Site Investigation Field Procedures Workplan

Nicolet Trails Campground
310 East Washington Street
Gillett, Wisconsin

January 15, 2014
by METCO
WDNR File Reference #: 03-43-560923
PECFA Claim #: 54124-9999-10

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This document was prepared by:

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January 15, 2014

WDNR BRRTS#: 03-43-560923
PECFA Claim #: 54124-9999-10

City of Gillett
Beth Rank
150 North McKenzie Avenue
Gillett, WI 54124

Dear Ms. Rank,

Enclosed is our "Site Investigation Field Procedures Workplan" concerning the Nicolet Trails Campground site in Gillett, Wisconsin. This document outlines the procedures and the methods used to conduct such an investigation.

A copy of this workplan will be sent to the Wisconsin Department of Natural Resources for review.

We appreciate the opportunity to be of service to you on this project. Should you have any questions or require additional information, do not hesitate to contact our La Crosse office.

Sincerely,

Jason T. Powell
Staff Scientist

C: Robert Klauk – WDNR

Site Investigation Field Procedures Workplan - METCO
Nicolet Trails Campground

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LIST OF ACRONYMS

AST - Aboveground Storage Tank
ASTM - American Society for Testing and Materials
Cd - Cadmium
DOT - Department of Transportation
DRO - Diesel Range Organics
ES - Enforcement Standards
gpm - gallons per minute
GRO - Gasoline Range Organics
HNU - brand name for Photoionization Detector
ID - inside-diameter
LAST - Leaking Aboveground Storage Tank
LUST - Leaking Underground Storage Tank
MSL - Mean Sea Level
MTBE - Methyl-tert-butyl ether
MW - Monitoring Well
NIOSH - National Institute for Occupational Safety & Health
NR - Natural Resources
OD - outside-diameter
PAH - Polynuclear Aromatic Hydrocarbons
PAL - Preventive Action Limits
Pb - Lead
PECFA - Petroleum Environmental Cleanup Fund
PID - Photoionization Detector
POTW - Publicly Owned Treatment Works
ppb ug/kg - parts per billion
ppm mg/kg - parts per million
psi - pounds per square inch
PVC - Polyvinyl Chloride
PVOC - Petroleum Volatile Organic Compounds
RAP - Remedial Action Plan
scfm - standard cubic feet per minute
SVE - Soil Vapor Extraction
USCS - Unified Soil Classification System
USGS - United States Geological Survey
UST - Underground Storage Tank
VOC - Volatile Organic Compounds
WDNR - Wisconsin Department of Natural Resources
WPDES - Wisconsin Pollutant Discharge Elimination System

Site Investigation Field Procedures Workplan – METCO
Nicolet Trails Campground

OBJECTIVES

Requirements of the WDNR

A Site Investigation is required by the Wisconsin Department of Natural Resources (WDNR) by authority of Section 292.11 of the Wisconsin Statutes. According to the WDNR, any soil that tests over 10 ppm Gasoline Range Organics (GRO) or Diesel Range Organics (DRO) requires an investigation. Any soil that tests over the Chapter NR720 Groundwater RCLs, Direct Contact RCLs, or Soil Saturation Values an investigation and possible remediation. Any groundwater that tests over the Preventive Action Limits (PAL) or Enforcement Standards (ES) for compounds listed in Chapter NR140 of the Wisconsin Statutes requires an investigation and possible remediation. For a further explanation of WDNR rules and regulations, see Appendix D.

Requirements of the PECFA Program

According to rules adopted in May 2006, the maximum allowable cost for an initial Site Investigation shall be no more than $20,000 unless pre-approved by PECFA. All consultant and commodity service costs must not exceed the PECFA Usual and Customary Charges.

Purpose of Document

This document briefly outlines all methods and procedures used by METCO personnel concerning "Site Investigations". These guidelines are strictly followed unless changed by managing personnel, site conditions, or project situations. All changes will be clearly noted.

All work conducted by METCO is undertaken in accordance with approved methods and regulations of the WDNR Bureau for Remediation and Redevelopment.

This document is site specific and will always be on-site during the project.

INTRODUCTION

Site Name

Nicolet Trails Campground

Site Address

310 East Washington Street
Gillett, Wisconsin

Legal Description

SE ¼, NW ¼, Section 22, Township 28 North, Range 18 East, Oconto County

Contact or Client

City of Gillett
Beth Rank
150 North McKenzie Avenue
Gillett, WI 54124
(920) 855-2255

WDNR Project Manager

Robert Klauk
Wisconsin Department of Natural Resources
2984 Shawno Avenue
Green Bay, WI 54313
(920) 662-5164

Consultant

METCO
Ronald J. Anderson, P.G.
Jason T. Powell
709 Gillette Street, Suite 3
La Crosse, WI 54603
(608) 781-8879

SITE BACKGROUND

Facility

A bulk petroleum facility existed on the property from at least the 1930's until the mid to late 1980's. The facility consisted of at least five above ground storage tanks (ASTs) for the storage of gasoline, diesel, and fuel oil. Two underground storage tanks (USTs) were also affiliated with the bulk facility, their contents are unknown. No other ASTs or USTs are currently known to exist on the subject property.

In the summer of 2013, the City of Gillett encountered two steel USTs on the property while installing a water line on the property. The USTs were subsequently removed from the property. On July 12, 2013, a test pit was dug in the area of the removed USTs and two soil samples (S-1 and S-2) were collected from the test pit for DRO and VOC analysis. The soil sampling results showed DRO concentrations ranging from 162 to 3,810 ppm along with various detects for VOCs. The petroleum contamination was reported to the WDNR, who then required that a site investigation be completed.

Other nearby LUST/ERP sites in this area include the Gillett City Trail Property (325 feet southwest), Mr B's Garage (600 feet south-southwest), and Kozak's Service Station (650 feet south-southwest). At this time, we do not suspect that these sites are impacting or being impacted by the subject property.

Potential Risks and Impacts

The subject property and surrounding properties are all served by the City of Gillett municipal water. The nearest municipal well (Well #2) exists approximately 750 feet to the west of the subject property. No private potable wells are known to exist in this area.

METCO is not currently aware of any other impacts, receptors, risks, or local problems associated with the subject property.

SITE CONDITIONS

Topography

According to the USGS Hydrologic Atlas, the subject property is located in the southern portion of the Menominee-Oconto-Peshtigo River Basin. This area is characterized by an irregular rolling landscape consisting of an uneven cover of glacial deposits overlying an eroded bedrock surface.

The elevation of the site is approximately 800 feet above Mean Sea Level

(MSL). See Appendix A for site location.

Geology

Native unconsolidated materials in this area generally consist of silt/clay to silty sand. The unconsolidated materials are underlain by sandstone bedrock at approximately 250 feet below ground surface.

Hydrology

The nearest surface water is Christie Brook, which exists approximately 650 feet to the northeast of the subject property.

Hydrogeology

Groundwater is estimated to exist at approximately 10-12 feet below ground surface in this area. Groundwater flow direction is expected to be toward the north to northeast.

SCOPE OF WORK

Site Investigation

An investigation consists of collecting samples of soil and groundwater for analysis by a laboratory for compounds related to petroleum products. The WDNR requires that the investigation determine the degree and extent of contaminants in these mediums, which is commonly referred to as "defining the contaminant plume". Further background information will also be collected to assist in the investigation.

Geoprobe Project

METCO has proposed a 1-2 day Geoprobe Project. We propose 6 to 10 borings to 10-15 feet with soil and groundwater sampling. The Geoprobe will be used to collect soil samples at various depths in order to determine the general extent of contaminants in the subsurface environment.

The goal of the Geoprobe Project is to complete the following:

1. Determine general subsurface geotechnical characteristics.
2. Determine general extent of the contaminants in the unconsolidated deposits.
3. Determine the general extent of contaminants in groundwater, if applicable.

4. Determine if contaminants have migrated to competent rock, if applicable.

This data will either completely define the extent of contamination or be used to guide the Drilling Project if required.

Drilling Project (if required)

METCO has proposed 6 to 10 boreholes to be completed on/off site. METCO has also proposed 5 to 8 monitoring wells to be installed on/off site. Based on the results of the Geoprobe project, we will be able to determine how many monitoring wells will need to be installed.

The goal of the Drilling Project is to complete the following:

1. Collect a soil sample for field analysis every 2.5 feet of boring.
2. Collect at least two soil samples for laboratory analysis in every boring.
3. Verify, through sampling, the horizontal and vertical extent of soil contamination, including smear zones.
4. Install monitoring wells in an arrangement that fully defines the horizontal and vertical extent of groundwater contamination.
5. Develop the monitoring wells.
6. Collect at least two rounds of groundwater samples from the monitoring wells.
7. If conditions warrant, perform slug tests on at least one monitoring well.

Report Preparation

The final report, prepared by METCO, will include background information, observations, procedures, methods, field data, laboratory analysis, site maps, data analysis, risk assessment, conclusions, and recommendations concerning all activities conducted for this project. This report will be submitted to the client and the WDNR for review and discussion.

METCO PROCEDURES AND METHODS

Geoprobe

The Geoprobe consists of a truck mounted, hydraulically driven unit that advances 1-inch diameter, 3 or 4-foot long, stainless steel rods into the subsurface. At desired depths, either a soil or water sample can be collected.

A 4-foot or 5-foot long, ½ or 1-inch diameter soil sampler is advanced to the sampling location. At desired depths, a soil sample is collected and brought to the surface for analysis.

All Geoprobe holes are properly abandoned to ground level using bentonite clay and a surface seal.

Drilling

Drilling is conducted with a truck mounted auger drill rig. To penetrate any unconsolidated materials, work is conducted in accordance with ASTM D-1452 "Soil Investigation and Sampling by Auger Boring". If bedrock is encountered and cannot be penetrated with auger boring, an accepted air-rotary drilling procedure will be used.

Sampling unconsolidated materials is done in accordance with ASTM D-1586 "Penetration Tests and Split-Barrel Sampling of Soils" using a 2-inch outside diameter (O.D.), 2.5 foot split spoon sampler. Using this procedure, a split spoon sampler is driven into the soil by a 140-pound weight falling 30-inches, and a soil sample collected.

All borings are properly abandoned to ground level using bentonite clay.

HNU Screening

Each of the samples, for headspace analysis, are placed in a clean, clear, plastic Ziploc bag. These containers are to be filled ¼ full. All containers are the same size and filled to the same volume. The containers are then sealed.

Once collected and sealed, samples are shaken for 30 seconds to break apart soil clods. They are then allowed to establish headspace. The following table is used to determine headspace equilibration time.

Outside temperature Time to establish headspace

- <40 deg. F 40 minutes
- 41-55 deg. F 20 minutes
- 56-69 deg. F 10 minutes
- >70 deg. F 5 minutes

To take readings, the HNU probe is inserted into the plastic bag halfway

between the sample and the highest meter response recorded. The samples are screened with a MODEL DL-102 HNU Meter equipped with a 10.6 eV lamp. Metered calibration is done at the beginning of each workday. Other notes taken are as follows:

1. Temperature and weather conditions.
2. Date of last factory calibration.
3. Field calibration gas used and concentration.
4. Date and time of last calibration.
5. Instrument gain setting.
6. Erratic instrument readings.
7. Cleaning or repairs performed in the field.
8. Sample moisture (saturated, wet, moist, damp, dry).
9. Petroleum odors or staining of samples.
10. Any instrument quenching.
11. Other relevant information.

Monitoring Wells

Groundwater monitoring well installations are completed under the direction of a METCO hydrogeologist and in accordance with Wisconsin Department of Natural Resources Chapter NR141, "Groundwater Monitoring Well Requirements." The monitoring wells are constructed of flush-threaded, two-inch inside diameter schedule 40 or 80 polyvinyl chloride (PVC) piping. Ten-foot well screens with 0.010-inch slots are installed approximately 5 to 6 feet into the watertable. A uniform washed sand is installed around the well screens to serve as a filter pack. Granular bentonite is used above the filter pack to provide a surface seal. Steel, locking protective well casings are cemented in at each well. Any variances from NR141 will be reported to the WDNR.

Each well is developed by alternately surging and purging with a clean polyethylene bailer for 20 to 30 minutes to remove fines from the well screen, after which ten well volumes are removed using a submersible pump.

Groundwater level measurements are obtained using an electronic water level indicator. All measurements are recorded to the nearest 0.01-foot. The probe is thoroughly washed between measurements.

At least two rounds of samples are collected using a bottom loading, disposable, polyethylene bailer and disposable polyethylene cord.

Approximately four well volumes are purged from each well before collecting samples.

Depending on site conditions and groundwater sampling results, slug tests may be conducted on two or three of the monitoring wells to determine hydrogeologic parameters (hydraulic conductivity, transmissivity, and flow velocity). During the slug test, groundwater in a monitoring well is displaced using a solid plastic slug, while water levels are recorded using a transducer and data logger. Water levels are recorded until the water level in the well returns to equilibrium. Slug test data is evaluated using the Bouwer and Rice method.

Well Elevation Survey

All wells are surveyed to the nearest 0.01-foot MSL by a qualified surveying company.

Sample Analysis

Environmental samples are collected to minimize both soil disturbance and exposure of the sample to the air.

Field observations such as soil characteristics, petroleum odors, product sheens, and staining associated with the samples are continuously noted throughout sampling.

The amount of sample taken, the size of the container used, and the type of sample preservation used, will depend on the laboratory contracted and for which parameters the soil samples are analyzed. See Appendix C for LUST Sample Guidelines.

All collected samples are stored in a cooler that maintains a temperature of, at most, 4 degrees Celsius. The coolers are accompanied by a complete chain of custody and are delivered to the laboratory within two days of sampling.

The WDNR document, "LUST Analytical and Quality Assurance Guidance, July 1993" is referenced in determining what parameters in which the soil and water samples will be analyzed, and the amount of duplicates/blanks required.

Quality Assurance/Quality Control/Waste Management

All drilling and sampling equipment advanced into the subsurface is cleaned between sampling locations. This consists of washing with a biodegradable Alconox solution and rinsing with potable water. Wash and rinse water are disposed of atop an isolated area of asphalt for evaporation or discharged into a

local storm sewer.

Drill cuttings, field screened as being contaminated, are contained in 55-gallon DOT barrels, characterized, and properly disposed of by METCO and/or client.

Development and purge waters are contained in 55 gallon DOT barrels, characterized, and properly disposed of by METCO and/or the client. Disposal options will depend on the amount of water, type of contaminants, and concentration of contaminants. All wastewater contaminants and disposal activities are recorded with complete documentation submitted to the WDNR.

Variances

We are not aware of any variances needed at this time.

SCHEDULE FOR INVESTIGATION PROJECT

The following is a checklist of activities that have been, or will be completed, concerning the Site Investigation, along with an estimated time frame. A typical Site Investigation takes approximately 2 to 6 months. The investigation may take up to 12 months if bedrock or groundwater is contaminated.

