KEY ENGINEERING GROUP LTD.
ENVIRONMENTAL ■ CIVIL/GEOTECH ■ COMPLIANCE

W66 N215 Commerce Court
Cedarburg, Wisconsin 53012
(262) 375-4750
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May 23, 2000

Ms. Barb Grundl
Wisconsin Department of Natural Resources
2300 North Dr. Martin Luther King Jr. Drive
Post Office Box 12436
Milwaukee, Wisconsin 53212

Reference: *Site Investigation Work Plan*
Former Key Products
8627-8633 West Lynx Avenue
Milwaukee, Wisconsin 53225
WDNR FID #: 241437790 ERP
WDNR BRRTS #: 02-41-153233

KEY ENGINEERING GROUP, LTD.
File No. 0712007

Dear Ms. Grundl:

Enclosed is the *Site Investigation Work Plan (SI Work Plan)* for the above referenced project. This *SI Work Plan* includes applicable background information and the purpose, objective, scope, procedures and preliminary schedule for the site investigation.

Please contact us at (262) 375-4750 if you have any questions regarding this report.

Sincerely,

KEY ENGINEERING GROUP, LTD.

Curtis M. Hoffart, CHMM
Project Scientist

Gregory L. Johnson, CHMM, P.H., P.G., P.E.
Senior Engineer/Scientist

CMH/clh

cc: Mr. Richard Meinburg, Key Products, Inc.
Ms. Karen Schapiro, Frazer Schapiro & Rich, SC

H:\PROJECTS\1997\0712007\0712007.wrkpln.wpd

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Inc. 500

SITE INVESTIGATION WORK PLAN

FORMER KEY PRODUCTS
8627-8633 WEST LYNX AVENUE
MILWAUKEE, WISCONSIN 53225
WDNR FID #: 241437790 ERP
WDNR BRRTS #: 02-41-153233

May 23, 2000

PREPARED FOR:

KEY PRODUCTS, INC.
10600 WEST GLENBROOK COURT
MILWAUKEE, WISCONSIN 53224

SITE INVESTIGATION WORK PLAN

FORMER KEY PRODUCTS
8627-8633 WEST LYNX AVENUE
MILWAUKEE, WISCONSIN 53225
WDNR FID #: 241437790 ERP
WDNR BRRTS #: 02-41-153233

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Senior Engineer/Scientist

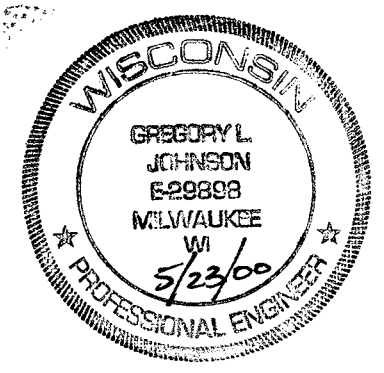
NR 700 CERTIFICATIONS

"I, Gregory L. Johnson, hereby certify that I am a hydrogeologist as that term is defined in Chapter NR 712.03 (1), Wisconsin Administrative Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in Chapters NR 700 to 726, Wisconsin Administrative Code."

Signature

5/23/00
Date

"I, Gregory L. Johnson, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of chapter A-E 4, Wisconsin Administrative Code; that this document has been prepared in accordance with the Rules of Professional Conduct in chapter A-E 8, Wisconsin Administrative Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chapters NR 700 to 726, Wisconsin Administrative Code."



Signature

Stamp

FILE NO. 0712007.wrkpln.wpd

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1.0 INTRODUCTION

This *Site Investigation Work Plan (SI Work Plan)* for the site located at 8627-8633 West Lynx Avenue, Milwaukee, Wisconsin was prepared for and is being submitted on behalf of Key Products, Inc. to the Wisconsin Department of Natural Resources (WDNR) by Key Engineering Group, Ltd. (KEY). This *SI Work Plan* was prepared in general accordance with Chapter NR 716 of the Wisconsin Administrative Code.

This *SI Work Plan* presents the site investigation (SI) objectives; pertinent background information; a preliminary conceptual site model; the SI scope; and project management information, including an estimated SI schedule. This *SI Work Plan* includes a *Sampling and Analysis Plan* (Appendix 1), a *Data Management Plan* (Appendix 2) and a *Health and Safety Plan* (Appendix 3).

- *Sampling and Analysis Plan (SAP).* The *SAP* details sample collection and data gathering procedures, equipment and documentation.

- *Data Management Plan (DMP).* The DMP details data management and reduction procedures for field, laboratory and quality assurance/quality control data gathered during the SI.

- *Health and Safety Plan (HASP).* The HASP includes a hazard assessment and details personal protective and monitoring equipment, site control measures, decontamination procedures, communications and safe work practices and emergency preparedness.

2.0 SITE INVESTIGATION OBJECTIVE

Soil and groundwater contamination was detected adjacent to the south side of the site building during remedial action activities conducted by Materials Management & Training, Ltd. (MMTL) in 1996. The WDNR issued Key Products, Inc. a "responsible party" letter dated January 3, 1997 requesting investigation at the site to determine groundwater quality. MMTL subsequently conducted a soil probe investigation, which included the collection of a groundwater sample. Concentrations of several volatile organic compounds (VOCs) were detected in the groundwater sample. KEY was initially retained in December 1997 to further evaluate groundwater quality at the site, and subsequently conducted additional investigation of soil and groundwater quality pursuant to additional correspondence with the WDNR.

The objective of the SI is to define the degree and extent of chlorinated VOCs in soil and groundwater. The objective of the SI will be met by advancing additional soil borings, collecting and analyzing soil samples, constructing groundwater monitoring wells and a piezometer and collecting and analyzing groundwater samples. The soil sample results will be compared to United States Environmental Protection Agency (USEPA) Region 9 Preliminary Remediation Goals (PRGs) or Soil Screening Levels (SSLs)or calculated site-specific residual contaminant levels (SSRCLs). The groundwater sample results will be compared to NR 140 groundwater quality standards.

3.0 BACKGROUND INFORMATION

3.1 Site Location

The site is located at 8627-8633 West Lynx Avenue, Milwaukee, Wisconsin. The property is situated in the southeast ¼ of the northwest ¼ of United States Public Land Survey Section 28, Township 8 North, Range 21 East in Milwaukee County, Wisconsin. The site location is depicted on Figure 1.

3.2 Site Description

The site is an approximately 0.75-acre parcel developed with an industrial building, located on the eastern portion of the site. An asphalt parking lot is located on the western portion of the site. The building is currently occupied by Kraussel Tool and Manufacturing, Corp. The site is bordered to the north by residential properties and to the south, west and east by commercial/industrial properties. The site and surrounding area are serviced by municipal water, sewer and natural gas. The site layout is depicted on Figure 2.

3.3 Site History

Site history information was obtained by reviewing aerial photographs and interviewing Mr. Richard Meinburg of Key Product, Inc. Pertinent historical information is summarized as follows:

- The building currently on the site was constructed between 1970 and 1975; one relatively smaller structure was depicted on the site prior to construction of the current building. The site appeared vacant and grass-covered prior to 1970.

- Several of the commercial/industrial buildings located south of the site were present as early as 1963 (earliest aerial photograph reviewed); however, development south of the site continued until approximately 1985.

- The building located east of the site (currently occupied by K-W Manufacturing and Engineering) was constructed between 1980 and 1985.

- Key Products, Inc. formerly occupied the site building for approximately 19 years, utilizing the building to manufacture custom metal removal equipment. Key Products, Inc. vacated the site in September 1994.

3.4 Topography

The site topography and drainage features were evaluated by reviewing the United States Geological Survey, Menomonee Falls, Wisconsin, 7.5 Minute Series (topographic) Quadrangle Map. The topography of the site is relatively flat with an elevation of approximately 740 feet above mean sea level. The immediate site vicinity slopes slightly to the southeast toward an intermittent stream, depicted approximately 300 feet southeast of the site.

3.5 Surface Water Drainage

Surface water generally drains onto the adjacent properties to the south or into a storm water catch basin located on the south side of the site. The Little Menomonee River and Lincoln Creek are located approximately ¾-mile west and 1¾-mile southeast of the site respectively.

3.6 Geology

Glacial materials in the site vicinity consist of end moraine deposits (glacial till) (Glacial Deposits of Wisconsin Map, 1976). The glacial till is predominantly silty clay with some stratified sand and gravel. The glacial deposits are approximately 100 to 200 feet thick (Trotta and Cotter, 1973).

The surficial bedrock geology in the vicinity of the subject site consists of Devonian or Silurian age dolomite.

3.7 Hydrogeology

Available hydrogeologic information reviewed for the area indicates that the main sources of groundwater, in order of depth, are the glacial deposits (sand and gravel), dolomite and sandstone aquifers. Based on KEY's initial investigation activities, groundwater flow within the glacial deposits is southwesterly to southeasterly . Groundwater flow in bedrock is easterly toward Lake Michigan (Skinner and Borman, 1973). Local conditions, such as water supply wells, buried utility lines and tunnels, roadways, building foundations and fill soils may affect local groundwater flow direction. The depth to ground water is approximately 2 to 12 feet below ground surface (bgs) based on previously collected groundwater elevation data.

3.8 Previous Investigation

Previous correspondence provided to KEY by Key Products, Inc. indicated that soil contamination was detected adjacent to the south side of the site building where a dumpster was stored. The contamination had apparently been confirmed on January 26, 1996 by the collection and analysis of a soil sample.

Based on the documentation provided to KEY, MMTL provided oversight for the excavation of approximately 226 tons of contaminated soil from the area adjacent to the south side of the building on May 23, 1996. The approximate extent of the excavation is depicted on Figure 2. The excavated soils were transported to Orchard Ridge Recycling and Disposal Facility, Menomonee Falls, Wisconsin, for landfill disposal. Soils were excavated to depths up to 12 feet bgs.

The WDNR issued Key Products, Inc. a "responsible party" letter dated January 3, 1997, requesting investigation at the site to determine groundwater quality. The WDNR request was based on the VOC concentrations detected in site soils and groundwater depth data obtained from a WDNR case file for a nearby site (Hampton Plumbing, 8617 West Kaul Avenue). No groundwater had apparently been encountered during the excavation activities; however, the WDNR indicated that may have been attributable to the clayey soil at the site.

MMTL subsequently conducted additional sampling at the site on July 23, 1997, consisting of three soil probes (GP-1, GP-2, and GP-3). A groundwater sample collected from GP-3 was submitted for VOC analysis. The GP-3 groundwater sample analytical results indicated that tetrachloroethene (PCE), trichloroethene (TCE), vinyl chloride, cis-1,2-dichlorcethene (DCE), benzene, and trimethylbenzeneswere detected at concentrations exceeding NR 140 enforcement

standards (ESs); MMTL indicated that the groundwater sample collected from GP-3 was collected from perched water at approximately 5 feet bgs.

