	1600	5200	100	8260B		9/21/2012	CJR	1
Trichloroethene (TCE)	2770 "J"	ug/kg	1700	5300	100	8260B		9/21/2012	CJR	1
Trichlorofluoromethane	< 4300	ug/kg	4300	13700	100	8260B		9/21/2012	CJR	1
1,2,4-Trimethylbenzene	24700 "J"	ug/kg	8000	25300	100	8260B		9/21/2012	CJR	1
1,3,5-Trimethylbenzene	6300 "J"	ug/kg	4800	15100	100	8260B		9/21/2012	CJR	1
Vinyl Chloride	< 1600	ug/kg	1600	4900	100	8260B		9/21/2012	CJR	1
m&p-Xylene	38000	ug/kg	8600	27400	100	8260B		9/21/2012	CJR	1
o-Xylene	16200	ug/kg	5000	15900	100	8260B		9/21/2012	CJR	1
SUR - Toluene-d8	94	Rec %			100	8260B		9/21/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	99	Rec %			100	8260B		9/21/2012	CJR	1
SUR - 4-Bromofluorobenzene	104	Rec %			100	8260B		9/21/2012	CJR	1
SUR - Dibromofluoromethane	95	Rec %			100	8260B		9/21/2012	CJR	1

"J" Flag: Analyte detected between LOD and LOQ LOD Limit of Detection LOQ Limit of Quantitation

Code	*Comment*
1	Laboratory QC within limits.

All solid sample results reported on a dry weight basis unless otherwise indicated. All LOD's and LOQ's are adjusted for dilutions but not dry weight. Subcontracted results are denoted by SUB in the analyst field.

Authorized Signature Michael J. Ricker

CHAIN OF CUSTODY RECORD

Synergy
Environmental Lab, Inc.

1990 Prospect Ct. • Appleton, WI 54914
920-830-2455 • FAX 920-733-0631

Chain # № 442

Page 1 of 1

Sample Handling Request
___ Rush Analysis Date Required ___
(Rushes accepted only with prior authorization)
X Normal Turn Around

Lab I.D. #

Account No. :

Quote No.:

Project #: 13097

Sampler: (signature) Stacy Orzusik

Project (Name / Location): Former D-F Incorporated / St. Francis, WI

Reports To: Kristin Kurzka	Invoice To: SAME
Company Sigma	Company
Address 1300 West Canal St.	Address
City State Zip MKE, WI 53233	City State Zip
Phone 414-643-4200	Phone
FAX 414-643-4210	FAX

Analysis Requested / **Other Analysis**

Lab I.D.	Sample I.D.	Collection Date	Collection Time	Comp	Grab	Filtered Y/N	No. of Containers	Sample Type (Matrix)*	Preservation	DRO (Mod DRO Sep 95)	GRO (Mod GRO Sep 95)	IRON	LEAD	NITRATE / NITRITE	PAH (EPA 8270)	PVOC (EPA 8021)	PVOC + NAPHTHALENE	SULFATE	VOC DW (EPA 524.2)	VOC (EPA 8260)	8-RCRA METALS											PID/ FID
5024280A	SGP-1 (9-10')	9-17-12	9am		X	N	2	Soil	1-meth											X												399
B	SGP-2 (7.5-10')		10am																													593
C	SMW-3 (9-10')		11am																													655
D	SMW-4 (9-10')		12pm																													278
E	Dup.	9-17-12			X	N	2	Soil	1-meth											X												—

Comments/Special Instructions (*Specify groundwater "GW", Drinking Water "DW", Waste Water "WW", Soil "S", Air "A", Oil, Sludge etc.)

Samples are hot.

Sample Integrity - To be completed by receiving lab.

Method of Shipment : Dunham

Temp. of Temp. Blank ___ °C On Ice: X

Cooler seal intact upon receipt: X Yes ___ No

Relinquished By: (sign)	Time	Date	Received By: (sign)	Time	Date
Stacy Orzusik	6:50am	9-18-12			

Received in Laboratory By: Time: 8:00 Date: 9/19/12

APPENDIX E

Laboratory Reports – Water

Synergy Environmental Lab, INC.

1990 Prospect Ct., Appleton, WI 54914 *P 920-830-2455 * F 920-733-0631

KRISTEN KURZKA
SIGMA ENVIRONMMENTAL
1300 W. CANAL STREET
MILWAUKEE, WI 53233

Report Date *25-Oct-12*

Project Name FMR DF **Invoice #** E24406
Project # 13097

Lab Code 5024406A
Sample ID SMW-3
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 250	ug/l	250	800	500	8260B		10/24/2012	CJR	1
Bromobenzene	< 370	ug/l	370	1200	500	8260B		10/24/2012	CJR	1
Bromodichloromethane	< 340	ug/l	340	1100	500	8260B		10/24/2012	CJR	1
Bromoform	< 215	ug/l	215	700	500	8260B		10/24/2012	CJR	1
tert-Butylbenzene	< 355	ug/l	355	1150	500	8260B		10/24/2012	CJR	1
sec-Butylbenzene	< 500	ug/l	500	1650	500	8260B		10/24/2012	CJR	1
n-Butylbenzene	< 450	ug/l	450	1450	500	8260B		10/24/2012	CJR	1
Carbon Tetrachloride	< 235	ug/l	235	750	500	8260B		10/24/2012	CJR	1
Chlorobenzene	< 255	ug/l	255	800	500	8260B		10/24/2012	CJR	1
Chloroethane	< 700	ug/l	700	2250	500	8260B		10/24/2012	CJR	1
Chloroform	< 245	ug/l	245	750	500	8260B		10/24/2012	CJR	1
Chloromethane	< 950	ug/l	950	3050	500	8260B		10/24/2012	CJR	1
2-Chlorotoluene	< 350	ug/l	350	1100	500	8260B		10/24/2012	CJR	1
4-Chlorotoluene	< 220	ug/l	220	700	500	8260B		10/24/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 1400	ug/l	1400	4450	500	8260B		10/24/2012	CJR	1
Dibromochloromethane	< 275	ug/l	275	900	500	8260B		10/24/2012	CJR	1
1,4-Dichlorobenzene	< 490	ug/l	490	1550	500	8260B		10/24/2012	CJR	1
1,3-Dichlorobenzene	< 435	ug/l	435	1400	500	8260B		10/24/2012	CJR	1
1,2-Dichlorobenzene	< 380	ug/l	380	1200	500	8260B		10/24/2012	CJR	1
Dichlorodifluoromethane	< 900	ug/l	900	2950	500	8260B		10/24/2012	CJR	1
1,2-Dichloroethane	320 "J"	ug/l	250	800	500	8260B		10/24/2012	CJR	1
1,1-Dichloroethane	1840	ug/l	490	1550	500	8260B		10/24/2012	CJR	1
1,1-Dichloroethene	< 300	ug/l	300	950	500	8260B		10/24/2012	CJR	1
cis-1,2-Dichloroethene	31100	ug/l	370	1200	500	8260B		10/24/2012	CJR	1
trans-1,2-Dichloroethene	< 395	ug/l	395	1250	500	8260B		10/24/2012	CJR	1
1,2-Dichloropropane	< 200	ug/l	200	650	500	8260B		10/24/2012	CJR	1
2,2-Dichloropropane	< 950	ug/l	950	2950	500	8260B		10/24/2012	CJR	8
1,3-Dichloropropane	< 355	ug/l	355	1150	500	8260B		10/24/2012	CJR	1
Di-isopropyl ether	< 345	ug/l	345	1100	500	8260B		10/24/2012	CJR	1

Project Name FMR DF **Invoice #** E24406
Project # 13097

Lab Code 5024406A
Sample ID SMW-3
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
EDB (1,2-Dibromoethane)	< 315	ug/l	315	1000	500	8260B		10/24/2012	CJR	1
Ethylbenzene	950 "J"	ug/l	390	1250	500	8260B		10/24/2012	CJR	1
Hexachlorobutadiene	< 1100	ug/l	1100	3400	500	8260B		10/24/2012	CJR	1
Isopropylbenzene	< 460	ug/l	460	1450	500	8260B		10/24/2012	CJR	1
p-Isopropyltoluene	< 460	ug/l	460	1450	500	8260B		10/24/2012	CJR	1
Methylene chloride	< 550	ug/l	550	1700	500	8260B		10/24/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 400	ug/l	400	1250	500	8260B		10/24/2012	CJR	1
Naphthalene	< 1050	ug/l	1050	3400	500	8260B		10/24/2012	CJR	1
n-Propylbenzene	< 295	ug/l	295	950	500	8260B		10/24/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 265	ug/l	265	850	500	8260B		10/24/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 500	ug/l	500	1600	500	8260B		10/24/2012	CJR	1
Tetrachloroethene	820	ug/l	220	700	500	8260B		10/24/2012	CJR	1
Toluene	2500	ug/l	265	850	500	8260B		10/24/2012	CJR	1
1,2,4-Trichlorobenzene	< 750	ug/l	750	2300	500	8260B		10/24/2012	CJR	1
1,2,3-Trichlorobenzene	< 650	ug/l	650	2100	500	8260B		10/24/2012	CJR	1
1,1,1-Trichloroethane	6700	ug/l	425	1350	500	8260B		10/24/2012	CJR	1
1,1,2-Trichloroethane	< 235	ug/l	235	750	500	8260B		10/24/2012	CJR	1
Trichloroethene (TCE)	1600	ug/l	235	750	500	8260B		10/24/2012	CJR	1
Trichlorofluoromethane	< 850	ug/l	850	2650	500	8260B		10/24/2012	CJR	1
1,2,4-Trimethylbenzene	440 "J"	ug/l	400	1250	500	8260B		10/24/2012	CJR	1
1,3,5-Trimethylbenzene	< 370	ug/l	370	1200	500	8260B		10/24/2012	CJR	1
Vinyl Chloride	9700	ug/l	90	280	500	8260B		10/24/2012	CJR	1
m&p-Xylene	3400	ug/l	550	1750	500	8260B		10/24/2012	CJR	1
o-Xylene	1390	ug/l	400	1300	500	8260B		10/24/2012	CJR	1
SUR - Toluene-d8	105	REC %			500	8260B		10/24/2012	CJR	1
SUR - Dibromofluoromethane	99	REC %			500	8260B		10/24/2012	CJR	1
SUR - 4-Bromofluorobenzene	108	REC %			500	8260B		10/24/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	100	REC %			500	8260B		10/24/2012	CJR	1

Lab Code 5024406B
Sample ID SMW-4
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	5.8 "J"	ug/l	5	16	10	8260B		10/25/2012	CJR	1
Bromobenzene	< 7.4	ug/l	7.4	24	10	8260B		10/25/2012	CJR	1
Bromodichloromethane	< 6.8	ug/l	6.8	22	10	8260B		10/25/2012	CJR	1
Bromoform	< 4.3	ug/l	4.3	14	10	8260B		10/25/2012	CJR	1
tert-Butylbenzene	< 7.1	ug/l	7.1	23	10	8260B		10/25/2012	CJR	1
sec-Butylbenzene	< 10	ug/l	10	33	10	8260B		10/25/2012	CJR	1
n-Butylbenzene	17.9 "J"	ug/l	9	29	10	8260B		10/25/2012	CJR	1
Carbon Tetrachloride	< 4.7	ug/l	4.7	15	10	8260B		10/25/2012	CJR	1
Chlorobenzene	< 5.1	ug/l	5.1	16	10	8260B		10/25/2012	CJR	1
Chloroethane	48	ug/l	14	45	10	8260B		10/25/2012	CJR	1
Chloroform	< 4.9	ug/l	4.9	15	10	8260B		10/25/2012	CJR	1
Chloromethane	< 19	ug/l	19	61	10	8260B		10/25/2012	CJR	1
2-Chlorotoluene	< 7	ug/l	7	22	10	8260B		10/25/2012	CJR	1
4-Chlorotoluene	< 4.4	ug/l	4.4	14	10	8260B		10/25/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 28	ug/l	28	89	10	8260B		10/25/2012	CJR	1
Dibromochloromethane	< 5.5	ug/l	5.5	18	10	8260B		10/25/2012	CJR	1

Lab Code 5024406B
Sample ID SMW-4
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
1,4-Dichlorobenzene	< 9.8	ug/l	9.8	31	10	8260B		10/25/2012	CJR	1
1,3-Dichlorobenzene	< 8.7	ug/l	8.7	28	10	8260B		10/25/2012	CJR	1
1,2-Dichlorobenzene	< 7.6	ug/l	7.6	24	10	8260B		10/25/2012	CJR	1
Dichlorodifluoromethane	< 18	ug/l	18	59	10	8260B		10/25/2012	CJR	1
1,2-Dichloroethane	30.1	ug/l	5	16	10	8260B		10/25/2012	CJR	1
1,1-Dichloroethane	116	ug/l	9.8	31	10	8260B		10/25/2012	CJR	1
1,1-Dichloroethene	< 6	ug/l	6	19	10	8260B		10/25/2012	CJR	1
cis-1,2-Dichloroethene	640	ug/l	7.4	24	10	8260B		10/25/2012	CJR	1
trans-1,2-Dichloroethene	16.6 "J"	ug/l	7.9	25	10	8260B		10/25/2012	CJR	1
1,2-Dichloropropane	< 4	ug/l	4	13	10	8260B		10/25/2012	CJR	1
2,2-Dichloropropane	< 19	ug/l	19	59	10	8260B		10/25/2012	CJR	8
1,3-Dichloropropane	< 7.1	ug/l	7.1	23	10	8260B		10/25/2012	CJR	1
Di-isopropyl ether	< 6.9	ug/l	6.9	22	10	8260B		10/25/2012	CJR	1
EDB (1,2-Dibromoethane)	< 6.3	ug/l	6.3	20	10	8260B		10/25/2012	CJR	1
Ethylbenzene	199	ug/l	7.8	25	10	8260B		10/25/2012	CJR	1
Hexachlorobutadiene	< 22	ug/l	22	68	10	8260B		10/25/2012	CJR	1
Isopropylbenzene	15.2 "J"	ug/l	9.2	29	10	8260B		10/25/2012	CJR	1
p-Isopropyltoluene	12.8 "J"	ug/l	9.2	29	10	8260B		10/25/2012	CJR	1
Methylene chloride	< 11	ug/l	11	34	10	8260B		10/25/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 8	ug/l	8	25	10	8260B		10/25/2012	CJR	1
Naphthalene	135	ug/l	21	68	10	8260B		10/25/2012	CJR	1
n-Propylbenzene	22.7	ug/l	5.9	19	10	8260B		10/25/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 5.3	ug/l	5.3	17	10	8260B		10/25/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 10	ug/l	10	32	10	8260B		10/25/2012	CJR	1
Tetrachloroethene	< 4.4	ug/l	4.4	14	10	8260B		10/25/2012	CJR	1
Toluene	320	ug/l	5.3	17	10	8260B		10/25/2012	CJR	1
1,2,4-Trichlorobenzene	< 15	ug/l	15	46	10	8260B		10/25/2012	CJR	1
1,2,3-Trichlorobenzene	< 13	ug/l	13	42	10	8260B		10/25/2012	CJR	1
1,1,1-Trichloroethane	77	ug/l	8.5	27	10	8260B		10/25/2012	CJR	1
1,1,2-Trichloroethane	< 4.7	ug/l	4.7	15	10	8260B		10/25/2012	CJR	1
Trichloroethene (TCE)	36	ug/l	4.7	15	10	8260B		10/25/2012	CJR	1
Trichlorofluoromethane	< 17	ug/l	17	53	10	8260B		10/25/2012	CJR	1
1,2,4-Trimethylbenzene	257	ug/l	8	25	10	8260B		10/25/2012	CJR	1
1,3,5-Trimethylbenzene	76	ug/l	7.4	24	10	8260B		10/25/2012	CJR	1
Vinyl Chloride	122	ug/l	1.8	5.6	10	8260B		10/25/2012	CJR	1
m&p-Xylene	960	ug/l	11	35	10	8260B		10/25/2012	CJR	1
o-Xylene	420	ug/l	8	26	10	8260B		10/25/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	102	REC %			10	8260B		10/25/2012	CJR	1
SUR - 4-Bromofluorobenzene	106	REC %			10	8260B		10/25/2012	CJR	1
SUR - Dibromofluoromethane	100	REC %			10	8260B		10/25/2012	CJR	1
SUR - Toluene-d8	107	REC %			10	8260B		10/25/2012	CJR	1

Lab Code 5024406C
Sample ID SPM-4
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 2500	ug/l	2500	8000	5000	8260B		10/25/2012	CJR	1
Bromobenzene	< 3700	ug/l	3700	12000	5000	8260B		10/25/2012	CJR	1
Bromodichloromethane	< 3400	ug/l	3400	11000	5000	8260B		10/25/2012	CJR	1