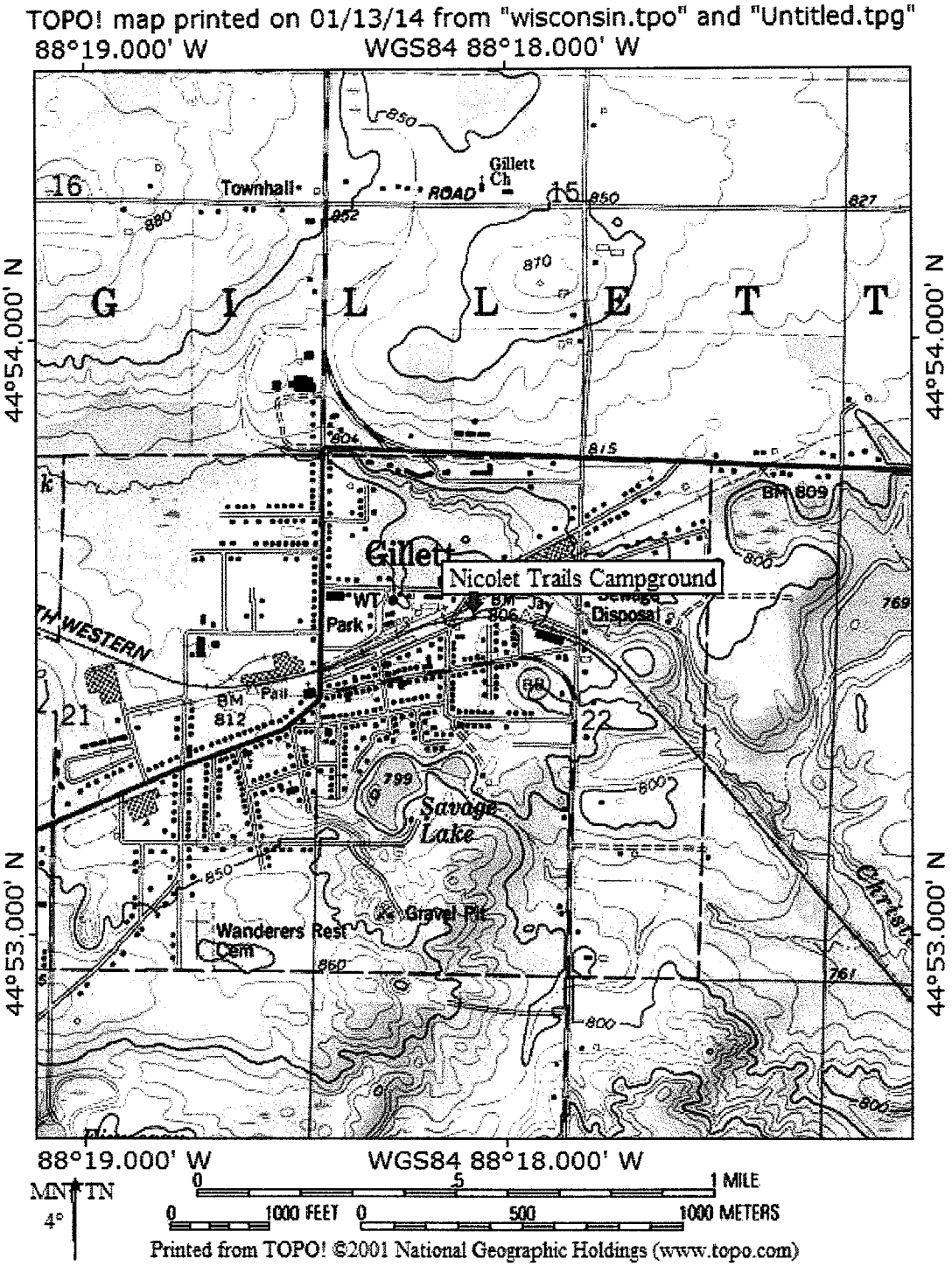
1) METCO submits a Site Investigation Project proposal to client (done).
2) Proposal acceptance by client. METCO notifies the WDNR that a consultant has been contracted (done).
3) Client obtains PECFA Packet and Site Eligibility Letter from PECFA (done).
4) METCO submits a Site Investigation Field Procedures Workplan to client and WDNR for review and approval (1/15/14).
5) METCO conducts Geoprobe Project (2-4 weeks). More than one field mobilization may be needed to complete project depending on complexity of the site and project (1 month to receive lab results).
6) Depending on the results of the investigation, METCO prepares a brief summary report or final report and sends copies to client and WDNR (2 months after lab results are received).

NOTE: If groundwater is found to be impacted or suspected of being impacted by released contaminants, the WDNR will require a Drilling Project with monitoring wells.

7) METCO conducts Drilling Project (2 months). More than one field mobilization may be needed to complete project depending on complexity of the site and project (1 month to receive lab results).

8) METCO develops/surveys the installed monitoring wells and collects. Round 1 groundwater samples for laboratory analysis (1 month to receive lab results).
9) METCO collects Round 2 groundwater samples for laboratory analysis (1 month to receive lab results).
10) METCO completes any additional work that is needed, such as slug tests (1 month).
11) METCO prepares a Site Investigation report that contains all collected data and submits to the client and WDNR (3-6 months).
12) If no further investigation work is required, METCO will apply for "site closure" with the WDNR. Upon closure, METCO will complete the PECFA Application and submit for reimbursement (reimbursement takes 3 to 6 months).
13) If further investigation and/or remediation is required METCO will provide further assistance.

APPENDIX A/SITE MAPS



B.1.a LOCATION MAP
CONTOUR INTERVAL 10 FEET
NICOLET TRAILS CAMPGROUND – GILLETT, WI
SEAMLESS USGS TOPOGRAPHIC MAPS ON CD-ROM

DETAILED SITE MAP

NICOLET TRAILS CAMPGROUND

GILLETT, WISCONSIN

DRAWN BY : ED

DATE: 1/10/14

METCO
709 Gillette Street, Suite 3
La Crosse, WI 54603
Tel: (608) 781-8879
Fax: (608) 781-8893
Excellence through experience

NOTE: INFORMATION BASED ON AVAILABLE DATA. ACTUAL CONDITIONS MAY DIFFER.

▨ - ABANDONED MONITORING WELL LOCATION - MR B'S GARAGE

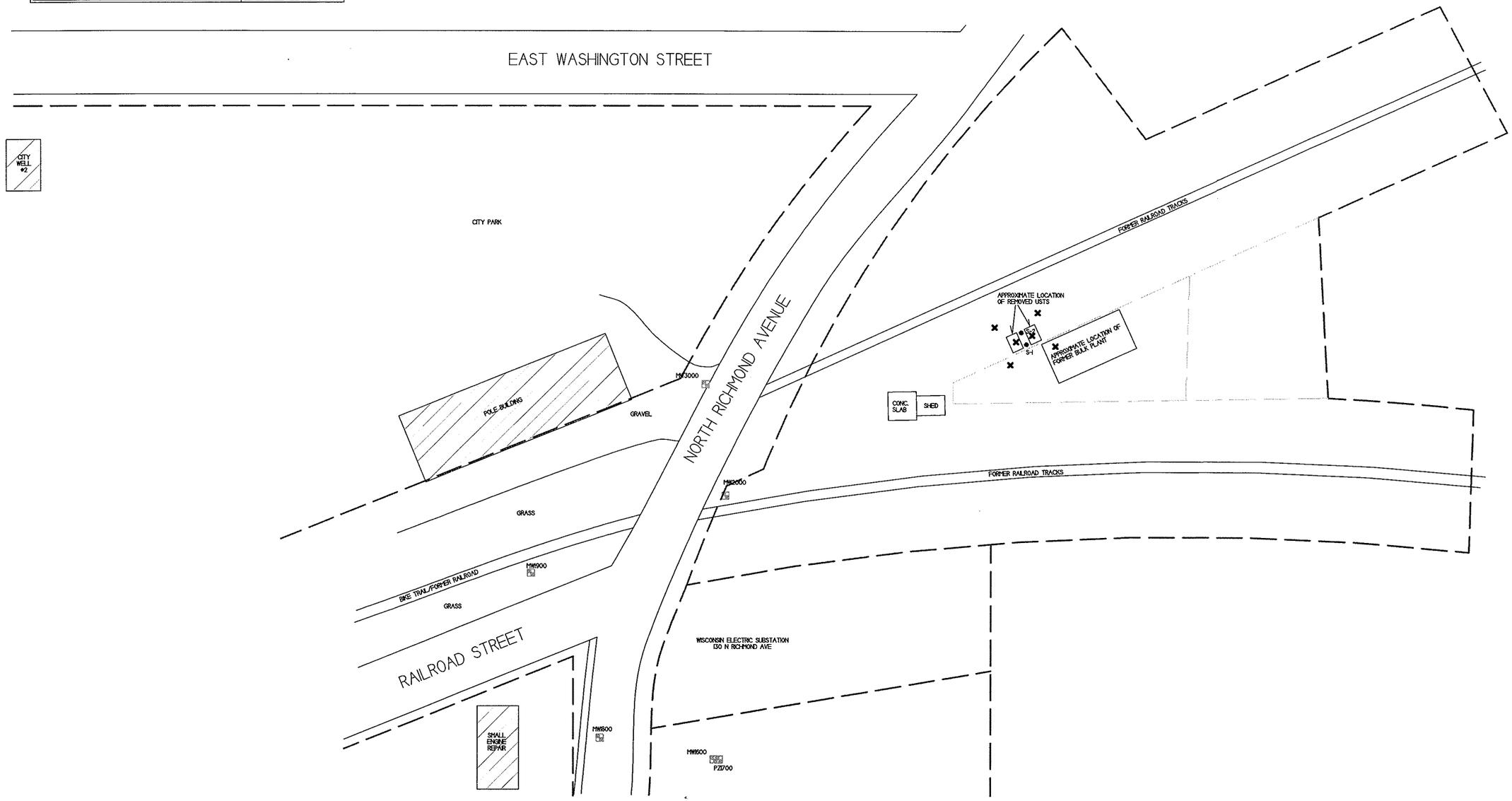
● - UST REMOVAL SOIL SAMPLING LOCATION

✖ - PROPOSED GEOPROBE BORING LOCATION

— — — — - APPROXIMATE PROPERTY BOUNDARY

SCALE: 1 INCH = 75 FEET

0 37.5 75



APPENDIX B/INVESTIGATION CHECKLIST

SITE INVESTIGATION CHECKLIST
Revised February 1992 PUBL-SW-115

This checklist was prepared by the Department of Natural Resources. It lists the necessary information to include in a site investigation report, for investigations conducted in accordance with guidelines prepared by the Emergency and Remedial Response Section, of the Bureau of Solid and Hazardous Waste Management, Wisconsin DNR. Sites include those where actions are conducted under the LUST, Spills and Environmental Repair programs. If some of this information is not submitted the report should clearly state why it is omitted. More complete information regarding site investigations is available in the Department's "Guidance on Conducting Environmental Response Actions".

The purpose of the site investigation is to 1) define the extent and degree of contamination and 2) to provide a basis for choosing a remedial action alternative. The narrative portion of the investigation report should clearly address these goals.

The Department strongly recommends that the site investigation report follow the sequence of information listed here. This will allow for a quick completeness check and more timely review of submittals. Incomplete reports will not be reviewed until all the necessary information has been received. The following information should be included in the site investigation, (as appropriate to each case):

I. INTRODUCTION/COVER LETTER

___ 1. Project title
___ 2. Purpose of report and desired department action
___ 3. Client(s)
___ 4. Author(s), with signatures
___ 5. Scope of Services
___ 6. Dates the work was performed
___ 7. Date of report
___ 8. Subcontractors employed by the consultant

II. GENERAL and BACKGROUND INFORMATION

1. General Information

A. Identify the owner/operator and/or person(s) responsible: (include all applicable)
___ 1. name
___ 2. address
___ 3. day phone number
___ 4. contact person (name)
___ 5. address
___ 6. phone number
___ 7. verification of ownership: photocopy of deed or exact legal description of property

B. Specify the site of contamination:
___ 1. name
___ 2. phone number
___ 3. specific location (street corner, miles from an intersection, etc)
___ a. legal address (street address if applicable, do not supply just a P.O. Box #)
___ b. location of impacted properties by latitude and longitude, to an accuracy of seconds, at a minimum (preferred method) or State Plane coordinate system
___ c. location of impacted properties by quarter, quarter, section, township, range, civil township, county, or other locational criteria if site(s) are not within the Public Land Survey system
___ 4. type of operation: gas station, tank farm, private residence, manufacturer, etc.

C. Site Location Maps
1. General Location Map
___ locate on a USGS topographic base map (include quadrangle name, series and scale)
___ locate on a plat map, if applicable

2. Local Base Map: the map must be drawn to scale and include the following items. Other features may also be needed:
___ a. bar scale
___ b. North arrow
___ c. legend
___ d. location of benchmark used
___ e. origin of horizontal grid system

3. Including Site Specific Features: more than one map may be appropriate, use the local map for the base map (These maps may be used for several purposes.)

___ a. location of discharge on site or facility, for example, the location of (former) tank and pump islands and piping
___ b. location of all buildings on site
___ c. locations of public utilities, appropriately marked
___ d. property boundaries
___ e. location of all soil borings and wells (monitoring wells and potable wells)
___ f. location of soil vapor points
___ g. locations of where field screenings and lab confirmation samples were taken
___ h. nearby/neighboring structures and private wells (within 1200 feet)
___ i. any nearby surface waters (within map scale)
___ j. roads and paved areas, and other access areas
___ k. known and potential sources of contamination
___ l. known and potential receptors
___ m. limits of excavation

2. Site Background

A. General Site Information
1. site description, including features like:
___ - number of tanks/containers
___ - volume/size of tanks/containers
___ - tank/container contents, past and present
___ - tank/container age, installation dates
___ - tank/container construction materials
___ - presence and type of leak detection
___ - presence and type of secondary containment
___ 2. general site construction history
___ 3. any past reports of spills, or other incidents
___ 4. periods of nonoperation
___ 5. proximity of sensitive sites such as schools, homes, private or public wells, etc.

B. Description of Discharge Incident
___ 1. type of hazardous substances discharged, known or suspected (released, spilled, lost, etc.)
___ 2. approximate amounts discharged
___ 3. location of impact
___ 4. dates of discharge
___ 5. local problems associated with discharge, e.g. vapors in homes, well contamination, etc.
___ 6. known receptors

C. Impacts
___ 1. existing impacts to human health, safety, welfare and the environment
___ 2. any impacts to adjacent or nearby buildings, wells or other structures
___ 3. names and addresses of owners of adjacent properties, if those properties have been adversely impacted by the hazardous substance discharge

D. Past Activities, Monitoring and Testing
___ 1. dates of site activities, duration and type and potential amounts of discharges
___ 2. description of emergency actions taken and of interim actions taken, including dates
___ 3. record of activities conducted at the site which had potential to cause contamination
___ 4. inventory record system data
5. summary of monitoring results, including:
___ - product monitoring records according to ILHR 10
___ - groundwater monitoring
___ - surface water monitoring
___ - soil monitoring
___ - sediment monitoring
___ - atmospheric monitoring
___ 6. records of testing, repair, removal or replacement, including dates
7. tank/container/line integrity testing
___ method
___ testing firm
___ dates
___ results

E. Hazardous Waste Generation
___ 1. hazardous waste manifest
___ 2. was hazardous waste ever generated or stored on site?