KEY conducted additional investigation activities in 1997 and 1999 to further evaluate the degree and extent of previously detected contaminants on site. KEY's work consisted of the installation of three groundwater monitoring wells (MW-1, MW-2 and MW-3) and the advancement of two soil probes (GP-1 and GP-2) on and east of the site. KEY's additional investigation activities were documented in the following letters to the WDNR.

- *Results of Limited Site Investigation*, July 23, 1998.
- *Investigation Results*, March 9, 2000 (provided as an attachment to a March 14, 2000 letter from Frazer Schapiro & Rich, SC).

The soil sample analytical results are summarized in Table 1 and on Figure 3. The groundwater sample analytical results are summarized in Table 2 and on Figure 4.

The soil sample analytical results generally indicated that PCE, TCE and cis-1,2- DCE were detected in soils on and east of the site at concentrations exceeding USEPA Region 9 PRGs or SSLs. The groundwater sample analytical results generally indicated that PCE, TCE, cis-1,2-DCE and vinyl chloride were detected adjacent to the former excavation area (MW-1) at concentrations exceeding NR 140 ESs; PCE was detected east of the site (MW-2) at a concentration exceeding the NR 140 ES.

Based on this data, the horizontal extent of soil and groundwater contamination is generally defined to the west; however, the horizontal extent of contamination is not defined to the north, south or east.

4.0 PRELIMINARY CONCEPTUAL SITE MODEL

Available site historical information and previous investigation results were used to develop a preliminary conceptual site model. The conceptual site model was developed to identify the SI strategy and scope.

The preliminary conceptual site model is depicted on Figure 5. Based on this model and the preliminary investigation results, the SI will focus on the following exposure/migration pathways:

- Direct contact with contaminated surface soils.
- Leaching of unsaturated soil contaminants into groundwater.
- Contaminant migration in groundwater.

5.0 SITE INVESTIGATION SCOPE

Based on the preliminary conceptual site model, the SI will consist of additional soil investigation, groundwater investigation and a site survey. Completing the SI scope of work will be contingent on obtaining access from adjacent property owners to drill soil borings and groundwater monitoring wells. Access form the current site occupant will also be needed to conduct SI field activities within the site building.

The SI will be performed in accordance with the *SAP* (Appendix 1), the *DMP* (Appendix 2) and the *HASP* (Appendix 3).

5.1 Soil Investigation

The scope of the additional soil investigation will consist of the following:

- Approximately five soil borings will be advanced to an approximate depth of 15 feet or 35 feet.
- Soil samples will be collected at 2½ -foot intervals and field screened with a photoionization detector.
- One soil sample from each soil boring will be submitted for laboratory analysis of VOCs. Three soil samples will also be submitted for laboratory analysis of total organic carbon (to support the development of SSRCLs and an evaluation of natural attenuation).

5.2 Groundwater Investigation

The scope of the groundwater investigation will consist of the following:

- Install four groundwater monitoring wells and one piezometer in accordance with NR 141. The proposed monitoring well and piezometer locations are depicted on Figure 2.
- Groundwater samples collected following monitoring well development will be analyzed for VOCs.
- Purge and sample the existing monitoring wells; collected groundwater samples will be analyzed for VOCs.
- Conduct down-well tests for natural attenuation indicator parameters.
- Perform in-field hydraulic conductivity testing in each groundwater monitoring well.

5.3 Survey

The scope of the subject site survey will consist of the location and ground surface, top of protective pipe and top of casing of the groundwater monitoring wells. The previously installed monitoring wells will be included in the survey.

5.4 Refinement of Conceptual Site Model

The SI data will be used to refine the conceptual site model to establish the migration and exposure pathways that may need to be addressed further (additional SI, feasibility study, interim action and/or remedial action).

This refinement may include the calculation of site-specific soil standards and receptor contaminant exposure point travel times and concentrations.

5.5 Reports

After the objectives of the SI have been met, a *SI Report* will be prepared in accordance with NR 716 and will be submitted to the WDNR. The *SI Report* will document the SI procedures and results. If necessary, a *Remedial Actions Options (RAO) Report* will be prepared to document an evaluation of RAO in accordance with NR 722. If applicable, the RAO evaluation will consider SSRCLs, remediation by natural attenuation and risk-based management procedures.

6.0 PROJECT MANAGEMENT

6.1 Site Investigation Contacts

Responsible Party: Key Products, Inc.
Contact: Mr. Richard Meinburg
10600 West Glenbrook Court
Milwaukee, Wisconsin 53224
Phone: (414) 355-5399
Fax: (414) 355-1154

Consultant: Key Engineering Group, Ltd.
Contact: Mr. Curtis M. Hoffart, CHMM
W66 N215 Commerce Court
Cedarburg, Wisconsin 53012
Phone: (262) 375-4750
Fax: (262) 375-9680

6.2 Schedule

The estimated SI schedule is summarized in the following table.

Site Investigation Activity	Estimated Schedule
Request and Obtain Off-Site Access	May 2000
Field Investigation	June to July 2000
Site Investigation Report	August to September 2000

7.0 REFERENCES

Glacial Deposits of Wisconsin, Wisconsin Geological and Natural History Survey, University of Wisconsin-Extension, State Planning Office, Wisconsin Department of Administration, 1976.

Menomonee Falls, Wisconsin, 7.5 Minute Quadrangle Map, United States Geological Survey, 1958, Photorevised 1971 and 1976.

Mudrey, M.G., Brown, B.A., Jr., and Greenburg, J.K., *Bedrock Geologic Map of Wisconsin*, Wisconsin Geological and Natural History Survey, 1983.

Skinner, E.L., and Borman, R.G., *Water Resources of Wisconsin-Lake Michigan Basin*, Hydrologic Investigation Atlas HA-432, United States Geological Survey, University of Wisconsin-Extension, Wisconsin Geological and Natural History Survey, 1973.

Southeastern Wisconsin Regional Planning Commission, Aerial Photographs, 1963, 1967, 1970, 1975, 1980, 1985, 1990 and 1995.

Trotta, L.C., and Cotter, R.D., *Depth to Bedrock in Wisconsin*, United States Geological Survey, University of Wisconsin-Extension, Wisconsin Geological and Natural History Survey, 1973.

Wisconsin Administrative Code, Wisconsin Department of Natural Resources, Environmental Protection, *Investigation and Remediation of Environmental Contamination*, Chapters NR 700 Series.

TABLE 1

SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS

SITE INVESTIGATION WORK PLAN

FORMER KEY PRODUCTS
8627-8633 West Lynx Avenue
Milwaukee, Wisconsin

SAMPLE ID	MW-2		MW-3	GP-1	GP-2	PRG	SSL
Date Collected	6/25/99		6/25/99	9/22/99	9/22/99	NA	NA
Depth (feet)	3.5-5.5 *	6-8 *	3.5-5.5	2-4	2-4	NA	NA
PID (i.u.)	79	218	4	2	58	NA	NA
VOCs (µg/kg)							
Tetrachloroethene	99,000	4,400,000	53	880	1,600	5,700	60
Trichloroethene	2,000	<25,000	<25	<25	550	2,800	60
cis-1,2-Dichloroethene	<1,300	<25,000	<25	<25	420	43,000	400

Notes:
* - sample collected at or below the groundwater table possibly biasing concentration
i.u. - instrument units
NA - not applicable
PID - photoionization detector
PRG - USEPA Region 9 residential direct contact Preliminary Remediation Goal
SSL - USEPA Region 9 soil screening level for the protection of groundwater (with dilution)
µg/kg - micrograms per kilogram
VOCs - volatile organic compounds

TABLE 2

SUMMARY OF GROUNDWATER SAMPLE ANALYTICAL RESULTS

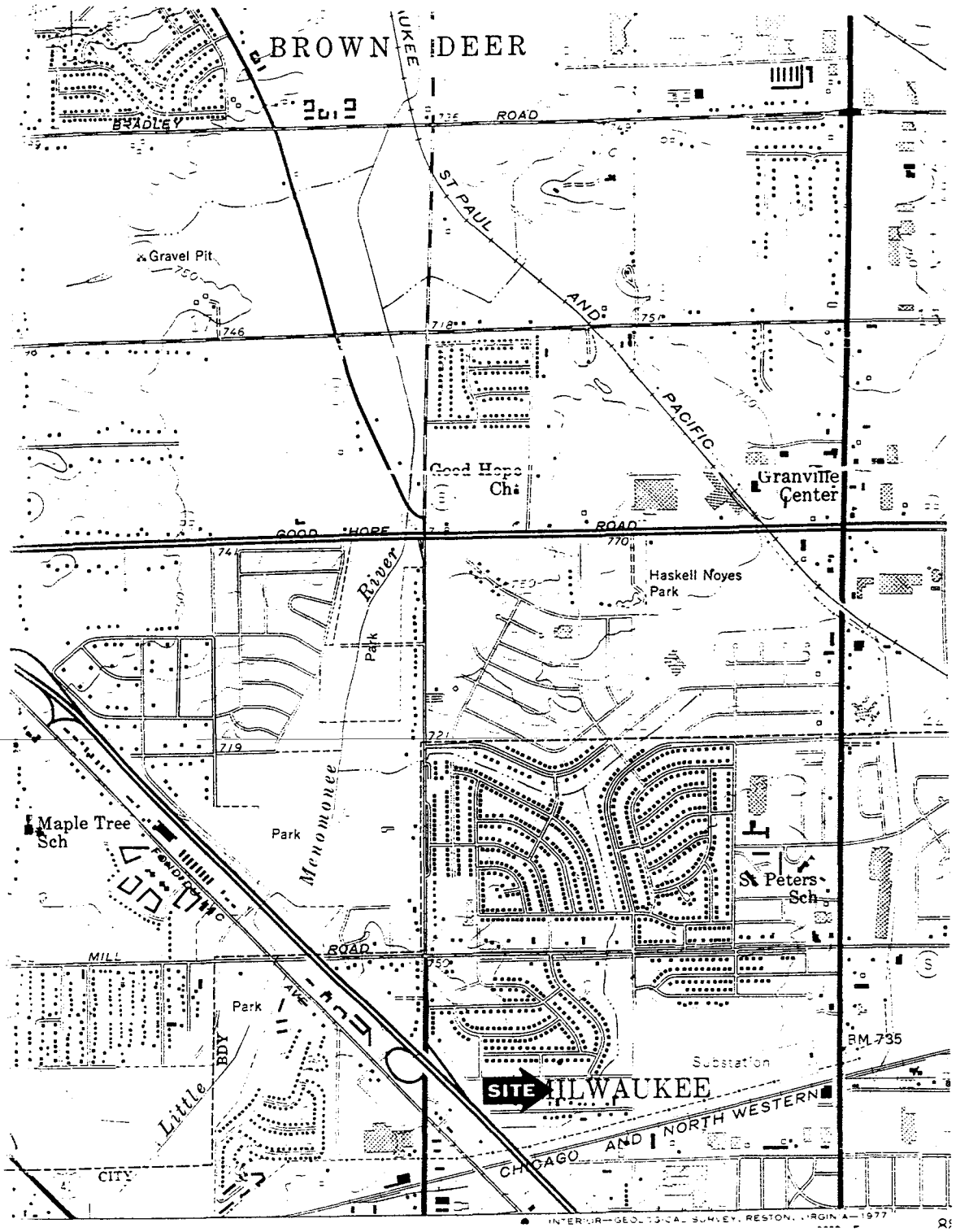
SITE INVESTIGATION WORK PLAN

FORMER KEY PRODUCTS

8627-8633 West Lynx Avenue
Milwaukee, Wisconsin

SAMPLE ID	MW-1		MW-2	MW-3	PAL	ES
Date Collected	12/31/97	7/13/99	7/13/99	7/13/99		
Detected VOCs (µg/l)						
Ethylbenzene	<0.50	<250	<0.50	1.5	140	700
Xylenes	<0.50	<250	<0.50	14	1,000	10,000
cis-1,2-Dichloroethene	**610**	**740**	1.4	<0.50	7	70
trans-1,2-Dichloroethene	3.9	<250	<0.50	<0.50	100	20
Trichloroethene	**120**	**400**	**0.80**	<0.50	0.5	5
Methylene chloride	<0.53	**430 B**	<0.53	<0.53	0.5	5
Tetrachloroethene	**4,100**	**24,000**	**14**	**2.0**	0.5	5
Vinyl chloride	**15**	<85	<0.17	<0.17	0.2	0.02