Project Name FMR DF **Invoice #** E24406
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Lab Code 5024406C
Sample ID SPM-4
Sample Matrix Water
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	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Bromoform	< 2150	ug/l	2150	7000	5000	8260B		10/25/2012	CJR	1
tert-Butylbenzene	< 3550	ug/l	3550	11500	5000	8260B		10/25/2012	CJR	1
sec-Butylbenzene	< 5000	ug/l	5000	16500	5000	8260B		10/25/2012	CJR	1
n-Butylbenzene	< 4500	ug/l	4500	14500	5000	8260B		10/25/2012	CJR	1
Carbon Tetrachloride	< 2350	ug/l	2350	7500	5000	8260B		10/25/2012	CJR	1
Chlorobenzene	< 2550	ug/l	2550	8000	5000	8260B		10/25/2012	CJR	1
Chloroethane	< 7000	ug/l	7000	22500	5000	8260B		10/25/2012	CJR	1
Chloroform	< 2450	ug/l	2450	7500	5000	8260B		10/25/2012	CJR	1
Chloromethane	< 9500	ug/l	9500	30500	5000	8260B		10/25/2012	CJR	1
2-Chlorotoluene	< 3500	ug/l	3500	11000	5000	8260B		10/25/2012	CJR	1
4-Chlorotoluene	< 2200	ug/l	2200	7000	5000	8260B		10/25/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 14000	ug/l	14000	44500	5000	8260B		10/25/2012	CJR	1
Dibromochloromethane	< 2750	ug/l	2750	9000	5000	8260B		10/25/2012	CJR	1
1,4-Dichlorobenzene	< 4900	ug/l	4900	15500	5000	8260B		10/25/2012	CJR	1
1,3-Dichlorobenzene	< 4350	ug/l	4350	14000	5000	8260B		10/25/2012	CJR	1
1,2-Dichlorobenzene	< 3800	ug/l	3800	12000	5000	8260B		10/25/2012	CJR	1
Dichlorodifluoromethane	< 9000	ug/l	9000	29500	5000	8260B		10/25/2012	CJR	1
1,2-Dichloroethane	< 2500	ug/l	2500	8000	5000	8260B		10/25/2012	CJR	1
1,1-Dichloroethane	12800 "J"	ug/l	4900	15500	5000	8260B		10/25/2012	CJR	1
1,1-Dichloroethene	< 3000	ug/l	3000	9500	5000	8260B		10/25/2012	CJR	1
cis-1,2-Dichloroethene	283000	ug/l	3700	12000	5000	8260B		10/25/2012	CJR	1
trans-1,2-Dichloroethene	< 3950	ug/l	3950	12500	5000	8260B		10/25/2012	CJR	1
1,2-Dichloropropane	< 2000	ug/l	2000	6500	5000	8260B		10/25/2012	CJR	1
2,2-Dichloropropane	< 9500	ug/l	9500	29500	5000	8260B		10/25/2012	CJR	8
1,3-Dichloropropane	< 3550	ug/l	3550	11500	5000	8260B		10/25/2012	CJR	1
Di-isopropyl ether	< 3450	ug/l	3450	11000	5000	8260B		10/25/2012	CJR	1
EDB (1,2-Dibromoethane)	< 3150	ug/l	3150	10000	5000	8260B		10/25/2012	CJR	1
Ethylbenzene	< 3900	ug/l	3900	12500	5000	8260B		10/25/2012	CJR	1
Hexachlorobutadiene	< 11000	ug/l	11000	34000	5000	8260B		10/25/2012	CJR	1
Isopropylbenzene	< 4600	ug/l	4600	14500	5000	8260B		10/25/2012	CJR	1
p-Isopropyltoluene	< 4600	ug/l	4600	14500	5000	8260B		10/25/2012	CJR	1
Methylene chloride	< 5500	ug/l	5500	17000	5000	8260B		10/25/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 4000	ug/l	4000	12500	5000	8260B		10/25/2012	CJR	1
Naphthalene	< 10500	ug/l	10500	34000	5000	8260B		10/25/2012	CJR	1
n-Propylbenzene	< 2950	ug/l	2950	9500	5000	8260B		10/25/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 2650	ug/l	2650	8500	5000	8260B		10/25/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 5000	ug/l	5000	16000	5000	8260B		10/25/2012	CJR	1
Tetrachloroethene	< 2200	ug/l	2200	7000	5000	8260B		10/25/2012	CJR	1
Toluene	19000	ug/l	2650	8500	5000	8260B		10/25/2012	CJR	1
1,2,4-Trichlorobenzene	< 7500	ug/l	7500	23000	5000	8260B		10/25/2012	CJR	1
1,2,3-Trichlorobenzene	< 6500	ug/l	6500	21000	5000	8260B		10/25/2012	CJR	1
1,1,1-Trichloroethane	96000	ug/l	4250	13500	5000	8260B		10/25/2012	CJR	1
1,1,2-Trichloroethane	< 2350	ug/l	2350	7500	5000	8260B		10/25/2012	CJR	1
Trichloroethene (TCE)	26000	ug/l	2350	7500	5000	8260B		10/25/2012	CJR	1
Trichlorofluoromethane	< 8500	ug/l	8500	26500	5000	8260B		10/25/2012	CJR	1
1,2,4-Trimethylbenzene	< 4000	ug/l	4000	12500	5000	8260B		10/25/2012	CJR	1
1,3,5-Trimethylbenzene	< 3700	ug/l	3700	12000	5000	8260B		10/25/2012	CJR	1
Vinyl Chloride	12600	ug/l	900	2800	5000	8260B		10/25/2012	CJR	1
m&p-Xylene	8800 "J"	ug/l	5500	17500	5000	8260B		10/25/2012	CJR	1
o-Xylene	< 4000	ug/l	4000	13000	5000	8260B		10/25/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	99	REC %			5000	8260B		10/25/2012	CJR	1
SUR - 4-Bromofluorobenzene	106	REC %			5000	8260B		10/25/2012	CJR	1

Project Name FMR DF **Invoice #** E24406
Project # 13097

Lab Code 5024406C
Sample ID SPM-4
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
SUR - Dibromofluoromethane	96	REC %			5000	8260B		10/25/2012	CJR	1
SUR - Toluene-d8	106	REC %			5000	8260B		10/25/2012	CJR	1

Lab Code 5024406D
Sample ID MW-1
Sample Matrix Water
Sample Date 10/15/2012

Organic

VOC's

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Benzene	< 0.5	ug/l	0.5	1.6	1	8260B		10/24/2012	CJR	1
Bromobenzene	< 0.74	ug/l	0.74	2.4	1	8260B		10/24/2012	CJR	1
Bromodichloromethane	< 0.68	ug/l	0.68	2.2	1	8260B		10/24/2012	CJR	1
Bromoform	< 0.43	ug/l	0.43	1.4	1	8260B		10/24/2012	CJR	1
tert-Butylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		10/24/2012	CJR	1
sec-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		10/24/2012	CJR	1
n-Butylbenzene	< 0.9	ug/l	0.9	2.9	1	8260B		10/24/2012	CJR	1
Carbon Tetrachloride	< 0.47	ug/l	0.47	1.5	1	8260B		10/24/2012	CJR	1
Chlorobenzene	< 0.51	ug/l	0.51	1.6	1	8260B		10/24/2012	CJR	1
Chloroethane	< 1.4	ug/l	1.4	4.5	1	8260B		10/24/2012	CJR	1
Chloroform	< 0.49	ug/l	0.49	1.5	1	8260B		10/24/2012	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6.1	1	8260B		10/24/2012	CJR	1
2-Chlorotoluene	< 0.7	ug/l	0.7	2.2	1	8260B		10/24/2012	CJR	1
4-Chlorotoluene	< 0.44	ug/l	0.44	1.4	1	8260B		10/24/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 2.8	ug/l	2.8	8.9	1	8260B		10/24/2012	CJR	1
Dibromochloromethane	< 0.55	ug/l	0.55	1.8	1	8260B		10/24/2012	CJR	1
1,4-Dichlorobenzene	< 0.98	ug/l	0.98	3.1	1	8260B		10/24/2012	CJR	1
1,3-Dichlorobenzene	< 0.87	ug/l	0.87	2.8	1	8260B		10/24/2012	CJR	1
1,2-Dichlorobenzene	< 0.76	ug/l	0.76	2.4	1	8260B		10/24/2012	CJR	1
Dichlorodifluoromethane	< 1.8	ug/l	1.8	5.9	1	8260B		10/24/2012	CJR	1
1,2-Dichloroethane	9.3	ug/l	0.5	1.6	1	8260B		10/24/2012	CJR	1
1,1-Dichloroethane	< 0.98	ug/l	0.98	3.1	1	8260B		10/24/2012	CJR	1
1,1-Dichloroethene	< 0.6	ug/l	0.6	1.9	1	8260B		10/24/2012	CJR	1
cis-1,2-Dichloroethene	< 0.74	ug/l	0.74	2.4	1	8260B		10/24/2012	CJR	1
trans-1,2-Dichloroethene	< 0.79	ug/l	0.79	2.5	1	8260B		10/24/2012	CJR	1
1,2-Dichloropropane	< 0.4	ug/l	0.4	1.3	1	8260B		10/24/2012	CJR	1
2,2-Dichloropropane	< 1.9	ug/l	1.9	5.9	1	8260B		10/24/2012	CJR	8
1,3-Dichloropropane	< 0.71	ug/l	0.71	2.3	1	8260B		10/24/2012	CJR	1
Di-isopropyl ether	< 0.69	ug/l	0.69	2.2	1	8260B		10/24/2012	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		10/24/2012	CJR	1
Ethylbenzene	< 0.78	ug/l	0.78	2.5	1	8260B		10/24/2012	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	6.8	1	8260B		10/24/2012	CJR	1
Isopropylbenzene	< 0.92	ug/l	0.92	2.9	1	8260B		10/24/2012	CJR	1
p-Isopropyltoluene	< 0.92	ug/l	0.92	2.9	1	8260B		10/24/2012	CJR	1
Methylene chloride	< 1.1	ug/l	1.1	3.4	1	8260B		10/24/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 0.8	ug/l	0.8	2.5	1	8260B		10/24/2012	CJR	1
Naphthalene	< 2.1	ug/l	2.1	6.8	1	8260B		10/24/2012	CJR	1
n-Propylbenzene	< 0.59	ug/l	0.59	1.9	1	8260B		10/24/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 0.53	ug/l	0.53	1.7	1	8260B		10/24/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 1	ug/l	1	3.2	1	8260B		10/24/2012	CJR	1
Tetrachloroethene	< 0.44	ug/l	0.44	1.4	1	8260B		10/24/2012	CJR	1
Toluene	< 0.53	ug/l	0.53	1.7	1	8260B		10/24/2012	CJR	1

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Sample ID MW-1
Sample Matrix Water
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	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
1,2,4-Trichlorobenzene	< 1.5	ug/l	1.5	4.6	1	8260B		10/24/2012	CJR	1
1,2,3-Trichlorobenzene	< 1.3	ug/l	1.3	4.2	1	8260B		10/24/2012	CJR	1
1,1,1-Trichloroethane	< 0.85	ug/l	0.85	2.7	1	8260B		10/24/2012	CJR	1
1,1,2-Trichloroethane	< 0.47	ug/l	0.47	1.5	1	8260B		10/24/2012	CJR	1
Trichloroethene (TCE)	< 0.47	ug/l	0.47	1.5	1	8260B		10/24/2012	CJR	1
Trichlorofluoromethane	< 1.7	ug/l	1.7	5.3	1	8260B		10/24/2012	CJR	1
1,2,4-Trimethylbenzene	< 0.8	ug/l	0.8	2.5	1	8260B		10/24/2012	CJR	1
1,3,5-Trimethylbenzene	< 0.74	ug/l	0.74	2.4	1	8260B		10/24/2012	CJR	1
Vinyl Chloride	1.27	ug/l	0.18	0.56	1	8260B		10/24/2012	CJR	1
m&p-Xylene	< 1.1	ug/l	1.1	3.5	1	8260B		10/24/2012	CJR	1
o-Xylene	< 0.8	ug/l	0.8	2.6	1	8260B		10/24/2012	CJR	1
SUR - 4-Bromofluorobenzene	107	REC %			1	8260B		10/24/2012	CJR	1
SUR - Dibromofluoromethane	99	REC %			1	8260B		10/24/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	98	REC %			1	8260B		10/24/2012	CJR	1
SUR - Toluene-d8	109	REC %			1	8260B		10/24/2012	CJR	1

Lab Code 5024406E
Sample ID MW-2
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 1000	ug/l	1000	3200	2000	8260B		10/25/2012	CJR	1
Bromobenzene	< 1480	ug/l	1480	4800	2000	8260B		10/25/2012	CJR	1
Bromodichloromethane	< 1360	ug/l	1360	4400	2000	8260B		10/25/2012	CJR	1
Bromoform	< 860	ug/l	860	2800	2000	8260B		10/25/2012	CJR	1
tert-Butylbenzene	< 1420	ug/l	1420	4600	2000	8260B		10/25/2012	CJR	1
sec-Butylbenzene	< 2000	ug/l	2000	6600	2000	8260B		10/25/2012	CJR	1
n-Butylbenzene	< 1800	ug/l	1800	5800	2000	8260B		10/25/2012	CJR	1
Carbon Tetrachloride	< 940	ug/l	940	3000	2000	8260B		10/25/2012	CJR	1
Chlorobenzene	< 1020	ug/l	1020	3200	2000	8260B		10/25/2012	CJR	1
Chloroethane	< 2800	ug/l	2800	9000	2000	8260B		10/25/2012	CJR	1
Chloroform	< 980	ug/l	980	3000	2000	8260B		10/25/2012	CJR	1
Chloromethane	< 3800	ug/l	3800	12200	2000	8260B		10/25/2012	CJR	1
2-Chlorotoluene	< 1400	ug/l	1400	4400	2000	8260B		10/25/2012	CJR	1
4-Chlorotoluene	< 880	ug/l	880	2800	2000	8260B		10/25/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 5600	ug/l	5600	17800	2000	8260B		10/25/2012	CJR	1
Dibromochloromethane	< 1100	ug/l	1100	3600	2000	8260B		10/25/2012	CJR	1
1,4-Dichlorobenzene	< 1960	ug/l	1960	6200	2000	8260B		10/25/2012	CJR	1
1,3-Dichlorobenzene	< 1740	ug/l	1740	5600	2000	8260B		10/25/2012	CJR	1
1,2-Dichlorobenzene	< 1520	ug/l	1520	4800	2000	8260B		10/25/2012	CJR	1
Dichlorodifluoromethane	< 3600	ug/l	3600	11800	2000	8260B		10/25/2012	CJR	1
1,2-Dichloroethane	< 1000	ug/l	1000	3200	2000	8260B		10/25/2012	CJR	1
1,1-Dichloroethane	4500 "J"	ug/l	1960	6200	2000	8260B		10/25/2012	CJR	1
1,1-Dichloroethene	< 1200	ug/l	1200	3800	2000	8260B		10/25/2012	CJR	1
cis-1,2-Dichloroethene	120000	ug/l	1480	4800	2000	8260B		10/25/2012	CJR	1
trans-1,2-Dichloroethene	< 1580	ug/l	1580	5000	2000	8260B		10/25/2012	CJR	1
1,2-Dichloropropane	< 800	ug/l	800	2600	2000	8260B		10/25/2012	CJR	1
2,2-Dichloropropane	< 3800	ug/l	3800	11800	2000	8260B		10/25/2012	CJR	8
1,3-Dichloropropane	< 1420	ug/l	1420	4600	2000	8260B		10/25/2012	CJR	1
Di-isopropyl ether	< 1380	ug/l	1380	4400	2000	8260B		10/25/2012	CJR	1

