Work Plan

N.W. Mauthe Site, System Evaluation

Wisconsin Department of Natural Resources
Bureau of Remediation & Redevelopment

May 25, 2005

BRRTS Number 02-45-000127
Contract Number 05RRYU

ENGINEERING • ARCHITECTURE • ENVIRONMENTAL

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DEPT. OF NATURAL RESOURCES

ENGINEERING
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ENVIRONMENTAL

OMNNI ASSOCIATES

OMNNI ASSOCIATES, INC.
ONE SYSTEMS DRIVE
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June 2, 2005

Ms. Jennifer Borski
Hydrogeologist/Project Manager
WDNR-Northeast Region RR
625 E. County Road Y, Suite 700
Oshkosh, WI 54901-9731

RE: N.W. Mauthe, System Evaluation – Final Work Plan
(Contract No. 05RRYU)

Dear Ms. Borski:

Enclosed please find two copies of the final Work Plan for the piezometer installation at the N.W. Mauthe project. The N.W. Mauthe project is located at 725 S. Outagamie Street, Appleton, Wisconsin.

If you have any questions regarding this work plan or the project in general, please do not hesitate to call.

Very truly yours,
OMNNI Associates, Inc.

Brian D. Wayner

Brian D. Wayner, P.E.
Environmental Manager

Enclosures

Evaluation of the Collection and Treatment System, N.W. Mauthe Project Conducted For The Wisconsin Department of Natural Resources

Work Plan

N.W. Mauthe Site
725 S. Outagamie Street
Appleton, Wisconsin 54914-5072

Prepared by:
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May 25, 2005

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EXECUTIVE SUMMARY

The following report outlines the work plan proposed by OMNNI Associates, Inc. (OMNNI) for additional investigation activities at the N.W. Mauthe (Mauthe) property located at 725 S. Outagamie Street, Appleton, Wisconsin 54914-5072. (See Figure 1 – Site Location Map, Appendix 1.)

Prior investigative activities and the U.S. EPA soil removal encountered elevated levels of volatile organic compounds (VOCs) and metals in the soil and groundwater. VOCs included trichloroethene, 1,1,1-trichloroethane, 1,1-dichloroethene, and toluene. Metals included cadmium, chromium (hexavalent and total), cyanide, and zinc.

The Wisconsin Department of Natural Resources (WDNR) requested the installation of piezometers at the Mauthe project as part of the evaluation of the collection and treatment system. Two piezometers are proposed to be installed near monitoring well MW-107. One piezometer is proposed to be installed near monitoring well MW-103. The final piezometer is proposed to be installed near monitoring well MW-104. The four piezometers will be installed to understand the extent of contaminants in the soil and groundwater at those locations.

GENERAL INFORMATION

Project Title

Evaluation of the collection and treatment system, N.W. Mauthe Project

Project Identification Numbers

WDNR Bureau for Remediation and Redevelopment Tracking System (BRRTS) Number: 02-45-000127.

WDNR Contract Number 05RRYU.

OMNNI Associates, Inc. Project Number: N1866A05.

Purpose

The purpose of the additional investigation portion of the project is to delineate the vertical extent of chromium contamination and evaluate the capture zone of the existing collection system. The additional investigation generally consists of documenting the vertical soil and groundwater conditions, the vertical extent of the soil and groundwater contamination, and the groundwater flow conditions.

Contact Information

Responsible Party:	N.W. Mauthe, Contact: Carol Mauthe.
Regulatory Agency:	Wisconsin Department of Natural Resources, Bureau of Remediation and Redevelopment, Ms. Jennifer Borski, Project Manager, 625 E. County Road Y, Suite 700, Oshkosh, WI 54901-9731, Telephone: 920/424-7887, Fax: 920/424-4404.
Regulatory Agency's Consultant:	OMNNI Associates, Inc., Mr. Brian Wayner, Project Manager, One Systems Drive, Appleton, WI 54914-1654, Telephone: 920/735-6900, Fax: 920/830-6100.
Driller:	Environmental Drilling Services, Inc., 3671 Monroe Road, De Pere, WI 54115; 800-236-0337. Contact: Mr. Tom Vande Yacht.
Analytical Laboratory:	En Chem, Inc., 1241 Bellevue Street, Suite 9, Green Bay, WI 54302; 1-800-736-2436. Contact: Ms. Laurie Woelfel.

Site Location

The additional investigation encompasses the Mauthe property and two off-site properties, which are located at 1428 W. Second Street and 1414 W. Second Street. The project is located in the NE¼, NW¼, Section 34, T21N, R17E, Outagamie County. (See Figure 1 – Site Location Map, Appendix 1.)

Geographic coordinates of the site are 645411,421476 and were obtained from the on-line GIS Registry of Closed Remediation Sites at a scale of 1:1,173 using the Wisconsin Transverse Mercater '91 (WTM) coordinate system.

SITE INVESTIGATION SCOPING

Facility Description

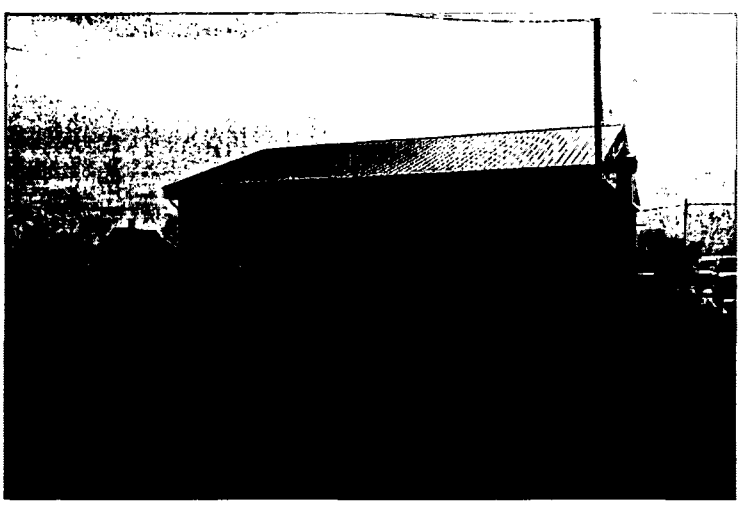
The Mauthe site is a former electroplating facility located at 725 South Outagamie Street in Appleton, Wisconsin. The facility consisted of a zinc building and a chromium building. Zinc, cadmium, copper, and possibly silver were electroplated in the zinc building from 1978 to 1987. Hard chromium plating was conducted in the chromium building from 1960 to 1976. In 1982, the WDNR received a report that yellowish-green water was observed south of the chromium building. Apparently, for several years plating solutions and waste solvents had leaked from holding vats and tanks, and sump pumps allegedly discharged plating tank solutions onto the ground outside the facility.

The WDNR began an investigation of the site in April 1982. A shallow groundwater collection system was installed parallel to the railroad tracks in May 1982, where groundwater and surface water were collected for two years. The Mauthe site was added to the National Priorities List in 1989.

From November 1991 to May 1992, CH2MHILL performed a Remedial Investigation for the WDNR. The Remedial Investigation is documented in the *Remedial Investigation Report, N.W. Mauthe Site, Appleton, Wisconsin,* dated February 1993. The remedial investigation showed the greatest concentrations of soil and groundwater contamination in the area around the zinc and chromium buildings. The chemicals most often detected above background levels or state standards include total chromium, hexavalent chromium, zinc, cadmium, cyanide, trichloroethene, 1,1,1-trichloroethane, 1,1-dichloroethene, and toluene. Subsurface soil contamination was detected up to 25 feet deep near the former buildings. Groundwater contamination extended over most of the block bordered by Melvin, Outagamie, and Second Streets.