Notes:
Bold concentrations exceed NR 140 PAL
Shaded concentrations exceed NR 140 ES
B - the blank associated with this sample contained 91 µg/l of methylene chloride
ES - NR 140 enforcement standard
PAL - NR 140 preventive action limit
µg/l - micrograms per liter
VOCs - volatile organic compounds



N

SOURCE: *USGS Menomonee Falls, Wisconsin Quadrangle Map*
Topographic Map 1958
Photorevised 1971 & 1976

0 1000 2000

SCALE: 1"=2000'

DRN. BY:	J.J.J.	DATE:	05/16/00
DSN. BY:	C.M.H.	FILE NO.:	0712007
CHK. BY:	C.M.H.	DWG. NO.:	07120071
REV. BY:	G.L.J.	SHEET NO.:	1

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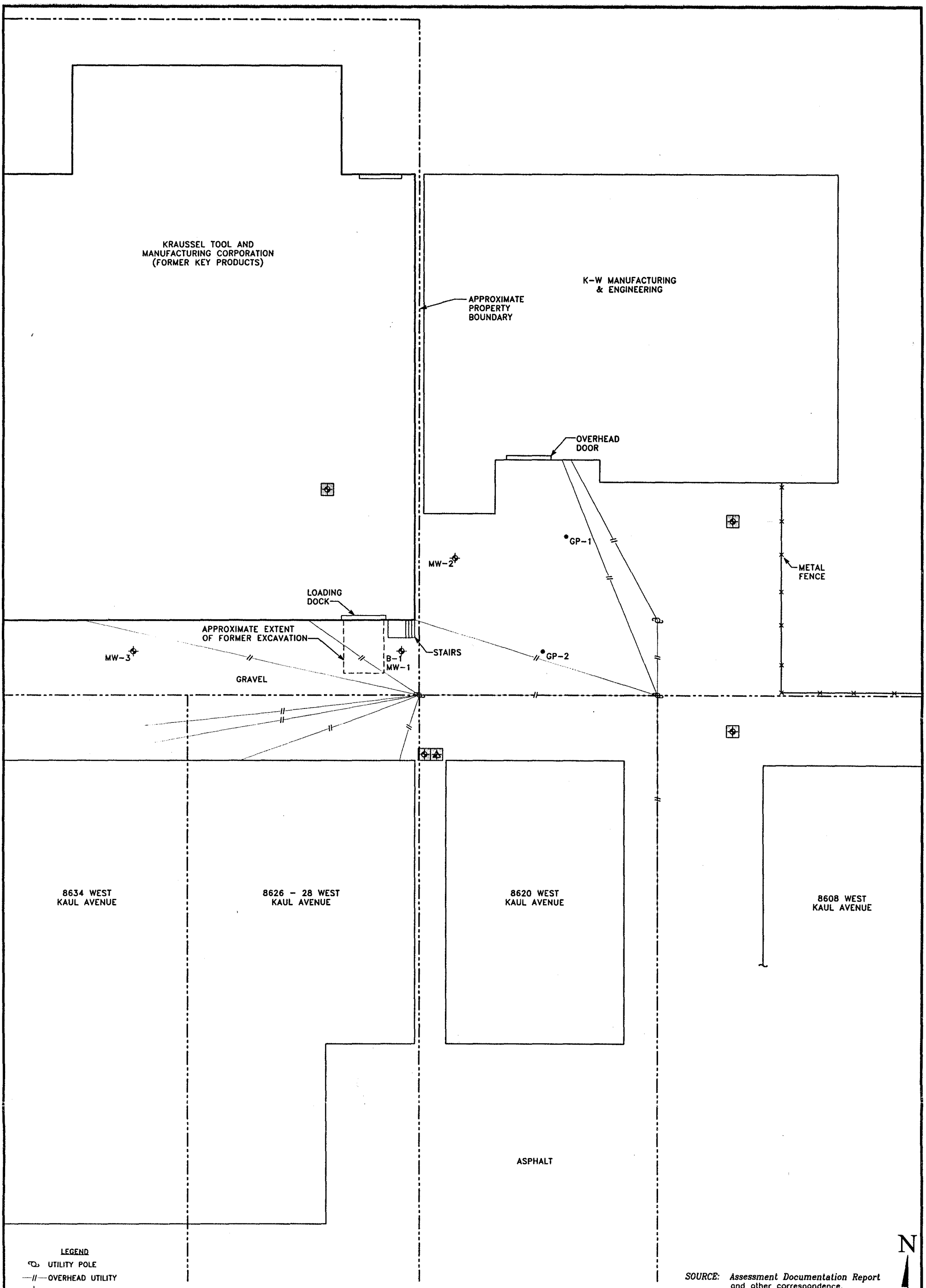
FIGURE 1
SITE LOCATION MAP

SITE INVESTIGATION WORK PLAN
FORMER KEY PRODUCTS
8627-8633 WEST LYNX AVENUE
MILWAUKEE, WISCONSIN



SOURCE: ***Assessment Documentation Report*** and other correspondence, Materials Management and Training, Ltd. September 19, 1997

DRN. BY:	J.J.J.	DATE:	05/16/00
DSN. BY:	C.M.H.	FILE NO.:	0712007
CHK. BY:	C.M.H.	DWG. NO.:	7120072
REV. BY:	G.L.J.	SHEET NO.:	1

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FIGURE 2
SITE LAYOUT

SITE INVESTIGATION WORK PLAN
FORMER KEY PRODUCTS
8627-8633 WEST LYNX AVENUE
MILWAUKEE, WISCONSIN

Key

K-W

GP-2				
DEPTH	0'-5'	5'-10'	10'-15'	15'-20'
C-1,2-DCE	280	<25	<30	<28
PCE	63,000	7,500	<30	<28
TCE	310	<25	<30	<28

GP-3		
DEPTH	0'-5'	5'-10'
C-1,2-DCE	490	<25
PCE	83,000	56
TCE	530	<25

GP-1	
DEPTH	2'-4'
PCE	880

MW-2		
DEPTH	3.5'-5.5'	6'-8'
PCE	99,000	4,400,000
TCE	2,000	<25,000

MW-3	
DEPTH	3.5'-5.5'
PCE	53
TCE	<25

GP-2	
DEPTH	2'-4'
C-1,2-DCE	420
PCE	1600
TCE	550

GP-1
MW-2
GP-2
GP-3
B-1
MW-1
MW-3
GP-2

NOTES

C-1,2-DCE: CIS-1,2-DICHLOROETHENE, ug/kg
PCE: TETRACHLOROETHENE, ug/kg
TCE: TRICHLOROETHENE, ug/kg
ug/kg: MICROGRMAS PER KILOGRAM
< : LESS THAN

LEGEND

- UTILITY POLE
- OVERHEAD UTILITY
- MONITORING WELL LOCATION
- SOIL PROBE LOCATION
- APPROXIMATE PREVIOUS SOIL PROBE LOCATION

SOURCE: *Assessment Documentation Report* and other correspondence, Materials Management and Training, Ltd. September 19, 1997

N

0 10 20

SCALE: 1"=20'

DRN. BY:	J.J.J.	DATE:	05/16/00
DSN. BY:	C.M.H.	FILE NO.:	0712007
CHK. BY:	C.M.H.	DWG. NO.:	07120073
REV. BY:	G.L.J.	SHEET NO.:	3

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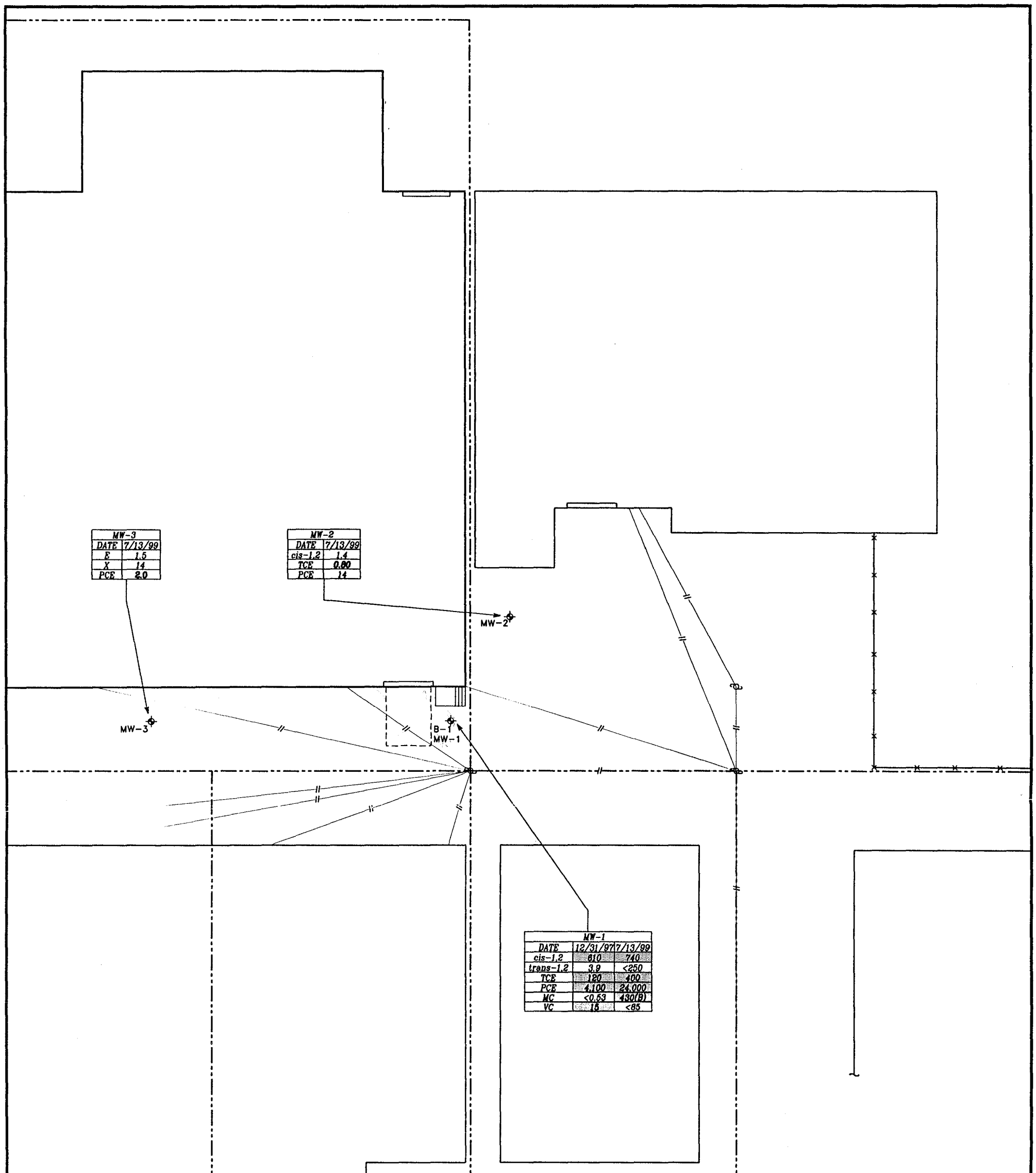
FIGURE 3
SUMMARY OF SOIL SAMPLE ANAYLTICAL RESULTS