Lab Code 5024406E
Sample ID MW-2
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
EDB (1,2-Dibromoethane)	< 1260	ug/l	1260	4000	2000	8260B		10/25/2012	CJR	1
Ethylbenzene	< 1560	ug/l	1560	5000	2000	8260B		10/25/2012	CJR	1
Hexachlorobutadiene	< 4400	ug/l	4400	13600	2000	8260B		10/25/2012	CJR	1
Isopropylbenzene	< 1840	ug/l	1840	5800	2000	8260B		10/25/2012	CJR	1
p-Isopropyltoluene	< 1840	ug/l	1840	5800	2000	8260B		10/25/2012	CJR	1
Methylene chloride	< 2200	ug/l	2200	6800	2000	8260B		10/25/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 1600	ug/l	1600	5000	2000	8260B		10/25/2012	CJR	1
Naphthalene	< 4200	ug/l	4200	13600	2000	8260B		10/25/2012	CJR	1
n-Propylbenzene	< 1180	ug/l	1180	3800	2000	8260B		10/25/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 1060	ug/l	1060	3400	2000	8260B		10/25/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 2000	ug/l	2000	6400	2000	8260B		10/25/2012	CJR	1
Tetrachloroethene	< 880	ug/l	880	2800	2000	8260B		10/25/2012	CJR	1
Toluene	1740 "J"	ug/l	1060	3400	2000	8260B		10/25/2012	CJR	1
1,2,4-Trichlorobenzene	< 3000	ug/l	3000	9200	2000	8260B		10/25/2012	CJR	1
1,2,3-Trichlorobenzene	< 2600	ug/l	2600	8400	2000	8260B		10/25/2012	CJR	1
1,1,1-Trichloroethane	17900	ug/l	1700	5400	2000	8260B		10/25/2012	CJR	1
1,1,2-Trichloroethane	< 940	ug/l	940	3000	2000	8260B		10/25/2012	CJR	1
Trichloroethene (TCE)	1820 "J"	ug/l	940	3000	2000	8260B		10/25/2012	CJR	1
Trichlorofluoromethane	< 3400	ug/l	3400	10600	2000	8260B		10/25/2012	CJR	1
1,2,4-Trimethylbenzene	< 1600	ug/l	1600	5000	2000	8260B		10/25/2012	CJR	1
1,3,5-Trimethylbenzene	< 1480	ug/l	1480	4800	2000	8260B		10/25/2012	CJR	1
Vinyl Chloride	1820	ug/l	360	1120	2000	8260B		10/25/2012	CJR	1
m&p-Xylene	< 2200	ug/l	2200	7000	2000	8260B		10/25/2012	CJR	1
o-Xylene	< 1600	ug/l	1600	5200	2000	8260B		10/25/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	102	REC %			2000	8260B		10/25/2012	CJR	1
SUR - 4-Bromofluorobenzene	101	REC %			2000	8260B		10/25/2012	CJR	1
SUR - Dibromofluoromethane	98	REC %			2000	8260B		10/25/2012	CJR	1
SUR - Toluene-d8	107	REC %			2000	8260B		10/25/2012	CJR	1

Lab Code 5024406F
Sample ID MW-3
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	0.91 "J"	ug/l	0.5	1.6	1	8260B		10/24/2012	CJR	1
Bromobenzene	< 0.74	ug/l	0.74	2.4	1	8260B		10/24/2012	CJR	1
Bromodichloromethane	< 0.68	ug/l	0.68	2.2	1	8260B		10/24/2012	CJR	1
Bromoform	< 0.43	ug/l	0.43	1.4	1	8260B		10/24/2012	CJR	1
tert-Butylbenzene	1.48 "J"	ug/l	0.71	2.3	1	8260B		10/24/2012	CJR	1
sec-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		10/24/2012	CJR	1
n-Butylbenzene	< 0.9	ug/l	0.9	2.9	1	8260B		10/24/2012	CJR	1
Carbon Tetrachloride	< 0.47	ug/l	0.47	1.5	1	8260B		10/24/2012	CJR	1
Chlorobenzene	< 0.51	ug/l	0.51	1.6	1	8260B		10/24/2012	CJR	1
Chloroethane	2.93 "J"	ug/l	1.4	4.5	1	8260B		10/24/2012	CJR	1
Chloroform	< 0.49	ug/l	0.49	1.5	1	8260B		10/24/2012	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6.1	1	8260B		10/24/2012	CJR	1
2-Chlorotoluene	< 0.7	ug/l	0.7	2.2	1	8260B		10/24/2012	CJR	1
4-Chlorotoluene	< 0.44	ug/l	0.44	1.4	1	8260B		10/24/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 2.8	ug/l	2.8	8.9	1	8260B		10/24/2012	CJR	1
Dibromochloromethane	< 0.55	ug/l	0.55	1.8	1	8260B		10/24/2012	CJR	1

Lab Code 5024406F
Sample ID MW-3
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
1,4-Dichlorobenzene	< 0.98	ug/l	0.98	3.1	1	8260B		10/24/2012	CJR	1
1,3-Dichlorobenzene	< 0.87	ug/l	0.87	2.8	1	8260B		10/24/2012	CJR	1
1,2-Dichlorobenzene	< 0.76	ug/l	0.76	2.4	1	8260B		10/24/2012	CJR	1
Dichlorodifluoromethane	< 1.8	ug/l	1.8	5.9	1	8260B		10/24/2012	CJR	1
1,2-Dichloroethane	0.55 "J"	ug/l	0.5	1.6	1	8260B		10/24/2012	CJR	1
1,1-Dichloroethane	2.59 "J"	ug/l	0.98	3.1	1	8260B		10/24/2012	CJR	1
1,1-Dichloroethene	< 0.6	ug/l	0.6	1.9	1	8260B		10/24/2012	CJR	1
cis-1,2-Dichloroethene	6.4	ug/l	0.74	2.4	1	8260B		10/24/2012	CJR	1
trans-1,2-Dichloroethene	< 0.79	ug/l	0.79	2.5	1	8260B		10/24/2012	CJR	1
1,2-Dichloropropane	< 0.4	ug/l	0.4	1.3	1	8260B		10/24/2012	CJR	1
2,2-Dichloropropane	< 1.9	ug/l	1.9	5.9	1	8260B		10/24/2012	CJR	8
1,3-Dichloropropane	< 0.71	ug/l	0.71	2.3	1	8260B		10/24/2012	CJR	1
Di-isopropyl ether	< 0.69	ug/l	0.69	2.2	1	8260B		10/24/2012	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		10/24/2012	CJR	1
Ethylbenzene	< 0.78	ug/l	0.78	2.5	1	8260B		10/24/2012	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	6.8	1	8260B		10/24/2012	CJR	1
Isopropylbenzene	1.44 "J"	ug/l	0.92	2.9	1	8260B		10/24/2012	CJR	1
p-Isopropyltoluene	< 0.92	ug/l	0.92	2.9	1	8260B		10/24/2012	CJR	1
Methylene chloride	< 1.1	ug/l	1.1	3.4	1	8260B		10/24/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 0.8	ug/l	0.8	2.5	1	8260B		10/24/2012	CJR	1
Naphthalene	< 2.1	ug/l	2.1	6.8	1	8260B		10/24/2012	CJR	1
n-Propylbenzene	< 0.59	ug/l	0.59	1.9	1	8260B		10/24/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 0.53	ug/l	0.53	1.7	1	8260B		10/24/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 1	ug/l	1	3.2	1	8260B		10/24/2012	CJR	1
Tetrachloroethene	< 0.44	ug/l	0.44	1.4	1	8260B		10/24/2012	CJR	1
Toluene	< 0.53	ug/l	0.53	1.7	1	8260B		10/24/2012	CJR	1
1,2,4-Trichlorobenzene	< 1.5	ug/l	1.5	4.6	1	8260B		10/24/2012	CJR	1
1,2,3-Trichlorobenzene	< 1.3	ug/l	1.3	4.2	1	8260B		10/24/2012	CJR	1
1,1,1-Trichloroethane	< 0.85	ug/l	0.85	2.7	1	8260B		10/24/2012	CJR	1
1,1,2-Trichloroethane	< 0.47	ug/l	0.47	1.5	1	8260B		10/24/2012	CJR	1
Trichloroethene (TCE)	< 0.47	ug/l	0.47	1.5	1	8260B		10/24/2012	CJR	1
Trichlorofluoromethane	< 1.7	ug/l	1.7	5.3	1	8260B		10/24/2012	CJR	1
1,2,4-Trimethylbenzene	< 0.8	ug/l	0.8	2.5	1	8260B		10/24/2012	CJR	1
1,3,5-Trimethylbenzene	< 0.74	ug/l	0.74	2.4	1	8260B		10/24/2012	CJR	1
Vinyl Chloride	35	ug/l	0.18	0.56	1	8260B		10/24/2012	CJR	1
m&p-Xylene	< 1.1	ug/l	1.1	3.5	1	8260B		10/24/2012	CJR	1
o-Xylene	< 0.8	ug/l	0.8	2.6	1	8260B		10/24/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	100	REC %			1	8260B		10/24/2012	CJR	1
SUR - 4-Bromofluorobenzene	108	REC %			1	8260B		10/24/2012	CJR	1
SUR - Dibromofluoromethane	100	REC %			1	8260B		10/24/2012	CJR	1
SUR - Toluene-d8	107	REC %			1	8260B		10/24/2012	CJR	1

Lab Code 5024406G
Sample ID MW-4
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	2.22	ug/l	0.5	1.6	1	8260B		10/24/2012	CJR	1
Bromobenzene	< 0.74	ug/l	0.74	2.4	1	8260B		10/24/2012	CJR	1
Bromodichloromethane	< 0.68	ug/l	0.68	2.2	1	8260B		10/24/2012	CJR	1

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Project # 13097

Lab Code 5024406G
Sample ID MW-4
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Bromoform	< 0.43	ug/l	0.43	1.4	1	8260B		10/24/2012	CJR	1
tert-Butylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		10/24/2012	CJR	1
sec-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		10/24/2012	CJR	1
n-Butylbenzene	< 0.9	ug/l	0.9	2.9	1	8260B		10/24/2012	CJR	1
Carbon Tetrachloride	< 0.47	ug/l	0.47	1.5	1	8260B		10/24/2012	CJR	1
Chlorobenzene	2.8	ug/l	0.51	1.6	1	8260B		10/24/2012	CJR	1
Chloroethane	27	ug/l	1.4	4.5	1	8260B		10/24/2012	CJR	1
Chloroform	< 0.49	ug/l	0.49	1.5	1	8260B		10/24/2012	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6.1	1	8260B		10/24/2012	CJR	1
2-Chlorotoluene	< 0.7	ug/l	0.7	2.2	1	8260B		10/24/2012	CJR	1
4-Chlorotoluene	< 0.44	ug/l	0.44	1.4	1	8260B		10/24/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 2.8	ug/l	2.8	8.9	1	8260B		10/24/2012	CJR	1
Dibromochloromethane	< 0.55	ug/l	0.55	1.8	1	8260B		10/24/2012	CJR	1
1,4-Dichlorobenzene	< 0.98	ug/l	0.98	3.1	1	8260B		10/24/2012	CJR	1
1,3-Dichlorobenzene	< 0.87	ug/l	0.87	2.8	1	8260B		10/24/2012	CJR	1
1,2-Dichlorobenzene	< 0.76	ug/l	0.76	2.4	1	8260B		10/24/2012	CJR	1
Dichlorodifluoromethane	< 1.8	ug/l	1.8	5.9	1	8260B		10/24/2012	CJR	1
1,2-Dichloroethane	2.31	ug/l	0.5	1.6	1	8260B		10/24/2012	CJR	1
1,1-Dichloroethane	14.1	ug/l	0.98	3.1	1	8260B		10/24/2012	CJR	1
1,1-Dichloroethene	< 0.6	ug/l	0.6	1.9	1	8260B		10/24/2012	CJR	1
cis-1,2-Dichloroethene	1.75 "J"	ug/l	0.74	2.4	1	8260B		10/24/2012	CJR	1
trans-1,2-Dichloroethene	< 0.79	ug/l	0.79	2.5	1	8260B		10/24/2012	CJR	1
1,2-Dichloropropane	< 0.4	ug/l	0.4	1.3	1	8260B		10/24/2012	CJR	1
2,2-Dichloropropane	< 1.9	ug/l	1.9	5.9	1	8260B		10/24/2012	CJR	8
1,3-Dichloropropane	< 0.71	ug/l	0.71	2.3	1	8260B		10/24/2012	CJR	1
Di-isopropyl ether	< 0.69	ug/l	0.69	2.2	1	8260B		10/24/2012	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		10/24/2012	CJR	1
Ethylbenzene	< 0.78	ug/l	0.78	2.5	1	8260B		10/24/2012	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	6.8	1	8260B		10/24/2012	CJR	1
Isopropylbenzene	0.95 "J"	ug/l	0.92	2.9	1	8260B		10/24/2012	CJR	1
p-Isopropyltoluene	< 0.92	ug/l	0.92	2.9	1	8260B		10/24/2012	CJR	1
Methylene chloride	< 1.1	ug/l	1.1	3.4	1	8260B		10/24/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 0.8	ug/l	0.8	2.5	1	8260B		10/24/2012	CJR	1
Naphthalene	< 2.1	ug/l	2.1	6.8	1	8260B		10/24/2012	CJR	1
n-Propylbenzene	< 0.59	ug/l	0.59	1.9	1	8260B		10/24/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 0.53	ug/l	0.53	1.7	1	8260B		10/24/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 1	ug/l	1	3.2	1	8260B		10/24/2012	CJR	1
Tetrachloroethene	< 0.44	ug/l	0.44	1.4	1	8260B		10/24/2012	CJR	1
Toluene	< 0.53	ug/l	0.53	1.7	1	8260B		10/24/2012	CJR	1
1,2,4-Trichlorobenzene	< 1.5	ug/l	1.5	4.6	1	8260B		10/24/2012	CJR	1
1,2,3-Trichlorobenzene	< 1.3	ug/l	1.3	4.2	1	8260B		10/24/2012	CJR	1
1,1,1-Trichloroethane	1.28 "J"	ug/l	0.85	2.7	1	8260B		10/24/2012	CJR	1
1,1,2-Trichloroethane	< 0.47	ug/l	0.47	1.5	1	8260B		10/24/2012	CJR	1
Trichloroethene (TCE)	6.5	ug/l	0.47	1.5	1	8260B		10/24/2012	CJR	1
Trichlorofluoromethane	< 1.7	ug/l	1.7	5.3	1	8260B		10/24/2012	CJR	1
1,2,4-Trimethylbenzene	< 0.8	ug/l	0.8	2.5	1	8260B		10/24/2012	CJR	1
1,3,5-Trimethylbenzene	< 0.74	ug/l	0.74	2.4	1	8260B		10/24/2012	CJR	1
Vinyl Chloride	2.73	ug/l	0.18	0.56	1	8260B		10/24/2012	CJR	1
m&p-Xylene	< 1.1	ug/l	1.1	3.5	1	8260B		10/24/2012	CJR	1
o-Xylene	< 0.8	ug/l	0.8	2.6	1	8260B		10/24/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	98	REC %			1	8260B		10/24/2012	CJR	1
SUR - 4-Bromofluorobenzene	105	REC %			1	8260B		10/24/2012	CJR	1

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Sample ID MW-4
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
SUR - Dibromofluoromethane	94	REC %			1	8260B		10/24/2012	CJR	1
SUR - Toluene-d8	109	REC %			1	8260B		10/24/2012	CJR	1