F. Description of Tank/Container and Soil Removal Activities

___ 1. description of soil conditions in the area of the tank/container excavation or in area of discharge
___ 2. volume of (contaminated) soils removed from the excavation
___ 3. location of stockpiled contaminated soils
___ 4. type of impermeable base for stockpiled soils
___ 5. type of impermeable cover for stockpiled soils
___ 6. if excavation was backfilled, what was used as fill?
___ 7. final deposition of soil excavated, where and how were they used? (daily cover, backfill on/off site, roasted, buried, etc.)
___ 8. condition of tanks, lines, pumps (corrosion, visible leaks, etc?)
___ 9. product (other than petroleum) or waste delivery or storage systems

G. Land Use Information

___ 1. current and past land uses of site and neighboring properties
___ 2. description of zoning of property and adjacent properties

3. Environmental Analysis

A. Site Historical Significance

___ 1. impacts or potential impacts to significant historical or archeological features due to any response activities or the discharge itself
___ 2. presence of buildings greater than 50 years old on or next to discharge site

B. Presence of "Sensitive" Environmental Receptors

___ 1. wildlife habitat
___ 2. state or federal threatened or endangered species
___ 3. sensitive or unique ecosystems or species
___ 4. areas of special natural resource interest
___ 5. other surface waters and wetlands, as appropriate

C. Geology (use maps as appropriate)

___ 1. geologic origin, nature and distribution of bedrock
___ 2. geologic origin, nature and distribution of overlying soils
___ 3. thicknesses of various strata (consolidated and unconsolidated)
___ 4. depth to bedrock
___ 5. geophysical characteristics
___ 6. soil types and texture
7. soil descriptions to include:
___ - structure
___ - mottling
___ - voids
___ - layering
___ - lenses
___ - geologic origin
___ - Unified Soil System Classification
___ - grain size distribution, if applicable
___ - evidence of secondary permeability
___ - odor, if evident
___ - staining, if evident
___ 8. bedrock descriptions, if impacted:
___ - rock type
___ - grain size
___ - bedding thickness
___ - presence of fractures
___ - orientation of fractures
___ - sedimentary structures
___ - secondary porosity/solutional features
___ - other
___ 9. topography
___ 10. site hydrology, including
___ - intermittent and ephemeral streams,
___ - drain tile systems,
___ - surface waters
___ - wetlands
___ - location of floodway and floodplain (this may be best located on a site map)

D. Hydrogeology

___ 1. depth to water table
___ 2. flow directions, seasonal variations

___ 3. horizontal and vertical gradients
___ 4. hydraulic characteristics: (define as field test results or non-field estimates)
___ hydraulic conductivity, variation
___ transmissivity
___ storativity
___ 5. aquifer definition:
___ size
___ use
___ presence of aquitards
___ 6. local and regional recharge or discharge area(s)
___ 7. potentiometric surface
___ 8. location, seasonal variation of groundwater divides
___ 9. location and extent of perched groundwater
___ 10. local and regional groundwater quality
___ 11. hydraulic connection between aquifers
___ 12. saturated thickness of aquifer
___ 13. estimates of flow volume passing below the discharge site/facility (include calculations in the appendices)
___ 14. drillers logs which indicated any abnormal drilling difficulties
___ 15. isoconcentration maps
___ 16. other

III. RESULTS

1. Contaminant Migration Pathway and Receptor Assessment

A. Potential Vapor and Product Migration Pathways (include depth of burial and construction material)
___ 1. sewer lines
___ 2. storm sewers
___ 3. buried power cables
___ 4. buried telephone lines
___ 5. tile lines
___ 6. more permeable soil lenses
___ 7. water lines
___ 8. road beds
___ 9. foundations
___ 10. other

B. Potential Receptors of Contamination (description of impacts or potential impacts, if applicable)
___ 1. buildings on site
___ 2. neighboring basements/buildings
___ 3. nearby wells (locations must be provided on a map)
___ 4. nearby surface waters, including wetlands
___ 5. critical habitats
___ 6. endangered species
___ 7. outstanding resource waters
___ 8. exceptional resource waters
___ 9. sensitive or unique ecosystems
___ 10. other

C. Potential Health Impacts
___ 1. danger of explosion
___ 2. contaminated private wells
___ 3. contaminated public water supply wells
___ 4. exposure to vapors
___ 5. dermal exposure
___ 6. other

2. Sampling and Analysis Results (figures and tables should be used, but general trends and the overall evaluation should be in narrative form) Provide units of measurement for all results. Describe or provide the following information for each media impacted:

A. soil chemistry results, per parameter, per location
___ 1. field screening results with locations identified
___ 2. laboratory (confirmation) sample results with locations identified
___ 3. any indication of contamination of soils encountered (staining, odor, etc.)

B. groundwater sample results, per parameter, per well, over time
___ 1. laboratory results
___ 2. trends analysis

___ 3. compliance evaluation with NR 140 groundwater standards, if applicable

C. soil vapor results (define type of survey used)
___ 1. by parameter
___ 2. per location

D. sampling results from other media impacted by the discharge
___ 1. parameters
___ 2. locations

3. Sampling Methods Used (for each media impacted, lists provided for soil and groundwater only)

A. Soils:
___ 1. description of sample collection method
2. field screening or analytical instrument type used
___ lamp strength
___ calibration
___ operating procedure
___ 3. sample container
___ 4. temperature at which the sample was collected
___ 5. time allowed for PID or FID samples to achieve at least 70° F, and location

B. Groundwater
___ 1. method and instruments used to obtain sample
___ 2. any indication of contamination noticed in field
___ 3. whether the well was purged or not, why and how, and amount removed
___ 4. drilling method used
___ 5. monitoring well construction features
6. abandonment methods
___ a. boreholes
___ b. monitoring wells
___ c. excavations
___ 7. survey methods
___ 8. sample container size
___ 9. sample description
___ - turbid
___ - clear
___ - sheen
___ - free product
___ 10. other

C. Vapors/Ambient Air
___ 1. description of sample collection method
___ 2. field screening, if conducted
___ 3. sample container

4. Quality Control and Quality Assurance

A. General QA/QC (for all media impacted)
___ 1. name and address of laboratory
___ 2. laboratory certification number
3. number of blanks, with results:
___ - field blanks
___ - trip blanks
___ - lab spikes
___ - split samples
___ - replicate spikes
___ 4. name and training of person collecting the samples (including certification, if applicable)

B. Field Instrument Quality Control (for all media impacted)
___ 1. instrument make, model and lamp energy
2. limitations of field screening instruments
___ - temperature changes
___ - humidity changes
___ - other
___ 3. any repairs to the instrument
___ 4. field instrument calibration measures conducted
___ 5. time and frequency or schedule of field instrument calibration
___ 6. composition of the calibration gas used (calibration product ?)
___ 7. calibration curves used
___ 8. correction factor if one was used

___ 9. results of any calibration checks
___ 10. time of day and ambient temperature when calibrations, calibration curves or calibration checks were completed
___ 11. time and temperature that samples were equilibrated if the outside temperature is below 60°F at the time of field analysis

C. Field Sampling and Transportation Quality Control and Assurance (for all media impacted)
___ 1. sample type
___ 2. sample location and associated field and laboratory identification
___ 3. sampling technique used
___ 4. sampling techniques used to minimize exposure of samples to the atmosphere
___ 5. date and time of sampling
___ 6. field preservation performed
___ 7. date and time of preservation or extraction
___ 8. decontamination procedures used during the site investigation
___ 9. deviations from standard operating procedures
___ 10. shipping time and technique

D. Laboratory Receipt and Analysis (for all media impacted)
___ 1. chain of custody forms (4400-151)
___ 2. time and date of receipt of samples by the laboratory
___ 3. sample condition on receipt by the laboratory including
- the temperature of the samples and
- whether the samples were properly sealed
___ 4. time and date of analysis
___ 5. method of analysis
___ 6. laboratory detection limit
___ 7. sample results with units of measurement
___ 8. accuracy and precision of replicate spikes
___ 9. results or percent recovery of matrix spikes with every batch of samples not to exceed eight hours

5. Investigative Wastes (for all media impacted, to include but which is not limited to contaminated water from excavations, borings, purge water, rinse waters from decontamination procedures, extra sample)

___ A. analytical results (hazardous determination, if listed?)
___ B. ultimate disposal
___ C. other

IV. SUMMARY AND EVALUATION OF RESULTS (Analysis of Degree and Extent of Contamination)

___ 1. degree and extent of soil contamination
___ 2. degree and extent of groundwater contamination
___ 3. degree and extent of contamination of other media impacted
___ 4. known or potential impacts to receptors, such as water supply wells
___ 4. vapor migration potential
___ 5. impacts from seepage into basements, utility lines, surface waters
___ 6. difficulties experienced during the investigation
___ 7. unanticipated or questionable results
___ 8. details needing emphasis

V. CONCLUSIONS

___ source and type of release defined
___ soil and groundwater contamination adequately defined?
___ further study needed
___ further remediation needed
___ known or potential impacts from the release defined?
___ clean site, ready for case closure
___ other

VI. RECOMMENDATIONS

1. Investigation Incomplete
___ continued monitoring
___ additional investigation

2. Remedial Action Alternatives (provide description of alternatives) e.g.:
___ remediation method (to be) used for contaminated soil

___ soil removal, treatment and disposal
___ soil venting
___ product recovery
___ groundwater extraction and treatment
___ insitu biological treatment
___ other actions (define)

3. Other
___ work plans for further action
___ construction proposals for further action
___ pilot study, other treatability studies
___ schedules for further actions
___ required permits
___ air quality
___ wastewater discharge

VII. FIGURES

1. Site Maps
___ - location maps (regional and local)
___ - water table and/or potentiometric surface maps
___ - isoconcentration maps
___ - surface water depth maps
___ - bedrock and soil type and distribution maps
___ 2. Flow Cross Sections
___ 3. Extent of Contamination in Soil
___ 4. Extent of Contamination in Groundwater (Isoconcentration)
___ 5. Locations of Potential Receptors
___ 6. Geologic Cross-Sections
___ a. geologic setting
___ b. boring location
___ c. soil classification
___ d. analytical sampling
___ e. monitoring well locations
___ f. water table
___ g. extent of contaminant plume
___ h. concentrations at referenced date and point
___ i. sampling intervals (for soil and groundwater)
___ j. of excavation walls showing location of field screening and/or analytical results, as appropriate
___ 7. Photographs (NO black and white photocopies)

VIII. TABLES

___ 1. Groundwater Chemistry Results
___ 2. Soil Chemistry Results
___ 3. Analytical Methods Used
___ 4. Standards for Comparison and Compliance Determinations (Tables with compliance standards should be combined with analytical results for comparison)
___ 5. Geologic and Hydrogeologic Results
___ 6. Groundwater Elevations
___ 7. Screening Results
___ 8. Other

IX. APPENDICES (up to the author)

___ 1. Table giving data for compounds found, such as:
Chemical formula, Molecular weight, Ionic potential, Solubility,
Vapor pressure, Henry's Law Constant, Kow
___ 2. References used to support methods or provide standards methods, including previous reports
___ 3. All raw data
4. All documentation on forms: (DNR form number)
___ a. soil boring logs (4400-122)
___ b. monitoring well construction logs (4400-113A)
___ c. soil boring/well abandonment forms (3300-5B)
___ d. chain of custody forms
___ e. lab/chemistry results
___ f. groundwater monitoring well information form (4400-89)
___ g. monitoring well development form (4400-113B)
___ 5. Variances (for well construction, hazardous waste storage requirements, etc.)

___ 6. Well logs of all impacted wells and potentially impacted wells within 1200' of the discharge site (locate wells on a map)
___ 7. All calculations and assumptions
___ 8. Landfill receipts for disposed soil
___ 9. Regional hydrogeological information references used

Other information that may be needed includes:
- access
- public information plan
- health and safety plan

APPENDIX C/LUST SAMPLING GUIDELINES

Petroleum Substance Discharged	Analysis of Samples Collected for UST Tank Closure Assessments	Solid Waste Program Requirements for Soils to be landfilled[5]	Site Investigation, Pretreatment and Posttreatment Sample Analysis[11]
Regular Gasoline	GRO[2]	Free Liquids[6] GRO Benzene[7] Pb[7] Haz. Waste Deter.[8]	GRO VOC/PVOC[15] Pb[12]
Unleaded Gasoline; Grades 80 100, and 100 LL (Low Lead) Aviation Fuel	GRO[2]	Free Liquids[6] GRO Benzene[7] Pb[7] Haz. Waste Deter.[8]	GRO PVOC
Diesel; Jet Fuels; and No's 1, 2, and 4 Fuel Oil	DRO[3]	Free Liquids[6] DRO Benzene[7] Haz. Waste Deter.[8]	DRO[3] PVOC PAH[13 14]
Crude Oil; Lubricating Oils; No. 6 Fuel Oil	DRO[3]	Free Liquids[6] DRO Haz. Waste Deter.[8]	DRO[3] PAH[13 14]
Unknown Petroleum	GRO[7] and DRO[3 4]	Free Liquids[6] GRO and DRO Pb, Cd[7] Haz. Waste Deter.[8] CN[19] S[2 10]	GRO and DRO[3 4] VOC/PVOC[15] PAH[13 14] Pb, Cd[12]
Waste Oil	DRO[3]	Free Liquids[6] DRO Pb, Cd[7] Haz. Waste Deter.[8] CN[19] S[2 10]	DRO[3] VOC/PVOC[15] PAH[13 14] PCBs[16] Pb, Cd[12]

Abbreviations:

GRO - Gasoline Range Organics, Determined by the Wisconsin Modified GRO Method

DRO - Diesel Range Organics, Determined by the Wisconsin Modified DRO Method

VOC - Volatile Organic Compounds (See Section 11.1 for a list of VOC compounds)

PVOC - Petroleum Organic Compounds (See Section 11.2 for a list of PVOC compounds)

PAH - Polynuclear Aromatic Hydrocarbons (See Section 11.3 for a list of the PAH compounds)

PCBs - Polychlorinated Biphenyls

Pb - Lead

SYNERGY ENVIRONMENTAL LAB – Sample Bottle Requirements

TABLE 1
SAMPLE & PRESERVATION REQUIREMENTS FOR WATER and DRINKING WATER SAMPLES

Test	Original Sample Container	Preserved	Holding Time to Analysis
WET CHEMISTRY			
Alkalinity SM2320B/EPA 310.2	250 mL HDPE	4°C	14 days
Ammonia EPA 350.1	250 mL HDPE	4°C, pH<2 with H_2SO_4	28 days
BOD, cBOD SM5210B	500 ml HDPE	4°C	48 hrs.
COD EPA 410.4	500 ml HDPE	4°C, pH<2 with H_2SO_4	28 days
Chloride EPA 300.0/EPA 325.2	250 mL HDPE	4°C	28 days
Cyanide SW846 9012A/SM4500-CN-C	1000 mL HDPE	4°C, pH>12 with NaOH	14 days
Flashpoint SW846 1010	250 mL HDPE	4°C	28 days
Fluoride EPA 300.0	250 mL HDPE	4°C	28 days
Hardness SW846 6010B	250 mL HDPE	4°C, pH<2 with HNO_3	180 days
TKN EPA 351.2	1 Liter HDPE	4°C, pH<2 with H_2SO_4	28 days
Nitrate EPA 300.0	250 mL HDPE	4°C	48 hours
Nitrate+Nitrite EPA 300.0	250 mL HDPE	4°C, pH<2 with H_2SO_4	28 days
Nitrite EPA 300.0	250 mL HDPE	4°C	48 hours
Oil & Grease EPA 1664	1 Liter Glass	4°C, pH<2 with H_2SO_4	28 days
Organic Carbon SW846 9060/ EPA 415.1	40 ml Glass	4°C, pH<2 with H_2SO_4 or HCL	28 days
Phenol, Total EPA 420.1	1 Liter Glass	4°C, pH<2 with H_2SO_4	28 days
Phosphorus, Total EPA 365.3	250 mL HDPE	4°C, pH<2 with H_2SO_4	28 days
Sulfate EPA 300.0	250 mL HDPE	4°C	28 days
Total Dissolved Solids EPA 160.1	250 ml HDPE	4°C	7 days
Total Solids EPA 160.3	250 ml HDPE	4°C	7 days
Total Suspended Solids EPA 160.2	250 mL HDPE	4°C	7 days
METALS			
Metals	250 mL HDPE	4°C, pH<2 with HNO_3	6 months
Mercury SW8467470/EPA 245.1	250 mL HDPE	4°C, pH<2 with HNO_3	28 days
ORGANICS			
Semivolatiles SW846 8270C	1 Liter amber glass, collect 2 for one of the samples submitted .	4°C	7 days extr. 40 days following extr
PAH SW846 8270C	1 Liter amber glass, collect 2 for one of the samples submitted	4°C	7 days extr. 40 days following extr
PCB SW846 8082	1 Liter amber glass, collect 2 for one of the samples submitted.	4°C	7 days extr. 40 days following extr
DRO, Modified DNR Sep 95	1 Liter amber glass with Teflon lined cap	4°C, 5 mL 50% HCl	7 days extr. 40 days following extr
VOC'S SW846 8260B/EPA524.2	(3) 40 mL glass vials with Teflon lined septum caps	4°C, 0.5 mL 50% HCl, No Headspace	14 days
GRO/VOC	(4) 40 mL glass vials with Teflon lined septum caps	4°C, 0.5 mL 50% HCl prior to adding sample to jar	14 days
GRO, Modified DNR Sep 95	(2) 40 mL glass vials with Teflon lined septum caps	4°C, 0.5 mL 50% HCl prior to adding sample to jar	14 days
GRO/PVOC	(2) 40 mL glass vials with Teflon lined septum caps	4°C, 0.5 mL 50% HCl prior to adding sample to jar	14 days
PVOC	(2) 40 mL glass vials with Teflon lined septum caps	4°C, 0.5 mL 50% HCl prior to adding sample to jar	14 days

All samples are to be cooled to 4°C until tested.
HDPE = High Density Polyethylene.