SITE INVESTIGATION WORK PLAN
FORMER KEY PRODUCTS
8627-8633 WEST LYNX AVENUE
MILWAUKEE, WISCONSIN



NOTES

E: ETHYLBENZENE, ug/l
X: TOTAL XYLENES, ug/l
cis-1,2: cis-1,2-DICHLOROETHENE, ug/l
trans-1,2: trans-1,2-DICHLOROETHENE, ug/l
TCE: TRICHLOROETHENE, ug/l
PCE: TETRACHLOROETHENE, ug/l
MC: METHYLENE CHLORIDE, ug/l
VC: VINYL CHLORIDE, ug/l
ug/l: MICROGRAMS PER LITER
B: THE BLANK ASSOCIATED WITH THIS SAMPLE CONTAINED 91ug/l of MC

LEGEND

- UTILITY POLE
- OVERHEAD UTILITY
- MONITORING WELL LOCATION
- CONCENTRATION WHICH ATTAINS OR EXCEEDS THE NR 140 ENFORCEMENT STANDARD (ES)
- 5 CONCENTRATION WHICH ATTAINS OR EXCEEDS THE NR 140 PREVENTIVE ACITON LIMIT (PAL)

N

SOURCE: *Assessment Documentation Report* and other correspondence, Materials Management and Training, Ltd. September 19, 1997

0 10 20

SCALE: 1"=20'

DRN. BY:	J.J.J.	DATE:	05/16/00
DSN. BY:	C.M.H.	FILE NO.:	0712007
CHK. BY:	C.M.H.	DWG. NO.:	7120077
REV. BY:	G.L.J.	SHEET NO.:	4

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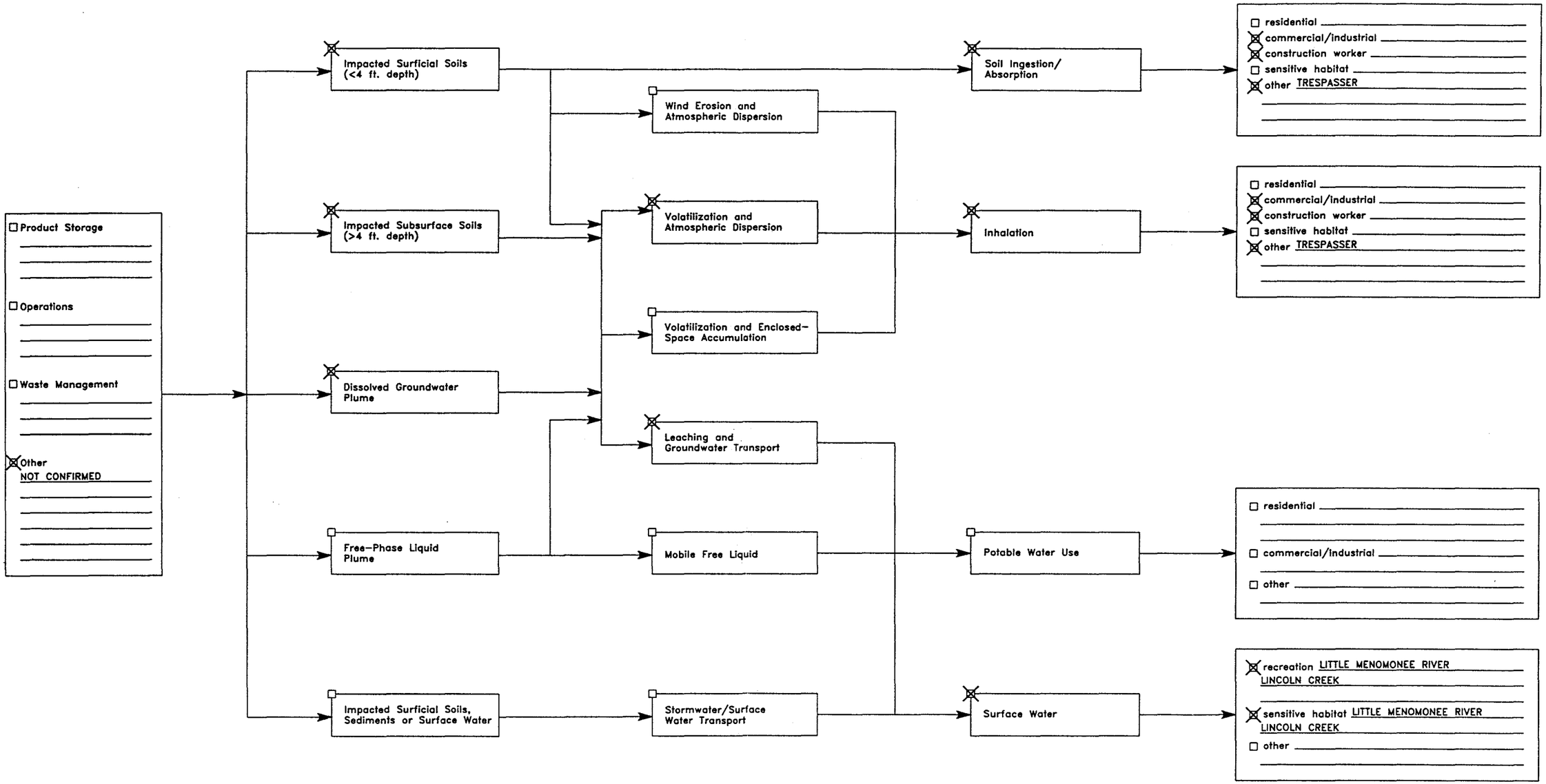
FIGURE 4
SUMMARY OF GROUNDWATER SAMPLE ANALYTICAL RESULTS

SITE INVESTIGATION WORK PLAN
FORMER KEY PRODUCTS
8627-8633 WEST LYNX AVENUE
MILWAUKEE, WISCONSIN

PRIMARY SOURCES	SECONDARY SOURCES	TRANSPORT MECHANISMS	EXPOSURE PATHWAYS	RECEPTOR CHARACTERIZATION



SOURCE:
ASTM E1739, Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites

NO SCALE

DRN. BY:	J.J.J.	DATE:	05/22/00
DSN. BY:	C.M.H.	FILE NO.:	0712007
CHK. BY:	C.M.H.	DWG. NO.:	SITEMODEL
REV. BY:	G.L.J.	SHEET NO.:	3

KEY ENGINEERING GROUP LTD.

FIGURE 5
PRELIMINARY CONCEPTUAL SITE MODEL

SITE INVESTIGATION WORK PLAN
FORMER KEY PRODUCTS
8627-8633 WEST LYNX AVENUE
MILWAUKEE, WISCONSIN

DATA MANAGEMENT PLAN

SITE INVESTIGATION WORK PLAN
FORMER KEY PRODUCTS

TABLE OF CONTENTS

1.0 INTRODUCTION

This *Data Management Plan* was prepared to identify the procedures that will be implemented during the site investigation (SI) at the above referenced site to ensure that data collected is recorded, reduced, validated and reported in an appropriate and consistent manner.

2.0 DATA RECORD KEEPING

2.1 Field Notes Form

The SI field activities will be documented on field notes forms. The field notes will provide sufficient data and observations, in as much detail as necessary, to reconstruct events that occurred during the SI. Information recorded on the field forms will include site conditions, the sequence and duration of events, field sampling information and field measurements. The field forms will be stored in a secured location when not in use. Each field form will include the name of the field personnel it is assigned to, project name, project start date and project end date. Each field notes form will include the date, start time, weather, names of field personnel and the names of site visitors. All measurements made and samples collected will be recorded in ink and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark and initialed by the person making the entry. All equipment used to make the measurements will be identified.

2.2 Field Forms

SI data will be recorded on the following field forms included in Appendix 1 of the *Sampling an Analysis Plan.*

- Photoionization Detector Calibration Sheet
- Soil Boring Log
- Borehole Abandonment Form
- Monitoring Well Construction Form
- Monitoring Well Development Form
- Groundwater Monitoring Form
- Groundwater Level Data Sheet
- Slug Test Form

2.3 Field Audits

Internal audits of field activities will be conducted. The audits will include an evaluation of data record keeping.

2.4 Project File

The original laboratory reports will be assembled by the Project Manager. The laboratory files, along with other relevant records, reports, field notes, photographs, subcontractor reports and data reviews will be maintained in a secured, limited-access area under the custody of the Project Manager.

3.0 FIELD SAMPLE IDENTIFICATION AND LABELING

Each SI sample will be identified with a field sample identification number consisting of a sample location (i.e., boring or monitoring well number) and depth interval.

3.1 Sample Location Number and Depth Interval

Numerical designation used to identify location and depth interval that the sample was collected.

3.2 Example

The following are examples of site-specific field sample identification numbers: B-1/ 1.0-2.5; MW-1.