CH2MHILL conducted a feasibility study for the WDNR. The Feasibility Study is documented in the *Feasibility Study Report, N.W. Mauthe Site, Appleton, Wisconsin,* dated May 1993. A Record of Decision was signed in March 1994.

Remedial design/remedial action activities took place at the Mauthe site in a phased approach. Phase I involved the excavation of contaminated soils and the installation of groundwater contanment trenches. Phase II involved the construction of a groundwater treatment system, which began operation in June 1997.



Site Description

The site is located within the city limits in an area of mixed commercial, light industrial, and residential properties. The property is approximately 0.6 acres in size and triangular in shape. Melvin Street borders the site to the north, a parking lot owned by Miller Electric and Manufacturing Company is on the west, and railroad tracks are on the southeast. Private residences are located north of Melvin Street and south of the railroad tracks. The former zinc building was located on the northeast portion of the property. The former chromium building was located on the southwest portion of the property. Approximately half of the land immediately

surrounding the site contains impervious structures or paved roads and parking areas.

The groundwater collection system consists of three trenches. The west trench crosses the Miller Electric Property to the west of the site and is approximately 200 linear feet in length. The central trench runs south of the site parallel to the railroad and is approximately 280 linear feet in length. The southeast trench runs along Second Street and Outagamie Street and is approximately 600 linear feet in length.

The west trench and southeast trench were located outside the estimated extent of the groundwater contamination and are designed to prevent further migration of groundwater contamination. The central trench was designed to collect contaminated groundwater and prevent further migration of the groundwater contamination off-site.

Groundwater will enter the trench based on the head differential between the local water table and the level maintained in the trench. The trenches are backfilled with course sand. A 6-inch perforated high-density polyethylene collection pipe in the bottom of the trench drains water from the trench to manholes where the water is collected and pumped to the groundwater treatment facility.

In normal operation, the water level in the trenches is maintained at or near the bottom of the trench. The trenches can provide storage and continue to act as a hydraulic barrier until the water in the trench rises to the level of the water table. This storage capacity can be taken advantage of if the treatment system needs to be shutdown for repair or maintenance for a short period of time.

Three properties south and southeast of the facility have foundation drain systems that are connected to the groundwater collection system via gravity piping (801 S. Outagamie Street, 1410 W. Second Street, and 1414 W. Second Street). Additionally, the sump pump discharge at 1428 W. Second Street is connected to the collection system.

Groundwater collected in the west trench flows by gravity to manhole No. 1 where the maximum depth of the trench extends approximately 32 feet below ground surface (fbgs). Groundwater in the central and southeast trenches flows by gravity to manhole No. 2, where the maximum depth of the trench extends approximately 31 fbgs.

The groundwater monitoring wells and piezometers were designed to provide information on containment of the groundwater plume and on water quality at the site and adjacent residential properties. There are 11 remaining monitoring wells (W-2, W-8, W-15, MW-101, MW-102, MW-103, MW-104, MW-105, MW-106, MW-107 and MW-108). The four piezometers at the site were used to evaluate the collection trenches and were abandoned on May 10, 2004.

Monitoring wells W-2 and MW-108 are located up-gradient of the site to monitor background conditions. Monitoring well MW-101, which is located west of the site, is used to monitor the effectiveness of the west trench. Three down-gradient wells, MW-102, MW-103 and MW-104, are used to monitor changes in groundwater quality down-gradient of the central trench and to monitor hydraulic gradient control. Four wells, W-8, W-15, MW-105 and MW-106, are used to monitor changes in groundwater quality outside of the southeast trench. Monitoring wells MW-106 and W-15 are also used to monitor hydraulic gradient control of the southeast trench. Monitoring well MW-107 is used to provide source area groundwater quality data and hydraulic gradient information up-gradient of the central trench. Isoconcentration maps from quarterly progress report #24[1] indicate that monitoring well MW-107 remains the most impacted well in the monitoring well network.

The property's parcel Identification number is 313011500. Outagamie County property record describes the property as "LENOX PARK ADDN 3 WD 141D227 LOT 12,13,14 &15 BLK 3 1501 W MELVIN ST & 725 S OUTAGAMIE ST 9086M22." The property is zoned manufacturing.

Geology and Hydrogeology

The site is located in the Fox-Wolf River basin of Wisconsin. Surficial deposits in this basin consist of glacial sediment deposited during the Wisconsin glaciation. The glaciers were present during the Pleistocene period. United States Geological Survey maps *Water Resources of Wisconsin – Fox-Wolf River Basin*, by Perry G. Alcott, 1968, indicate that the materials in the vicinity of the site are composed of glacial lake deposits consisting of silt and clay. The site overlies bedrock formed during the Ordovician Period and bedrock in this area is comprised of the undifferentiated Platteville Formation, Decorah Formation, and Galena Dolomite.

The Phase I remedial action at the site involved excavating soils with chromium contaminations in excess of 500 mg/kg. The depth of the excavation varied across the site from four to 20 fbgs. The excavation was filled with clean fill, a two foot clay cap, and topsoil.

Prior to the excavation, previous work completed at the site identified fill ranging in thickness from one to seven feet. Underlying the fill was a till unit that could be divided into two layers. The upper till unit varied in thickness from five to 10 feet. The bottom of the upper till was at an elevation of 792 to 795 feet above mean sea level (MSL) and was noted to be fairly uniform across the site. The soils in the upper till were generally classified as silty clay with sand (CL).

[1] Reference Quarterly Progress Report #24 & Semi-Annual Operation & Maintenance Report, Dated October 28, 2004.

The lower till was observed to be approximately 60 feet thick and extended down to bedrock. The lower till was described as soft to firm, light brown-gray clay with trace gravel and sand. Some of the deep borings showed peat lenses several inches thick. The soils in the lower till were generally classified as silty clay with sand (CL).

Bedrock was encountered in one boring at an elevation of 72 fbgs. The bedrock was thought to be dolomitic.

Topography across most of the site is generally flat. Regionally, the topography is also generally flat with an approximate elevation of 805 feet above MSL.

Groundwater depth and flow direction are influenced by the collection system. The piezometers will be placed near monitoring wells MW-103, MW-104, and MW-107. During the groundwater treatment system operation: groundwater elevation at monitoring well MW-103 has been observed from 788 to 799 feet above MSL; groundwater elevation at monitoring well MW-104 has been observed from 790 to 800 feet above MSL; and groundwater elevation at monitoring well MW-107 has been observed from 796 to 800 feet above MSL. Regional groundwater flow is expected to be to the south-southeast toward the Fox River. The Fox River is located approximately ½ mile to the south-southeast of the site. The Fox River flows to the north.

Other Potential Sources of Contamination

The Christensen & Wisnet Bulk Oil Plant site (BRRTS #02-45-000382) is located at 702 S. Outagamie Street, approximately 380 feet east of the Mauthe project. Although this project has received closure from the Department of Commerce, petroleum soil and groundwater contamination remains on and off property. Based on data collected from monitoring wells for this project, it is not anticipated that contamination would have impacted the Mauthe study area.