SYNERGY ENVIRONMENTAL LAB – Sample Bottle Requirements

TABLE 2
SAMPLE & PRESERVATION REQUIREMENTS FOR SOIL SAMPLES

Test	Original Sample Container	Preserved	Holding Times from Date and Time of Collection			
			Solvent Addition	Shipping	Extraction	Analysis
METALS						
Metals	2 oz glass or soil cup	4°C	NA	NA	NA	180 days
Mercury SW846 7471	2 oz glass or soil cup	4°C	NA	NA	NA	28 days
Chromium Hexavalent SM3500-Cr	2 oz glass or soil cup	4°C	NA	NA	NA	24 hours
ORGANICS						
Any combinations of GRO, VOC, PVOC	1- tared VOC vial with 10 mls methanol, 13 grams of soil collected with syringe	4°C, 1:1 with methanol	Immediately	4 days	21 days	21 days
DRO, Modified	1- tared VOC vial, 13 grams of soil collected with syringe jar	4°C, Hexane	10 days	4 days	47 days	47 days
PAH, SW846 8270C	2 oz glass untared	4°C	NA	NA	14 days	40 days
Semivolatile SW846 8270C	2 oz glass untared	4°C	NA	NA	14 days	40 days
PCB SW846 8082	2 oz glass untared	4°C	NA	NA	14 days	40 days

All samples are to be cooled to 4°C until tested.

APPENDIX D/WDNR DOCUMENTS

Residential setting. Not-To-Exceed D-C RCLs from web-calculator at: *http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search* (Chicago as climatic zone). Basis: **ca** = cancer; **nc** = non-cancer; **Csat** = soil saturation concentration; **ceiling** = 10%.

------> If web-calculator result or Csat exceeds 10% by weight (the **ceiling** limit concentration defined in RSL Users Guide), Not-to-Exceed D-C RCL defaults to 100,000 ppm.

1. ***Enter data in yellow cells.*** Numeric only values under "INPUT Site Data." For ND, use detection limit. Do not type '-', 'NA' nor 'space bar.' Leave purple cells "as is."

2. ***After completing data entry, See Summary in Row 872.***

Site Name:

Sample ID:

Contaminant	CAS Number	NC RCL (mg/kg)	C RCL (mg/kg)	Not-To-Exceed D-C RCL (mg/kg)	Basis	INPUT Site Data (mg/kg)	Comparison / Hazard Index / Cumulative Cancer Risk: Flag E = Individual Exceedance!	Hazard Quotient (HQ) from Data	Target CR used: 1.00E-06 Cancer Risk (CR) from Data
Benzene	71-43-2	111	1.49	1.49	ca				
Ethylbenzene	100-41-4	4220	7.47	7.47	ca				
Toluene	108-88-3	5300	-	818	Csat				
Xylenes	1330-20-7	890	-	258	Csat				
Methyl tert-Butyl Ether (MTBE)	1634-04-4	23800	59.4	59.4	ca				
Dichloroethane, 1,2-	107-06-2	46.7	0.61	0.61	ca				
Dibromoethane, 1,2-	106-93-4	107	0.05	0.05	ca				
Trichloroethylene	79-01-6	6.05	0.64	0.64	ca				
Tetrachloroethylene	127-18-4	115	30.7	30.7	ca				
Vinyl Chloride	75-01-4	93.3	0.07	0.07	ca				
Dichloroethylene, 1,1-	75-35-4	342	-	342	nc				
Dichloroethylene, 1,2-trans-	156-60-5	211	-	211	nc				
Dichloroethylene, 1,2-cis-	156-59-2	156	-	156	nc				
Trichloroethane, 1,1,1-	71-55-6	12300	-	640	Csat				
Carbon Tetrachloride	56-23-5	137	0.85	0.85	ca				
Trimethylbenzene, 1,2,4-	95-63-6	89.8	-	89.8	nc				
Trimethylbenzene, 1,3,5-	108-67-8	782	-	182	Csat				
Naphthalene	91-20-3	188	5.15	5.15	ca				
Benzo[a]pyrene	50-32-8	-	0.01	0.01	ca				
Acenaphthene	83-32-9	3440	-	3440	nc				
Anthracene	120-12-7	17200	-	17200	nc				
Benz[a]anthracene	56-55-3	-	0.15	0.15	ca				
Benzo(j)fluoranthene	205-82-3	-	0.38	0.38	ca				
Benzo[b]fluoranthene	205-99-2	-	0.15	0.15	ca				
Benzo[k]fluoranthene	207-08-9	-	1.48	1.48	ca				
Chrysene	218-01-9	-	14.8	14.8	ca				
Dibenz[a,h]anthracene	53-70-3	-	0.01	0.01	ca				
Dibenzo(a,e)pyrene	192-65-4	-	0.04	0.04	ca				
Dimethylbenz(a)anthracene, 7,12-	57-97-6	-	0	0	ca				
Fluoranthene	206-44-0	2290	-	2290	nc				
Fluorene	86-73-7	2290	-	2290	nc				
Indeno[1,2,3-cd]pyrene	193-39-5	-	0.15	0.15	ca				
Methylnaphthalene, 1-	90-12-0	4010	15.6	15.6	ca				
Methylnaphthalene, 2-	91-57-6	229	-	229	nc				
Nitropyrene, 4-	57835-92-4	-	0.38	0.38	ca				
Pyrene	129-00-0	1720	-	1720	nc				
Cadmium (Diet)	7440-43-9	70.2	2110	70.2	nc				
Lead and Compounds	7439-92-1	400	-	400	nc				
Test1Chem(DRO)	Wis. DRO			100					
Test2Chem(GRO)	Wis. GRO			100					

Type BRRTS No. Here (If Known)

Exceedance Count / Hazard Index / Cumulative Cancer Risk: 0 | 0.00E+00 | 0.0E+00

To Pass, data must meet all these criteria: Exceedance Count = 0 | HI 1.00E+00 | ≤ Cumulative CR ≤ 1e-05

Bottom-Line: Soil Data Entry Needed!

Residual Contaminant Levels Protective of Groundwater Quality
(Soil-to-Groundwater Scenario Results from: *http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search*)

NR140 Substance	NR 140 CAS	Fed MCL (ug/l) (If Red, MCL>ES)	NR 140 ES (ug/l)	RCL-gw (mg/kg) DF=1	Use 2, or input the calculated site-specific DF --> 2.00	INPUT NUMERIC Site Data Max (mg/kg)	Flag E = Individual Exceedance!	*Type BRRTS No. Here (If Known). Assess groundwater levels separately.*
Acetochlor	34256-82-1	-	7	5.58E-03				
Acetone	67-64-1	-	9000	1.85E+00				
Alachlor	15972-60-8	2	2	1.65E-03				
Aldicarb	116-06-3	3	10	2.49E-03				
Aluminum	7429-90-5	-	200	3.01E+02				
Antimony	7440-36-0	6	6	2.71E-01				
Anthracene	120-12-7	-	3000	9.84E+01				
Arsenic	7440-38-2	10	10	2.92E-01				
Atrazine, total chlorinated residues	1912-24-9	3	3	1.95E-03				
Barium	7440-39-3	2000	2000	8.24E+01				
Bentazon	25057-89-0	-	300	6.59E-02				
Benzene	71-43-2	5	5	2.56E-03				
Benzo(a)pyrene (PAH)	50-32-8	0.2	0.2	2.35E-01				
Benzo(b)fluoranthene (PAH)	205-99-2	-	0.2	2.40E-01				
Beryllium	7440-41-7	4	4	3.16E+00				
Boron	7440-42-8	-	1000	3.20E+00				
Bromodichloromethane (THM)	75-27-4	80	0.6	1.63E-04				
Bromoform (THM)	75-25-2	80	4.4	1.17E-03				
Bromomethane	74-83-9	-	10	2.53E-03				
Butylate	2008-41-5	-	400	3.88E-01				
Cadmium	7440-43-9	5	5	3.76E-01				
Carbaryl	63-25-2	-	40	3.64E-02				
Carbofuran	1563-66-2	40	40	1.56E-02				
Carbon disulfide	75-15-0	-	1000	2.97E-01				
Carbon tetrachloride	56-23-5	5	5	1.94E-03				
Chloramben	133-90-4	-	150	3.63E-02				
Chlorodifluoromethane	75-45-6	-	7000	2.89E+00				
Chloroethane	75-00-3	-	400	1.13E-01				
Chloroform (THM)	67-66-3	80	6	1.67E-03				
Chlorpyrifos	2921-88-2	-	2	2.95E-02				
Chloromethane	74-87-3	-	30	7.76E-03				
Chromium (total)	7440-47-3	100	100	1.80E+05				Re-assess if Cr-VI present
Chrysene (PAH)	218-01-9	-	0.2	7.25E-02				
Cobalt	7440-48-4	-	40	1.81E+00				
Copper	7440-50-8	1300	1300	4.58E+01				
Cyanazine	21725-46-2	-	1	4.68E-04				
Cyanide, free	57-12-5	200	200	2.02E+00				
Dacthal (DCPA)	1861-32-1	-	70	8.56E-02				
1,2-Dibromoethane	106-93-4	0.05	0.05	1.41E-05				
Dibromochloromethane (THM)	124-48-1	80	60	1.60E-02				
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	0.2	0.2	8.64E-05				
Dibutyl phthalate	84-74-2	-	1000	2.52E+00				
Dicamba	1918-00-9	-	300	7.76E-02				
1,2-Dichlorobenzene	95-50-1	600	600	5.84E-01				
1,3-Dichlorobenzene	541-73-1	-	600	5.76E-01				
1,4-Dichlorobenzene	106-46-7	75	75	7.20E-02				
Dichlorodifluoromethane	75-71-8	-	1000	1.54E+00				
1,1-Dichloroethane	75-34-3	-	850	2.42E-01				
1,2-Dichloroethane	107-06-2	5	5	1.42E-03				
1,1-Dichloroethylene	75-35-4	7	7	2.51E-03				
1,2-Dichloroethylene (cis)	156-59-2	70	70	2.06E-02				
1,2-Dichloroethylene (trans)	156-60-5	100	100	2.94E-02				
2,4-Dichlorophenoxyacetic acid (2,4-D)	94-75-7	70	70	1.81E-02				
1,2-Dichloropropane	78-87-5	5	5	1.66E-03				
1,3-Dichloropropene (cis/Trans) (Telone)	542-75-6	-	0.4	1.43E-04				
Di (2-ethylhexyl) phthalate	117-81-7	6	6	1.44E+00				
Dimethoate	60-51-5	-	2	4.51E-04				
2,4-Dinitrotoluene	121-14-2	-	0.05	6.76E-05				
2,6-Dinitrotoluene	606-20-2	-	0.05	6.88E-05				
Dinitrotoluene, Total Residues	25321-14-6	-	0.05	6.89E-05				
Dinoseb	88-85-7	7	7	6.15E-02				
1,4-Dioxane (p-dioxane)	123-91-1	-	3	6.18E-04				
Dioxin (2,3,7,8-TCDD)	1746-01-6	0	0	1.50E-05				
Endrin	72-20-8	2	2	8.08E-02				
EPTC	759-94-4	-	250	1.32E-01				

No RSL result for: Asbestos; Bacteria; 1,3-DCB; Hydrogen Sulfide; Nitrate/Nitrite; Tetrahydrofuran; Perchlorate.

Only use DAF=2 (or site-specific DAF) RCL after clearly defining gw plume. RCL < 0.0001 ppm is in "E" notation.

Residual Contaminant Levels Protective of Groundwater Quality
(Soil-to-Groundwater Scenario Results from: *http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search*)

NR140 Substance	NR 140 CAS	Fed MCL (ug/l) (If Red, MCL>ES)	NR 140 ES (ug/l)	RCL-gw (mg/kg) DF=1	Use 2, or input the calculated site-specific DF --> 2.00	INPUT NUMERIC Site Data Max (mg/kg)	Flag E = Individual Exceedance!
Ethylbenzene	100-41-4	700	700	7.85E-01			
Ethyl Ether (Diethyl Ether)	60-29-7	-	1000	2.24E-01			
Ethylene glycol	107-21-1	-	14000	2.82E+00			
Fluoranthene	206-44-0	-	400	4.44E+01			
Fluorene (PAH)	86-73-7	-	400	7.41E+00			
Fluoride	7782-41-4	4000	4000	6.01E+02			
Fluorotrichloromethane	75-69-4	-	3490	2.23E+00			
Formaldehyde	50-00-0	-	1000	2.02E-01			
Heptachlor	76-44-8	0.4	0.4	3.31E-02			
Heptachlor epoxide	1024-57-3	0.2	0.2	4.08E-03			
Hexachlorobenzene	118-74-1	1	1	1.26E-02			
n-Hexane	110-54-3	-	600	4.22E+00			
Lead	7439-92-1	15	15	1.35E+01			
Lindane	58-89-9	0.2	0.2	1.16E-03			
Manganese	7439-96-5	-	300	1.96E+01			
Mercury	7439-97-6	2	2	1.04E-01			
Methanol	67-56-1	-	5000	1.01E+00			
Methoxychlor	72-43-5	40	40	2.16E+00			
Methylene chloride	75-09-2	5	5	1.28E-03			
Methyl ethyl ketone (MEK)	78-93-3	-	4000	8.39E-01			
Methyl isobutyl ketone (MIBK)	108-10-1	-	500	1.13E-01			
Methyl tert-butyl ether (MTBE)	1634-04-4	-	60	1.35E-02			
Metolachlor/s-Metolachlor	51218-45-2	-	100	1.17E-01			
Metribuzin	21087-64-9	-	70	2.14E-02			
Molybdenum	7439-98-7	-	40	8.08E-01			
Monochlorobenzene	108-90-7	100	100	6.79E-02			
Naphthalene	91-20-3	-	100	3.29E-01			
Nickel	7440-02-0	-	100	6.50E+00			
N-Nitrosodiphenylamine (NDPA)	86-30-6	-	7	3.82E-02			
Pentachlorophenol (PCP)	87-86-5	1	1	1.01E-02			
Phenol	108-95-2	-	2000	1.15E+00			
Picloram	1918-02-1	500	500	1.39E-01			
Polychlorinated biphenyls (PCBs)	1336-36-3	0.5	0.03	4.69E-03			
Prometon	1610-18-0	-	100	4.75E-02			
Propazine	139-40-2	-	10	8.86E-03			
Pyrene (PAH)	129-00-0	-	250	2.72E+01			
Pyridine	110-86-1	-	10	3.44E-03			
Selenium	7782-49-2	50	50	2.60E-01			
Silver	7440-22-4	-	50	4.25E-01			
Simazine	122-34-9	4	4	1.97E-03			
Styrene	100-42-5	100	100	1.10E-01			
Tertiary Butyl Alcohol (TBA)	75-65-0	-	12	2.45E-03			
1,1,1,2-Tetrachloroethane	630-20-6	-	70	2.67E-02			
1,1,2,2-Tetrachloroethane	79-34-5	-	0.2	7.80E-05			
Tetrachloroethylene (PCE)	127-18-4	5	5	2.27E-03			
Tetrahydrofuran	109-99-9	-	50	1.11E-02			
Thallium	7440-28-0	2	2	1.42E-01			
Toluene	108-88-3	1000	800	5.54E-01			
Toxaphene	8001-35-2	3	3	4.64E-01			
1,2,4-Trichlorobenzene	120-82-1	70	70	2.04E-01			
1,1,1-Trichloroethane	71-55-6	200	200	7.01E-02			
1,1,2-Trichloroethane	79-00-5	5	5	1.62E-03			
Trichloroethylene (TCE)	79-01-6	5	5	1.79E-03			
2,4,5- Trichlorophenoxypropionic acid (2,4,5- TP(Silvex))	93-72-1	50	50	2.75E-02			
1,2,3-Trichloropropane	96-18-4	-	60	2.60E-02			
Trifluralin	1582-09-8	-	7.5	2.48E-01			
Trimethylbenzenes (1,2,4- and 1,3,5- combined)	95-63-6 / 108-67-8	-	480	6.90E-01			
Vanadium	7440-62-2						
Vinyl chloride	75-01-4	2	0.2	6.90E-05			
Xylenes (m-, o-, p- combined)	1330-20-7	10000	2000	1.97E+00			

Type BRRTS No. Here (If Known). Assess groundwater levels separately.