3.3 Sample Label

Each sample will be labeled. The sample label will include the following information:

- Site Name
- Name of Sample
- Date and Time of Collection
- Field Sample Identification Number
- Analysis required
- Preservation

4.0 DATA REDUCTION AND REPORTING

Field data will be transcribed onto tables for review and validation. Once validated, the data will be compiled and reported in summary tables. Units will also be provided on all summary tables.

Laboratory deliverables will include sample results and quality assurance (QA)/quality control (QC) summaries of blanks, field duplicates, spikes, surrogates and laboratory control samples. Deliverables will also provide the date of sample receipt, extraction date and analysis date. The analytical data will be summarized in a format organized to facilitate data review and evaluation. The data summaries will include any data qualifiers provided by the laboratory. The laboratory data qualifiers may include items such as no detects, concentrations detected below the limit of quantitation and estimated concentrations due to QA/QC results.

APPENDIX A1-1

KEY ENGINEERING GROUP, LTD.
W66 N215 Commerce Court
Cedarburg, Wisconsin 53012
Phone No. (262) 375-4750
Fax No. (262) 375-9680

FIELD NOTES

Page ____ of____

Date:_____ KEY Job No.:_____
Project Manager:_____ Field Personnel:_____

Subcontractor/Other Personnel On-Site:_____

Drilling Firm and Crew Chief: _____

Weather
Conditions: _____

Arrived: _____ ☐ am ☐ pm Departed: _____ ☐ am ☐ pm

Description of Field Activities:

Form 4400-122 Rev. 7-98

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

Facility/Project Name	License/Permit/Monitoring Number	Boring Number

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method

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

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

Facility ID	County	County Code	Civil Town/City/ or Village

Sample Number and Type	Sample 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	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			1											
			2											
			3											
			4											
			5											
			6											
			7											
			8											
			9											
			10											
			11											
			12											

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

Signature	Firm	
	KEY ENGINEERING GROUP, LTD W66 N215 COMMERCE CT CEDARBURG WI 53012	Tel: (262) 375-4750 Fax: (262) 375-9680

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.

Boring Number . Use only as an attachment to Form 4400-122. Page 2 of

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
			13											
			14											
			15								—			
			16											
			17											
			18											
			19											
			20											
			21											
			22											
			23											
			24											
			25											
			26											
			27											
			28											
			29											
			30											
			31											
			32											

All abandonment work shall be performed in accordance with the provisions of Chapters NR 811, NR 812 or 141, Wis. Admin. Code, whichever is applicable.

(1) GENERAL INFORMATION		(2) FACILITY NAME	
Well/Drillhole/Borehole Location	County	Original Well Owner (If Known)	
____ 1/4 of ____ 1/4 of Sec. ____ ; T. ____ N; R. ____ ☐ E ☐ W		Present Well Owner	
(If Applicable) ____ Gov't Lot ____ Grid Number		Street or Route	
Grid Location ____ ft. ☐ N. ☐ S., ____ ft. ☐ E. ☐ W.		City, State, Zip Code	
Civil Town Name		Facility Well No. and/or Name (If Applicable)	WI Unique Well No.
Street Address of Well		Reason For Abandonment	
City, Village		Date of Abandonment	

WELL/DRILLHOLE/BOREHOLE INFORMATION

(3) Original Well/Drillhole/Borehole Construction Completed On (Date) _____

☐ Monitoring Well
☐ Water Well
☐ Drillhole
☐ Borehole

Construction Report Available? ☐ Yes ☐ No

Construction Type:
☐ Drilled ☐ Driven (Sandpoint) ☐ Dug
☐ Other (Specify) _____

Formation Type:
☐ Unconsolidated Formation ☐ Bedrock

Total Well Depth (ft) _____ (From ground surface)
Casing Diameter (in.) _____
Casing Depth (ft.) _____

Lower Drillhole Diameter (in.) _____

Was Well Annular Space Grouted? ☐ Yes ☐ No ☐ Unknown
If Yes, To What Depth? _____ Feet

(4) Depth to Water (Feet) _____

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	

If No, Explain _____

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

(5) Required Method of Placing Sealing Material
☐ Conductor Pipe - Gravity ☐ Conductor Pipe - Pumped
☐ Dump Bailer ☐ Other (Explain)

(6) 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 Pellets
☐ Granular Bentonite
☐ Bentonite-Cement Grout

(7) Sealing Material Used	From (Ft.)	To (Ft.)		Mix Ratio or Mud Weight
	Surface			

(8) Comments _____

(9) Name of Person or Firm Doing Sealing Work	
Key Engineering Group, Ltd.	
Signature of Person Doing Work	Date Signed
Street or Route: W66 N215 Commerce Court	Telephone Number: (262) 375-4750
City, State, Zip Code: Cedarburg, Wisconsin 53012	

(10) FOR DNR OR COUNTY USE ONLY	
Date Received/Inspected	District County
Reviewer/Inspector	☐ Complying Work ☐ Noncomplying Work
Follow-up Necessary	

DNR/COUNTY

KEY ENGINEERING GROUP, LTD.

W66 N215 Commerce Court
Cedarburg, Wisconsin 53012
Phone No. (262) 375-4750
Fax No. (262) 375-9860

PID CALIBRATION SHEET

Site/Project Name:_____ Project No.:_____
Weather Conditions:_____

Model: ☐ OVM580B ☐ MSA

Instrument Range (units): ☐ 0-20 ☐ 0-200 ☐ 0-2000

Light Source Energy (eV): ☐ 10.0 ☐ 10.6 ☐ 11.8

Serial #:_____

Field Calibration:

Reference Gas Data

GAS	REFERENCE GAS CONCENTRATION (i.u.)	BASELINE READING (i.u.)	FINAL RESPONSE READING (i.u.)
Isobutylene	100		
Isobutylene	250		

Date:_____ Time:_____

Technician:_____ Signature:_____

Comments:_____

_____

_____

_____

Route To: Water Supply Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐

MONITORING WELL CONSTRUCTION

Form 4400-113A Rev. 7-98

Facility/Project Name	Local Grid Location of Well ☐N. ☐S. ____ft. ☐E. ☐W. ____ft.	Well Name
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☐ Lat. ____ ____ ____ Long. ____ ____ ____ or	Wis. Unique Well No. / DNR Well Number
Facility ID	St. Plane ____ ft. N, ____ ft. E. S/C/N	Date Well Installed
Type of Well	Section Location of Waste/Source ____1/4 of ____ 1/4 of Sec. ____ T. ____ N, R. ____ ☐E ☐W	Well Installed By: (Person's Name and Firm)
Distance from Waste/Source ____ ft. / Enf. Stds. Apply ☐	Location of Well Relative to Waste/Source u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known / Gov. Lot Number ____	

A. Protective pipe, top elevation ____ ft. MSL

B. Well casing, top elevation ____ ft. MSL

C. Land surface elevation ____ ft. MSL

D. Surface seal, bottom ____ ft. MSL or ____ ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

14. Drilling method used: Rotary ☐ 50
Hollow Stem Auger ☐ 41
____ Other ☐ __

15. Drilling fluid used: Water ☐ 02 Air ☐ 01
Drilling Mud ☐ 03 None ☐ 99

16. Drilling additives used? ☐ Yes ☐ No

Describe ____

17. Source of water (attach analysis, if required):
____

E. Bentonite seal, top ____ ft. MSL or ____ ft.

F. Fine sand, top ____ ft. MSL or ____ ft.

G. Filter pack, top ____ ft. MSL or ____ ft.

H. Screen joint, top ____ ft. MSL or ____ ft.

I. Well bottom ____ ft. MSL or ____ ft.

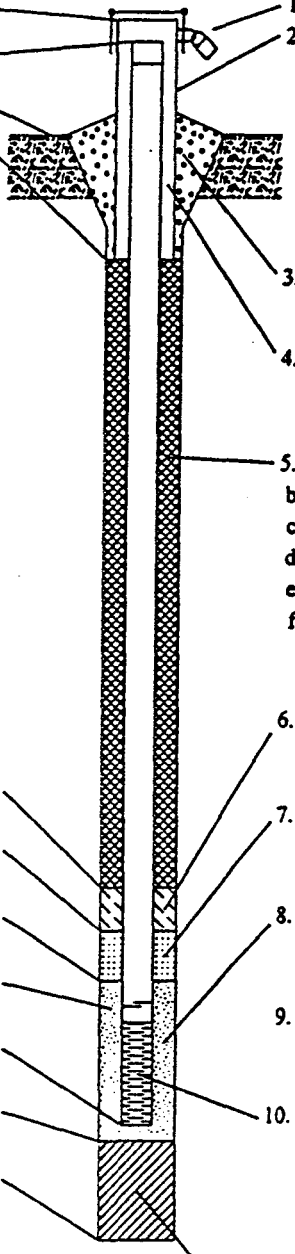
J. Filter pack, bottom ____ ft. MSL or ____ ft.

K. Borehole, bottom ____ ft. MSL or ____ ft.

L. Borehole, diameter ____ in.

M. O.D. well casing ____ in.

N. I.D. well casing ____ in.



1. Cap and lock? ☐ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: ____ in.
b. Length: ____ ft.
c. Material: Steel ☐ 04
____ Other ☐ __
d. Additional protection? ☐ Yes ☐ No
If yes, describe: ____
3. Surface seal: Bentonite ☐ 30
Concrete ☐ 01
____ Other ☐ __
4. Material between well casing and protective pipe:
Bentonite ☐ 30
____ Other ☐ __
5. Annular space seal: a. Granular/Chipped Bentonite ☐ 33
b. ____Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. ____Lbs/gal mud weight . . . Bentonite slurry ☐ 31
d. ____% Bentonite . . . Bentonite-cement grout ☐ 50
e. ____Ft^3 volume added for any of the above
f. How installed: Tremie ☐ 01
Tremie pumped ☐ 02
Gravity ☐ 08
6. Bentonite seal: a. Bentonite granules ☐ 33
b. ☐1/4 in. ☐3/8 in. ☐1/2 in. Bentonite chips ☐ 32
c. ____ Other ☐ __
7. Fine sand material: Manufacturer, product name & mesh size
a. ____ __
b. Volume added ____ ft^3
8. Filter pack material: Manufacturer, product name & mesh size
a. ____ __
b. Volume added ____ ft^3
9. Well casing: Flush threaded PVC schedule 40 ☐ 23
Flush threaded PVC schedule 80 ☐ 24
____ Other ☐ __
10. Screen material: ____ __
a. Screen Type: Factory cut ☐ 11
Continuous slot ☐ 01
____ Other ☐ __
b. Manufacturer ____
c. Slot size: ____ in.
d. Slotted length: ____ ft.
11. Backfill material (below filter pack): None ☐ 14
____ Other ☐ __

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

Signature	Firm	
	KEY ENGINEERING GROUP, LTD W66 N215 COMMERCE CT CEDARBURG WI 53012	Tel: (262) 375-4750 Fax: (262) 375-9680

Please complete both Forms 4400-113A and 4400-113B and return them to the appropriate DNR office and bureau. Completion of these reports 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 these forms 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 these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.