The Midwest Plating Corporation site (BRRTS #02-45-191769) is located at 1315 West Fourth Street, approximately 700 feet east of the Mauthe project. This site is also a former electroplating facility that engaged in hard chrome plating. Soil and groundwater results observed to date reveal that the site is contaminated with cadmium, chromium, lead, and nickel. Based on data collected from downgradient monitoring wells for the Mauthe project and the groundwater flow direction observed at both projects, it is not anticipated that contamination from the Midwest Plating Corporation site would have impacted the Mauthe project area.

There are several other leaking underground storage tank sites, spill sites, and sites in the environmental repair program located around the Mauthe study area. However, these sites have either had a minimum amount of reported contamination, or are located at a distance, which make them unlikely to have impacted the Mauthe study area.

Site Access

Access agreements are in place with Carol Mauthe for the 725 S. Outagamie Street property and the property owners of 1635 W. Spencer Street; 715 and 801[2] S. Outagamie Street; and 1400, 1410, 1414, and 1428 W. Second Street.

Potential For Impacts

At this time the remaining contamination from the Mauthe property does not appear to be impacting: species, habitat, or ecosystems sensitive to the contamination; wetlands; outstanding resource waters; or sites or facilities of historic or archaeological significance.

SITE INVESTIGATION WORK PLAN

The piezometer installation will be performed in general accordance with the requirements of ch. NR 141 Wisconsin Administrative Code (Wis. Adm. Code) and additional information provided in the WDNR Site Investigation Scope of Work.

OMNNI will meet with representatives from the City of Appleton utilities to have sewer and water utilities located. Digger's Hotline will also be contacted prior to any drilling performed. Since system electrical lines, controls, and piping are present near locations of two of the proposed piezometers, we will solicit an electrical contractor to locate private utilities.

Once property owners are notified, utilities located, and the piezometer locations have been approved, OMNNI proposes to coordinate the installation of four piezometers. (See Figure 2 – Site Detail Map.)

Soil Boring Installation Procedures

Environmental Drilling Services, Inc. (EDS) will be subcontracted for the piezometer installation.

Samples from soil borings will be obtained from each boring continuously by split-spoon sampling according to ASTM D-1586. A portion of each sample will be field screened with a photoionization detector (PID) equipped with a lamp suitable for detecting vapors of petroleum and chlorinated solvents. At each sampling interval, a representative portion of the soil will also be collected for possible laboratory analysis. Approximately two soil samples will be chosen from each of the sampled borings for laboratory analysis. Initial laboratory analysis will be conducted on samples based on field evidence (for volatiles) and the native material – fill interface

[2] Residents at this address did not agree to the installation of new wells. If new wells are needed on their property, the residents need to be contacted with details for permission.

(for metals). If a soil boring is not used for piezometer installation it will be abandoned according to section NR 141.25, Wis. Admin. Code.

Soil Sampling Procedures

Soil samples from the drilled borings will be analyzed for total chromium at the four proposed piezometer locations, VOCs at piezometers PZ5 and PZ6, and if field evidence indicates, VOC contamination at PZ7 and PZ8.

The entire recovered sample will be maintained until laboratory analysis has been obtained on the portions submitted. This will allow for additional metals analysis from the samples for up to six months without the cost of remobilizing for sample collection.

The soil sampling procedures are outlined in the Sampling and Analysis Plan for the project, which can be found in Appendix 2.

Monitoring Well Installation And Development Procedures

The piezometers are typically constructed of two-inch, schedule 40, flush-threaded polyvinyl chloride (PVC) casings and slotted well screens. Prior to use, well parts are individually wrapped in plastic.

The piezometers will be installed and developed according to chapter NR 141, Wis. Admin. Code, WDNR Groundwater Monitoring Well Requirements. Each piezometer will be assigned a Wisconsin unique well number. The piezometers will be installed with five-foot screens. Filter pack and annular space seal material are installed by gravity as the augers are withdrawn from the hole. The PVC casing will be cut to the required height using a PVC pipe cutter.

The two piezometers northeast (PZ5) and west (PZ6) of MW-107 will be screened from approximately 35 to 40 fbgs. Monitoring well MW-107 is screen from 10.5 to 30.5 fbgs[3]. Based on the soil analytical data from the investigation[4] and the confirmation soil analysis from the excavation[5], the remaining concentrations of total chromium in the area around monitoring well MW-107 should be below 300 ppm.

Piezometer PZ7, which will be located near monitoring well MW-104, will be screened from approximately 31 to 36 fbgs. Monitoring well MW-104 is screened from 6 to 26 fbgs[6]. Based on the soil analytical data from the investigation and the

[3] Reference monitoring well construction form for monitoring well MW-107 (Amended), contained in the Phase I Remedial Action Closure Report, Appendix C, dated July 31, 1996.
[4] Reference Remedial Investigation Report Appendixes, Volume 2 of 2, dated February 4, 1993, Table D-2.
[5] Reference Phase I Remedial Action Closure Report, dated July 31, 1996, Figure D-1 and Summary of Cleanup Verification Sampling.
[6] Reference monitoring well construction form for monitoring well MW-104, contained in the Phase I Remedial Action Closure Report, Appendix C, dated July 31, 1996.

confirmation soil analysis from the excavation, the remaining concentrations of total chromium in the area around monitoring well MW-104 should be below 200 ppm.

Piezometer PZ8, which will be located near monitoring well MW-103, will be screened from approximately 32 to 37 fbgs. Monitoring well MW-103 is screened from 7 to 27 fbgs[7]. Based on the soil analytical data from the investigation and the confirmation soil analysis from the excavation, the remaining concentrations of total chromium in the area around monitoring well MW-103 should be below 300 ppm.

Given the anticipated concentrations of chromium contamination in the soil and the limited zone of soil contamination that should be encountered, double casing the piezometers is no longer recommended.

An as-constructed well and boring survey will be performed by OMNNI once fieldwork is complete. The piezometers will be located and the PVC well casings, and ground surfaces near each piezometer will be surveyed with a level to 0.01-foot accuracy. We will use existing site elevation data from monitoring wells MW-103, MW-104, and MW-107 as a reference to the new piezometers and the treatment building as a reference for the location of the new piezometers.

To properly develop each piezometer, water will be removed until a consistent water quality is obtained. Removing 10 times the water volume in the well and filter pack, removing water until it is free of sediment, or removing the water until the well is purged dry, does this. Water will be removed from the wells by bailing the water with as little agitation as possible. If the water level is unaffected by bailing and large amounts of water are to be removed, the well will be developed by using the surge and purge method with a centrifugal pump or equivalent. No water is added to the well during development. The development water will be placed into manhole #1 for treatment through the on-site treatment plant.

Groundwater Sampling Procedures

Groundwater samples will be analyzed for total and hexavalent chromium. If soil analysis indicates VOC contamination, a groundwater sample will also be collected and analyzed for VOCs.

The groundwater sampling procedures are outlined in the Sampling and Analysis Plan for the project, which can be found in Appendix 2.

INVESTIGATIVE WASTE MANAGEMENT

The investigative waste from the Mauthe project will consist of soil cuttings from borings, well development and purge water, equipment decontamination, and

[7] Reference monitoring well construction form for monitoring well MW-103, contained in the Phase I Remedial Action Closure Report, Appendix C, dated July 31, 1996.

sampling wastes. A Waste Management Plan for the project can be found in Appendix 4.