No RSL result for: Asbestos; Bacteria; 1,3-DCB; Hydrogen Sulfide; Nitrate/Nitrite; Tetrahydrofuran; Perchlorate.

Only use DAF=2 (or site-specific DAF) RCL after clearly defining gw plume. RCL < 0.0001 ppm is in "E" notation.

Site-specific

Resident Screening Levels (RSL) for Soil

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	Volatilization Factor (m^3/kg)	Soil Saturation Concentration (mg/kg)	Particulate Emission Factor (m^3/kg)	Ingestion SL TR=1.0E-6 (mg/kg)	Dermal SL TR=1.0E-6 (mg/kg)	Inhalation SL TR=1.0E-6 (mg/kg)	Carcinogenic SL TR=1.0E-6 (mg/kg)	Ingestion SL Child HQ=1 (mg/kg)	Dermal SL Child HQ=1 (mg/kg)	Inhalation SL Child HQ=1 (mg/kg)
Benzene	5.49E+03	1.82E+03	1.56E+09	1.16E+01	-	1.71E+00	1.49E+00	3.13E+02	-	1.72E+02
Cadmium (Diet)	-	-	1.56E+09	-	-	2.11E+03	2.11E+03	7.82E+01	6.98E+02	1.63E+04
Carbon Tetrachloride	2.32E+03	4.58E+02	1.56E+09	9.15E+00	-	9.42E-01	8.54E-01	3.13E+02	-	2.42E+02
Dibromoethane, 1,2-	1.34E+04	1.34E+03	1.56E+09	3.20E-01	-	5.45E-02	4.65E-02	7.04E+02	-	1.26E+02
Dichloroethane, 1,2-	7.11E+03	2.98E+03	1.56E+09	7.04E+00	-	6.65E-01	6.08E-01	4.69E+02	-	5.19E+01
Dichloroethylene, 1,1-	1.80E+03	1.19E+03	1.56E+09	-	-	-	-	3.91E+03	-	3.75E+02
Dichloroethylene, 1,2-cis-	3.88E+03	2.37E+03	1.56E+09	-	-	-	-	1.56E+02	-	-
Dichloroethylene, 1,2-trans-	3.90E+03	1.67E+03	1.56E+09	-	-	-	-	1.56E+03	-	2.44E+02
Ethylbenzene	8.81E+03	4.80E+02	1.56E+09	5.82E+01	-	8.57E+00	7.47E+00	7.82E+03	-	9.18E+03
Lead and Compounds	-	-	1.56E+09	-	-	-	-	-	-	-
Methyl tert-Butyl Ether (MTBE)	7.62E+03	8.87E+03	1.56E+09	3.56E+02	-	7.13E+01	5.94E+01	-	-	2.38E+04
Acenaphthene	2.19E+05	-	1.56E+09	-	-	-	-	4.69E+03	1.29E+04	-
Anthracene	8.13E+05	-	1.56E+09	-	-	-	-	2.35E+04	6.45E+04	-
Benz[a]anthracene	-	-	1.56E+09	2.04E-01	5.32E-01	1.36E+04	1.48E-01	-	-	-
Benzo(j)fluoranthene	-	-	1.56E+09	5.34E-01	1.30E+00	3.45E+04	3.78E-01	-	-	-
Benzo[a]pyrene	-	-	1.56E+09	2.04E-02	5.32E-02	1.36E+03	1.48E-02	-	-	-
Benzo[b]fluoranthene	-	-	1.56E+09	2.04E-01	5.32E-01	1.36E+04	1.48E-01	-	-	-
Benzo[k]fluoranthene	-	-	1.56E+09	2.04E+00	5.32E+00	1.36E+04	1.48E+00	-	-	-
Chrysene	-	-	1.56E+09	2.04E+01	5.32E+01	1.36E+05	1.48E+01	-	-	-
Dibenz[a,h]anthracene	-	-	1.56E+09	2.04E-02	5.32E-02	1.25E+03	1.48E-02	-	-	-
Dibenzo(a,e)pyrene	-	-	1.56E+09	5.34E-02	1.30E-01	3.45E+03	3.78E-02	-	-	-
Dimethylbenz(a)anthracene, 7,12-	-	-	1.56E+09	5.97E-04	1.55E-03	2.11E+01	4.31E-04	-	-	-
Fluoranthene	-	-	1.56E+09	-	-	-	-	3.13E+03	8.59E+03	-
Fluorene	4.37E+05	-	1.56E+09	-	-	-	-	3.13E+03	8.59E+03	-
Indeno[1,2,3-cd]pyrene	-	-	1.56E+09	2.04E-01	5.32E-01	1.36E+04	1.48E-01	-	-	-
Methylnaphthalene, 1-	9.11E+04	-	1.56E+09	2.21E+01	5.36E+01	-	1.56E+01	5.48E+03	1.50E+04	-
Methylnaphthalene, 2-	9.01E+04	-	1.56E+09	-	-	-	-	3.13E+02	8.59E+02	-
Naphthalene	7.20E+04	-	1.56E+09	-	-	5.15E+00	5.15E+00	1.56E+03	4.30E+03	2.25E+02

Site-specific

Resident Screening Levels (RSL) for Soil

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	Volatilization Factor (m^3/kg)	Soil Saturation Concentration (mg/kg)	Particulate Emission Factor (m^3/kg)	Ingestion SL TR=1.0E-6 (mg/kg)	Dermal SL TR=1.0E-6 (mg/kg)	Inhalation SL TR=1.0E-6 (mg/kg)	Carcinogenic SL TR=1.0E-6 (mg/kg)	Ingestion SL Child HQ=1 (mg/kg)	Dermal SL Child HQ=1 (mg/kg)	Inhalation SL Child HQ=1 (mg/kg)
Nitropyrene, 4-	-	-	1.56E+09	5.34E-01	1.30E+00	3.45E+04	3.78E-01	-	-	-
Pyrene	3.70E+06	-	1.56E+09	-	-	-	-	2.35E+03	6.45E+03	-
Tetrachloroethylene	3.65E+03	1.66E+02	1.56E+09	3.05E+02	-	3.41E+01	3.07E+01	4.69E+02	-	1.52E+02
Toluene	6.66E+03	8.18E+02	1.56E+09	-	-	-	-	6.26E+03	-	3.47E+04
Trichloroethane, 1,1,1-	2.56E+03	6.40E+02	1.56E+09	-	-	-	-	1.56E+05	-	1.34E+04
Trichloroethylene	3.43E+03	6.92E+02	1.56E+09	3.24E+00	-	8.04E-01	6.44E-01	3.91E+01	-	7.16E+00
Trimethylbenzene, 1,2,4-	1.23E+04	2.19E+02	1.56E+09	-	-	-	-	-	-	8.98E+01
Trimethylbenzene, 1,3,5-	1.03E+04	1.82E+02	1.56E+09	-	-	-	-	7.82E+02	-	-
Vinyl Chloride	1.49E+03	3.92E+03	1.56E+09	9.32E-02	-	2.39E-01	6.71E-02	2.35E+02	-	1.55E+02
Xylenes	9.05E+03	2.58E+02	1.56E+09	-	-	-	-	1.56E+04	-	9.44E+02

(22) "Wastewater and sludge storage or treatment lagoon" means a natural or man–made containment structure, constructed primarily of earthen materials for the treatment or storage of wastewater or sludge, which is not a land disposal system.

History: Cr. Register, September, 1985, No. 357, eff. 10–1–85; cr. (1m), am. (7), (17) and (18), Register, October, 1988, No. 394, eff. 11–1–88; am. (6), cr. (20h) and (20m), Register, March, 1994, No. 459, eff. 4–1–94; cr. (1s), (10e), (10s), (20k), r. and recr. (12), (13), Register, August, 1995, No. 476, eff. 9–1–95; cr. (14m), Register, October, 1996, No. 490, eff. 11–1–96; am. (20), Register, December, 1998, No. 516, eff. 1–1–99; correction in (9) made under s. 13.93 (2m) (b) 7., Stats., Register, April, 2001, No. 544; CR 02–134: cr. (1u), (1w), (1y) and (20s) Register June 2003 No. 570, eff. 7–1–03.

Subchapter II — Groundwater Quality Standards

NR 140.10 Public health related groundwater standards. The groundwater quality standards for substances of public health concern are listed in Table 1.

Note: For all substances that have carcinogenic, mutagenic or teratogenic properties or interactive effects, the preventive action limit is 10% of the enforcement standard. The preventive action limit is 20% of the enforcement standard for all other substances that are of public health concern. Enforcement standards and preventive action limits for additional substances will be added to Table I as recommendations are developed pursuant to ss. 160.07, 160.13 and 160.15, Stats.

Table 1
Public Health Groundwater Quality Standards

Substance[1]	Enforcement Standard (micrograms per liter – except as noted)	Preventive Action Limit (micrograms per liter – except as noted)
Acetochlor	7	0.7
Acetochlor ethane sulfonic acid + oxanilic acid (Acetochlor – ESA + OXA)	230	46
Acetone	9 mg/l	1.8 mg/l
Alachlor	2	0.2
Alachlor ethane sulfonic acid (Alachlor – ESA)	20	4
Aldicarb	10	2
Aluminum	200	40
Ammonia (as N)	9.7 mg/l	0.97 mg/l
Antimony	6	1.2
Anthracene	3000	600
Arsenic	10	1
Asbestos	7 million fibers per liter (MFL)	0.7 MFL
Atrazine, total chlorinated residues	3[2]	0.3[2]
Bacteria, Total Coliform	0[3]	0[3]
Barium	2 milligrams/liter (mg/l)	0.4 mg/l
Bentazon	300	60
Benzene	5	0.5
Benzo(b)fluoranthene	0.2	0.02
Benzo(a)pyrene	0.2	0.02
Beryllium	4	0.4
Boron	1000	200
Bromodichloromethane	0.6	0.06
Bromoform	4.4	0.44
Bromomethane	10	1
Butylate	400	80
Cadmium	5	0.5
Carbaryl	40	4
Carbofuran	40	8
Carbon disulfide	1000	200
Carbon tetrachloride	5	0.5
Chloramben	150	30
Chlordane	2	0.2
Chlorodifluoromethane	7 mg/l	0.7 mg/l
Chloroethane	400	80
Chloroform	6	0.6
Chlorpyrifos	2	0.4
Chloromethane	30	3
Chromium (total)	100	10
Chrysene	0.2	0.02

Table 1 – Continued
Public Health Groundwater Quality Standards

Substance[1]	Enforcement Standard (micrograms per liter – except as noted)	Preventive Action Limit (micrograms per liter – except as noted)
Cobalt	40	8
Copper	1300	130
Cyanazine	1	0.1
Cyanide, free[4]	200	40
Dacthal	70	14
1,2–Dibromoethane (EDB)	0.05	0.005
Dibromochloromethane	60	6
1,2–Dibromo–3–chloropropane (DBCP)	0.2	0.02
Dibutyl phthalate	1000	100
Dicamba	300	60
1,2–Dichlorobenzene	600	60
1,3–Dichlorobenzene	600	120
1,4–Dichlorobenzene	75	15
Dichlorodifluoromethane	1000	200
1,1–Dichloroethane	850	85
1,2–Dichloroethane	5	0.5
1,1–Dichloroethylene	7	0.7
1,2–Dichloroethylene (cis)	70	7
1,2–Dichloroethylene (trans)	100	20
2,4–Dichlorophenoxyacetic Acid (2,4–D)	70	7
1,2–Dichloropropane	5	0.5
1,3–Dichloropropene (cis/trans)	0.4	0.04
Di (2–ethylhexyl) phthalate	6	0.6
Dimethenamid/Dimethenamid–P	50	5
Dimethoate	2	0.4
2,4–Dinitrotoluene	0.05	0.005
2,6–Dinitrotoluene	0.05	0.005
Dinitrotoluene, Total Residues[5]	0.05	0.005
Dinoseb	7	1.4
1,4–Dioxane	3	0.3
Dioxin (2, 3, 7, 8–TCDD)	0.00003	0.000003
Endrin	2	0.4
EPTC	250	50
Ethylbenzene	700	140
Ethyl ether	1000	100
Ethylene glycol	14 mg/l	2.8 mg/l
Fluoranthene	400	80
Fluorene	400	80
Fluoride	4 mg/l	0.8 mg/l
Fluorotrichloromethane	3490	698
Formaldehyde	1000	100
Heptachlor	0.4	0.04
Heptachlor epoxide	0.2	0.02
Hexachlorobenzene	1	0.1
N–Hexane	600	120
Hydrogen sulfide	30	6
Lead	15	1.5
Lindane	0.2	0.02
Manganese	300	60
Mercury	2	0.2

Table 1 – Continued
Public Health Groundwater Quality Standards

Substance[1]	Enforcement Standard (micrograms per liter – except as noted)	Preventive Action Limit (micrograms per liter – except as noted)
Methanol	5000	1000
Methoxychlor	40	4
Methylene chloride	5	0.5
Methyl ethyl ketone (MEK)	4 mg/l	0.8 mg/l
Methyl isobutyl ketone (MIBK)	500	50
Methyl tert–butyl ether (MTBE)	60	12
Metolachlor/s–Metolachlor	100	10
Metolachlor ethane sulfonic acid + oxanilic acid (Metolachlor – ESA + OXA)	1.3 mg/l	0.26 mg/l
Metribuzin	70	14
Molybdenum	40	8
Monochlorobenzene	100	20
Naphthalene	100	10
Nickel	100	20
Nitrate (as N)	10 mg/l	2 mg/l
Nitrate + Nitrite (as N)	10 mg/l	2 mg/l
Nitrite (as N)	1 mg/l	0.2 mg/l
N–Nitrosodiphenylamine	7	0.7
Pentachlorophenol (PCP)	1	0.1
Perchlorate	1	0.1
Phenol	2 mg/l	0.4 mg/l
Picloram	500	100
Polychlorinated biphenyls (PCBs)	0.03	0.003
Prometon	100	20
Propazine	10	2
Pyrene	250	50
Pyridine	10	2
Selenium	50	10
Silver	50	10
Simazine	4	0.4
Styrene	100	10
Tertiary Butyl Alcohol (TBA)	12	1.2
1,1,1,2–Tetrachloroethane	70	7
1,1,2,2–Tetrachloroethane	0.2	0.02
Tetrachloroethylene	5	0.5
Tetrahydrofuran	50	10
Thallium	2	0.4
Toluene	800	160
Toxaphene	3	0.3
1,2,4–Trichlorobenzene	70	14
1,1,1–Trichloroethane	200	40
1,1,2–Trichloroethane	5	0.5
Trichloroethylene (TCE)	5	0.5
2,4,5–Trichlorophenoxy–propionic acid (2,4,5–TP)	50	5
1,2,3–Trichloropropane	60	12
Trifluralin	7.5	0.75
Trimethylbenzenes (1,2,4– and 1,3,5– combined)	480	96
Vanadium	30	6

Table 1 – Continued
Public Health Groundwater Quality Standards

Substance[1]	Enforcement Standard (micrograms per liter – except as noted)	Preventive Action Limit (micrograms per liter – except as noted)
Vinyl chloride	0.2	0.02
Xylene[6]	2 mg/l	0.4 mg/l

[1] Appendix I contains Chemical Abstract Service (CAS) registry numbers, common synonyms and trade names for most substances listed in Table 1.

[2] Total chlorinated atrazine residues includes parent compound and the following metabolites of health concern: 2–chloro–4–amino–6–isopropylamino–s–triazine (formerly deethylatrazine), 2–chloro–4–amino–6–ethylamino–s–triazine (formerly deisopropylatrazine) and 2–chloro–4,6–diamino–s–triazine (formerly diaminoatrazine).