Lab Code 5024406H
Sample ID MW-5
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	1.96	ug/l	0.5	1.6	1	8260B		10/24/2012	CJR	1
Bromobenzene	< 0.74	ug/l	0.74	2.4	1	8260B		10/24/2012	CJR	1
Bromodichloromethane	< 0.68	ug/l	0.68	2.2	1	8260B		10/24/2012	CJR	1
Bromoform	< 0.43	ug/l	0.43	1.4	1	8260B		10/24/2012	CJR	1
tert-Butylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		10/24/2012	CJR	1
sec-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		10/24/2012	CJR	1
n-Butylbenzene	< 0.9	ug/l	0.9	2.9	1	8260B		10/24/2012	CJR	1
Carbon Tetrachloride	< 0.47	ug/l	0.47	1.5	1	8260B		10/24/2012	CJR	1
Chlorobenzene	< 0.51	ug/l	0.51	1.6	1	8260B		10/24/2012	CJR	1
Chloroethane	< 1.4	ug/l	1.4	4.5	1	8260B		10/24/2012	CJR	1
Chloroform	< 0.49	ug/l	0.49	1.5	1	8260B		10/24/2012	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6.1	1	8260B		10/24/2012	CJR	1
2-Chlorotoluene	< 0.7	ug/l	0.7	2.2	1	8260B		10/24/2012	CJR	1
4-Chlorotoluene	< 0.44	ug/l	0.44	1.4	1	8260B		10/24/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 2.8	ug/l	2.8	8.9	1	8260B		10/24/2012	CJR	1
Dibromochloromethane	< 0.55	ug/l	0.55	1.8	1	8260B		10/24/2012	CJR	1
1,4-Dichlorobenzene	< 0.98	ug/l	0.98	3.1	1	8260B		10/24/2012	CJR	1
1,3-Dichlorobenzene	< 0.87	ug/l	0.87	2.8	1	8260B		10/24/2012	CJR	1
1,2-Dichlorobenzene	< 0.76	ug/l	0.76	2.4	1	8260B		10/24/2012	CJR	1
Dichlorodifluoromethane	< 1.8	ug/l	1.8	5.9	1	8260B		10/24/2012	CJR	1
1,2-Dichloroethane	0.92 "J"	ug/l	0.5	1.6	1	8260B		10/24/2012	CJR	1
1,1-Dichloroethane	35	ug/l	0.98	3.1	1	8260B		10/24/2012	CJR	1
1,1-Dichloroethene	< 0.6	ug/l	0.6	1.9	1	8260B		10/24/2012	CJR	1
cis-1,2-Dichloroethene	30.7	ug/l	0.74	2.4	1	8260B		10/24/2012	CJR	1
trans-1,2-Dichloroethene	< 0.79	ug/l	0.79	2.5	1	8260B		10/24/2012	CJR	1
1,2-Dichloropropane	< 0.4	ug/l	0.4	1.3	1	8260B		10/24/2012	CJR	1
2,2-Dichloropropane	< 1.9	ug/l	1.9	5.9	1	8260B		10/24/2012	CJR	8
1,3-Dichloropropane	< 0.71	ug/l	0.71	2.3	1	8260B		10/24/2012	CJR	1
Di-isopropyl ether	< 0.69	ug/l	0.69	2.2	1	8260B		10/24/2012	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		10/24/2012	CJR	1
Ethylbenzene	< 0.78	ug/l	0.78	2.5	1	8260B		10/24/2012	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	6.8	1	8260B		10/24/2012	CJR	1
Isopropylbenzene	< 0.92	ug/l	0.92	2.9	1	8260B		10/24/2012	CJR	1
p-Isopropyltoluene	< 0.92	ug/l	0.92	2.9	1	8260B		10/24/2012	CJR	1
Methylene chloride	< 1.1	ug/l	1.1	3.4	1	8260B		10/24/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 0.8	ug/l	0.8	2.5	1	8260B		10/24/2012	CJR	1
Naphthalene	< 2.1	ug/l	2.1	6.8	1	8260B		10/24/2012	CJR	1
n-Propylbenzene	< 0.59	ug/l	0.59	1.9	1	8260B		10/24/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 0.53	ug/l	0.53	1.7	1	8260B		10/24/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 1	ug/l	1	3.2	1	8260B		10/24/2012	CJR	1
Tetrachloroethene	< 0.44	ug/l	0.44	1.4	1	8260B		10/24/2012	CJR	1
Toluene	< 0.53	ug/l	0.53	1.7	1	8260B		10/24/2012	CJR	1

Lab Code 5024406H
Sample ID MW-5
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Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
1,2,4-Trichlorobenzene	< 1.5	ug/l	1.5	4.6	1	8260B		10/24/2012	CJR	1
1,2,3-Trichlorobenzene	< 1.3	ug/l	1.3	4.2	1	8260B		10/24/2012	CJR	1
1,1,1-Trichloroethane	3.3	ug/l	0.85	2.7	1	8260B		10/24/2012	CJR	1
1,1,2-Trichloroethane	< 0.47	ug/l	0.47	1.5	1	8260B		10/24/2012	CJR	1
Trichloroethene (TCE)	35	ug/l	0.47	1.5	1	8260B		10/24/2012	CJR	1
Trichlorofluoromethane	< 1.7	ug/l	1.7	5.3	1	8260B		10/24/2012	CJR	1
1,2,4-Trimethylbenzene	< 0.8	ug/l	0.8	2.5	1	8260B		10/24/2012	CJR	1
1,3,5-Trimethylbenzene	< 0.74	ug/l	0.74	2.4	1	8260B		10/24/2012	CJR	1
Vinyl Chloride	17.5	ug/l	0.18	0.56	1	8260B		10/24/2012	CJR	1
m&p-Xylene	< 1.1	ug/l	1.1	3.5	1	8260B		10/24/2012	CJR	1
o-Xylene	< 0.8	ug/l	0.8	2.6	1	8260B		10/24/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	98	REC %			1	8260B		10/24/2012	CJR	1
SUR - Toluene-d8	104	REC %			1	8260B		10/24/2012	CJR	1
SUR - Dibromofluoromethane	98	REC %			1	8260B		10/24/2012	CJR	1
SUR - 4-Bromofluorobenzene	103	REC %			1	8260B		10/24/2012	CJR	1

Lab Code 5024406I
Sample ID MW-6
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	5.4 "J"	ug/l	5	16	10	8260B		10/25/2012	CJR	1
Bromobenzene	< 7.4	ug/l	7.4	24	10	8260B		10/25/2012	CJR	1
Bromodichloromethane	< 6.8	ug/l	6.8	22	10	8260B		10/25/2012	CJR	1
Bromoform	< 4.3	ug/l	4.3	14	10	8260B		10/25/2012	CJR	1
tert-Butylbenzene	< 7.1	ug/l	7.1	23	10	8260B		10/25/2012	CJR	1
sec-Butylbenzene	< 10	ug/l	10	33	10	8260B		10/25/2012	CJR	1
n-Butylbenzene	< 9	ug/l	9	29	10	8260B		10/25/2012	CJR	1
Carbon Tetrachloride	< 4.7	ug/l	4.7	15	10	8260B		10/25/2012	CJR	1
Chlorobenzene	< 5.1	ug/l	5.1	16	10	8260B		10/25/2012	CJR	1
Chloroethane	400	ug/l	14	45	10	8260B		10/25/2012	CJR	1
Chloroform	< 4.9	ug/l	4.9	15	10	8260B		10/25/2012	CJR	1
Chloromethane	< 19	ug/l	19	61	10	8260B		10/25/2012	CJR	1
2-Chlorotoluene	< 7	ug/l	7	22	10	8260B		10/25/2012	CJR	1
4-Chlorotoluene	< 4.4	ug/l	4.4	14	10	8260B		10/25/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 28	ug/l	28	89	10	8260B		10/25/2012	CJR	1
Dibromochloromethane	< 5.5	ug/l	5.5	18	10	8260B		10/25/2012	CJR	1
1,4-Dichlorobenzene	< 9.8	ug/l	9.8	31	10	8260B		10/25/2012	CJR	1
1,3-Dichlorobenzene	< 8.7	ug/l	8.7	28	10	8260B		10/25/2012	CJR	1
1,2-Dichlorobenzene	< 7.6	ug/l	7.6	24	10	8260B		10/25/2012	CJR	1
Dichlorodifluoromethane	< 18	ug/l	18	59	10	8260B		10/25/2012	CJR	1
1,2-Dichloroethane	< 5	ug/l	5	16	10	8260B		10/25/2012	CJR	1
1,1-Dichloroethane	< 9.8	ug/l	9.8	31	10	8260B		10/25/2012	CJR	1
1,1-Dichloroethene	< 6	ug/l	6	19	10	8260B		10/25/2012	CJR	1
cis-1,2-Dichloroethene	< 7.4	ug/l	7.4	24	10	8260B		10/25/2012	CJR	1
trans-1,2-Dichloroethene	< 7.9	ug/l	7.9	25	10	8260B		10/25/2012	CJR	1
1,2-Dichloropropane	< 4	ug/l	4	13	10	8260B		10/25/2012	CJR	1
2,2-Dichloropropane	< 19	ug/l	19	59	10	8260B		10/25/2012	CJR	8
1,3-Dichloropropane	< 7.1	ug/l	7.1	23	10	8260B		10/25/2012	CJR	1
Di-isopropyl ether	< 6.9	ug/l	6.9	22	10	8260B		10/25/2012	CJR	1

Lab Code 5024406I
Sample ID MW-6
Sample Matrix Water
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	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
EDB (1,2-Dibromoethane)	< 6.3	ug/l	6.3	20	10	8260B		10/25/2012	CJR	1
Ethylbenzene	< 7.8	ug/l	7.8	25	10	8260B		10/25/2012	CJR	1
Hexachlorobutadiene	< 22	ug/l	22	68	10	8260B		10/25/2012	CJR	1
Isopropylbenzene	< 9.2	ug/l	9.2	29	10	8260B		10/25/2012	CJR	1
p-Isopropyltoluene	< 9.2	ug/l	9.2	29	10	8260B		10/25/2012	CJR	1
Methylene chloride	< 11	ug/l	11	34	10	8260B		10/25/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 8	ug/l	8	25	10	8260B		10/25/2012	CJR	1
Naphthalene	< 21	ug/l	21	68	10	8260B		10/25/2012	CJR	1
n-Propylbenzene	< 5.9	ug/l	5.9	19	10	8260B		10/25/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 5.3	ug/l	5.3	17	10	8260B		10/25/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 10	ug/l	10	32	10	8260B		10/25/2012	CJR	1
Tetrachloroethene	< 4.4	ug/l	4.4	14	10	8260B		10/25/2012	CJR	1
Toluene	< 5.3	ug/l	5.3	17	10	8260B		10/25/2012	CJR	1
1,2,4-Trichlorobenzene	< 15	ug/l	15	46	10	8260B		10/25/2012	CJR	1
1,2,3-Trichlorobenzene	< 13	ug/l	13	42	10	8260B		10/25/2012	CJR	1
1,1,1-Trichloroethane	< 8.5	ug/l	8.5	27	10	8260B		10/25/2012	CJR	1
1,1,2-Trichloroethane	< 4.7	ug/l	4.7	15	10	8260B		10/25/2012	CJR	1
Trichloroethene (TCE)	< 4.7	ug/l	4.7	15	10	8260B		10/25/2012	CJR	1
Trichlorofluoromethane	< 17	ug/l	17	53	10	8260B		10/25/2012	CJR	1
1,2,4-Trimethylbenzene	13.9 "J"	ug/l	8	25	10	8260B		10/25/2012	CJR	1
1,3,5-Trimethylbenzene	< 7.4	ug/l	7.4	24	10	8260B		10/25/2012	CJR	1
Vinyl Chloride	2.2 "J"	ug/l	1.8	5.6	10	8260B		10/25/2012	CJR	1
m&p-Xylene	92	ug/l	11	35	10	8260B		10/25/2012	CJR	1
o-Xylene	< 8	ug/l	8	26	10	8260B		10/25/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	97	REC %			10	8260B		10/25/2012	CJR	1
SUR - 4-Bromofluorobenzene	110	REC %			10	8260B		10/25/2012	CJR	1
SUR - Dibromofluoromethane	96	REC %			10	8260B		10/25/2012	CJR	1
SUR - Toluene-d8	106	REC %			10	8260B		10/25/2012	CJR	1

Lab Code 5024406J
Sample ID MW-8
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 2.5	ug/l	2.5	8	5	8260B		10/25/2012	CJR	1
Bromobenzene	< 3.7	ug/l	3.7	12	5	8260B		10/25/2012	CJR	1
Bromodichloromethane	< 3.4	ug/l	3.4	11	5	8260B		10/25/2012	CJR	1
Bromoform	< 2.15	ug/l	2.15	7	5	8260B		10/25/2012	CJR	1
tert-Butylbenzene	< 3.55	ug/l	3.55	11.5	5	8260B		10/25/2012	CJR	1
sec-Butylbenzene	16.9	ug/l	5	16.5	5	8260B		10/25/2012	CJR	1
n-Butylbenzene	5.7 "J"	ug/l	4.5	14.5	5	8260B		10/25/2012	CJR	1
Carbon Tetrachloride	< 2.35	ug/l	2.35	7.5	5	8260B		10/25/2012	CJR	1
Chlorobenzene	< 2.55	ug/l	2.55	8	5	8260B		10/25/2012	CJR	1
Chloroethane	9.8 "J"	ug/l	7	22.5	5	8260B		10/25/2012	CJR	1
Chloroform	< 2.45	ug/l	2.45	7.5	5	8260B		10/25/2012	CJR	1
Chloromethane	< 9.5	ug/l	9.5	30.5	5	8260B		10/25/2012	CJR	1
2-Chlorotoluene	< 3.5	ug/l	3.5	11	5	8260B		10/25/2012	CJR	1
4-Chlorotoluene	< 2.2	ug/l	2.2	7	5	8260B		10/25/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 14	ug/l	14	44.5	5	8260B		10/25/2012	CJR	1
Dibromochloromethane	< 2.75	ug/l	2.75	9	5	8260B		10/25/2012	CJR	1

Lab Code 5024406J
Sample ID MW-8
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
1,4-Dichlorobenzene	< 4.9	ug/l	4.9	15.5	5	8260B		10/25/2012	CJR	1
1,3-Dichlorobenzene	< 4.35	ug/l	4.35	14	5	8260B		10/25/2012	CJR	1
1,2-Dichlorobenzene	< 3.8	ug/l	3.8	12	5	8260B		10/25/2012	CJR	1
Dichlorodifluoromethane	< 9	ug/l	9	29.5	5	8260B		10/25/2012	CJR	1
1,2-Dichloroethane	< 2.5	ug/l	2.5	8	5	8260B		10/25/2012	CJR	1
1,1-Dichloroethane	67	ug/l	4.9	15.5	5	8260B		10/25/2012	CJR	1
1,1-Dichloroethene	< 3	ug/l	3	9.5	5	8260B		10/25/2012	CJR	1
cis-1,2-Dichloroethene	21.6	ug/l	3.7	12	5	8260B		10/25/2012	CJR	1
trans-1,2-Dichloroethene	< 3.95	ug/l	3.95	12.5	5	8260B		10/25/2012	CJR	1
1,2-Dichloropropane	< 2	ug/l	2	6.5	5	8260B		10/25/2012	CJR	1
2,2-Dichloropropane	< 9.5	ug/l	9.5	29.5	5	8260B		10/25/2012	CJR	8
1,3-Dichloropropane	< 3.55	ug/l	3.55	11.5	5	8260B		10/25/2012	CJR	1
Di-isopropyl ether	< 3.45	ug/l	3.45	11	5	8260B		10/25/2012	CJR	1
EDB (1,2-Dibromoethane)	< 3.15	ug/l	3.15	10	5	8260B		10/25/2012	CJR	1
Ethylbenzene	< 3.9	ug/l	3.9	12.5	5	8260B		10/25/2012	CJR	1
Hexachlorobutadiene	< 11	ug/l	11	34	5	8260B		10/25/2012	CJR	1
Isopropylbenzene	11.8 "J"	ug/l	4.6	14.5	5	8260B		10/25/2012	CJR	1
p-Isopropyltoluene	< 4.6	ug/l	4.6	14.5	5	8260B		10/25/2012	CJR	1
Methylene chloride	< 5.5	ug/l	5.5	17	5	8260B		10/25/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 4	ug/l	4	12.5	5	8260B		10/25/2012	CJR	1
Naphthalene	< 10.5	ug/l	10.5	34	5	8260B		10/25/2012	CJR	1
n-Propylbenzene	9.4 "J"	ug/l	2.95	9.5	5	8260B		10/25/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 2.65	ug/l	2.65	8.5	5	8260B		10/25/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 5	ug/l	5	16	5	8260B		10/25/2012	CJR	1
Tetrachloroethene	< 2.2	ug/l	2.2	7	5	8260B		10/25/2012	CJR	1
Toluene	< 2.65	ug/l	2.65	8.5	5	8260B		10/25/2012	CJR	1
1,2,4-Trichlorobenzene	< 7.5	ug/l	7.5	23	5	8260B		10/25/2012	CJR	1
1,2,3-Trichlorobenzene	< 6.5	ug/l	6.5	21	5	8260B		10/25/2012	CJR	1
1,1,1-Trichloroethane	< 4.25	ug/l	4.25	13.5	5	8260B		10/25/2012	CJR	1
1,1,2-Trichloroethane	< 2.35	ug/l	2.35	7.5	5	8260B		10/25/2012	CJR	1
Trichloroethene (TCE)	3 "J"	ug/l	2.35	7.5	5	8260B		10/25/2012	CJR	1
Trichlorofluoromethane	< 8.5	ug/l	8.5	26.5	5	8260B		10/25/2012	CJR	1
1,2,4-Trimethylbenzene	< 4	ug/l	4	12.5	5	8260B		10/25/2012	CJR	1
1,3,5-Trimethylbenzene	< 3.7	ug/l	3.7	12	5	8260B		10/25/2012	CJR	1
Vinyl Chloride	160	ug/l	0.9	2.8	5	8260B		10/25/2012	CJR	1
m&p-Xylene	< 5.5	ug/l	5.5	17.5	5	8260B		10/25/2012	CJR	1
o-Xylene	< 4	ug/l	4	13	5	8260B		10/25/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	97	REC %			5	8260B		10/25/2012	CJR	1
SUR - 4-Bromofluorobenzene	104	REC %			5	8260B		10/25/2012	CJR	1
SUR - Dibromofluoromethane	101	REC %			5	8260B		10/25/2012	CJR	1
SUR - Toluene-d8	106	REC %			5	8260B		10/25/2012	CJR	1

Lab Code 5024406K
Sample ID MW-9
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.5	ug/l	0.5	1.6	1	8260B		10/24/2012	CJR	1
Bromobenzene	< 0.74	ug/l	0.74	2.4	1	8260B		10/24/2012	CJR	1
Bromodichloromethane	< 0.68	ug/l	0.68	2.2	1	8260B		10/24/2012	CJR	1