SCHEDULE

Major Tasks	Anticipated Date
Piezometer Construction	
Piezometer location approval	May 4, 2005
Site fence modification	May 24, 2005
Installation of soil borings and piezometer construction	May 25-26, 2005
Develop piezometers	June 9, 2005
Survey piezometers	June 9, 2005
Sample piezometers (first event)	June 23, 2005
Sample piezometers (second event)	September 19, 2005

STANDARD OF CARE

The conclusions presented in this report were arrived at using generally accepted hydrogeologic and engineering practices. The conclusions presented herein represent our professional opinions, based on data collected at the time of the previous investigations and remedial work discussed in this report. Conditions at other locations on the property may be different than described in the previous work. The scope of this report is limited to the specific project and location described herein.

Prepared By: Brian D. Wayner

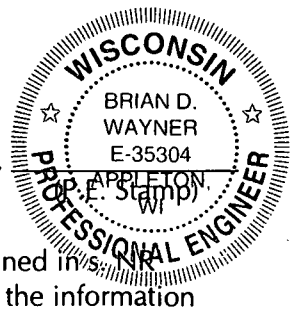
Brian D. Wayner, P.E.
Project Manager

Reviewed By: Dave

Dave Fries, P.G.
Hydrogeologist

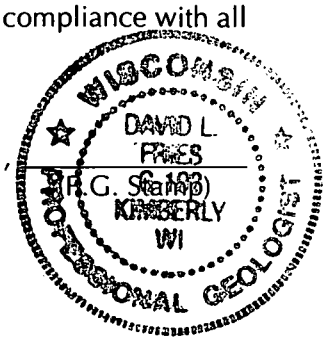
"I, Brian D. Wayner, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code."

Brian D. Wayner , (P.E. Stamp)
(Professional Engineer)



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

Dave Fries , (P.G. Stamp)
(Professional Geologist)



DISTRIBUTION

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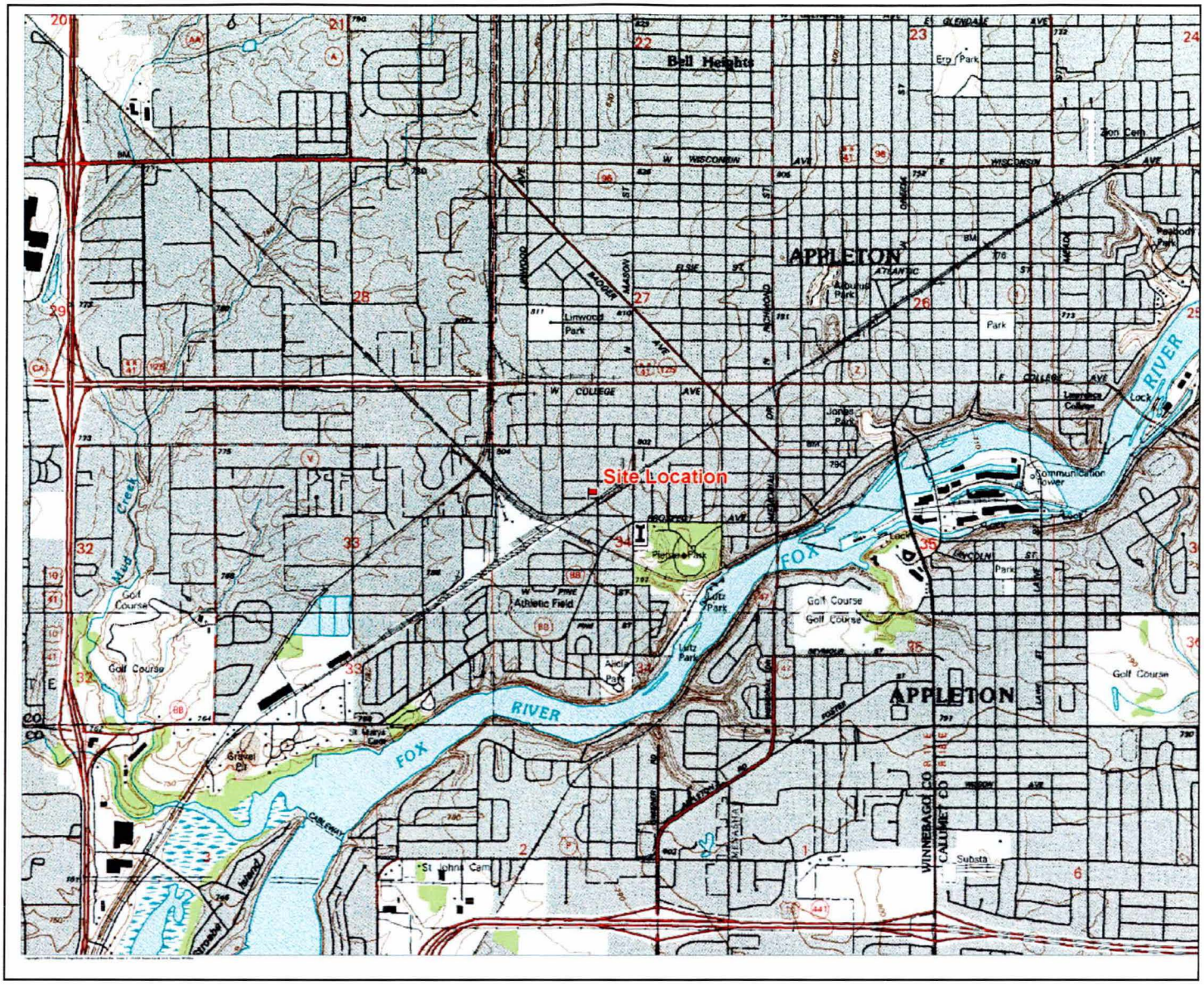