[3] Total coliform bacteria may not be present in any 100 ml sample using either the membrane filter (MF) technique, the presence–absence (P–A) coliform test, the minimal medium ONPG–MUG (MMO–MUG) test or not present in any 10 ml portion of the 10–tube multiple tube fermentation (MTF) technique.

[4] "Cyanide, free" refers to the simple cyanides (HCN, CN^-) and /or readily dissociable metal–cyanide complexes. Free cyanide is regulatorily equivalent to cyanide quantified by approved analytical methods for "amenable cyanide" or "available cyanide".

[5] Dinitrotoluene, Total Residues includes the dinitrotoluene (DNT) isomers: 2,3–DNT, 2,4–DNT, 2,5–DNT, 2,6–DNT, 3,4–DNT and 3,5–DNT.

[6] Xylene includes meta–, ortho–, and para–xylene combined.

History: Cr. Register, September, 1985, No. 357, eff. 10–1–85; am. table 1, Register, October, 1988, No. 394, eff. 11–1–88; am. table 1, Register, September, 1990, No. 417, eff. 10–1–90; am. Register, January, 1992, No. 433, eff. 2–1–92; am. Table 1, Register, March, 1994, No. 459, eff. 4–1–94; am. Table 1, Register, August, 1995, No. 476, eff. 9–1–95; am. Table 1, Register, December, 1998, No. 516, eff. 1–1–99; am. Table 1, boron, Register, December, 1998, No. 516, eff. 12–31–99; am. Table 1, Register, March, 2000, No. 531, eff. 4–1–00; CR 03–063: am Table 1, Register February 2004 No. 578, eff. 3–1–04; CR 02–095: am. Table 1, Register November 2006 No. 611, eff. 12–1–06; reprinted to correct errors in Table 1, Register January 2007 No. 613; CR 07–034: am. Table 1 Register January 2008 No. 625, eff. 2–1–08; **CR 09–102: am. Table 1 Register December 2010 No. 660, eff. 1–1–11.**

NR 140.12 Public welfare related groundwater standards. The groundwater quality standards for substances of public welfare concern are listed in Table 2.

Note: For each substance of public welfare concern, the preventive action limit is 50% of the established enforcement standard.

Table 2
Public Welfare Groundwater Quality Standards

Substance	Enforcement Standard (milligrams per liter – except as noted)	Preventive Action Limit (milligrams per liter – except as noted)
Chloride	250	125
Color	15 color units	7.5 color units
Foaming agents MBAS (Methylene–Blue Active Substances)	0.5	0.25
Iron	0.3	0.15
Manganese	0.05	0.025
Odor	3 (Threshold Odor No.)	1.5 (Threshold Odor No.)
Sulfate	250	125
Zinc	5	2.5

History: Cr. Register, September, 1985, No. 357, eff. 10–1–85; am. table 2, Register, October, 1990, No. 418, eff. 11–1–90; am. Table 2, Register, March, 1994, No. 459, eff. 4–1–94.

NR 140.14 Statistical procedures. (1) If a preventive action limit or an enforcement standard for a substance listed in Table 1 or 2, an alternative concentration limit issued in accordance with s. NR 140.28 or a preventive action limit for an indicator parameter established according to s. NR 140.20 (2) is attained or exceeded at a point of standards application:

(a) The owner or operator of the facility, practice or activity at which a standard is attained or exceeded shall notify the appropriate regulatory agency that a standard has been attained or exceeded; and

(b) The regulatory agency shall require a response in accordance with the rules promulgated under s. 160.21, Stats. No response shall be required if it is demonstrated to the satisfaction of the appropriate regulatory agency that a scientifically valid determination cannot be made that the preventive action limit or enforcement standard for a substance in Table 1 or 2 has been attained or exceeded based on consideration of sampling procedures or laboratory precision and accuracy, at a significance level of 0.05.

(2) The regulatory agency shall use one or more valid statistical procedures to determine if a change in the concentration of a substance has occurred. A significance level of 0.05 shall be used for all tests.

(3) In addition to sub. (2), the following applies when a preventive action limit or enforcement standard is equal to or less than the limit of quantitation:

(a) If a substance is not detected in a sample, the regulatory agency may not consider the preventive action limit or enforcement standard to have been attained or exceeded.

(b) If the preventive action limit or enforcement standard is less than the limit of detection, and the concentration of a substance is reported between the limit of detection and the limit of quantitation, the regulatory agency shall consider the preventive action limit or enforcement standard to be attained or exceeded only if:

1. The substance has been analytically confirmed to be present in the same sample using an equivalently sensitive analytical method or the same analytical method, and

2. The substance has been statistically confirmed to be present above the preventive action limit or enforcement standard, determined by an appropriate statistical test with sufficient samples at a significance level of 0.05.

(c) If the preventive action limit or enforcement standard is between the limit of detection and the limit of quantitation, the regulatory agency shall consider the preventive action limit or

APPENDIX E/PROJECT DOCUMENTS

UST Removal Site Assessment Report for

Nicolet Trails Campground

Project Number 0582-02-13

Site Address: N. Richmond Street
City of Gillett, Oconto County, Wisconsin

July 26, 2013

Mach IV
Engineering & Surveying LLC

Prepared by
Chad M. Fradette
211 N. Broadway, Suite 114
Green Bay, Wisconsin 54303
(920) 569-5765 cfradette@mach-iv.com

SUMMARY

Mach IV Engineering (Mach IV) performed a Tank System Removal Site Assessment on the subject property. The assessment revealed evidence of a gasoline and diesel fuel release associated with the subject property.

This site assessment was performed by Chad M. Fradette of Mach IV Engineering & Surveying, LLC. Chad M. Fradette is an Environmental Professional who meets the definition of an "Environmental Professional" as defined by 40 C.F.R. § 312.10(b) and is licensed by the State of Wisconsin as a Tank System Site Assessor.

Mach IV has no reported the release to the Wisconsin Department of Natural Resources (WDNR). However, Mach IV has been informed that the WDNR has been to the site and has requested soil sampling.

Brief Site History

The site was reportedly a petroleum bulk plant in the past. The City of Gillett has been redeveloping the site into a campground. Two steel USTs were encountered during installation of a water main. The USTs were removed by employees of Mike's Plumbing of Pulcifer, Wisconsin. Mike's Plumbing is not a UST removal firm. The USTs were reportedly constructed of steel and full of water. The USTs were removed to an unknown location and size and previous contents were not known.

Sampling Overview

On July 12, 2013, two soil samples were collected from near the reported location of two USTs that had been laying side-by-side. Soil samples S-1 and S-2 were collected from test pits. The soils encountered in the test pits were clay fill soils. Two soil samples were prepared and submitted to Pace Analytical, Inc., Green Bay, Wisconsin (Pace) for laboratory analysis of diesel range organics (DRO) and volatile organic compounds (VOCs).

Soil Sample and UST Notes

Soil samples S-1 and S-2 were collected from 5 foot below ground surface (ft bgs) and 4 ft bgs, respectively. Obvious indication of soil contamination was encountered during field screening and samples registered a PID reading of 18 ppm eq and 180 ppm eq, respectively. Heavy petroleum odor was encountered during excavation of test pit 2.

The USTs were already taken from the site and disposed at an unknown location and therefore could not be inspected.

The UST cavities were reportedly backfilled with clay fill soils from the site.

Laboratory Analytical Results

Soil Samples

Soil sample S-1 results reported detections of DRO (162 ppm), sec-butylbenzene (89.6 ppb), chloroform (36.2 ppb), ethylbenzene (142 ppb), cumene (48.3 ppb), p-isopropylbenzene (86 ppb), naphthalene (337 ppb), n-propylbenzene (109 ppb), toluene (156 ppb), trimethylbenzenes (TMBs)(1,168 ppb), and xylenes (492.9 ppb). The detection of DRO is above the Wisconsin Administrative Code (WAC) NR 720 screening level (100 ppm) and the detection of chloroform is above the Site Specific Groundwater Residual Contaminant Level. The chloroform is possibly a laboratory contaminant.

Soil sample S-2 results reported detections of DRO (3,810 ppm), benzene (1,070 ppb), sec-butylbenzene (3,140 ppb), ethylbenzene (1,750 ppb), cumene (968 ppb), p-isopropylbenzene (3,130 ppb), naphthalene (13,900 ppb), n-propylbenzene (1,780 ppb), toluene (645 ppb), trimethylbenzenes (TMBs)(36,780 ppb), and xylenes (18,200 ppb). The detection of DRO is above the Wisconsin Administrative Code (WAC) NR 720 screening level (100 ppm) and the detections of benzene, ethylbenzene, naphthalene, TMBs and xylenes are above the Site Specific Groundwater Residual Contaminant Level. The detection of naphthalene also exceeds the Direct Contact Standard.

The soil data table is located in Appendix B and Laboratory Analytical Reports are located in Appendix C.

OPINION

Risk Assessment Level	
	Based on the opinions formulated during the completion of a Tank Removal Site Assessment by an Environmental Professional, the subject property represents the following level of risk for contamination: ◯ Low Risk No evidence of environmental concerns which indicate the need for further investigation or review at this time. ⊗ High Risk Evidence of environmental concerns with the subject property which necessitate the need for Investigative and/or Remedial Work.

CONCLUSIONS & RECOMMENDATIONS

It is Mach IV's opinion that past use of a gasoline and/or diesel fuel USTs has led to a release on the property.

The release has led to significant DRO and gasoline contamination of soils in the former location of two USTs of unknown size. The groundwater aquifer is located at approximately 10 ft bgs and may have been impacted.

It is Mach IV's opinion that further investigation is warranted.

SIGNATURE(S) OF ENVIRONMENTAL PROFESSIONAL(S)

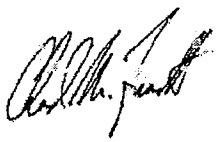
I, Chad M. Fradette, possess sufficient specific education, training, and experience necessary to exercise professional judgment to develop opinions and conclusions regarding conditions indicative of releases or threatened releases, per ASTM E 1527-05, Section 7.5.1.

I, Chad M. Fradette, meet the definition of Environmental Professional per ASTM E 1527-05, Section Z2.1.1(3)(iii). I possess a Baccalaureate or higher degree from an accredited institution of higher education in a discipline of engineering or science and the equivalent of thirteen (13) years of full-time relevant experience.

I, Chad M. Fradette, am licensed by the State of Wisconsin, Department of Safety and Professional Services to perform Tank System Site Assessments, license no. 892926.

I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in 40 CFR 312.10. I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the Subject Property. I have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

In addition, the undersigned acknowledge and agree that the above-noted declarations and statements are accurate with regard to the subject matter of this report.



26 July 2013

Chad M. Fradette
Director of Environmental Services

Date

QUALIFICATION(S) OF ENVIRONMENTAL PROFESSIONAL(S)

Chad M. Fradette, Director of Environmental Services, Professional Consultant

Experience
Director of Environmental Services with Mach IV Engineering & Surveying LLC (Mach IV); Mr. Fradette has 15 years of professional consulting experience in Illinois, Indiana, Michigan, Ohio, Texas, and Wisconsin. Mr. Fradette has managed a wide range of environmental projects including: Phase I and II Environmental Site Assessments; environmental contamination investigation and remediation; wetland delineation, mitigation, and restoration; air emissions testing; and coordination of industrial environmental programs.

Mr. Fradette has experience working with such large and diverse entities as the United States Environmental Protection Agency, the United States Army Corps of Engineers, the Wisconsin Department of Commerce, the Wisconsin Department of Natural Resources, the Illinois Environmental Protection Agency, and the Michigan Department of Environmental Quality. Additionally, he has worked with counties, municipalities, private industry, commercial developers, attorneys at law, and lending institutions.

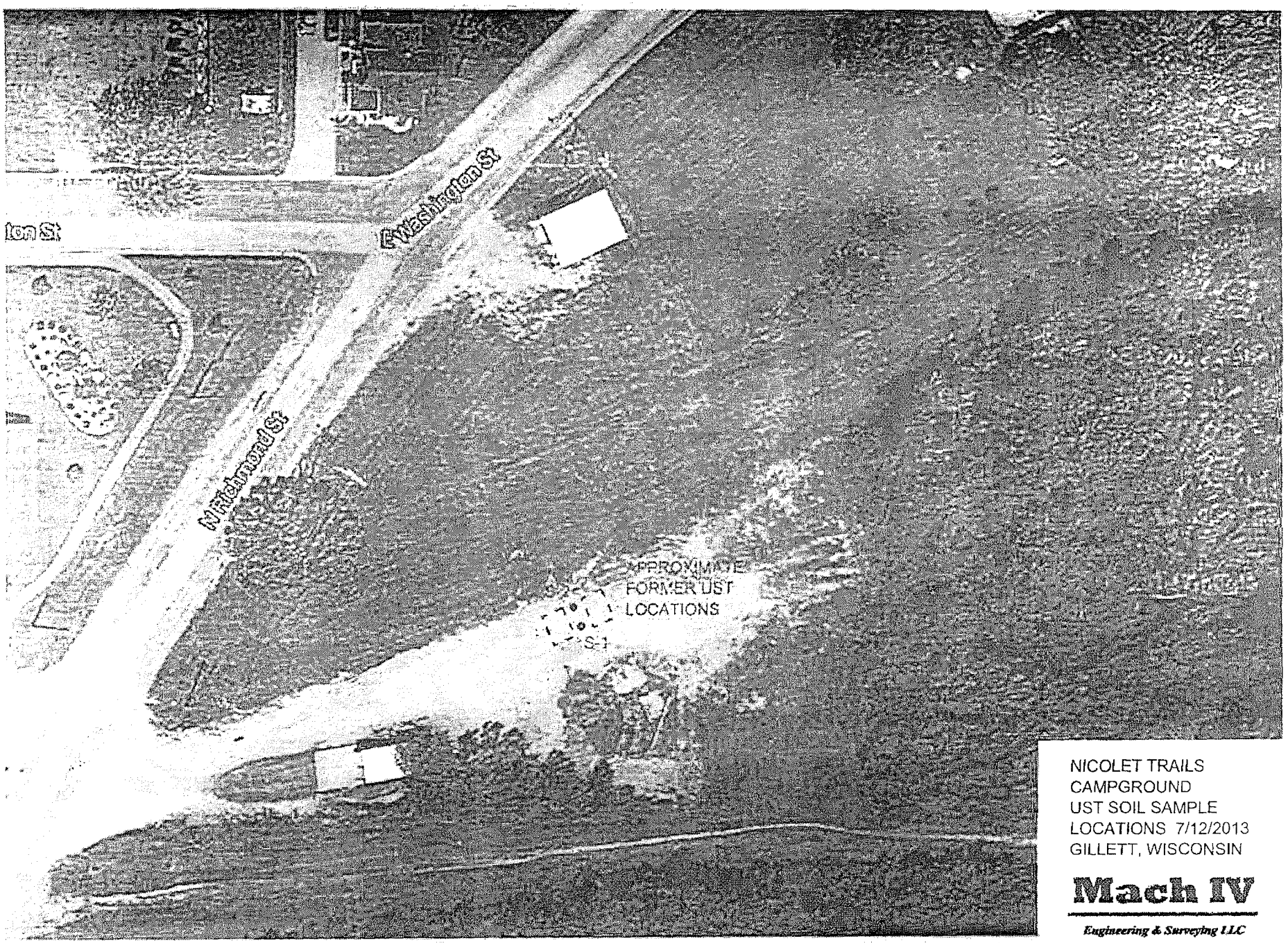
The following examples are cited as a range of Mr. Fradette's applied experience.

- ***Environmental Site Assessments.*** Perform and manage Transaction Screens Processes, Risk Assessments, Phase I and II Environmental Site Assessment (ESA) projects for a variety of private, commercial, industrial, and undeveloped sites. These assessments are designed to identify the existence of environmental liabilities and to determine whether contamination is present on a parcel of real property.