Project Name FMR DF **Invoice #** E24406
Project # 13097

Lab Code 5024406K
Sample ID MW-9
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Bromoform	< 0.43	ug/l	0.43	1.4	1	8260B		10/24/2012	CJR	1
tert-Butylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		10/24/2012	CJR	1
sec-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		10/24/2012	CJR	1
n-Butylbenzene	< 0.9	ug/l	0.9	2.9	1	8260B		10/24/2012	CJR	1
Carbon Tetrachloride	< 0.47	ug/l	0.47	1.5	1	8260B		10/24/2012	CJR	1
Chlorobenzene	< 0.51	ug/l	0.51	1.6	1	8260B		10/24/2012	CJR	1
Chloroethane	< 1.4	ug/l	1.4	4.5	1	8260B		10/24/2012	CJR	1
Chloroform	< 0.49	ug/l	0.49	1.5	1	8260B		10/24/2012	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6.1	1	8260B		10/24/2012	CJR	1
2-Chlorotoluene	< 0.7	ug/l	0.7	2.2	1	8260B		10/24/2012	CJR	1
4-Chlorotoluene	< 0.44	ug/l	0.44	1.4	1	8260B		10/24/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 2.8	ug/l	2.8	8.9	1	8260B		10/24/2012	CJR	1
Dibromochloromethane	< 0.55	ug/l	0.55	1.8	1	8260B		10/24/2012	CJR	1
1,4-Dichlorobenzene	< 0.98	ug/l	0.98	3.1	1	8260B		10/24/2012	CJR	1
1,3-Dichlorobenzene	< 0.87	ug/l	0.87	2.8	1	8260B		10/24/2012	CJR	1
1,2-Dichlorobenzene	< 0.76	ug/l	0.76	2.4	1	8260B		10/24/2012	CJR	1
Dichlorodifluoromethane	< 1.8	ug/l	1.8	5.9	1	8260B		10/24/2012	CJR	1
1,2-Dichloroethane	< 0.5	ug/l	0.5	1.6	1	8260B		10/24/2012	CJR	1
1,1-Dichloroethane	< 0.98	ug/l	0.98	3.1	1	8260B		10/24/2012	CJR	1
1,1-Dichloroethene	< 0.6	ug/l	0.6	1.9	1	8260B		10/24/2012	CJR	1
cis-1,2-Dichloroethene	< 0.74	ug/l	0.74	2.4	1	8260B		10/24/2012	CJR	1
trans-1,2-Dichloroethene	< 0.79	ug/l	0.79	2.5	1	8260B		10/24/2012	CJR	1
1,2-Dichloropropane	< 0.4	ug/l	0.4	1.3	1	8260B		10/24/2012	CJR	1
2,2-Dichloropropane	< 1.9	ug/l	1.9	5.9	1	8260B		10/24/2012	CJR	8
1,3-Dichloropropane	< 0.71	ug/l	0.71	2.3	1	8260B		10/24/2012	CJR	1
Di-isopropyl ether	< 0.69	ug/l	0.69	2.2	1	8260B		10/24/2012	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		10/24/2012	CJR	1
Ethylbenzene	< 0.78	ug/l	0.78	2.5	1	8260B		10/24/2012	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	6.8	1	8260B		10/24/2012	CJR	1
Isopropylbenzene	< 0.92	ug/l	0.92	2.9	1	8260B		10/24/2012	CJR	1
p-Isopropyltoluene	< 0.92	ug/l	0.92	2.9	1	8260B		10/24/2012	CJR	1
Methylene chloride	< 1.1	ug/l	1.1	3.4	1	8260B		10/24/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 0.8	ug/l	0.8	2.5	1	8260B		10/24/2012	CJR	1
Naphthalene	< 2.1	ug/l	2.1	6.8	1	8260B		10/24/2012	CJR	1
n-Propylbenzene	< 0.59	ug/l	0.59	1.9	1	8260B		10/24/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 0.53	ug/l	0.53	1.7	1	8260B		10/24/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 1	ug/l	1	3.2	1	8260B		10/24/2012	CJR	1
Tetrachloroethene	< 0.44	ug/l	0.44	1.4	1	8260B		10/24/2012	CJR	1
Toluene	< 0.53	ug/l	0.53	1.7	1	8260B		10/24/2012	CJR	1
1,2,4-Trichlorobenzene	< 1.5	ug/l	1.5	4.6	1	8260B		10/24/2012	CJR	1
1,2,3-Trichlorobenzene	< 1.3	ug/l	1.3	4.2	1	8260B		10/24/2012	CJR	1
1,1,1-Trichloroethane	< 0.85	ug/l	0.85	2.7	1	8260B		10/24/2012	CJR	1
1,1,2-Trichloroethane	< 0.47	ug/l	0.47	1.5	1	8260B		10/24/2012	CJR	1
Trichloroethene (TCE)	< 0.47	ug/l	0.47	1.5	1	8260B		10/24/2012	CJR	1
Trichlorofluoromethane	< 1.7	ug/l	1.7	5.3	1	8260B		10/24/2012	CJR	1
1,2,4-Trimethylbenzene	< 0.8	ug/l	0.8	2.5	1	8260B		10/24/2012	CJR	1
1,3,5-Trimethylbenzene	< 0.74	ug/l	0.74	2.4	1	8260B		10/24/2012	CJR	1
Vinyl Chloride	< 0.18	ug/l	0.18	0.56	1	8260B		10/24/2012	CJR	1
m&p-Xylene	< 1.1	ug/l	1.1	3.5	1	8260B		10/24/2012	CJR	1
o-Xylene	< 0.8	ug/l	0.8	2.6	1	8260B		10/24/2012	CJR	1
SUR - Toluene-d8	105	REC %			1	8260B		10/24/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	92	REC %			1	8260B		10/24/2012	CJR	1

Lab Code 5024406K
Sample ID MW-9
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
SUR - 4-Bromofluorobenzene	106	REC %			1	8260B		10/24/2012	CJR	1
SUR - Dibromofluoromethane	100	REC %			1	8260B		10/24/2012	CJR	1

Lab Code 5024406L
Sample ID MW-14
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 50	ug/l	50	160	100	8260B		10/24/2012	CJR	1
Bromobenzene	< 74	ug/l	74	240	100	8260B		10/24/2012	CJR	1
Bromodichloromethane	< 68	ug/l	68	220	100	8260B		10/24/2012	CJR	1
Bromoform	< 43	ug/l	43	140	100	8260B		10/24/2012	CJR	1
tert-Butylbenzene	< 71	ug/l	71	230	100	8260B		10/24/2012	CJR	1
sec-Butylbenzene	< 100	ug/l	100	330	100	8260B		10/24/2012	CJR	1
n-Butylbenzene	< 90	ug/l	90	290	100	8260B		10/24/2012	CJR	1
Carbon Tetrachloride	< 47	ug/l	47	150	100	8260B		10/24/2012	CJR	1
Chlorobenzene	< 51	ug/l	51	160	100	8260B		10/24/2012	CJR	1
Chloroethane	< 140	ug/l	140	450	100	8260B		10/24/2012	CJR	1
Chloroform	< 49	ug/l	49	150	100	8260B		10/24/2012	CJR	1
Chloromethane	< 190	ug/l	190	610	100	8260B		10/24/2012	CJR	1
2-Chlorotoluene	< 70	ug/l	70	220	100	8260B		10/24/2012	CJR	1
4-Chlorotoluene	< 44	ug/l	44	140	100	8260B		10/24/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 280	ug/l	280	890	100	8260B		10/24/2012	CJR	1
Dibromochloromethane	< 55	ug/l	55	180	100	8260B		10/24/2012	CJR	1
1,4-Dichlorobenzene	< 98	ug/l	98	310	100	8260B		10/24/2012	CJR	1
1,3-Dichlorobenzene	< 87	ug/l	87	280	100	8260B		10/24/2012	CJR	1
1,2-Dichlorobenzene	< 76	ug/l	76	240	100	8260B		10/24/2012	CJR	1
Dichlorodifluoromethane	< 180	ug/l	180	590	100	8260B		10/24/2012	CJR	1
1,2-Dichloroethane	< 50	ug/l	50	160	100	8260B		10/24/2012	CJR	1
1,1-Dichloroethane	< 98	ug/l	98	310	100	8260B		10/24/2012	CJR	1
1,1-Dichloroethene	< 60	ug/l	60	190	100	8260B		10/24/2012	CJR	1
cis-1,2-Dichloroethene	< 74	ug/l	74	240	100	8260B		10/24/2012	CJR	1
trans-1,2-Dichloroethene	< 79	ug/l	79	250	100	8260B		10/24/2012	CJR	1
1,2-Dichloropropane	< 40	ug/l	40	130	100	8260B		10/24/2012	CJR	1
2,2-Dichloropropane	< 190	ug/l	190	590	100	8260B		10/24/2012	CJR	8
1,3-Dichloropropane	< 71	ug/l	71	230	100	8260B		10/24/2012	CJR	1
Di-isopropyl ether	< 69	ug/l	69	220	100	8260B		10/24/2012	CJR	1
EDB (1,2-Dibromoethane)	< 63	ug/l	63	200	100	8260B		10/24/2012	CJR	1
Ethylbenzene	< 78	ug/l	78	250	100	8260B		10/24/2012	CJR	1
Hexachlorobutadiene	< 220	ug/l	220	680	100	8260B		10/24/2012	CJR	1
Isopropylbenzene	< 92	ug/l	92	290	100	8260B		10/24/2012	CJR	1
p-Isopropyltoluene	< 92	ug/l	92	290	100	8260B		10/24/2012	CJR	1
Methylene chloride	< 110	ug/l	110	340	100	8260B		10/24/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 80	ug/l	80	250	100	8260B		10/24/2012	CJR	1
Naphthalene	< 210	ug/l	210	680	100	8260B		10/24/2012	CJR	1
n-Propylbenzene	< 59	ug/l	59	190	100	8260B		10/24/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 53	ug/l	53	170	100	8260B		10/24/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 100	ug/l	100	320	100	8260B		10/24/2012	CJR	1
Tetrachloroethene	< 44	ug/l	44	140	100	8260B		10/24/2012	CJR	1
Toluene	< 53	ug/l	53	170	100	8260B		10/24/2012	CJR	1

Lab Code 5024406L
Sample ID MW-14
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
1,2,4-Trichlorobenzene	< 150	ug/l	150	460	100	8260B		10/24/2012	CJR	1
1,2,3-Trichlorobenzene	< 130	ug/l	130	420	100	8260B		10/24/2012	CJR	1
1,1,1-Trichloroethane	< 85	ug/l	85	270	100	8260B		10/24/2012	CJR	1
1,1,2-Trichloroethane	< 47	ug/l	47	150	100	8260B		10/24/2012	CJR	1
Trichloroethene (TCE)	102 "J"	ug/l	47	150	100	8260B		10/24/2012	CJR	1
Trichlorofluoromethane	< 170	ug/l	170	530	100	8260B		10/24/2012	CJR	1
1,2,4-Trimethylbenzene	< 80	ug/l	80	250	100	8260B		10/24/2012	CJR	1
1,3,5-Trimethylbenzene	< 74	ug/l	74	240	100	8260B		10/24/2012	CJR	1
Vinyl Chloride	< 18	ug/l	18	56	100	8260B		10/24/2012	CJR	1
m&p-Xylene	< 110	ug/l	110	350	100	8260B		10/24/2012	CJR	1
o-Xylene	< 80	ug/l	80	260	100	8260B		10/24/2012	CJR	1
SUR - Toluene-d8	105	REC %			100	8260B		10/24/2012	CJR	1
SUR - Dibromofluoromethane	97	REC %			100	8260B		10/24/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	106	REC %			100	8260B		10/24/2012	CJR	1
SUR - 4-Bromofluorobenzene	105	REC %			100	8260B		10/24/2012	CJR	1

Lab Code 5024406M
Sample ID DUP
Sample Matrix Water
Sample Date 10/15/2012

Organic

VOC's

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Benzene	< 1000	ug/l	1000	3200	2000	8260B		10/25/2012	CJR	1
Bromobenzene	< 1480	ug/l	1480	4800	2000	8260B		10/25/2012	CJR	1
Bromodichloromethane	< 1360	ug/l	1360	4400	2000	8260B		10/25/2012	CJR	1
Bromoform	< 860	ug/l	860	2800	2000	8260B		10/25/2012	CJR	1
tert-Butylbenzene	< 1420	ug/l	1420	4600	2000	8260B		10/25/2012	CJR	1
sec-Butylbenzene	< 2000	ug/l	2000	6600	2000	8260B		10/25/2012	CJR	1
n-Butylbenzene	< 1800	ug/l	1800	5800	2000	8260B		10/25/2012	CJR	1
Carbon Tetrachloride	< 940	ug/l	940	3000	2000	8260B		10/25/2012	CJR	1
Chlorobenzene	< 1020	ug/l	1020	3200	2000	8260B		10/25/2012	CJR	1
Chloroethane	< 2800	ug/l	2800	9000	2000	8260B		10/25/2012	CJR	1
Chloroform	< 980	ug/l	980	3000	2000	8260B		10/25/2012	CJR	1
Chloromethane	< 3800	ug/l	3800	12200	2000	8260B		10/25/2012	CJR	1
2-Chlorotoluene	< 1400	ug/l	1400	4400	2000	8260B		10/25/2012	CJR	1
4-Chlorotoluene	< 880	ug/l	880	2800	2000	8260B		10/25/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 5600	ug/l	5600	17800	2000	8260B		10/25/2012	CJR	1
Dibromochloromethane	< 1100	ug/l	1100	3600	2000	8260B		10/25/2012	CJR	1
1,4-Dichlorobenzene	< 1960	ug/l	1960	6200	2000	8260B		10/25/2012	CJR	1
1,3-Dichlorobenzene	< 1740	ug/l	1740	5600	2000	8260B		10/25/2012	CJR	1
1,2-Dichlorobenzene	< 1520	ug/l	1520	4800	2000	8260B		10/25/2012	CJR	1
Dichlorodifluoromethane	< 3600	ug/l	3600	11800	2000	8260B		10/25/2012	CJR	1
1,2-Dichloroethane	< 1000	ug/l	1000	3200	2000	8260B		10/25/2012	CJR	1
1,1-Dichloroethane	4100 "J"	ug/l	1960	6200	2000	8260B		10/25/2012	CJR	1
1,1-Dichloroethene	< 1200	ug/l	1200	3800	2000	8260B		10/25/2012	CJR	1
cis-1,2-Dichloroethene	117000	ug/l	1480	4800	2000	8260B		10/25/2012	CJR	1
trans-1,2-Dichloroethene	< 1580	ug/l	1580	5000	2000	8260B		10/25/2012	CJR	1
1,2-Dichloropropane	< 800	ug/l	800	2600	2000	8260B		10/25/2012	CJR	1
2,2-Dichloropropane	< 3800	ug/l	3800	11800	2000	8260B		10/25/2012	CJR	8
1,3-Dichloropropane	< 1420	ug/l	1420	4600	2000	8260B		10/25/2012	CJR	1
Di-isopropyl ether	< 1380	ug/l	1380	4400	2000	8260B		10/25/2012	CJR	1