Source: 2000 DeLorme Topo Tools

N

Figure 1
Site Location Map

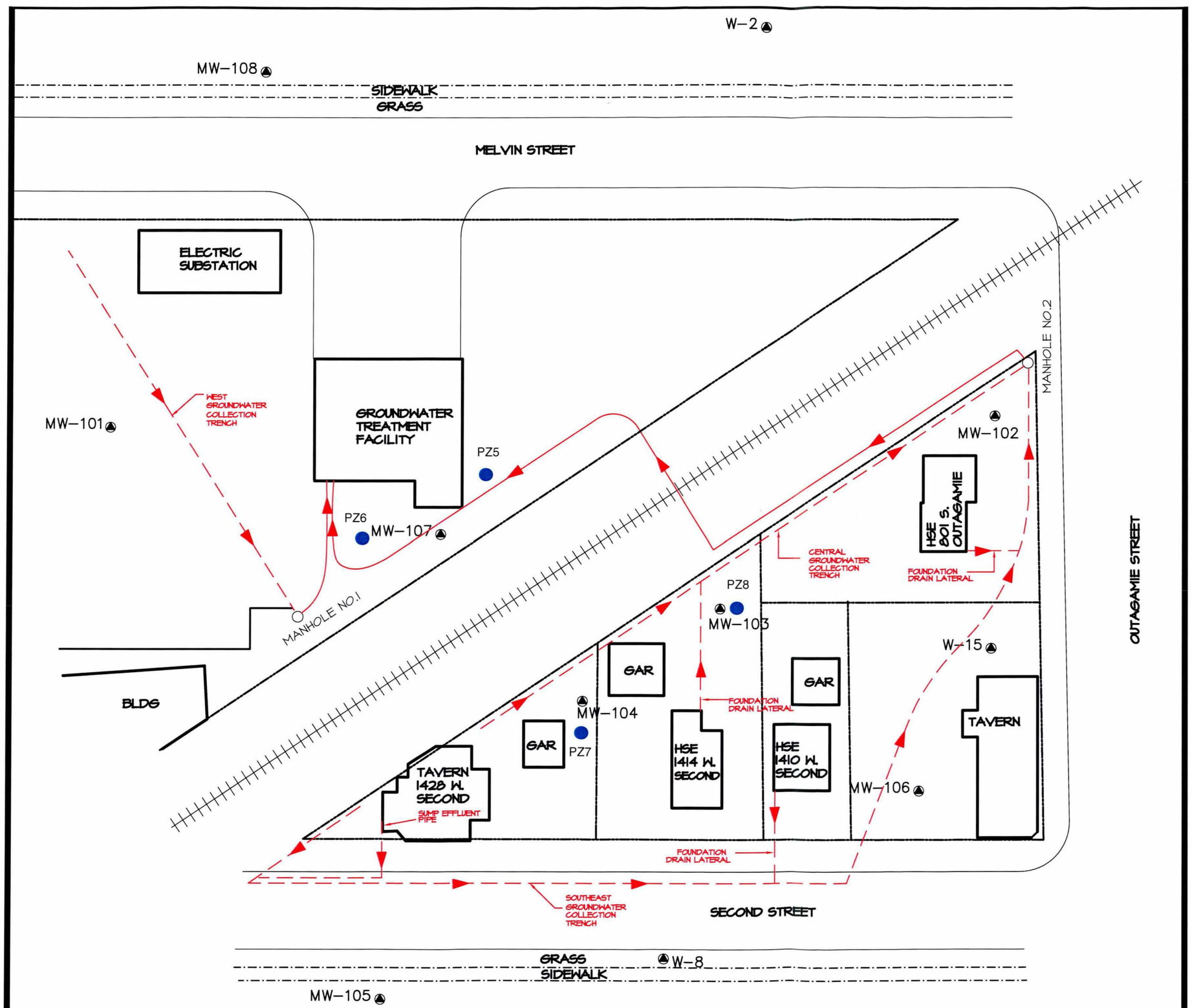
N.W. Mauthe
725 South Outagamie Street
Appleton, Wisconsin 54914-5072

OMNI ASSOCIATES

Project Number:
N1866A05

Date: January 18, 2005

One Systems Drive, Appleton, Wisconsin 54914-1654
Phone: (920) 735-6900 Fax: (920) 830-6100



0' 10' 25' 50'
SCALE: 1" = 50'

LOCAL GRID NORTH
N

LEGEND:

- MW-108 ▲ Well Location and I.D. No.
- Rail Road Tracks
- Building Face
- Property Line
- Edge of Concrete Pavement
- Collection System
- Pump Discharge
- Approximate Piezometer Location

FIGURE 2
SITE DETAIL MAP

N.W. MAUTHE
725 SOUTH OUTAGAMIE STREET
APPLETON, WISCONSIN

OMNI ASSOCIATES
ONE SYSTEMS DRIVE
APPLETON, WI 54914
PHONE (920) 735-6900
FAX (920) 830-6100

PROJECT MANAGER:	BDW	PROJECT NO:	
PROJECT ENGINEER:	BDW	CAD FILE NO:	SITE
DRAWN BY:	DLD	SCALE:	1" = 50'
REVIEWED BY:	BDW	DATE:	10/4/2004

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for the
Sampling and Analysis Plan

SAMPLING and ANALYSIS PLAN

Purpose

The purpose of the Sampling and Analysis Plan for the N.W. Mauthe (Mauthe) project is to address the type of sampling needed along with the collection procedures and analysis necessary to document that the piezometer installation has achieved its goals. Sampling will be performed for three purposes: to define the degree and extent of vertical soil contamination near existing impacted monitoring wells; to determine the degree of groundwater contamination beneath the existing monitoring well network; and to collect information that will assist with evaluating the existing groundwater containment system. The type of sampling that will be required at the Mauthe project includes soil, groundwater, and waste characterization.

Organizational Structure and Responsibility

The organizational structure and responsibilities of the project team are described in the Quality Assurance and Quality Control Plan, Appendix 3.

Sequence of Events

The Mauthe project will consist of installing soil borings and constructing piezometers to collect soil and groundwater samples for field and laboratory analysis. The soil borings and piezometers will be placed on the Mauthe property and two adjacent residential properties.

Four soil borings will be drilled on or near the Mauthe property, OB1 – OB4. Piezometers (PZ5 – PZ8) will be installed in these borings to determine the piezometeric elevation and chemical characteristics. (See Figure 2 – Site Detail Map, Appendix 1.)

The schedule for the field activities can be found in the Work Plan under the heading Schedule.

Data Quality Objectives

Data Quality Objectives (DQOs) are qualitative and quantitative statements that specify the quality of the data required to support decisions made during the site investigation. Different data uses may require different levels of data quality. EPA protocol specifies five analytical levels different data uses and the QA/QC effort and methods required to achieve the desired DQO. For field screening, DQO Level 1 is the common level of data quality desired. Field screening techniques that are associated with DQO Level 1 provide rapid results for determining which samples should be sent for off-site laboratory analysis. The data quality associated with the investigative samples sent to the off-site laboratory will be DQO Level 4, which provides the level of data quality used for determining if the soil has been impacted above background conditions or the groundwater has been impacted above

the groundwater enforcement standards. DQO Level 4 analyses require full laboratory program analytical and data validation procedures.

Types of Sampling and Analysis

Field Screening

A portion of each soil sample will be field screened with a photoionization detector (PID) equipped with a lamp suitable for detecting vapors of petroleum and chlorinated solvents.

Soil Laboratory Analysis

Select soil samples collected during the boring installation will be submitted for laboratory analysis. Selection of soil samples for laboratory analysis will be based on field screening and historical information from the area in which the soil boring is being placed. Soil samples will be analyzed for total chromium, and if field evidence indicates the presence of volatile organic compounds (VOCs), VOC samples will be collected.

The soil samples collected from the drilled borings that are not submitted for laboratory analysis will be placed in re-closeable plastic storage bags and labeled with the boring number, sample interval depth, and sample collection date. The samples will be kept for up to six months (maximum holding time) for possible additional metals analysis.

Groundwater Laboratory Analysis

Groundwater samples collected from the piezometers will be submitted for laboratory analysis. Groundwater samples will be analyzed for total and hexavalent chromium. If soil analysis indicates VOC contamination, a groundwater sample will also be collected and analyzed for VOCs.

Waste Characterization

Soil cuttings from the installation of borings will be containerized in 55-gallon steel drums and kept in the on-site treatment building until laboratory analysis is available. Cuttings from each boring will be kept separate to avoid mixing of potentially contaminated and uncontaminated material. The investigative waste will be handled as described in the Waste Management Plan, Appendix 4.

Decontamination Fluid, Development, and Purge Water

Liquid generated from decontamination activities, piezometer development, and purge water will be placed in manhole #1 for treatment through the treatment system.