- ***Environmental Site Investigations and Remediation.*** Perform and manage investigations and remediation on behalf of clients to ensure their compliance with state and federal regulations. These investigations and remediation include solid, liquid, and hazardous wastes. The investigations include: installing soil vapor probes, soil borings, test pits, and/or monitoring wells. Remediation includes: monitoring and evaluating for natural attenuation; ex-situ removal and placement in sanitary landfills, construction of biopiles, and land spreading; in-situ groundwater and soil vapor extraction, air sparging, and enhanced bio. Reports prepared include work plans, site investigation reports, remedial action option reports, and case closure reports involving a wide range of sites.

- ***Wetland Delineation, Mitigation, and Restoration.*** Perform and manage wetland delineation, mitigation, and restoration projects on behalf of clients to ensure compliance with state and federal regulations. Wetland delineation is designed to define the extent of wetland and the types of wetland that would be impacted by a project. Wetland mitigation is the process of constructing new wetland acreage to compensate for the loss of natural wetlands during the development process. Mitigation seeks to replace structural and functional qualities of the natural wetland type that has been destroyed. A wetland restoration re-establishes the habitats and functions of a former wetland.

Education
B.A., Chemistry with an emphasis in Analytical Chemistry:
Luther College, Decorah Iowa



NICOLET TRAILS
CAMPGROUND
UST SOIL SAMPLE
LOCATIONS 7/12/2013
GILLETT, WISCONSIN

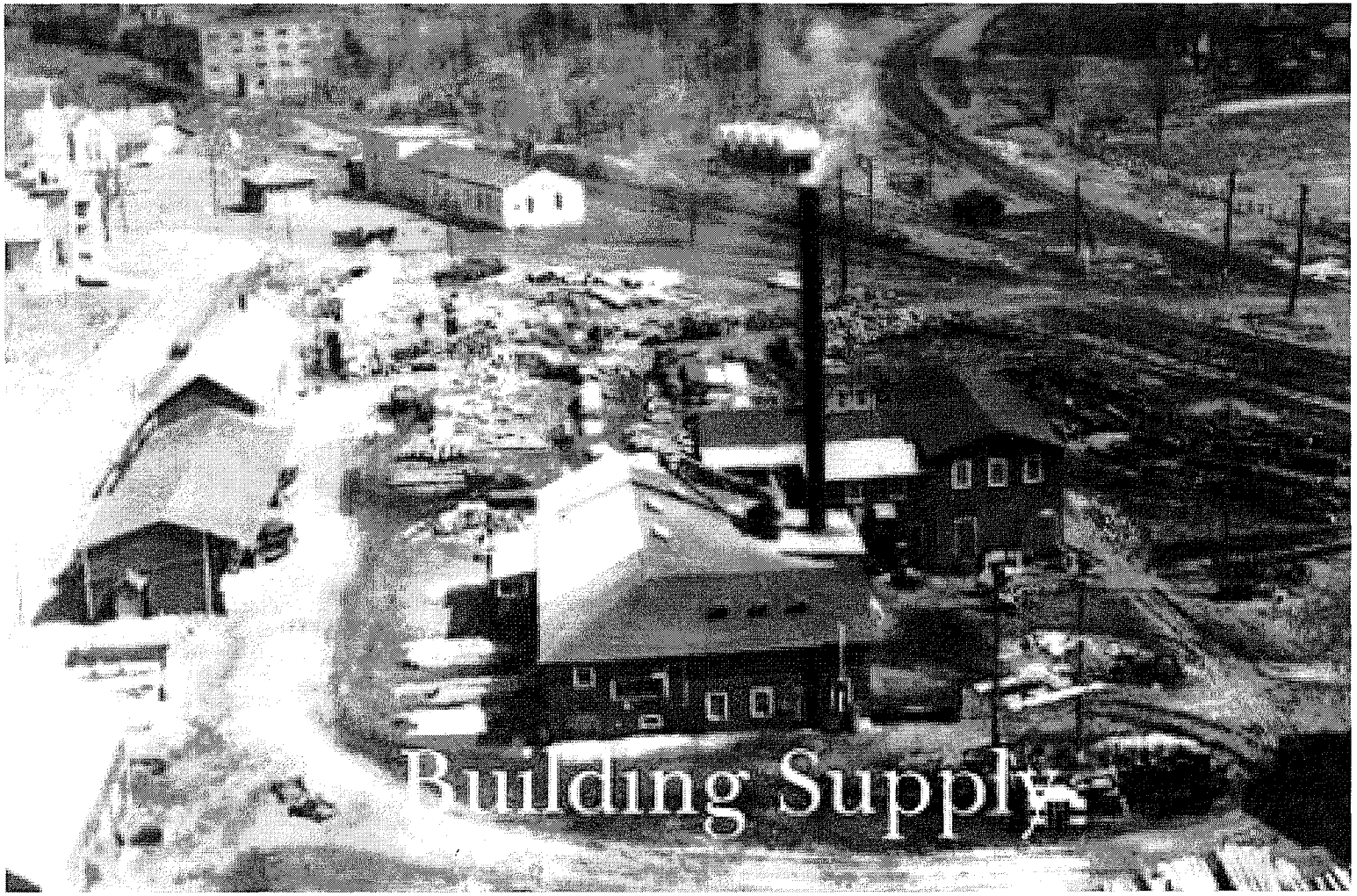
Mach IV

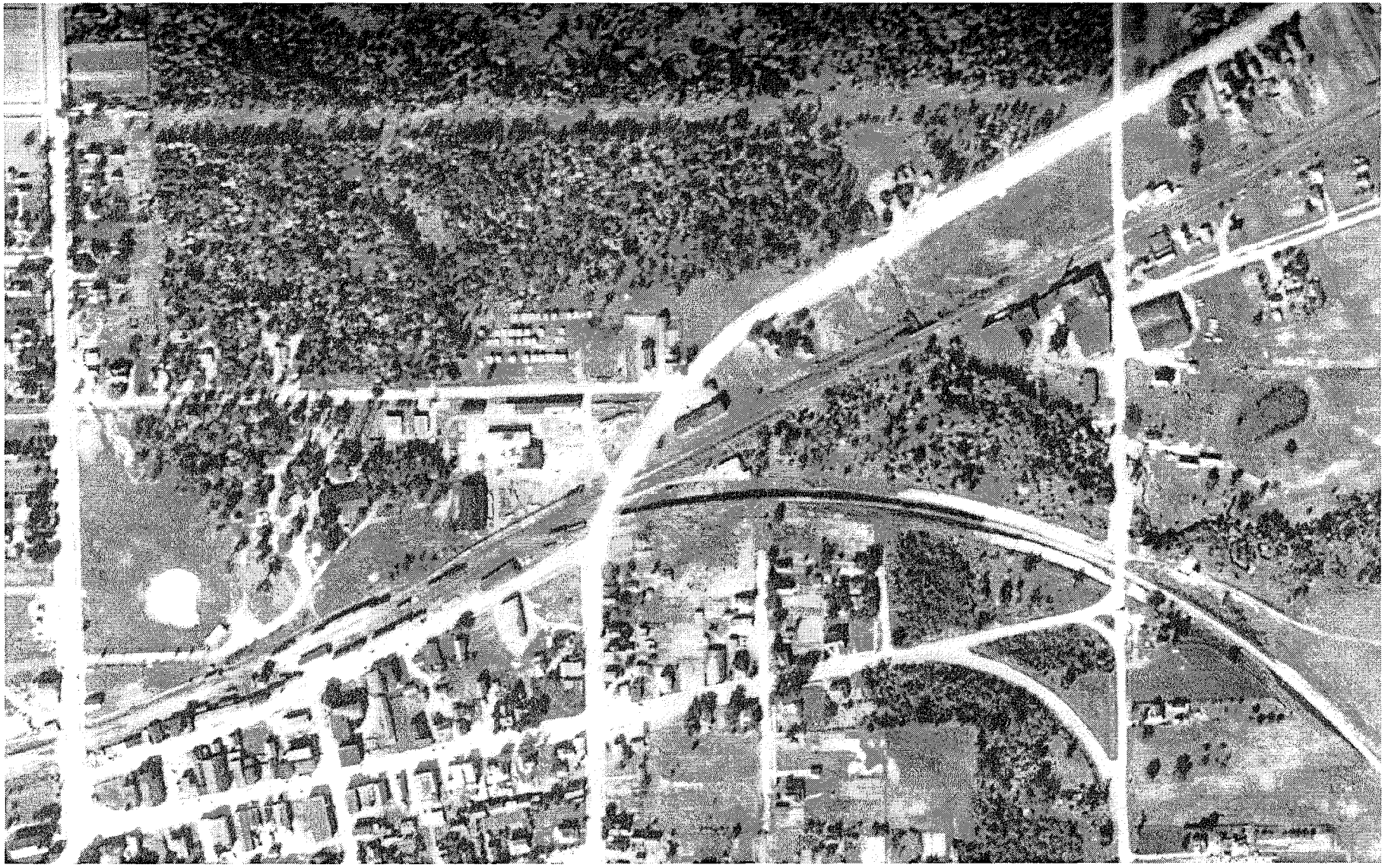
Engineering & Surveying LLC

Soil Sample Laboratory Analytical Results
Nicolet Trails Campground
Mach IV Engineering, Project No. 0582-02-13

Sample ID	Sample Date	Sample Interval (ft bgs)	PID	DRO	Benzene	sec-Butyl-benzene	Chloroform	Ethyl-benzene	Cumene	p-Isopropyl-benzene	MTBE	Naphthalene	n-Propyl-benzene	Toluene	TMB's	Xylenes
S-1	7/12/2013	5 ft bgs	18.0	162	<25.0	89.6	36.2	142	48.3	86.0	<25.0	337	109	156	1,168	492.9
S-2	7/12/2013	4 ft bgs	187	**3,810**	**1,070**	3,140	<100	**1,750**	968	3,130	<100	**13,900**	1,780	645	**36,780**	**18,200**
Site Specific Groundwater RCL					5.1	NS	3.3	1,570	NS	NS	27	658.7	NS	1,107	1,379	3,940
Direct Contact RCL					1,490	145,000	423	7,470	268,000	162,000	59,400	5,150	264,000	818,000	271,800	258,000

Notes:
All Concentrations reported in ppb except DRO
** Estimated concentration by laboratory
bgs: below ground surface
DRO - Diesel Range Organic Compounds
PID - Photoionization Detector
MTBE - Methyl-tert-butyl-ether
TMB - Trimethylbenzene


Building Supply



APPENDIX F/HEALTH AND SAFETY PLAN

SAFETY PLAN INFORMATION

Code: METCO METCO Project No: C2320

Company Name: METCO

Contact:

Last Name: Powell First Name: Jason

Salutation:

P.O. Box Street: 709 Gillette Street, Suite 3

City: La Crosse State WI Zip Code: 54603-0000

Area code: 608 Phone: 781-8879 Fax: (608)781-8893

SITE INFORMATION

Site Name: Nicolet Trails Campground

Site Address: 310 East Washington Street Site Address City: Gillett

Site Address State: WI Site Address Zip Code: 54124 Site Address County: Oconto

WDNR Contact: Robert Klauk Fire Dept. Contact: Gillett

Project Date: 3/1/2014 Tank Removal Contractor:

General Contractor: METCO

TANK INFORMATION

Tank Sizes\Contents					
Tank 1:	300	Contents:	Unknown	Age:	Removed
Tank 2:	300	Contents:	Unknown	Age:	Removed
Tank 3:	11500	Contents:	Gasoline	Age:	Removed
Tank 4:	11500	Contents:	Diesel	Age:	Removed
Tank 5:	11500	Contents:	Fuel Oil	Age:	Removed
Tank 6:		Contents:		Age:	

PURPOSE OF ACTIVITY (Check all appropriate)

New Tank Installation	☐	Tank Closure	☐	Install Tank Leak Detection	☐
Tank/Pipe Removal	☐	Tank\Pipe Repair	☐	Install Spill Protection	☐
Petroleum Release Investigation	☑	Install Remedial System	☐	Install Overfill Protection	☐
Leak Detection Testing	☐	Install Monotoring Wells	☑	Install Kard System	☐

Other

Backgro☐☐nformation st☐s Complete ☑ Ir ☐

TYPE OF SITE

SITE HEALTH AND SAFETY PLAN

POTENTAIL HEALTH AND SAFETY HAZARDS (check all appropriate)

Handling\transfer of product: ☐	Heavy Equipment: ☑	Snakes: ☐
* Fire	Noise: ☑	Insects: ☐
* Explosions	Oxygen Depletion: ☐	Rodents: ☐
General Construction: ☑	Excavation: ☐	Heat: ☑
* Electrical Hazards	* Cave-ins	Cold: ☑
* Physical Injury	* Falls, slips	
Confined Space Entry: ☐	Poisonous plants: ☐	
* Explosions	Other (Specify):	

Description of site-specific hazards (utilities, terrain, etc.):
Underground utilities and site traffic

EVALUATION OF CHEMICAL HAZARDS (MSDS sheets attached)

NAME	PHYSICAL STATE	ROUTE OF ENTRY	OSHA PEL/TLV	SYMPTOMS OF EXPOSURE
1.	Vapor/Liq	Inh/Skin	25-300PPM	Nausea, Irritation
2.				
3. Gasoline	Vapor/Liq	Inh/Skin	25-300 PPM	Irritation of eyes, nose and throat
4. Diesel Fuel				
5.				

ON-SITE PERSONNEL RESPONSIBILITIES

Team Member	Responsibilities
1. Jason Powell	Site Project Management
2. Eric Dahl	Hydrogeologist
3. Brandon Walker	Environmental Tech
4. Matt Michalski	Environmental Tech

METHOD TO CONTROL POTENTIAL HEALTH AND SAFETY HAZARDS

MONITORING INSTRUMENTS

Combustible Gas Indicator: ☐

Action Levels		Action
0-10% LEL	No Explosion Hazard	None
Action Levels		Action
Normal:	21%	None
Oxygen Deficient:	Less than 21%	Notify Health & Safety Officer
Oxygen Deficient:	Less than 19.5%	Evacuate

Photoionization Detector: ☑ Flame Ionization Detector: ☐ Detector Tubes: ☐

SITE HEALTH AND SAFETY PLAN

PERSONAL PROTECTIVE EQUIPMENT

Minimum Requirements

1. Hardhat
2. Safety glasses\goggles
3. Steel toes\shank shoes or boots
4. Flame retardant coveralls
5. Hearing protection (muffs or ear plugs)

Is additional PPE required? yes: ☐ no: ☑

Additional Requirements

Uncoated tyvek coveralls: ☐
Saranex tyvek coveralls: ☐
Rubber boots: ☐
Overboots: ☐
Surgical Inner Gloves: ☐
Butyl Neoprene\nitrile outer gloves: ☐

Full face respirators: ☐
* type of catrridge:
SCBA \ SAR: ☐
Other:

Level of protection designated A: ☐ B: ☐ C: ☐ D: ☑

SITE CONTROL

Work Zones

Support Zone: Beyond a 25' Radius of drilling or excavation and upwind of operation

Contamination Reduction Zone: Between 15 foot and 25 foot Radius of drilling or excavation

Exclusion Zone: Within 15 feet Radius of excavation or machine operation

Site Entry Procedure: Obtain approval and instructions from Project Leader.

Decontaminations Procedures:

Personnel: Remove protective equipment and wash hands prior to eating.

Equipment: Wash with brush and Alconox soap and rinsed with portable water.

Investigation-derived material disposal

Stockpiling: The soils will be placed on and covered with plastic. The client will determine the stockpile location, but will have to be approved by the Project Manager. Soils will be disposed of by the most efficient and cost effective approved method. DOT drums: Label drums as to content and date filled. Routinely inspect drums for leakage or spills. Place together in area where movement is at a minimum.

Work Limitations: Daylight hours. No eating, drinking, or smoking in the exclusion zone or the contamination reduction zone.