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	County	Well Name

Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well 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 _____	☐	99

3. Time spent developing well ____ min.

4. Depth of well (from top of well casing) ____ ft.

5. Inside diameter of well ____ in.

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

7. Volume of water removed from well ____ gal.

8. Volume of water added (if any) ____ gal.

9. Source of water added _____

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. ____ ft.	____ ft.
Date	b.	
Time	c. ☐ a.m. ☐ p.m.	☐ a.m. ☐ p.m.
12. Sediment in well bottom	____ inches	____ 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: Person's Name and Firm

17. Additional comments on development:

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____

City/State/Zip: _____

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

Signature: _____

Print Name: _____

Firm: KEY ENGINEERING GROUP, LTD

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

KEY ENGINEERING GROUP, LTD.
W66 N215 Commerce Court
Cedarburg, Wisconsin 53012
Phone No. (414) 375-4750
Fax No. (414) 375-9680

GROUNDWATER MONITORING FORM

Page _____ of _____

Project Name: _____ KEY Project No.: _____

Project Location.: _____ Weather Conditions: _____

Date: _____ ☐ M ☐T ☐W ☐TH ☐F Sampling Method: ☐ Pumped ☐ Bailed Other _____

Pump: _____ Bailer: _____

Well ID								
Depth to Bottom (feet)								
Depth to Water (feet)								
Water Column Height (feet)								
Volume to be Removed (gallons)								
4 x the Volume to be Removed (gallons)								
Actual Volume Removed (gallons)								
Time Collected								
Temperature (°F)								
Dissolved O_2 (% sat)								
Dissolved O_2 (mg/L)								
Sp. Cond. (µS/cm)								
Resistivity (kΩ/cm)								
Salinity (ppt)								
pH (s.u.)								
ORP (mV)								
Depth (feet)								
Ferrous Iron (mg/l)								
Odor (Y/N)								
Turbidity								

Quality Control Samples:

Field Duplicate ☐ No ☐ Yes Well No. _____

Field Blank ☐ No ☐ Yes Time _____

Trip Blank ☐ No ☐ Yes Time _____

Additional Comments: _____

_____

Signature: _____

KEY ENGINEERING GROUP, LTD.
W66 N215 Commerce Court
Cedarburg, Wisconsin 53012
Phone No. (262) 375-4750
Fax No. (262) 375-9680

GROUNDWATER LEVEL DATA SHEET

Project:_____ Project No.:_____ Page: _____ of _____
Measurements Taken By:_____ Measuring Device:_____
Date:_____ Weather Conditions:_____

Well No.	Time	Depth to Groundwater (feet)	Well Depth (feet)	Water Column Height (feet)	Reference Elevation (feet)	Groundwater Elevation (feet)	Comments

Notes:_____

KEY ENGINEERING GROUP, LTD.

W66 N215 Commerce Court
Cedarburg, Wisconsin 53012
Phone No. (262) 375-4750
Fax No. (262) 375-9680

Slug Test Field Form
(for HERMIT 1000C Datalogger)

Site/Project Name:_____ Job No.:_____

Date:_____ Weather Conditions: _____

Well I.D.:_____
Sel_____ ☐ Bail-In Test ☐ Bail-Out Test
Reference #:_____
W.L. Start:_____ Start:_____ ☐ a.m. ☐ p.m. Comments:_____
W.L. End:_____ Stop:_____ ☐ a.m. ☐ p.m. _____
DX Start:_____ _____ Minute Test _____
DX End:_____
Slug Used: ☐ 2' ☐ 3' ☐ 4' ☐ 5'

No.	Water Level	Time	Percentage Recovered	No.	Water Level	Time	Percentage Recovered
1				6			
2				7			
3				8			
4				9			
5				10			

Well I.D.:_____
Sel._____ ☐ Bail-In Test ☐ Bail-Out Test
Reference #:_____
W.L. Start:_____ Start:_____ ☐ a.m. ☐ p.m. Comments:_____
W.L. End:_____ Stop:_____ ☐ a.m. ☐ p.m. _____

DX Start:_____ _____Minute Test _____

DX End:_____
Slug Used: ☐ 2' ☐ 3' ☐ 4' ☐ 5'

No.	Water Level	Time	Percentage Recovered	No.	Water Level	Time	Percentage Recovered
1				6			
2				7			
3				8			
4				9			
5				10			

SAMPLING AND ANALYSIS PLAN

SITE INVESTIGATION WORK PLAN
FORMER KEY PRODUCTS

TABLE OF CONTENTS

TABLE OF CONTENTS
(CONTINUED)

LIST OF APPENDICES

1.0 INTRODUCTION

This *Sampling and Analysis Plan (SAP)* identifies the sampling procedures that will be implemented during the site investigation (SI). This *SAP* includes SI sampling objectives, scope, procedures, equipment, quality control and documentation, as well as management procedures for investigation derived waste.

2.0 FIELD SAMPLING

This section details the field sampling scope, equipment, procedures, decontamination, quality control and documentation protocols.

2.1 Soil Investigation

2.1.1 Scope

The scope of the soil investigation is detailed in Section 5.1 of *SI Work Plan*. The boring locations are depicted on Figure 2.

2.1.2 Equipment

Equipment and materials to be used during soil investigation will include:

- Drill rig with capability of boring with 4¼ ID hollow stem augers (HSAs)
- Field notes form
- Soil boring logs
- Tap water, distilled water, Alconox®
- Steam cleaner
- Photoionization detector (PID) and calibration gas
- Sample jars and preservatives
- Electronic scale
- Field screening jars
- Munsell Soil Color Chart
- Chain of custody
- Sample labels
- Indelible marking pen
- Coolers and ice
- Camera and film

2.1.3 Procedures

The soil borings will be advanced with a drilling rig using HSAs. Soil samples will be collected at 2½-foot intervals with a 2-foot split-spoon sampler. Soil samples will be collected in accordance with American Society of Testing Materials D1586, *Standard Method for Penetration Test and Split-Barrel Sampling of Soil.*

Immediately after sample collection, a 25 to 35 gram portion of the sample (for volatile organic compound (VOC) analysis) will be weighed using an electronic scale, placed in a laboratory supplied container and preserved in methanol. The soil samples will then be placed in a cooler with ice.

A portion of each soil sample will be placed into an 8-ounce glass jar or resealable plastic bag and screened for the presence of VOCs using a Thermal Environmental Instruments model 580B organic vapor meter (OVM). The OVM detects and quantifies most organic vapors with a PID and has an operating range of 0 to 2,000 instrument units (i.u.)

with a minimum detection of 0.1 i.u. The PID will be equipped with a 10.6 electron volt lamp and calibrated to an isobutylene standard. The sample will be allowed to warm and then will be shaken to release gas phases trapped in the soil. The lid of the container will be slightly opened, the tip of the PID inserted into the head space and the highest reading on the PID recorded on the sample log.

A boring log will be maintained for each boring location. Boring logs will include the Standard Penetration Test blow counts; depth and thickness of each soil stratum; a description of each stratum including color, Unified Soil Classification System classification, soil moisture, plasticity, density or consistency; olfactory observations; sample depth interval and recovery; and the depth at which groundwater is first encountered.

2.1.4 Decontamination

The down-hole drilling equipment will be decontaminated prior to mobilization and between boring locations using a high pressure steam cleaner. The split-spoon soil sampler will be decontaminated between each use. Decontamination will consist of a tap water and detergent (Alconox®) wash, tap water rinse and a distilled water rinse. Decontamination water will not be contained.

2.1.5 Quality Control

A methanol blank sample will be submitted with the soil samples for VOC analysis to document the accuracy of laboratory analytical procedures and to document possible contamination from outside sources such as traveling in the sample cooler. The methanol blank will be supplied by the analytical laboratory and will be kept with the soil samples during shipment.

The PID used for field screening will be calibrated at the beginning of each operational day. Calibration results will be recorded on a PID Calibration Sheet.

Soil investigation field documentation will undergo a quality control (QC) review during and after the completion of field activities. Original field forms and photo documentation will be stored in a secure area until completion of the field program. Upon completion of the field program, documentation will be relinquished to the Project Manager.

2.1.6 Documentation

Soil sampling documentation will consist of the following:

- Field Notes Form (Appendix A1-1)
- Soil Boring Log (WDNR Form 4400-122) (Appendix A1-1)
- Borehole Abandonment (WDNR Form 3300-5B) (Appendix A1-1)
- Photographs
- PID Calibration Sheet (Appendix A1-1)

2.2 Groundwater Monitoring Well Installation

2.2.1 Scope

The scope of the groundwater monitoring well installation task is detailed in Section 5.2 of *SI Work Plan*. The groundwater monitoring well locations are depicted on Figure 2.

2.2.2 Equipment

Equipment that will be used to install and develop the monitoring wells are as follows:

- Drill rig with capability of boring with 4¼ ID HSAs
- Fiberglass tape of adequate length to reach the bottom of the well
- Field notes form
- Soil boring logs, well construction forms, well development forms
- Tap water, distilled water, Alconox®
- Generator, steam cleaner
- Brush, buckets and plastic
- 2-inch, flush-threaded 0.010-inch slot, Sch. 40 polyvinyl chloride (PVC) well screen, 5, 10 and 15 feet long
- Locking well caps
- High solids bentonite grout
- Bentonite pellets
- Washed, well sorted No. 30 and No. 45/55 silica sand
- Concrete
- Flush-mount protective casings
- Keyed-alike locks
- Bailer
- Electric water level indicator
- Camera and film

2.2.3 Procedures

The groundwater monitoring well and piezometer soil borings will be advanced with a drilling rig using HSAs. Soil samples will be collected at 2½-foot intervals with a 2-foot split-spoon sampler. Soil sampling will be in accordance with the procedures detailed in Section 2.1.

The groundwater monitoring wells and piezometer will be constructed in general accordance with NR 141. The groundwater monitoring wells will be constructed of schedule 40 PVC. The groundwater monitoring wells will have a 10- or 15-foot length, machine slotted, PVC well screen placed so that it intersects the groundwater table. The piezometer will have a 5-foot length PVC screen placed to that the top of the screen is approximately 15 feet below the groundwater table.

Because of the shallow depth to water, the filter pack seal will also function as the annular space seal and will consist of granular bentonite. The filter pack, filter pack seal, ground surface seal and protective cover materials will meet the NR 141 specifications. The annual space between the borehole and the well screen will be backfilled with clean washed No. 30 silica sand filter pack to a depth of ½-foot above the top of the well screen. Placement of the filter pack will be

followed by the installation of approximately ½-foot of fine filter sand (No. 44/55 silica sand). A 1-foot bentonite pellet seal will be placed directly above the sand pack.

A flush-mount or stand pipe protective casing will be placed over the PVC pipe. The protective casing will be placed in a concrete pad raised approximately 1-inch above the surrounding grade, sloping away from the casing.