General Waste

The sampling material wastes (disposable gloves, disposable bailers, cleaning supplies, plastic tubing, etc.) generated during the investigative activities will be removed from the property and disposed of as solid waste. Laboratory analysis of these materials is not anticipated.

Sample Collection Procedures

Soil Boring Installation Procedure

OMNNI proposes to use Environmental Drilling Services, Inc. (3671 Monroe Road, De Pere, WI 54115) to advance the drilled borings and construct the piezometers. Borings are advanced using 7.625-inch outside diameter (O.D.) x 4.5-inch inside diameter (I.D.) hollow stem augers or 6.25-inch O.D. solid stem augers powered by a truck-mounted drill rig.

Samples from the drilled borings are typically obtained from each boring at 2.5-foot intervals by split-spoon sampling according to American Society for Testing and Materials (ASTM) Standard D 1586.

Field Screening Procedures

A portion of each sample will be field screened with a photoionization detector (PID) equipped with a lamp suitable for detecting vapors of petroleum and chlorinated solvents. A portion of soil from each interval is placed in a clean 4-oz. jar (approx. 1/2-filled), and sealed with aluminum foil and a teflon-lined lid. The headspace sample is then agitated for a minimum of 30 seconds and then allowed to equilibrate. Equilibration time will correspond to the following guidelines:

Sample Headspace Equilibration Time

Ambient outside air temperature at the time of sample collection:	Minimum amount of time sample must equilibrate at 70° F or greater temperature:
< 40° F	40 min.
41 – 55° F	20 min.
56 – 69°F	10 min.
> 70°F	5 min.

When the sample has completed equilibration, it is promptly field analyzed with a portable PID. OMNNI uses a Photovac Inc. Microtip HL-200 or ML-1000, equipped with an 11.2 ev lamp. A background reading is first taken. The PID probe is then inserted into the jar through a single hole in the aluminum foil. The instrument reading is measured at one-half the distance between the foil seal and the sample surface. The measured reading is then recorded.

Soil Sampling Procedures

Soil samples are collected from a split-spoon sampler during environmental drilling. The sampler will wear clean, disposable, vinyl or latex gloves and use a decontaminated stainless steel trowel anytime a sample is physically collected or handled to decrease the risk of personal exposure and cross contamination. Samples will be placed in the laboratory supplied sampling containers. The samples will be analyzed for the parameters and according to the requirements identified in Table 1 – Parameters, Containers, Preservation, Analytical Methods, and Holding Time Requirements. The samples will be sent to En Chem for appropriate analysis.

Piezometer Installation and Development Procedures

The piezometers are typically constructed of two-inch, schedule 40, flush-threaded polyvinyl chloride (PVC) casings and slotted well screens. Prior to use, well parts are individually wrapped in plastic.

Piezometers are installed and developed according to chapter NR 141, Wis. Adm. Code. The piezometers are installed with five-foot screens and sealed beneath the water table. Filter pack and annular space seal material are installed by gravity as the augers are withdrawn from the hole. PVC casings are cut to the required height using a PVC pipe cutter.

To properly develop each piezometer, water is removed until a consistent water quality is obtained. Removing 10 times the water volume in the well and filter pack, removing water until it is free of sediment, or removing the water until the well is purged dry, does this. Water is removed from the wells by bailing the water with as little agitation as possible. If the water level is unaffected by bailing and large amounts of water are to be removed, the well is developed by using the surge and purge method with a centrifugal pump. No water is added to the well during development.

Groundwater Sampling Procedures

The piezometers will be opened to allow for equilibration before the depth to groundwater is determined. A Solonist 101 water level meter will be used to measure groundwater elevations.

The piezometers will be sampled in the order of PZ8, PZ7, PZ6, and PZ5. As the degree of contamination becomes known, piezometers with the least contamination will be sampled first, followed by piezometers with increasing concentrations. Groundwater will be removed from the piezometers for approximately 15 to 20 minutes by slow purging before collecting samples.

Odor, turbidity, temperature, conductivity, and pH will be determined on the unfiltered portions of the sample and recorded on the well specific field sheet.

The sampler will wear clean, disposable, vinyl or latex gloves and use decontaminated collection equipment and field instruments during sample collection. Samples will be placed in the laboratory supplied sampling containers. The samples will be analyzed for the parameters and according to the requirements identified in Table 1 – Parameters, Containers, Preservation, Analytical Methods, and Holding Time Requirements. The samples will be sent to En Chem for appropriate analysis.

Table 1 - Parameters, Containers, Preservation, Analytical Methods, and Holding Time Requirements

Sample Type and Parameters	Container Size	Sample Size	Preservation	Analysis Method	Detection Limits[1]	Holding Times
Field Soil Sampling (VOCs)	4 oz. Wide mouth glass jar	Approx. 2 oz.	None	Field Screening Procedures section	Ionization potential < 11.2 eV	N/A
Soil Sampling (Total Chromium)	4 oz. Wide mouth plastic jar (2 per sample)	8 oz.	Cooled to 4°C	SW-846-6010B	Cr 0.55 mg/kg	6 months
VOCs	DNR approved soil syringe or 40 ml glass vial (2 per sample)	13 g (vial)	Cooled to 4°C (sample preserved by laboratory or methonal preservation during sample collection)	SW 846 8021	25 µg/kg	48 hours
Groundwater Sampling (Total Chromium - Filtered)	250 ml plastic bottle (2 per sample)	500 ml	Cooled to 4°C, 2 ml of HNO_3 to a pH of <2	Graphite furnace atomic adsorption SW-846-(Cr)-7191	Cr 0.7 µg/L	6 months
Hexavalent Chromium - Filtered	250 ml plastic bottle (1 per sample)	250 ml	Cooled to 4°C	SW-846-6010B	Hex Cr 3.6 µg/L	24 hrs with advanced notice to lab
General Wastes	N/A	N/A	N/A	N/A	N/A	N/A
1 The actual method detection limits are sample dependent and may vary as the sample matrix varies and dilution factors are applied.						

Sample Quality Assurance/Quality Control

Field Instruments

Isobutylene at a concentration of 100 ppm is used for field calibration gas for the PID. The PID meter is field calibrated at the following times: at the beginning of each day; after any significant change in temperature or humidity; every three hours; and after any repairs to the instrument are performed.

The Oakton pH/CON 10 portable pH, conductivity, and temperature meter is calibrated following the manufacture's specifications. The instrument is calibrated with a three-point pH calibration using standard pH buffers: 4.00, 7.00, and 10.00. The instrument is calibrated with a four-point calibration solution: 447 µs, 1,413 µs, 2,764 µs, and 12,880 µs.

Laboratory Samples

Samples will be placed on ice until refrigerated. The samples will be picked up by En Chem's courier for transportation to the laboratory as soon as possible, preferably the same day the samples were collected. A chain-of-custody will be filled out listing all samples collected, requested laboratory analysis, date and time of collection, and the name of the sample collector. This document remains with the samples at all times and bears the names of all persons handling the samples until the samples are received at the laboratory.

Soil Matrix Samples

One duplicate sample will be collected following the Sample Collection Procedures outlined above.

Liquid Samples

One duplicate sample will be collected and one laboratory blank sample will be performed for each sampling event following the Sample Collection Procedures outlined above.