Lab Code 5024406M
Sample ID DUP
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	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
EDB (1,2-Dibromoethane)	< 1260	ug/l	1260	4000	2000	8260B		10/25/2012	CJR	1
Ethylbenzene	< 1560	ug/l	1560	5000	2000	8260B		10/25/2012	CJR	1
Hexachlorobutadiene	< 4400	ug/l	4400	13600	2000	8260B		10/25/2012	CJR	1
Isopropylbenzene	< 1840	ug/l	1840	5800	2000	8260B		10/25/2012	CJR	1
p-Isopropyltoluene	< 1840	ug/l	1840	5800	2000	8260B		10/25/2012	CJR	1
Methylene chloride	< 2200	ug/l	2200	6800	2000	8260B		10/25/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 1600	ug/l	1600	5000	2000	8260B		10/25/2012	CJR	1
Naphthalene	< 4200	ug/l	4200	13600	2000	8260B		10/25/2012	CJR	1
n-Propylbenzene	< 1180	ug/l	1180	3800	2000	8260B		10/25/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 1060	ug/l	1060	3400	2000	8260B		10/25/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 2000	ug/l	2000	6400	2000	8260B		10/25/2012	CJR	1
Tetrachloroethene	< 880	ug/l	880	2800	2000	8260B		10/25/2012	CJR	1
Toluene	1620 "J"	ug/l	1060	3400	2000	8260B		10/25/2012	CJR	1
1,2,4-Trichlorobenzene	< 3000	ug/l	3000	9200	2000	8260B		10/25/2012	CJR	1
1,2,3-Trichlorobenzene	< 2600	ug/l	2600	8400	2000	8260B		10/25/2012	CJR	1
1,1,1-Trichloroethane	19400	ug/l	1700	5400	2000	8260B		10/25/2012	CJR	1
1,1,2-Trichloroethane	< 940	ug/l	940	3000	2000	8260B		10/25/2012	CJR	1
Trichloroethene (TCE)	1980 "J"	ug/l	940	3000	2000	8260B		10/25/2012	CJR	1
Trichlorofluoromethane	< 3400	ug/l	3400	10600	2000	8260B		10/25/2012	CJR	1
1,2,4-Trimethylbenzene	< 1600	ug/l	1600	5000	2000	8260B		10/25/2012	CJR	1
1,3,5-Trimethylbenzene	< 1480	ug/l	1480	4800	2000	8260B		10/25/2012	CJR	1
Vinyl Chloride	1540	ug/l	360	1120	2000	8260B		10/25/2012	CJR	1
m&p-Xylene	< 2200	ug/l	2200	7000	2000	8260B		10/25/2012	CJR	1
o-Xylene	< 1600	ug/l	1600	5200	2000	8260B		10/25/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	107	REC %			2000	8260B		10/25/2012	CJR	1
SUR - 4-Bromofluorobenzene	108	REC %			2000	8260B		10/25/2012	CJR	1
SUR - Dibromofluoromethane	100	REC %			2000	8260B		10/25/2012	CJR	1
SUR - Toluene-d8	109	REC %			2000	8260B		10/25/2012	CJR	1

Lab Code 5024406N
Sample ID EQUIP
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.5	ug/l	0.5	1.6	1	8260B		10/23/2012	CJR	1
Bromobenzene	< 0.74	ug/l	0.74	2.4	1	8260B		10/23/2012	CJR	1
Bromodichloromethane	< 0.68	ug/l	0.68	2.2	1	8260B		10/23/2012	CJR	1
Bromoform	< 0.43	ug/l	0.43	1.4	1	8260B		10/23/2012	CJR	1
tert-Butylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		10/23/2012	CJR	1
sec-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		10/23/2012	CJR	1
n-Butylbenzene	< 0.9	ug/l	0.9	2.9	1	8260B		10/23/2012	CJR	1
Carbon Tetrachloride	< 0.47	ug/l	0.47	1.5	1	8260B		10/23/2012	CJR	1
Chlorobenzene	< 0.51	ug/l	0.51	1.6	1	8260B		10/23/2012	CJR	1
Chloroethane	< 1.4	ug/l	1.4	4.5	1	8260B		10/23/2012	CJR	1
Chloroform	0.73 "J"	ug/l	0.49	1.5	1	8260B		10/23/2012	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6.1	1	8260B		10/23/2012	CJR	1
2-Chlorotoluene	< 0.7	ug/l	0.7	2.2	1	8260B		10/23/2012	CJR	1
4-Chlorotoluene	< 0.44	ug/l	0.44	1.4	1	8260B		10/23/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 2.8	ug/l	2.8	8.9	1	8260B		10/23/2012	CJR	1
Dibromochloromethane	< 0.55	ug/l	0.55	1.8	1	8260B		10/23/2012	CJR	1

Lab Code 5024406N
Sample ID EQUIP
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
1,4-Dichlorobenzene	< 0.98	ug/l	0.98	3.1	1	8260B		10/23/2012	CJR	1
1,3-Dichlorobenzene	< 0.87	ug/l	0.87	2.8	1	8260B		10/23/2012	CJR	1
1,2-Dichlorobenzene	< 0.76	ug/l	0.76	2.4	1	8260B		10/23/2012	CJR	1
Dichlorodifluoromethane	< 1.8	ug/l	1.8	5.9	1	8260B		10/23/2012	CJR	1
1,2-Dichloroethane	< 0.5	ug/l	0.5	1.6	1	8260B		10/23/2012	CJR	1
1,1-Dichloroethane	< 0.98	ug/l	0.98	3.1	1	8260B		10/23/2012	CJR	1
1,1-Dichloroethene	< 0.6	ug/l	0.6	1.9	1	8260B		10/23/2012	CJR	1
cis-1,2-Dichloroethene	< 0.74	ug/l	0.74	2.4	1	8260B		10/23/2012	CJR	1
trans-1,2-Dichloroethene	< 0.79	ug/l	0.79	2.5	1	8260B		10/23/2012	CJR	1
1,2-Dichloropropane	< 0.4	ug/l	0.4	1.3	1	8260B		10/23/2012	CJR	1
2,2-Dichloropropane	< 1.9	ug/l	1.9	5.9	1	8260B		10/23/2012	CJR	8
1,3-Dichloropropane	< 0.71	ug/l	0.71	2.3	1	8260B		10/23/2012	CJR	1
Di-isopropyl ether	< 0.69	ug/l	0.69	2.2	1	8260B		10/23/2012	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		10/23/2012	CJR	1
Ethylbenzene	< 0.78	ug/l	0.78	2.5	1	8260B		10/23/2012	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	6.8	1	8260B		10/23/2012	CJR	1
Isopropylbenzene	< 0.92	ug/l	0.92	2.9	1	8260B		10/23/2012	CJR	1
p-Isopropyltoluene	< 0.92	ug/l	0.92	2.9	1	8260B		10/23/2012	CJR	1
Methylene chloride	< 1.1	ug/l	1.1	3.4	1	8260B		10/23/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 0.8	ug/l	0.8	2.5	1	8260B		10/23/2012	CJR	1
Naphthalene	< 2.1	ug/l	2.1	6.8	1	8260B		10/23/2012	CJR	1
n-Propylbenzene	< 0.59	ug/l	0.59	1.9	1	8260B		10/23/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 0.53	ug/l	0.53	1.7	1	8260B		10/23/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 1	ug/l	1	3.2	1	8260B		10/23/2012	CJR	1
Tetrachloroethene	< 0.44	ug/l	0.44	1.4	1	8260B		10/23/2012	CJR	1
Toluene	< 0.53	ug/l	0.53	1.7	1	8260B		10/23/2012	CJR	1
1,2,4-Trichlorobenzene	< 1.5	ug/l	1.5	4.6	1	8260B		10/23/2012	CJR	1
1,2,3-Trichlorobenzene	< 1.3	ug/l	1.3	4.2	1	8260B		10/23/2012	CJR	1
1,1,1-Trichloroethane	< 0.85	ug/l	0.85	2.7	1	8260B		10/23/2012	CJR	1
1,1,2-Trichloroethane	< 0.47	ug/l	0.47	1.5	1	8260B		10/23/2012	CJR	1
Trichloroethene (TCE)	< 0.47	ug/l	0.47	1.5	1	8260B		10/23/2012	CJR	1
Trichlorofluoromethane	< 1.7	ug/l	1.7	5.3	1	8260B		10/23/2012	CJR	1
1,2,4-Trimethylbenzene	< 0.8	ug/l	0.8	2.5	1	8260B		10/23/2012	CJR	1
1,3,5-Trimethylbenzene	< 0.74	ug/l	0.74	2.4	1	8260B		10/23/2012	CJR	1
Vinyl Chloride	< 0.18	ug/l	0.18	0.56	1	8260B		10/23/2012	CJR	1
m&p-Xylene	< 1.1	ug/l	1.1	3.5	1	8260B		10/23/2012	CJR	1
o-Xylene	< 0.8	ug/l	0.8	2.6	1	8260B		10/23/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	98	REC %			1	8260B		10/23/2012	CJR	1
SUR - 4-Bromofluorobenzene	107	REC %			1	8260B		10/23/2012	CJR	1
SUR - Dibromofluoromethane	98	REC %			1	8260B		10/23/2012	CJR	1
SUR - Toluene-d8	109	REC %			1	8260B		10/23/2012	CJR	1

Lab Code 5024406O
Sample ID TRIP
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Organic										
VOC's										
Benzene	< 0.5	ug/l	0.5	1.6	1	8260B		10/23/2012	CJR	1
Bromobenzene	< 0.74	ug/l	0.74	2.4	1	8260B		10/23/2012	CJR	1
Bromodichloromethane	< 0.68	ug/l	0.68	2.2	1	8260B		10/23/2012	CJR	1

Project Name FMR DF **Invoice #** E24406
Project # 13097

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Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
Bromoform	< 0.43	ug/l	0.43	1.4	1	8260B		10/23/2012	CJR	1
tert-Butylbenzene	< 0.71	ug/l	0.71	2.3	1	8260B		10/23/2012	CJR	1
sec-Butylbenzene	< 1	ug/l	1	3.3	1	8260B		10/23/2012	CJR	1
n-Butylbenzene	< 0.9	ug/l	0.9	2.9	1	8260B		10/23/2012	CJR	1
Carbon Tetrachloride	< 0.47	ug/l	0.47	1.5	1	8260B		10/23/2012	CJR	1
Chlorobenzene	< 0.51	ug/l	0.51	1.6	1	8260B		10/23/2012	CJR	1
Chloroethane	< 1.4	ug/l	1.4	4.5	1	8260B		10/23/2012	CJR	1
Chloroform	< 0.49	ug/l	0.49	1.5	1	8260B		10/23/2012	CJR	1
Chloromethane	< 1.9	ug/l	1.9	6.1	1	8260B		10/23/2012	CJR	1
2-Chlorotoluene	< 0.7	ug/l	0.7	2.2	1	8260B		10/23/2012	CJR	1
4-Chlorotoluene	< 0.44	ug/l	0.44	1.4	1	8260B		10/23/2012	CJR	1
1,2-Dibromo-3-chloropropane	< 2.8	ug/l	2.8	8.9	1	8260B		10/23/2012	CJR	1
Dibromochloromethane	< 0.55	ug/l	0.55	1.8	1	8260B		10/23/2012	CJR	1
1,4-Dichlorobenzene	< 0.98	ug/l	0.98	3.1	1	8260B		10/23/2012	CJR	1
1,3-Dichlorobenzene	< 0.87	ug/l	0.87	2.8	1	8260B		10/23/2012	CJR	1
1,2-Dichlorobenzene	< 0.76	ug/l	0.76	2.4	1	8260B		10/23/2012	CJR	1
Dichlorodifluoromethane	< 1.8	ug/l	1.8	5.9	1	8260B		10/23/2012	CJR	1
1,2-Dichloroethane	< 0.5	ug/l	0.5	1.6	1	8260B		10/23/2012	CJR	1
1,1-Dichloroethane	< 0.98	ug/l	0.98	3.1	1	8260B		10/23/2012	CJR	1
1,1-Dichloroethene	< 0.6	ug/l	0.6	1.9	1	8260B		10/23/2012	CJR	1
cis-1,2-Dichloroethene	< 0.74	ug/l	0.74	2.4	1	8260B		10/23/2012	CJR	1
trans-1,2-Dichloroethene	< 0.79	ug/l	0.79	2.5	1	8260B		10/23/2012	CJR	1
1,2-Dichloropropane	< 0.4	ug/l	0.4	1.3	1	8260B		10/23/2012	CJR	1
2,2-Dichloropropane	< 1.9	ug/l	1.9	5.9	1	8260B		10/23/2012	CJR	8
1,3-Dichloropropane	< 0.71	ug/l	0.71	2.3	1	8260B		10/23/2012	CJR	1
Di-isopropyl ether	< 0.69	ug/l	0.69	2.2	1	8260B		10/23/2012	CJR	1
EDB (1,2-Dibromoethane)	< 0.63	ug/l	0.63	2	1	8260B		10/23/2012	CJR	1
Ethylbenzene	< 0.78	ug/l	0.78	2.5	1	8260B		10/23/2012	CJR	1
Hexachlorobutadiene	< 2.2	ug/l	2.2	6.8	1	8260B		10/23/2012	CJR	1
Isopropylbenzene	< 0.92	ug/l	0.92	2.9	1	8260B		10/23/2012	CJR	1
p-Isopropyltoluene	< 0.92	ug/l	0.92	2.9	1	8260B		10/23/2012	CJR	1
Methylene chloride	< 1.1	ug/l	1.1	3.4	1	8260B		10/23/2012	CJR	1
Methyl tert-butyl ether (MTBE)	< 0.8	ug/l	0.8	2.5	1	8260B		10/23/2012	CJR	1
Naphthalene	< 2.1	ug/l	2.1	6.8	1	8260B		10/23/2012	CJR	1
n-Propylbenzene	< 0.59	ug/l	0.59	1.9	1	8260B		10/23/2012	CJR	1
1,1,2,2-Tetrachloroethane	< 0.53	ug/l	0.53	1.7	1	8260B		10/23/2012	CJR	1
1,1,1,2-Tetrachloroethane	< 1	ug/l	1	3.2	1	8260B		10/23/2012	CJR	1
Tetrachloroethene	< 0.44	ug/l	0.44	1.4	1	8260B		10/23/2012	CJR	1
Toluene	< 0.53	ug/l	0.53	1.7	1	8260B		10/23/2012	CJR	1
1,2,4-Trichlorobenzene	< 1.5	ug/l	1.5	4.6	1	8260B		10/23/2012	CJR	1
1,2,3-Trichlorobenzene	< 1.3	ug/l	1.3	4.2	1	8260B		10/23/2012	CJR	1
1,1,1-Trichloroethane	< 0.85	ug/l	0.85	2.7	1	8260B		10/23/2012	CJR	1
1,1,2-Trichloroethane	< 0.47	ug/l	0.47	1.5	1	8260B		10/23/2012	CJR	1
Trichloroethene (TCE)	< 0.47	ug/l	0.47	1.5	1	8260B		10/23/2012	CJR	1
Trichlorofluoromethane	< 1.7	ug/l	1.7	5.3	1	8260B		10/23/2012	CJR	1
1,2,4-Trimethylbenzene	< 0.8	ug/l	0.8	2.5	1	8260B		10/23/2012	CJR	1
1,3,5-Trimethylbenzene	< 0.74	ug/l	0.74	2.4	1	8260B		10/23/2012	CJR	1
Vinyl Chloride	< 0.18	ug/l	0.18	0.56	1	8260B		10/23/2012	CJR	1
m&p-Xylene	< 1.1	ug/l	1.1	3.5	1	8260B		10/23/2012	CJR	1
o-Xylene	< 0.8	ug/l	0.8	2.6	1	8260B		10/23/2012	CJR	1
SUR - Toluene-d8	106	REC %			1	8260B		10/23/2012	CJR	1
SUR - 1,2-Dichloroethane-d4	97	REC %			1	8260B		10/23/2012	CJR	1

Project Name FMR DF **Invoice #** E24406
Project # 13097

Lab Code 5024406O
Sample ID TRIP
Sample Matrix Water
Sample Date 10/15/2012

	Result	Unit	LOD	LOQ	Dil	Method	Ext Date	Run Date	Analyst	Code
SUR - 4-Bromofluorobenzene	101	REC %			1	8260B		10/23/2012	CJR	1
SUR - Dibromofluoromethane	99	REC %			1	8260B		10/23/2012	CJR	1

"J" Flag: Analyte detected between LOD and LOQ LOD Limit of Detection LOQ Limit of Quantitation

Code	***Comment***
1	Laboratory QC within limits.
8	Closing calibration standard not within established limits.

All solid sample results reported on a dry weight basis unless otherwise indicated. All LOD's and LOQ's are adjusted for dilutions but not dry weight. Subcontracted results are denoted by SUB in the analyst field.

Authorized Signature Michael J. Ricker

CHAIN C CUSTODY RECORD

Synergy

Environmental Lab, Inc.

1990 Prospect Ct. • Appleton, WI 54914
920-830-2455 • FAX 920-733-0631

Chain # Nº .281

Page 1 of 2

Sample Handling Request
___ Rush Analysis Date Required ___
(Rushes accepted only with prior authorization)
X Normal Turn Around

Lab I.D. #

Account No. :

Quote No.:

Project #: 13097

Sampler: (signature) David Dailey

Project (Name / Location): Farmer DF 2517 E. Norwich, St. Francis, WI

Reports To: Kristen Kurzka	Invoice To:
Company Sigma Env.	Company
Address 1300 W. Canal St.	Address
City State Zip Milw. WI 53233	City State Zip
Phone 414. 643. 4200	Phone
FAX	FAX

Lab I.D.	Sample I.D.	Collection Date	Collection Time	Comp	Grab	Filtered Y/N	No. of Containers	Sample Type (Matrix)*	Preservation	DRO (Mod DRO Sep 95)	GRO (Mod GRO Sep 95)	IRON	LEAD	NITRATE / NITRITE	PAH (EPA 8270)	PVOC (EPA 8021)	PVOC + NAPHTHALENE	SULFATE	VOC DW (EPA 524.2)	VOC (EPA 8260)	8-RCRA METALS	Other Analysis									PID/ FID
50244 00A	Smw 3	10-15-12	10:52		G	N	3	GW	HCL											X											
B	Smw 4		11:00				3													X											
C	SPM 4		11:06				3													X											
D	mw 1		11:40				3													X											
E	mw 2		2:20				3													X											
F	mw 3		12:55				3													X											
G	mw 4		12:15				3													X											
H	mw 5		12:30				3													X											
I	mw 6		1:35				3													X											
J	mw 8		2:50				3													X											

Comments/Special Instructions (*Specify groundwater "GW", Drinking Water "DW", Waste Water "WW", Soil "S", Air "A", Oil, Sludge etc.)