Each monitoring well and piezometer will be developed to remove sediment produced by construction and to clear out screen slots. The wells will be developed in accordance with NR 141. The wells will be developed utilizing a bailer or pump. For wells that cannot be purged dry, the wells will first be surged and purged. Following well surging and purging, the well will be pumped or bailed until a minimum of ten well volumes is removed or until the well produces sediment free water. For wells that can be purged dry, development will consist of slowly purging the well dry. To measure the well volume, the depth to the static water level and to the bottom of the well will be measured from the survey reference point (the highest point on the well casing). The water level indicator will be decontaminated between measurements. By using the depth to water, well depth and well radius, the volume of standing water in the well (well volume) will be calculated using the following equation:

$$V = 3.14\ r^2 \times h \times 7.48$$

V= well volume (gallons)
r= well radius (feet)
h= water height (feet)

2.2.4 Decontamination

The down-hole drilling equipment will be decontaminated prior to mobilization and between boring locations using a high pressure steam cleaner. The split-spoon soil sampler and development equipment will be decontaminated between each use. Decontamination will consist of a tap water and detergent (Alconox®) wash, tap water rinse and a distilled water rinse. Decontamination water will not be contained.

2.2.5 Quality Control

Groundwater monitoring well installation documentation will undergo a QC review after the completion of field activities. Original field forms and photo documentation will be stored in a secure area until completion of the field program. Upon completion of the field program, documentation will be relinquished to the Project Manager.

2.2.6 Documentation

The drilling and groundwater monitoring well construction and development will be documented in the field by a Key Engineering Group, Ltd. (KEY) hydrogeologist using the following field forms:

- Field Notes Form (Appendix A1-1)
- Soil Boring Log (WDNR Form 4400-122) (Appendix A1-1)
- Monitoring Well Construction Form (WDNR Form 4400-113A) (Appendix A1-1)
- Monitoring Well Development Form (WDNR Form 4400-113B) (Appendix A1-1)

2.3 Groundwater Sampling and Testing

2.3.1 Scope

Each monitoring well and piezometer will be sampled and analyzed for parameters documented in Section 5.2 of *SI Work Plan*.

2.3.2 Equipment

Equipment used for groundwater sampling include:

- Teflon bailer
- Electric water level indicator
- Field log book and field forms/logs
- Tap water, distilled water, Alconox®
- 5-gallon pails
- Sample containers and preservatives
- Chain of custody
- Sample labels
- Indelible marking pen
- Coolers and ice
- Nylon rope
- Hydrolab DataSonde® 4 and MiniSonde® Water Quality Multiprobe

2.3.3 Procedures

To prevent potential contamination during transportation to the site, sampling equipment will be stored in clean plastic containers or wrapped with aluminum foil. A new sheet of clean plastic sheeting will be used at each sampling location to provide a clean surface on which to place sampling equipment during sample collection activities.

Prior to sampling, each well will be purged of at least three well volumes. Following the well purging process, groundwater samples will be collected with a Teflon bailer. The time between the completion of purging and sample collection will not exceed 24 hours unless the rate of recovery in the well requires more time for groundwater to collect in the well. All samples requiring preservation will be preserved in the field.

Down-well tests for natural attenuation indicator parameters will be conducted following purging with a calibrated Hydrolab DataSonde® 4 and MiniSonde® Water Quality Multiprobe.

2.3.4 Decontamination

The bailer and Water Quality Multiprobe will be decontaminated between wells. Decontamination will include an Alconox® and tap water wash, a tap water rinse and distilled water rinse.

2.3.5 Quality Control

To evaluate the effectiveness of the decontamination process, a field blank will be collected during the sampling process. The bailer will be cleaned and filled with distilled water and subsequently transferred to laboratory supplied vials. The field blank will be maintained with the other groundwater samples.

A duplicate groundwater sample will be collected from a downgradient well. The duplicate sample will be submitted for analysis to evaluate the precision of the laboratory analysis.

A trip blank supplied by the laboratory will be submitted for analysis during each round of sampling. The trip blank is a water sample prepared by the laboratory and analyzed to identify potential contamination which may occur due to outside influences (i.e., traveling in a cooler).

2.3.6 Documentation

Data collected and field observations made during groundwater sampling will be recorded on the following field documentation forms:

- Field Notes Form (Appendix A1-1)
- Groundwater Monitoring Form (Appendix A1-1)

2.4 Hydraulic Characterization

2.4.1 Scope

Following the installation and development of the monitoring wells, water levels and in-field hydraulic conductivity testing will be performed to determine aquifer hydraulic characteristics. Water levels will be measured in all of the monitoring wells and hydraulic conductivity tests (slug tests or bail down tests) will be performed in a minimum of three groundwater monitoring wells and the piezometer.

2.4.2 Equipment

- Solid PVC slug
- Nylon rope
- Stop watch (or watch with a second hand)
- Electric water level indicator
- Water level data logger with pressure transducer
- Field forms/logs
- Tap water, distilled water, Alconox®
- 5-gallon pails and plastic sheeting

2.4.3 Procedures

The depth to groundwater in the wells will be measured with a hand-held electric water level indicator.

Slug testing will involve lowering the pressure transducer into the well to a depth that will allow the solid PVC slug to be lowered into the well without coming into contact with the transducer. The maximum transducer depth will be limited by the settings of the data logger and will be addressed according to the manufacturers operation manual when setting up the test. The rising water level produced by lowering the slug into the well, as well as the falling water level when the slug is removed and the corresponding time, will be digitally recorded by a data logger device. Readings will be recorded until the water level has recovered to approximately 90 percent of the static water level or stabilized.

Bail-down testing will involve purging the well dry with a bailer, measuring the rising water level with a pressure transducer or a water level indicator and recording the time and water level depth during the return of the water level to the static position.

Reduction of the test data and calculation of the hydraulic conductivity will be performed by the Bower and Rice (1976, 1989) method using the AQTESOLV™ software.

2.4.4 Decontamination

The testing and water level measurement equipment, with the exception of the pressure transducer, will be decontaminated prior to use and at each well location by an Alconox® and tap water wash, a tap water rinse and distilled water rinse. A distilled water rinse only (no soap or tap water) will be used to decontaminate the pressure transducer.

2.4.5 Quality Control

Field documentation will undergo a QC review during the field activities. Original field forms will be reviewed for completeness and accuracy. Original field documentation, computer disks and data plots will be stored in a secure area until completion of the field program. Upon completion of the field program, documentation will be relinquished to the Project Manager.

2.4.6 Documentation

Data collected and field observations made while performing in-field hydraulic conductivity tests and water level measurements will be recorded on the following field documentation forms:

- Field Notes Form (Appendix A1-1)
- Groundwater Level Data Sheet (Appendix A1-1)
- Slug Test Field Form (Appendix A1-1)

2.5 Survey

2.5.1 Scope

The scope of the survey is detailed in Section 5.3 of *SI Work Plan*.

2.5.2 Procedures

The survey will be performed by KEY. Horizontal control will be referenced to an established site benchmark assumed to have an elevation of 100 feet at 0.01-foot accuracy. The survey will include the previously installed monitoring wells.

2.5.3 Quality Control

Survey field documentation will undergo a QC review after the completion of field activities. Original field forms will be stored in a secure area until completion of the field program. Upon completion of the field program, documentation will be relinquished to the Project Manager.

2.5.4 Documentation

The survey will be documented in Autocad electronic format.

3.0 MANAGEMENT OF INVESTIGATION DERIVED WASTE

Investigative derived waste generated during the field investigation activities will be managed as described below.

3.1 Solid Waste

Personal protective equipment, plastic sheeting and disposable sampling equipment will be disposed of as solid waste.

3.2 Soil Cuttings

Soil cuttings generated during soil boring drilling and groundwater monitoring well construction will be contained in 55-gallon drums. The drums will be labeled and stored on-site for later off-site management at an appropriately licensed facility.

3.3 Well Development and Sampling Water

Water collected during well development and sampling will be contained in 55-gallon drums. The drums will be labeled and stored on-site. The drummed water will be disposed of based on groundwater sample analytical results. Drums of water generated from wells in which groundwater sample analytical results indicate contaminant concentrations less than NR 140 preventive action limits (PALs) will be emptied on-site. Drums containing water with contaminant concentrations greater than PALs will be disposed off-site at an appropriately licensed facility.

4.0 REFERENCES

American Society of Testing and Materials, *Standard Method for Penetration Test and Split-Barrel Sampling of Soil*, Designation D1586-84.

Wisconsin Department of Natural Resources, *Leaking Underground Storage Tank and Petroleum Analytical and Quality Assurance Guidance*, PUBL-SW-130-93, July 1993.

Wisconsin Department of Natural Resources, Wisconsin Administrative Code, Environmental Protection, *Groundwater Monitoring Well Requirements*, Chapter NR 141.

Wisconsin Department of Natural Resources, Wisconsin Administrative Code, Environmental Protection, *Groundwater Quality*, Chapter NR 140.

Wisconsin Department of Natural Resources, Wisconsin Administrative Code, Environmental Protection, *Investigation and Remediation of Environmental Contamination*, Chapters NR 700 Series.

SITE HEALTH AND SAFETY PLAN

SITE INVESTIGATION WORK PLAN
FORMER KEY PRODUCTS

SITE HEALTH AND SAFETY PLAN

Site Description

A site investigation (SI) will be conducted at the site to identify the horizontal and vertical extent of contamination detected on the above referenced site.

Project Objectives

The project objectives consist of collecting soil and groundwater samples from soil borings and groundwater monitoring wells, respectively. This *Site Health and Safety Plan (HASP)* establishes protocol for safe collection of samples and decontamination of personnel and equipment associated with the site activities.

Project Organization

Key Engineering Group, Ltd. (KEY) representative Mr. Curtis Hoffart is the Project Manager. KEY has been retained to provide engineering services for soil and groundwater sampling, site health and safety and to provide the equipment, labor and supplies necessary to complete the scope of work for this project. The Project Manager will be responsible for ensuring employees and representatives of KEY read, understand and comply with the HASP.

Chemical Hazard Evaluation

The contaminants (chemical hazards) detected at the site consist primarily of volatile organic compounds (VOCs).

The contaminants of concern at the site can affect the body if they are inhaled, ingested, or come in contact with the eyes or skin. These contaminants may be released during intrusive activities.

Ingestion generally will not be an exposure route at investigative project sites if no food, gum, tobacco or cosmetics are used on-site. Direct contact with contaminants will be minimized by the use of appropriate personal protective clothing and gloves. Inhalation of contaminants will be minimized by monitoring the concentration of VOCs in the breathing air zone with a photoionization detector (PID).