Laboratory Sampling by Method 6010B

Inductively coupled plasma-atomic emission spectrometry determines trace elements, including metals, in solution. The method is applicable to the metals that have been found at the Mauthe facility. The instrument measures characteristic emission spectra by optical spectrometry. Samples are nebulized and the resulting aerosol is transported to the plasma torch. Element specific emissions spectra are produced by a radio frequency inductively coupled plasma. The spectra are dispersed by a grating spectrometer, and the intensities of the emission lines are monitored by photosensitive devices.

All matrices, excluding filtered groundwater samples but including groundwater, aqueous samples, TCLP and EP extracts, industrial and organic wastes, soils, sludges, sediments, and other solid wastes, require digestion prior to analysis. Groundwater samples that have been prefiltered and acidified will not need acid digestion. Samples, which are not digested, must either use an internal standard or be matrix matched with the standards.

The laboratory quality assurance procedure will contain a standard operating procedure for Method 6010B. The standard operating procedures will specify the types of audits required (sample spikes, surrogate spikes, reference samples, controls, and blanks), the frequency of each audit, the compounds to be used for sample spikes and surrogate spikes, and the quality control acceptance criteria for these audits. The laboratory will document initial and ongoing instrument and analytical quality control functions have been met. Any samples analyzed in nonconformance with the quality control criteria will either be reanalyzed by the laboratory or noted as to the quality of the analytical results on the analysis documentation.

Sample Documentation

Data collections activities will be recorded on field notes. Field notes will include data collection activities described in as much detail as possible so that persons going to the site

could reconstruct a particular situation without reliance on memory. The project name and project number will be clearly marked on each field sheet. Entries into the field notes will include at the start of each day, the date, page number, start time, general weather conditions (estimated temperature, wind direction and speed, visibility, etc.), names of all team members present, level of personal protection being used, and signature of the person making the entry. All entries will be made in ink. If an incorrect entry is made, the information will be crossed out with a single strike mark, initialed, and dated. When a sample is collected or a measurement is made, a detailed description of the location of the station will be recorded. If a photograph is taken, the number of the station will be noted. All equipment used to make measurements will be identified, along with the date and results of calibration. Sample collection activities will document the time of sampling, sample description, sample identification number, depth at which the sample was collected, any quality control samples, measurements made and results collected.

Soil sampling locations will be identified starting with the letter "OB", for OMNNI boring, and followed by consecutive numbering starting with the number 1. The sample interval will also be included in the soil sampling description. (Examples: OB1-1, OB1-3, OB2-5.)

Groundwater samples from the monitoring wells will be identified starting with "PZ", for piezometer, and followed by piezometer identification number. (Examples: PZ5, PZ6, PZ8.)

Duplicate samples will be identified with the letter "D", for duplicate, within the already established sample designation for the type of sample being collected. (Examples: PZ5D, PZ7D, OB2-1D.)

Sample containers will be labeled with OMNNI's project number; date sampled was collected; sample identification number; analysis to be performed; type of preservative used (if any); and laboratory contact information.

A chain-of-custody form is filled out, listing all samples collected, requested laboratory analysis, date and time of collection, and the name of the sample collector. This document remains with the samples at all times and bears the names of all persons handling the samples until they are received at the laboratory.

Sample Packaging, Handling, Shipment, and Chain of Custody Procedures

Samples requiring laboratory analysis will be placed in the laboratory supplied sampling containers for the appropriate analysis. A separate signed chain of custody record enclosed in each sample box or cooler will accompany collected samples at all times. Samples will be picked up at OMNNI's office by the laboratory courier.

Decontamination Procedures

Decontamination is the process of removing and/or neutralizing contaminants that may have accumulated on personnel protective equipment and sampling equipment. Proper

decontamination is a critical element in the control of hazards, which helps ensure safety of workers and the potential for cross contamination.

During the collection of the soil samples the split spoon will be cleaned between samples in a multiple rinse surfactant solution (soap and water or Alconox solution). Soil, which has accumulated around the boring, will be drummed.

Upon completion of the boring, the augers will be decontaminated by drilling contractors before they are used again. The following procedures are typically used when decontaminating drilling equipment: a decontamination basin lined with plastic is set up near the work area; contaminated equipment is placed in the decontamination basin; a pressurized steam cleaner is used to clean contaminated equipment; and following steam cleaning, the auger is removed from the decontamination basin. Upon completion of the job, the accumulated water in the decontamination basin is pumped out and placed in a drum. Wash water used for cleaning the split spoons is also added to the drum. The water from the drum will be placed in manhole #1 for treatment. The plastic used in the decontamination basin is disposed of as solid waste.

Samples will be collected while wearing new disposable vinyl or latex gloves. Used sampling gloves will be collected and disposed of as solid waste. If facilities are available, all exposed skin, such as hands, should be washed prior to leaving the site. Boots and clothing will be checked for excess soil, which if present, will be removed.

The sampling trowel will be decontaminated between sample locations in a surfactant wash (soap and water or Alconox solution) and a double rinse with tap water.

In the field groundwater-sampling equipment is rinsed with a 10% methanol solution and then flushed with distilled water between each monitoring point. Equipment that is still contaminated after field cleaning will be rinsed with tap water, washed off with detergent, rinsed with a 10% methanol solution, and flushed with distilled water.

QUALITY ASSURANCE and QUALITY CONTROL PLAN

Purpose

The purpose of the Quality Assurance and Quality Control Plan for the N. W. Mauthe (Mauthe) project is to address the quality assurance activities during the soil boring and piezometer installation. Quality assurance refers to all activities designed to provide adequate documentation and confidence that materials and workmanship substantially meet the requirements of the project objectives. Quality control refers to those actions taken by the manufacturer, fabricator, or contractor to confirm that materials and workmanship meet requirements of the contract or purchase order and the applicable drawings and specifications. This plan will address the following: 1) identify the project's organizational structure and responsibility; 2) outline project communications; 3) define the observation of the installation methods for soil borings and piezometers; and 4) outline the documentation format.

Organizational Structure and Responsibility

WDNR – Ms. Jennifer Borski, Project Manager and Hydrogeologist, WDNR, 625 E. County Road Y, Suite 700, Oshkosh, WI 54901-9731, Telephone: 920-424-7887. The Wisconsin Department of Natural Resources (WDNR) is implementing this project as a department-funded state response action and is responsible for ensuring the project meets the site investigation objectives and the remedial action recommendation requirements.

Oversight Engineer – Mr. Brian Wayner, Project Manager and Engineer, OMNNI Associates, Inc., One Systems Drive, Appleton, WI 54914, Telephone: 920-735-6900. The Oversight Engineer's overall responsibility is for meeting the site investigation objectives. These objectives include technical, financial, and scheduling for the site investigation and remedial actions recommendations project. The Oversight Engineer reports directly to the WDNR Program Manager.

Laboratory Analytical Services – Ms. Laurie Woelfel, En Chem, Inc., 1241 Bellevue Street, Suite 9, Green Bay, WI 54302, Telephone 800-736-2436. The laboratory is responsible, through the Oversight Engineer, for maintaining quality control procedures in accordance with their contractual arrangements and appropriate laboratory analytical methods.

Drilling Services – Tom Vande Yacht, Environmental Drilling Services, Inc., 3671 Monroe Road, De Pere, WI 54115; Telephone 800-236-0337. The driller is responsible, through the Oversight Engineer, for maintaining quality control procedures in accordance with their contractual arrangements and appropriate soil boring installation and piezometer construction methods.