Sample Integrity - To be completed by receiving lab.

Method of Shipment: [illegible]

Temp. of Temp. Blank. ___ °C On Ice: X

Cooler seal intact upon receipt: X Yes ___ No

Relinquished By: (sign)	Time	Date	Received By: (sign)	Time	Date
David Dailey	3:20 pm	10-15-12			

Received in Laboratory By: Time: 8:00 Date: 10/16/12

CHAIN OF CUSTODY RECORD

Synergy

Environmental Lab, Inc.

1990 Prospect Ct. • Appleton, WI 54914
920-830-2455 • FAX 920-733-0631

Chain # № .640

Page 2 of 2

Sample Handling Request

___ Rush Analysis Date Required ___

(Rushes accepted only with prior authorization)

X Normal Turn Around

Lab I.D. #	
Account No. :	**Quote No.:**
Project #: 13097	
Sampler: (signature) David Dailey	
Project (Name / Location): Former D.F. 2517 E. Norwich, St. Francis, WI	
Reports To: Kristen Kurzka	Invoice To:
Company Sigma Env.	Company
Address 1300 W. Canal St	Address
City State Zip Milw. WI	City State Zip
Phone 414-643-4200	Phone
FAX	FAX

Analysis Requested / **Other Analysis**

Lab I.D.	Sample I.D.	Collection Date	Collection Time	Comp	Grab	Filtered Y/N	No. of Containers	Sample Type (Matrix)*	Preservation	DRO (Mod DRO Sep 95)	GRO (Mod GRO Sep 95)	IRON	LEAD	NITRATE / NITRITE	PAH (EPA 8270)	PVOC (EPA 8021)	PVOC + NAPHTHALENE	SULFATE	VOC DW (EPA 524.2)	VOC (EPA 8260)	8-RCRA METALS	PID/ FID
S024406K	mw-9	10-15-12	12:00		G	N	3	GW	HCL											X		
L	mw-14		10:40		G		3													X		
M	Dup.				G		3													X		
N	Equip.				-		2	-												X		
O	Tlp.				-		1	-												X		

Comments/Special Instructions (*Specify groundwater "GW", Drinking Water "DW", Waste Water "WW", Soil "S", Air "A", Oil, Sludge etc.)

Sample Integrity - To be completed by receiving lab.

Method of Shipment : Dunham

Temp. of Temp. Blank. ___ °C On Ice: X

Cooler seal intact upon receipt: X Yes ___ No

Relinquished By: (sign)	Time	Date	Received By: (sign)	Time	Date
David Dailey	3:20	10-15-12			

Received in Laboratory By: Time: 8:00 Date: 10/16/12

ATTACHMENT D

STN REPORT (REF. 6)

241469250
02-41-000269

STN
En tal
service disabled veteran owned small business

June 30, 2009

Mr. Stavros Emmanouil
On-Scene Coordinator
Emergency Response Branch
U.S. Environmental Protection Agency
77 West Jackson Boulevard
Chicago, IL 60604

Subject: **Final Removal Action Letter Report**
St. Francis Auto Wreckers Site
St. Francis, Milwaukee County, Wisconsin
Technical Direction Document No. S05-0809-001
EPA Contract No. EP-S5-06-03

Dear Mr. Emmanouil:

The STN Environmental JV (STN) Superfund Technical Assessment and Response Team (START) has prepared this removal action letter report in accordance with the requirements of U.S. Environmental Protection Agency (EPA) Technical Direction Document (TDD) No. S05-0809-001 for the St. Francis Auto Wrecker's Site (Site). The scope of this TDD included (1) preparing a quality assurance action plan, (2) completion and maintenance of documentation of all contractor actions and costs, (3) conducting air monitoring, (4) CERCLA documentation, (5) soil and air sampling, and (6) assisting EPA with the removal action. Removal activities were conducted by the EPA under Stavros Emmanouil as the On-Scene Coordinator, and the Emergency and Rapid Response Services (ERRS) contractor, Environmental Quality Management, Inc. (EQM) with its subcontractor Veolia Environmental Services. START activities were performed by STN Environmental.

This removal action letter report summarizes the site background; discusses the removal action activities, including sampling activities; and provides a summary of the removal action. Appendix A of this letter report presents a photographic log of removal action activities and Appendix B provides sample analytical results. Analytical services were procured by ERRS, EQM, and START received the results later from ERRS.

Site Background

The Site is an active auto salvage yard located in a populated, mixed residential and commercial area within the City of St. Francis, Milwaukee County, Wisconsin. The Site is located at 4043 South Pennsylvania Avenue (Figure 1). The auto salvage and recycling operations were being conducted at the Site for the past 40 years and were primarily confined to the southern half of the Site area. Previous records and inspections of the site indicate that the northern portion of the Site was once part of a landfill for the Town of Lake, Wisconsin, and was purchased by the Site owner for expanding the auto salvage yard. The area of the removal is to the north of the main building and is presently not being used by the salvage yard. The removal area is approximately 230 feet by 200 feet.

discussion of former landfill

Wisconsin Department of Transportation (WDOT) purchased the western portion of the property from the site owners to develop the Lake Parkway freeway. In 1997, WDOT removed buried drums containing solid and semi-solid material identified as paint, resin or adhesive solids, foundry sand and slag, asphaltic tar solids, metal parts, plated debris, and firebricks. Wisconsin Department of Natural Resources (WDNR) soil sampling at the site revealed the presence of polychlorinated biphenyls (PCBs), volatile organic chemicals (VOCs) and metals in site soils. WDNR monitoring well sampling results indicated detected concentrations of VOCs above the WDNR groundwater enforcement standards. U.S. EPA site assessment results from two sample locations on the west side of the Site bordering the Lake Parkway freeway construction area were above the regulatory limits for PCBs, toxicity characteristic leaching procedure (TCLP) lead, and TCLP VOCs. Sample results showed lead, chromium and PCB contamination above Resource Conservation and Recovery Act (RCRA) limits in surface soil sample SS-1 (refer to Site Assessment Report prepared by STN Environmental, dated June 5, 2008). Trace levels of PCBs (>1 mg/kg) were found in SS-2 and SS-3. Historical WDNR and WDOT sample results show the presence of trichloroethylene (TCE) above RCRA limits within the areas of the test pits, along with flashpoint results of <140°F, showing that some soil may be considered ignitable. Based on these results, an action memo to conduct a time-critical removal action was approved.

Removal Action Activities

Removal action activities at the site included excavating the site to remove PCB-contaminated soil, drums and contaminated sludge from the property.

During the week of October 20, 2008, EPA, ERRS, START, and the ERRS Subcontractor mobilized to the site to conduct removal activities. Based on field screening, PCB-contaminated soil and drums and containers were excavated to a depth of four feet below grade surface (bgs) and stockpiled on the site. Initial separation of soil and drums were based on visual assessment of the materials as they were excavated. Three categories of stockpiles were used including (1) soils that appear to be hazardous, (2) soils that appear to be non-hazardous, and (3) drums, containers, and paint sludge.

A soil sample was collected from each stockpile by ERRS and submitted to Test America Laboratories for PCBs, TCLP lead, and TCE analyses. START received the analytical results from ERRS. The action levels for each of these contaminants of concern (COC) are 50 parts per million (ppm) for total PCBs, 0.5 milligrams per liter (mg/L) for TCLP lead, and 0.5 mg/L for TCE. The soil sample analytical results are shown in Table 1.

If the analytical results for a soil sample exceeded the action level for PCBs, the soil was removed from the site and disposed of at Wayne Disposal Facility in Belleville, Michigan as hazardous materials. If the analytical results for a soil sample exceeded the action level for TCLP lead, the soil was treated with quick lime.

Five test pits were excavated within the access roads along the north and east site boundaries to a depth of 10 feet bgs. The test pits were to identify subsurface materials and collect soil samples at two separate depths for contaminant delineation. A composite soil sample was collected from a depth of five feet bgs and a composite soil sample was collected from the floor of the test pit. The soil samples collected from five feet bgs were submitted to a laboratory for COC analyses. If the analytical results exceeded the action levels, then the samples collected from the 10 feet depth would be submitted to the laboratory for COC analyses. Analytical results from the five feet depth were below action levels, therefore no further excavation was required along the north and east site boundaries. Analytical results are shown in Table 1. Sample locations are shown on Figure 1.

During excavation activities START donned Level C personal protection equipment to provide air monitoring for the site and the site perimeters for VOC vapors and particulates. A photoionization detection meter and a personal data RAM meter were used to monitor for VOCs and particulates, respectively.

A total of 4,575 cubic yards of PCB-contaminated soil, 490 drums and 67 paint cans was excavated and transported from the site to Wayne Disposal. Prior to placing a cap on the excavated area, confirmation samples were collected from the surface of the work zone. Eight composite soil samples were submitted to a laboratory for COC analyses. Sample locations can be found on Figure 1. Analytical results for all samples are shown on Table 1.

The cap consisted of a geomembrane fabric covered with two feet of gravel fines, graded and compacted, and six inches of topsoil and grass seed. Removal activities were completed on April 17, 2009.

If you have any questions or comments regarding this letter report or require any additional information, please call me at (312) 443-0550 or send an e-mail to tkoach@onesullivan.com.

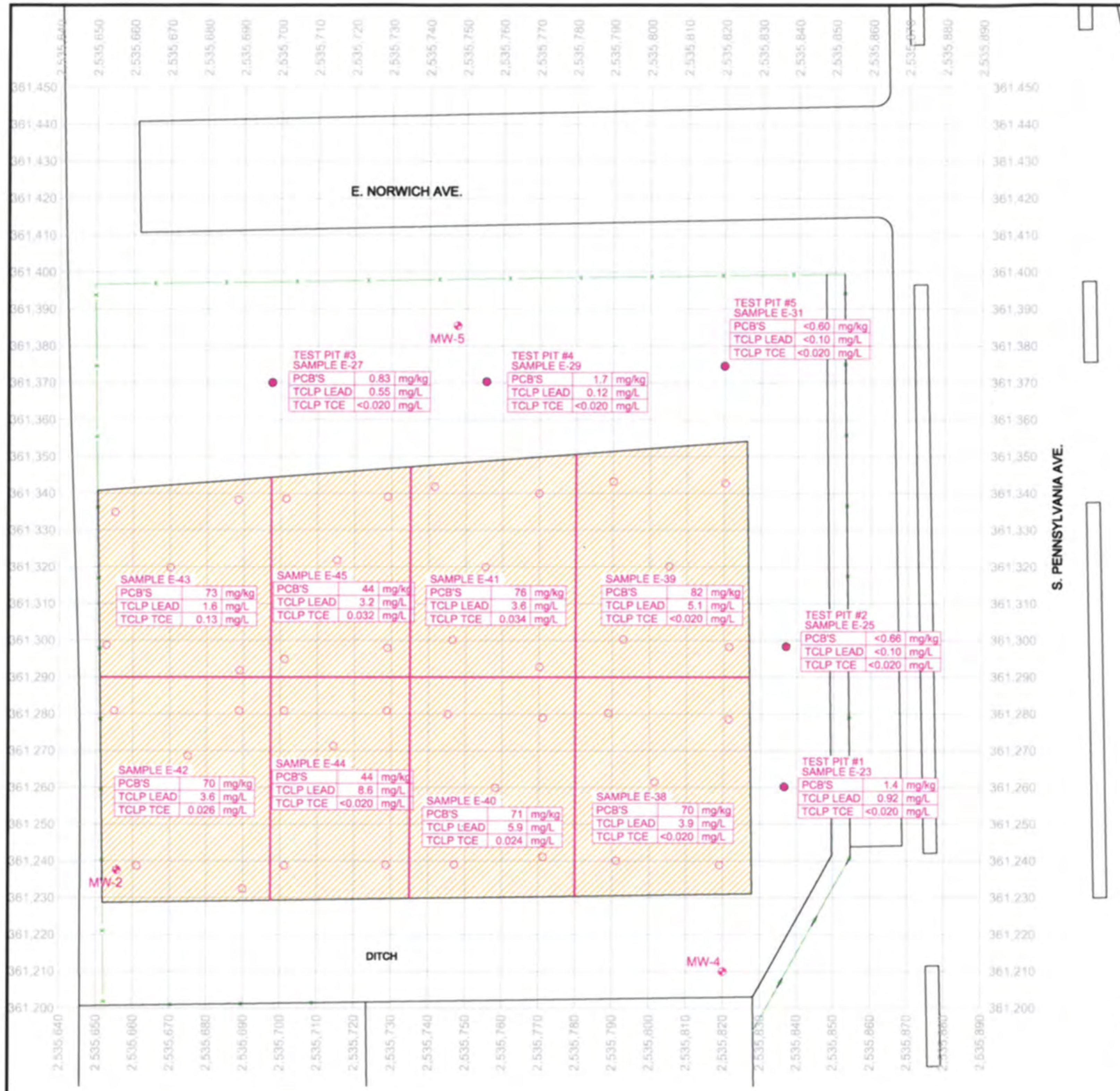
Sincerely,

Tracey L Koach

Tracey L. Koach
Project Geologist, STN Environmental JV

Attachments

cc: Stavros Emmanouil, EPA START On-Scene Coordinator
Craig Thomas, EPA START On-Scene Coordinator
Gail Stanuch, EPA START Project Officer
Raghu Nagam, STN START Program Manager



TEST PIT #3
SAMPLE E-27

PCB'S	0.83	mg/kg
TCLP LEAD	0.55	mg/L
TCLP TCE	<0.020	mg/L

TEST PIT #4
SAMPLE E-29

PCB'S	1.7	mg/kg
TCLP LEAD	0.12	mg/L
TCLP TCE	<0.020	mg/L

TEST PIT #5
SAMPLE E-31

PCB'S	<0.60	mg/kg
TCLP LEAD	<0.10	mg/L
TCLP TCE	<0.020	mg/L

SAMPLE E-43

PCB'S	73	mg/kg
TCLP LEAD	1.6	mg/L
TCLP TCE	0.13	mg/L

SAMPLE E-45

PCB'S	44	mg/kg
TCLP LEAD	3.2	mg/L
TCLP TCE	0.032	mg/L

SAMPLE E-41

PCB'S	76	mg/kg
TCLP LEAD	3.6	mg/L
TCLP TCE	0.034	mg/L

SAMPLE E-39

PCB'S	82	mg/kg
TCLP LEAD	5.1	mg/L
TCLP TCE	<0.020	mg/L

TEST PIT #2
SAMPLE E-25

PCB'S	<0.66	mg/kg
TCLP LEAD	<0.10	mg/L
TCLP TCE	<0.020	mg/L

SAMPLE E-42

PCB'S	70	mg/kg
TCLP LEAD	3.6	mg/L
TCLP TCE	0.026	mg/L

SAMPLE E-44

PCB'S	44	mg/kg
TCLP LEAD	8.6	mg/L
TCLP TCE	<0.020	mg/L

SAMPLE E-40

PCB'S	71	mg/kg
TCLP LEAD	5.9	mg/L
TCLP TCE	0.024	mg/L

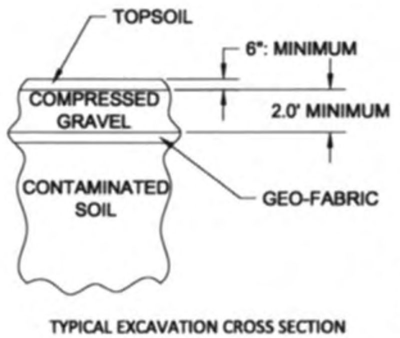
SAMPLE E-38

PCB'S	70	mg/kg
TCLP LEAD	3.9	mg/L
TCLP TCE	<0.020	mg/L

TEST PIT #1
SAMPLE E-23

PCB'S	1.4	mg/kg
TCLP LEAD	0.92	mg/L
TCLP TCE	<0.020	mg/L

CO-ORDINATE SYSTEM SHOWN IS WISCONSIN STATE
PLANE SOUTH NAD 83 FEET



TYPICAL EXCAVATION CROSS SECTION

ENVIRONMENTAL QUALITY
MANAGEMENT, INC.
1800 CARILLON BLVD.
CINCINNATI, OHIO 45240
P (513)825-7500
F (513)825-7495

ST. FRANCIS AUTO SITE
SITE MAP

DRAWN	D.TOMO	1-19-09
CHECKED		
APPROVED		
SCALE:	NONE	

ORIGINAL SIZE	PROJECT NO.	DWG NO.	REV
D	030281.0015		0

Table 1
St. Francis Auto Wreckers Removal Action
Soil Sample Analytical Results Summary