Physical Hazards

Physical hazards include slip, trip and fall, rotating equipment on the drill rig and weather conditions. Slip, trip and fall hazards will be minimized by being aware of one's surroundings and walking (not running) at the job site. Overhead and rotating hazards associated with the drill rig will be minimized by general awareness, wearing a hard hat and keeping a safe distance from moving parts, respectively.

On-Site Control

On-site control will be the owner's responsibility. KEY will coordinate with the contractor and site owner. Due to the potential for VOCs at this site, the safe perimeter to prevent KEY's personnel from accidental exposure to potential contaminants has been established as being greater than 20 feet from the drilling rig unless personnel have the appropriate training and personal protective equipment (PPE). No persons will be allowed near the sampling crew unless

they have written documentation of necessary training and medical monitoring, are notified of the potential hazards and are outfitted with proper PPE.

Personnel from KEY will not direct the subcontractor's means and methods. All work must comply with all Occupational Safety and Health Administration and other applicable safety regulations and rules. Daily inspections of the work area will be conducted to prevent mishaps due to vandalism or weather.

Air Monitoring and Action Levels

A PID equipped with a 10.6 electron volt lamp will be used to monitor for volatile organic vapors in the breathing zone air. The breathing zone air will be monitored on a continuous basis while sampling operations occur. If volatile organic vapor concentrations exceed a concentration of 5 instrument units (i.u.) (parts per million (ppm) equivalent) above background concentrations, indicating a higher level of respiratory protection is warranted, work will stop. The area will be allowed to clear before resuming work. If the area does not clear and respiratory protection is deemed necessary, then a hazard assessment will be performed before donning respiratory equipment. An explosive gas meter will be used in addition to the PID to monitor the breathing zone and the surrounding atmosphere if respiratory equipment is required. Work will stop if concentrations of volatile organic vapors meet or exceed 10 ppm above background concentrations in the breathing zone.

Field operations will be performed initially in Level D PPE. In the event measurable organic vapor concentrations in the breathing zone reach 5 i.u. above background concentration (PID measurement is relative to the calibration gas), work will stop. If the concentration of vapors does not decrease, work will stop, a hazard assessment will be performed and Level C PPE and use of an explosive gas meter likely will be implemented. If concentrations in the breathing zone reach or exceed 10 i.u. above background concentrations or break-through on a respirator cartridge occurs in less than 30 minutes, work will stop.

Personal Protective Equipment

Persons outside the stated 20 foot radius (preferably upwind) will be permitted to observe the proceedings without PPE. Within the work area radius, Level D PPE will be required. In this context, Level D PPE consists of hard hat, gloves, ear plugs (if necessary) and boots. Hard hats will be required for all on-site activities and especially for operations around heavy equipment. Steel toe, steel-shank boots will be required during field activities. Gloves will be required to cover hands. Removal of the gloves during the on-site activities will not be allowed.

If Level C PPE and air purifying respirators are authorized, organic vapor cartridges are likely the appropriate cartridge for use with the involved substances at specified concentrations between 5 ppm and 10 ppm above background concentration in the breathing air zone. At concentrations greater than 10 ppm work will stop.

Communications

Communications on-site will be primarily voice and hand signaling. The standard hand signals will be used in case of an emergency:

Hand gripping throat	Out of air/can't breathe
Grip partner's wrist or - both hands around waist	Leave area immediately
Hands on top of head	Need assistance
Thumbs up	OK
Thumbs down	No

Field personnel will be equipped with pagers which are accessible through the voice mail system at the number (262) 375-4750. A phone will be available on-site.

Personnel

Personnel leaving the work area will not be required to undergo decontamination except for hand cleansing and removing PPE. With petroleum products as the expected chemicals of concern, the decontamination procedure will consist of removing the gloves and cleaning the hands. Attached or adhered soils on boots or clothing will be brushed or scraped to minimize mobilization of contaminant presence off-site.

Equipment

Decontamination of soil sampling equipment between sampling locations will be a soap and water wash using a hard wire or stiff plastic bristle brush to remove soil particles and oily films. Soil particles would be the likely vehicle for contaminant migration. The equipment will be rinsed with tap water to remove the soap solution.

Final decontamination will consist of a thorough scrubbing in soap and water with wire or stiff plastic brush to remove soil particles.

Emergency Procedures

All on-site personnel will monitor one another to evaluate the potential for being affected by site contaminants.

Symptoms which may indicate potential exposure include irritation to the eyes, skin and respiratory tract. Changes in attitude of the workers on-site could indicate inhalation of excessive petroleum vapors. The affected person should be removed from the work area and if appropriate, transported to hospital for observation.

Accident or Injury

In the event of an accident or injury on the site, the following procedures will be implemented:

- Injury - the nature of the injury will be assessed by other on-site personnel and, if possible, by the project manager. First aid will be given as appropriate. Medical attention will be summoned if required or if requested by the injured.

- Accident - the nature of the accident will be assessed by on-site personnel and, if appropriate, by the project manager. Either emergency assistance will be summoned, or the situation rectified and work continued.

The situation will be rectified and work continued. The nearest hospital is St. Joseph's Hospital can be found on the attached Hospital Route Map. St. Joseph's Hospital is located at 5000 West Chambers Street, Milwaukee, Wisconsin; the phone number is (414) 447-2000.

Directions to the hospital are as follows:

- Go east on West Lynx Avenue.
- Turn left (north) on North 84th Street.
- Turn right (east) on West Mill Road.
- Turn right (south) on North 76th Street.
- Turn left (southeast) on West Appleton Avenue.

- Turn left (east) on West Chambers Street.

In case of emergency call 911, otherwise call the hospital number on the way to the hospital.

Emergency Agencies	*Emergency #'s*	*Non Emergency #'s*
Police	*911*	*(414) 933-4400*
Fire	*911*	*(414) 286-8976*
Hospital	*(414) 447-2171*	*(414) 345-3400*
Ambulance	*911*	*(414) 286-8976*

KEY site personnel have read this HASP and are familiar with its provisions and will abide by its contents.

Name	Signature
_____	_____
_____	_____
_____	_____
_____	_____

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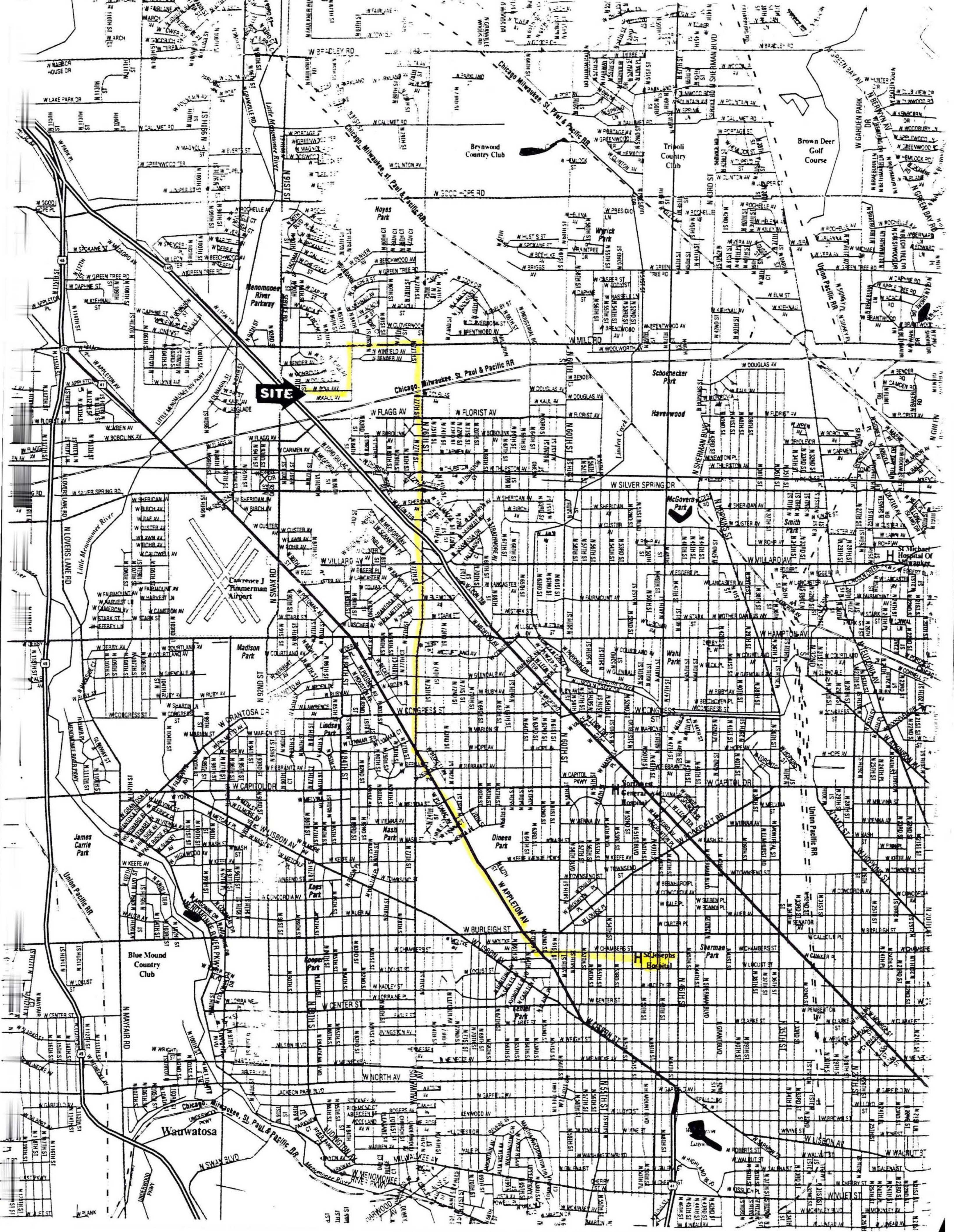

SITE
St Josephs Hospital
Brynwood Country Club
Tripoli Country Club
Brown Deer Golf Course
Noyes Park
Menomonee River Parkway
Schoenecker Park
Havenwood
McGovern Park
Smith Park
St Michael Hospital Of Milwaukee
Lawrence J Timmerman Airport
Madison Park
Wahl Park
Lindsay Park
Northwest General Hospital
James Currie Park
Nash Park
Dineen Park
Kops Park
Sherman Park
Blue Mound Country Club
Cooper Park
Center Park
Wauwatosa
Chicago Milwaukee, St. Paul & Pacific RR
Union Pacific RR
Little Menomonee River
W BRADLEY RD
W GOOD HOPE RD
W MILL RD
W FLAGG AV
W FLORIST AV
W SILVER SPRING DR
W VILLARD AV
W HAMPTON AV
W CONGRESS ST
W CAPITOL DR
W LISBON AV
W APPLETON AV
W BURLEIGH ST
W CENTER ST
W NORTH AV
N 91ST ST
N SWAN RD
N 76TH ST
N 60TH ST
N SHERMAN BLVD
N LOVERS LANE RD
N MAYFAIR RD
W FOND DU LAC AV