Project Communications

A project web page has been set up to provide the public with contact information and project status 24 hours a day, anywhere Internet access is available. This web page can be accessed at http://www.omnni.com/activeprojects/mauthe.htm.

For the WDNR project manager, a project portal will be established. This portal allows the WDNR project manager and other authorized individuals to access files on OMNNI's server. These files can include draft reports, laboratory data, site data tables and figures, budget information, and project contact information. Access to these files is available 24 hours a day anywhere Internet access is available.

The WDNR project manager will also be updated on the project's status through email communications and monthly status reports.

Observation Of Soil Boring Installation And Piezometer Construction

The Oversight Engineer or authorized representative will document observations made during the soil boring installation and the piezometer construction. Samples from soil borings will be obtained from each boring continuously by split-spoon sampling according to ASTM D-1586. The piezometers will be installed and developed according to ch. NR 141 Wis. Adm. Code groundwater monitoring well requirements. Each piezometer will be assigned a Wisconsin unique well number.

WDNR Form 4400-122 will be completed to document the installation of all soil borings. Soil borings not used for piezometer construction will be abandoned and WDNR Form 3300-5, Well/Drillhole/Borehole Abandonment, will be completed. Piezometer construction will be documented on the WDNR Monitoring Well Construction, Form 4400-113A and piezometer development will be documented on the Monitoring Well Development, Form 4400-113B. General piezometer information will be documented on the WDNR Groundwater Monitoring Well Information Form, Form 4400-89.

Documentation

All project quality assurance activities and quality control submittals pertaining to the contract specifications are to be documented. Maintaining complete, accurate records of all work is crucial to verifying conformance with the specifications and drawings. The Oversight Engineer will maintain the project documentation file.

Test Results and Material Certification:
Results from all field tests, laboratory tests, material design evaluations and certifications, and material specification sheets will be submitted to the Oversight Engineer, who will review for conformance with contract documents, approve, and forward copies to the WDNR Project Manager.

Photographic Documentation:

A photographic record of the project will be made and kept as part of the quality assurance record. The Oversight Engineer will conduct a pre-boring photographic record of the project area. The Oversight Engineer will use the photographic record to document fieldwork and installation/construction details. Each photograph will be marked with a sequence number, date, location, photographer, and description. A digital camera, video camera, or thirty-five millimeter color film will be used. Any of the observers may photograph work for record purposes. The Oversight Engineer will conduct a post-boring photographic record of the project area. The Oversight Engineer will maintain the photographic record file.

Field Notes:
Data collections activities will be recorded in field sheets. Field notes will include data collection activities described in as much detail as possible so that persons going to the site could reconstruct a particular situation without reliance on memory. The project name and project number will be clearly marked on each field sheet. Entries into the field notes will include at the start of each day, the date, page number, start time, general weather conditions (estimated temperature, wind direction and speed, visibility, etc.), names of all team members present, level of personal protection being used, and initials of the person making the entry. All entries will be made in ink. If an incorrect entry is made, the information will be crossed out with a single strike mark, initialed, and dated. When a sample is collected or a measurement is made, a detailed description of the location of the station will be recorded. If a photograph is taken, the number of the station will be noted. All equipment used to make measurements will be identified, along with the date and results of calibration. Sample collection activities will document the time of sampling, sample description, sample identification number, depth at which the sample was collected, any quality control samples, measurements made and results collected.

Document Transmittals:
Document transmittals between the project team members provide a record of communications and are necessary for keeping project team personnel informed of project requirements, progress, changes, and quality of work. To prevent misunderstandings and omissions, transmittals will be formally communicated with proper documentation and confirmation of submittal and receipt. Document transmittals include the following:

1. Change Order To Contract For Professional Services - This is the "Change Order" form for professional services contracts. A draft of the change of scope is usually prepared by the Oversight Engineer and submitted to the WDNR project manager. The WDNR project manager will review, modify and approve it and forward it to the Department Project Manager for review who then forwards it to the R&R Program Coordinator for processing. All major changes to the project must be documented using this form.
2. Invoice For Professional Services - This form is completed by the Oversight Engineer and submitted to the WDNR project manager for approval, along with a project status letter and any supporting invoices. The WDNR project manager will review, modify and approve it and forward it to the R&R Program Coordinator for processing.

3. Project Meeting Notes – This form is to be used to document all project meetings relating to the investigation activities.
4. Letter of Transmittal – This form is to be used if a cover letter does not accompany a transmittal for investigation related documentation.

Final Storage:
A summary of the investigation will be included in the proposal for collection and treatment system modifications report. At the completion of the project, all files associated with the project including forms, records, reports, field logbooks, pictures, analytical data, chain-of-custody forms, and correspondence, will be kept in storage boxes in a secured, limited access area. The Oversight Engineer will keep a copy of the files for six years after project completion.

WASTE MANAGEMENT PLAN

The purpose of the Waste Management Plan for the N.W. Mauthe (Mauthe) project is to address waste management activities for waste materials generated during the soil boring installation, piezometer construction, and groundwater sampling activities.

Investigative waste will be managed in accordance with the General Interim Guidelines for the Management of Investigative Wastes[1]. The guidelines define investigative waste as any contaminated media generated as a result of investigative activities. The investigative waste at the Mauthe project will consist of soil cuttings from borings, well development and purge water, equipment decontamination, and sampling wastes. Waste management methods will be protective of human health and the environment and will comply with applicable laws and rules. Every effort will be made to minimize the amount of investigative waste generated.

Organizational Structure and Responsibility

The organizational structure and responsibilities of the project team are described in the Quality Assurance and Quality Control Plan, Appendix 3.

Solid Waste, Handling, Storage and Disposal

Soil cuttings from the installation of borings will be containerized in 55-gallon steel drums and kept in the on-site treatment building until laboratory analysis is available. Cuttings from each boring will be kept separate to avoid mixing of potentially contaminated and uncontaminated material, thus minimizing disposal or treatment costs. Drums will be clearly labeled with the BRRTS number, date of collection, "OMNNI Associates," and waste type. Analysis will be performed as outlined in the Sampling and Analysis Plan, Appendix 2. Once laboratory data is available, a decision will be made regarding the final destination of the waste.

The sampling material wastes (disposable gloves, disposable bailers, cleaning supplies, plastic tubing, etc.) generated during the investigative activities will be removed from the property and disposed of as solid waste.

Soil wastes generated will be handled, stored, transported, and disposed of as a special solid waste. These wastes will be stored on the Mauthe property until transported to an approved Subtitle D landfill.

Hazardous Waste Determination, Handling, Storage, Treatment, and Disposal

Based on the confirmation samples from the previous soil removal activities, soil cuttings generated from the soil boring installation are not anticipated to exhibit the hazardous waste characteristic of toxicity and therefore, will not be considered hazardous waste.

[1] Wisconsin DNR Remediation and Redevelopment Program, General Interim Guidelines for Management of Investigative Waste, Publication RR-556, January 14, 1993.

Groundwater and Decontamination Fluid Handling, Storage and Disposal

Liquid generated from decontamination activities, piezometer development, and purge water will be placed into manhole #1 for treatment through the on-site treatment plant prior to discharge to the City of Appleton sanitary sewer system.

Schedule

The schedule for the site preparation and soil removal activities can be found in the Work Plan under the heading Schedule.

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