			ppm	mg/L	
Sample ID	Sample Date	Sample Location	Total PCBs	TCLP Lead	TCE
		Action Level	50	0.5	0.5
E-1	10/23/2008	Stockpile 1	16	0.38	NA
E-2	10/23/2008	Stockpile 2	**980**	1.8	NA
E-3	10--30-08	Stockpile 2, Section 2	**810**	NA	NA
E-4	10/31/2008	Stockpile 1, Section 2	**76**	NA	NA
E-5 South	12/3/2008	Material left in hole, southwest	**143**	**2.2**	0.062
E-6 North	12/3/2008	Material left in hole, northwest	**89**	**20**	<0.040
E-5	11/5/2008	Roll Off Boxes of Drums and Drum Contents	**1240**	0.37	**2.5**
E-7	12/10/2008	Treated Stockpile #2, Section 2A	NA	ND	0.27
E-8	12/15/2008	Treated Stockpile #2, Section 2B	NA	**0.97**	0.061
E-9	12/16/2008	Treated Stockpile #2, Section 2C	NA	0.27	0.061
E-10	12/18/2008	Excavation Floor, SW Section of Site	ND	0.23	ND
E-11	12/23/2008	Pre-Treated Soil Stockpile #3	**145**	**8.00**	**24.00**
E-13	1/9/2009	Post-Treated Soil Stockpile #3, Section 1	NA	ND	0.088
E-14	1/23/2009	Post-Treated Soil Stockpile #3, Section 2	NA	ND	0.072
E-15	1/23/2009	Stockpile #4 No Treatment	44	**1.2**	0.13
E-16 (1)	2/2/2009	Stockpile #7 No Treatment	**126**	**2.2**	0.096
E-17 (2)	2/2/2009	Stockpile #5 No Treatment	**114**	**3.5**	ND
E-18 (3)	2/2/2009	Stockpile #6 No Treatment	**126**	**2.00**	0.042
E-19 (1)	2/5/2009	Stockpile #8 No Treatment	52.5	**2.2**	0.015
E-20 (3)	2/5/2009	Stockpile #10 No Treatment	**199**	**2.4**	0.27
E-21	2/9/2009	Stockpiles #5, #6, #7 No Treatment	NA	**1.2**	NA

Table 1
St. Francis Auto Wreckers Removal Action
Soil Sample Analytical Results Summary

			ppm	mg/L	
Sample ID	Sample Date	Sample Location	Total PCBs	TCLP Lead	TCE
		Action Level	50	0.5	0.5
E-22	2/9/2009	Stockpile #9 No Treatment	**380**	**2.9**	**0.11**
E-23	2/12/2009	Test Pit #1	1.4	**0.92**	ND
E-24 (4)	2/12/2009	Test Pit #1			
E-25	2/12/2009	Test Pit #2	ND	ND	ND
E-26 (4)	2/12/2009	Test Pit #2			
E-27	2/12/2009	Test Pit #3	0.83	**0.55**	ND
E-28 (4)	2/12/2009	Test Pit #3			
E-29	2/12/2009	Test Pit #4	1.7	0.12	ND
E-30 (4)	2/12/2009	Test Pit #4			
E-31	2/12/2009	Test Pit #5	ND	ND	ND
E-32 (4)	2/12/2009	Test Pit #5			
E-33 (1)	2/13/2009	Stockpile #11 No Treatment	**110**	**3.5**	0.02
E-34 (2)	2/13/2009	Stockpile #12 No Treatment	**110**	**1.5**	0.02
E-35 (3)	2/13/2009	Stockpile #13 No Treatment	**150**	**2.2**	0.066
E-36	2/12/2009	Grease	NA	ND	NA
E-37	No sample collected.				
E-38	3/27/2009	Confirmation Sample	70	3.9	<0.02
E-39	3/27/2009	Confirmation Sample	82	5.1	<0.02
E-40	3/27/2009	Confirmation Sample	71	5.9	0.024
E-41	3/27/2009	Confirmation Sample	76	3.6	0.034
E-42	4/1/2009	Confirmation Sample	70	3.6	0.026
E-43	4/1/2009	Confirmation Sample	73	1.6	0.13
E-44	3/31/2009	Confirmation Sample	44	8.6	<0.02
E-45	3/31/2009	Confirmation Sample	44	3.2	0.032

Notes: Removal activities were conducted under TDD number S05-0809-001 and analytical services were provided through ERRS.

(1) Stockpiled material judged to be non-hazardous.
(2) Stockpiled material judged to be contaminated.
(3) Stockpiled drums and paint sludge.
(4) Sample collected from floor of test pit (approximately 10 feet bgs), but not analyzed.
Bolded results exceed action levels.
ppm - parts per million
mg/L - milligrams per liter
ID - Identification
PCBs - polychlorinated biphenyls
TCLP - toxicity characteristic leaching procedure
TCE - trichloroethylene
ND - Non-detect
NA - Not analyzed

ATTACHMENT E

WDNR LETTER REQUESTING EPA ASSISTANCE (REF. 8)

WISCONSIN
DEPT. OF NATURAL RESOURCES

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Jim Doyle, Governor
Scott Hassett, Secretary

101 S. Webster St.
Box 7921
Madison, Wisconsin 53707-7921
Telephone 608-266-2621
FAX 608-267-3579
TTY Access via relay - 711

August 9, 2007

Mike Harris
US EPA Region V
77 West Jackson Blvd.
Chicago, IL 60604

Subject: Removal Assistance Request

Dear Mr. Harris:

The Wisconsin Department of Natural Resources (WDNR) requests U.S. EPA Region 5 Emergency Response Branch assistance to help evaluate and mitigate the threat posed by St. Francis Auto Wreckers, Inc. located at 4043 Pennsylvania Avenue, St. Francis, Milwaukee County, Wisconsin.

The site is a vacant parcel (1.2 acres) next to an operating auto salvage yard. The vacant parcel was purchased at the same time as the salvage yard but has not been used for any specific purpose by the owner. During the installation of a new water line by the city, buried drums were uncovered. The city removed the drums in the area of their project and informed the property owner of the findings. The property owner has spent more than $30,000 to conduct a site investigation and removal of drums. There are many more drums in the area that require removal. Testing results indicate the presence of PCB's and hazardous waste materials at the site.

I have included a RISE form with this letter. Please contact me (608) 267-2465, to set up a conference call to discuss this situation.

Sincerely,

Marie Stewart

Marie Stewart
Federal Removals Coordinator
Bureau for Remediation and Redevelopment

cc: Andy Boettcher/Jim Schmidt – SER

Region 5 RISE Information Form

Date: 08/09/07

OSC/phone #:

State Contact/ Phone # : Andy Boettcher / 414-263-8541
Fax (414) 263-8483
Email: andrew.boettcher@wisconsin.gov

Other Contacts: Marie Stewart, DNR Federal Removals Coordinator (608) 267-2465
Fax (608) 267-7646 E-mail marie.stewart@wisconsin.gov

Who reported site? WI DOT
Site Name: St. Francis Auto Wreckers – Vacant Parcel

CERCLIS ID #: WID988639068 – (St. Francis Auto Wreckers Site and Vacant Parcel are together under this ID#)
Site Specific Spill ID#: 02-41-000269

Site Location (address/city/county/state): 4043 S Pennsylvania Ave, St. Francis, Milwaukee County, WI (address listed is for the St. Francis Auto Wreckers Property - Note that the vacant parcel is a separate property located immediately north from the St. Francis Auto Wrecker's Facility)

Site Owner Name and Phone #: St. Francis Auto Wreckers, Inc.
Attn: Robert Melton, 414-481-4540

Suspected Resource Damage:

- Buried Abandoned Drums
- Contaminated Soil
- Contaminated Groundwater

Operation Status: Vacant Property, purchased by St. Francis Auto Wreckers Inc. around 1979. Currently vacant.

Type of Operation and Wastes

- Landfill containing Foundry Sand, Waste and Buried Abandoned Drums (containing Free Liquids and Solid Material).
- Historic Dump for Town of Lake
- A Preliminary Assessment was conducted by WDNR (dated 9/21/1993)
- As a result of the PA, the site was "archived".

- When WI DOT was preparing for construction of the Lake Arterial Parkway (immediately adjacent to the west side of the site), buried drums containing a variety of wastes were discovered (September – October 1997).
- A Site Reassessment was conducted by WDNR (dated 11/10/2004).
- During site assessment activities conducted by North Shore Environmental on behalf of the City of St. Francis (WDNR SAG grant funded), buried drums were discovered on the vacant parcel. The drums contained free liquids, semi-solid and solid materials. The waste characterization samples indicated the presence of TSCA wastes and RCRA hazardous wastes. (August 2006)

Request for Assistance
WDNR is requesting U.S. EPA to conduct a removal assessment at this site to determine whether EPA can take a response action to mitigate the immediate threat posed by the presence of drums containing TSCA wastes and RCRA hazardous wastes at the site.

WDNR has requested that the waste generated during the August 2006 site assessment be securely stored and not disposed, until requested by WDNR, to allow potential re-evaluation of the labeling on the recovered buried drums and containers.

Photographs of two of the partially legible container labels **will be forwarded under separate cover.**

A copy of the laboratory analytical reports for the characterization samples collected during the August 2006 site assessment **will be forwarded under separate cover.**

A copy of some of the relevant information from the Phase I Environmental Reconnaissance report prepared by STS Consultants for WI **DOT will be forwarded under separate cover.** This includes property ownership records, municipal land filling information and an aerial photograph interpretation summary.

<u>Note to OSC's:</u>
Send copies of documents and fax PolReps to:
1) State Contact listed above **and**
2) Marie Stewart, Federal Removals Coordinator (608) 267-2465 Fax - (608) 267-7646
E-mail = marie.stewart@wisconsin.gov

DNR
101 S. Webster Street RR/3
P.O. Box 7921
Madison, WI 53707

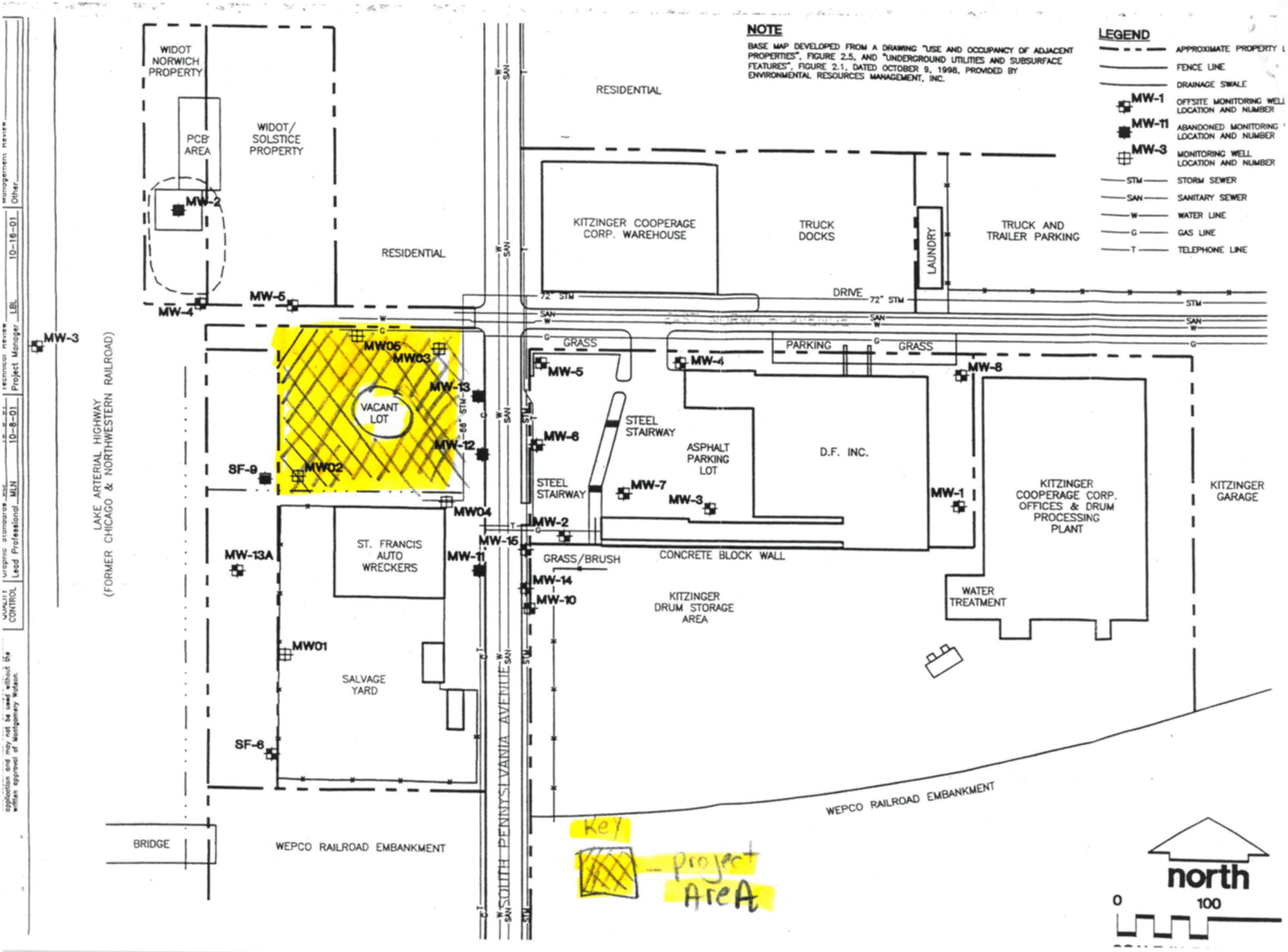
JUSTIFICATION FOR INITIATING ACTIVITY

Removal Site Assessment

Remediation Decision (TC, NTC, NPL) **Date of Decision:**

Prepared by: **Date:**

Removal Action Decision:


NOTE
BASE MAP DEVELOPED FROM A DRAWING "USE AND OCCUPANCY OF ADJACENT PROPERTIES", FIGURE 2.5, AND "UNDERGROUND UTILITIES AND SUBSURFACE FEATURES", FIGURE 2.1, DATED OCTOBER 9, 1998, PROVIDED BY ENVIRONMENTAL RESOURCES MANAGEMENT, INC.
LEGEND
APPROXIMATE PROPERTY L
FENCE LINE
DRAINAGE SWALE
MW-1 OFFSITE MONITORING WELL LOCATION AND NUMBER
MW-11 ABANDONED MONITORING LOCATION AND NUMBER
MW-3 MONITORING WELL LOCATION AND NUMBER
STM STORM SEWER
SAN SANITARY SEWER
W WATER LINE
G GAS LINE
T TELEPHONE LINE
WIDOT NORWICH PROPERTY
PCB AREA
WIDOT/ SOLSTICE PROPERTY
RESIDENTIAL
RESIDENTIAL
KITZINGER COOPERAGE CORP. WAREHOUSE
TRUCK DOCKS
LAUNDRY
TRUCK AND TRAILER PARKING
DRIVE
72" STM
72" STM
GRASS
PARKING
GRASS
MW-2
MW-4
MW-5
MW-3
MW05
MW03
MW-13
VACANT LOT
MW-12
66" STM
SF-9
MW02
MW04
MW-13A
ST. FRANCIS AUTO WRECKERS
MW-11
MW-15
MW01
SALVAGE YARD
SF-6
MW-5
MW-4
MW-8
MW-6
STEEL STAIRWAY
ASPHALT PARKING LOT
D.F. INC.
STEEL STAIRWAY
MW-7
MW-3
MW-1
MW-2
KITZINGER COOPERAGE CORP. OFFICES & DRUM PROCESSING PLANT
KITZINGER GARAGE
CONCRETE BLOCK WALL
GRASS/BRUSH
MW-14
MW-10
KITZINGER DRUM STORAGE AREA
WATER TREATMENT
LAKE ARTERIAL HIGHWAY (FORMER CHICAGO & NORTHWESTERN RAILROAD)
SOUTH PENNSYLVANIA AVENUE
WEPCO RAILROAD EMBANKMENT
WEPCO RAILROAD EMBANKMENT
BRIDGE
Key
Project Area
north
0
100
QUALITY CONTROL
Lead Professional MLN 10-8-01
Project Manager LBL 10-16-01
Other
application and may not be used without the written approval of Montgomery Watson.