Employee Limitations:

Site Resources

Plan Approved by: Date:

Shower: ☐ Water Supply: ☐

SITE HEALTH AND SAFETY PLAN

CONTINGENCY PLANNING

LOCAL RESOURCES	Phone Number
Ambulance: City of Gillett	**911**
Hospital Emergency Room: Community Memorial Hospital	**(920) 846-3444**
Poison Control Center: Milwaukee	**(800) 222-1222**
Police City of Gillett	**911**
Fire Dept: City of Gillett	**911**
Hazardous Waste Response Center:	**800-943-0003 Wisconsin** **EPA 800-424-8802**

Location Address: 310 East Washington Street, Gillett, WI

EMERGENCY ROUTES (attach maps)

Hospital: Community Memorial Hospital (855 South Main Street, Oconto Falls, WI 54154) - Travel northeast on E Washington St 0.5 miles to STH 22. Turn right on STH 22 and travel approximately 8 miles into Oconto Falls, continue on S Main Street approximately 1 mile past the STH 22 turn-off in Oconto Falls and hospital will be on right.

Other:

EMERGENCY PROCEDURES

If an emergency develops at the site, the discoverer will take the following course of action:

* Notify the proper emergency service (fire, police, etc.) for assistance.
* Notify other personnel on the site. Notify Project Leader.
* Contact METCO and the client representative to inform them of the incident as soon as possible.
* Prepare a summary report of the incident for METCO and the client representative.

ON-SITE ORGANIZATION	PHONE NUMBERS	
METCO Project Leader: Jason Powell	work	608-781-8879
	home	608-526-6108
METCO Safety Officer: Linda Eastman	work	1-800-236-0448
	home	(608)489-2236
Engineer/Architect Contact:		
Client Contact: Beth Rank		(920) 855-2255
METCO Corporate Contact: Paul Knower	home	(608)489-2659
	work	1-800-236-0448

DAILY SAFETY PLAN CHECK

1. Hard-hat
2. Visible fire extinguisher
3. Safety glasses
4. Hearing protection
5. No smoking on site
6. Safety data sheet
7. Route to hospital
8. Barricades (cones, flags, fences, vehicle)
9. Emegency phone numbers
10. Know where the job site book is

Driving directions to 855 S Main St, Oconto Falls, WI 54154

310 E Washington St
Gillett, WI 54124

1. Head **northeast** on **E Washington St** toward **N Green Bay Ave**

0.5 mi

2. Turn right onto **State Hwy 32 S/WI-22 N/WI-22 Trunk N/WI-32 S**

2.3 mi

3. At the traffic circle, continue straight onto **WI-22 N/WI-22 Trunk N**

5.8 mi

4. Continue onto **S Main St**

Destination will be on the right

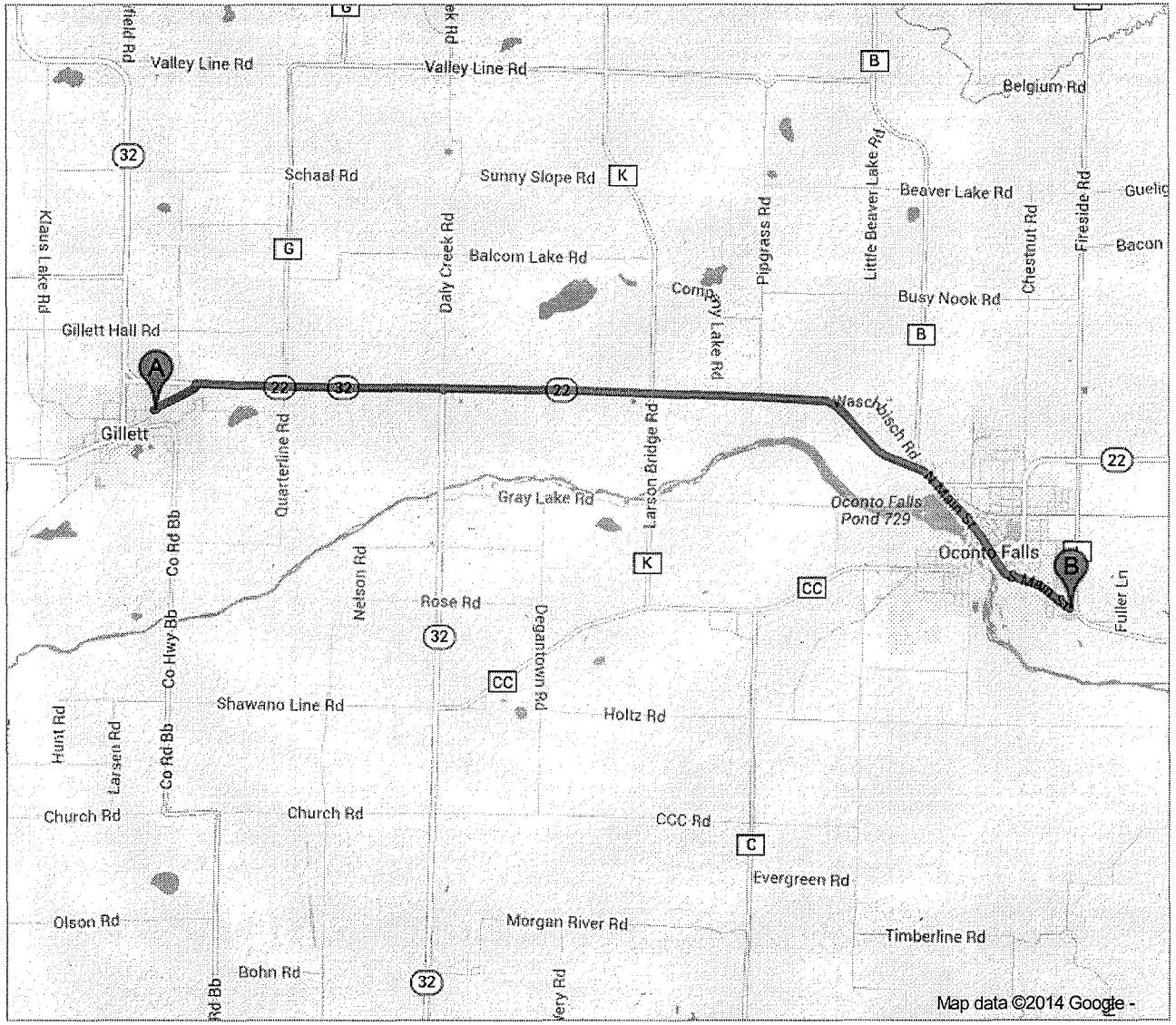
0.8 mi

855 S Main St
Oconto Falls, WI 54154

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Google

To see all the details that are visible on the screen, use the "Print" link next to the map.



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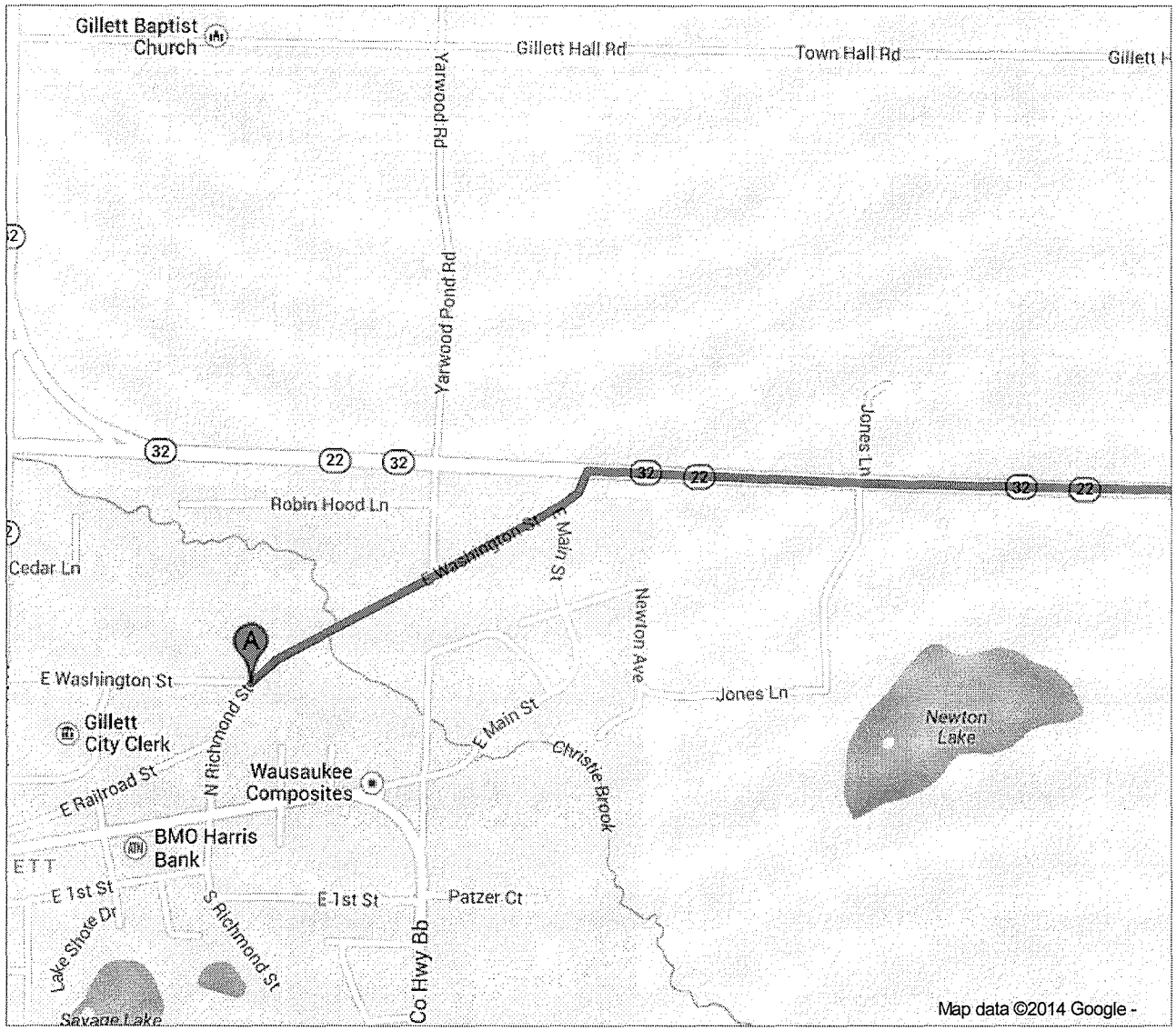

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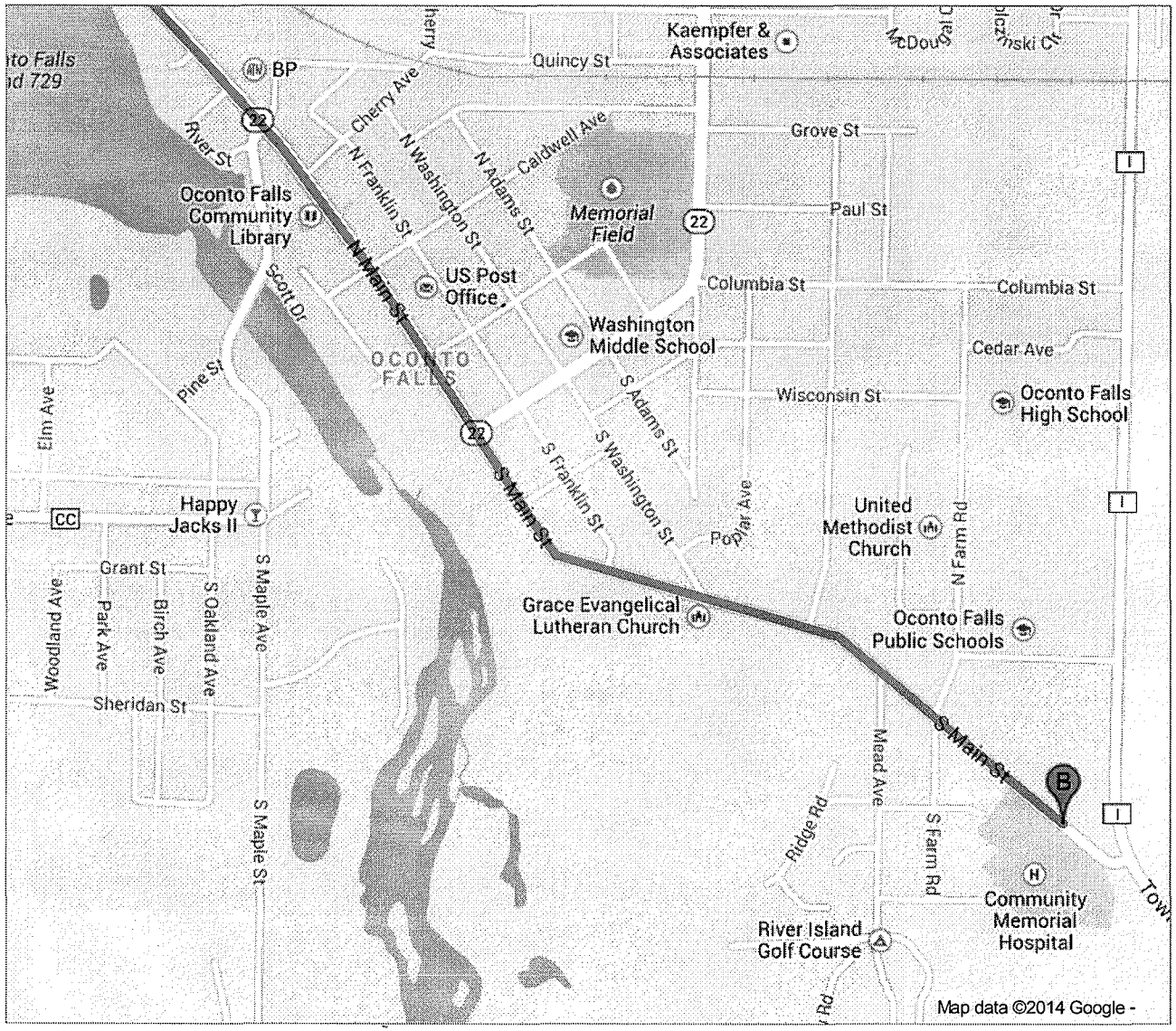

APPENDIX G/QUALIFICATIONS

Ronald J. Anderson, P.G.

Professional Titles

- Senior Hydrogeologist
- Project Manager

Credentials

- Licensed Professional Geologist in Wisconsin
- Licensed Professional Geologist in Minnesota
- Recognized by the State of Wisconsin Department of Natural Resources (Chapter NR712) as a qualified Hydrogeologist
- Certified by State of Wisconsin/DSPS to conduct PECFA-funded LUST projects
- Certified tank closure site assessor (#41861) in Wisconsin
- Member of the Wisconsin Groundwater Association
- Member of the Minnesota Groundwater Association
- Member of the Federation of Environmental Technologist, Inc.
- Member of the Wisconsin Fabricare Institute

Education

Includes a BA in Earth Science from the University of Minnesota-Duluth. Applicable courses successfully completed include Hydrogeology, Applied Hydrogeology, Environmental Geology, Geological Field Methods, Geology Field Camp, Geomorphology, Structural Geology, Stratigraphy/Tectonics, Mineralogy/Petrology, Glacial/Quaternary Geology, Geology of North America, Oceanography, General Chemistry, Organic Chemistry, and Environmental Conservation

Post-Graduate Education

Includes Personnel Protection and Safety, Conducting Comprehensive Environmental Property Assessments, Groundwater Flow and Well Hydraulics, Effective Techniques for Contaminated Groundwater Treatment, and numerous other continuing education classes and conferences.

Work Experience

Includes nine months with the Wisconsin Department of Natural Resources Leaking Underground Storage Tank Program regulating LUST sites and since June 1990, with METCO as a Hydrogeologist and Project Manager. Duties have included: managing, conducting, and reporting tank closure assessments; property assessment, LUST investigations; spill investigations; agricultural chemical investigations, dry cleaning chemical investigations, general geotechnical/environmental investigations; Geoprobe projects (soil, groundwater, soil gas sampling); drilling projects (soil boring and monitoring wells); and remedial projects. Since 1989, METCO has sampled/consulted over 700 environmental sites.

Jason T. Powell

Professional Title

- Staff Scientist

Credentials

- Recognized by the State of Wisconsin Department of Natural Resources (Chapter NR712) as a qualified Scientist.

Education

Includes a BS in Groundwater Management from the University of Wisconsin- Stevens Point. Applicable courses successfully completed include Hydrogeology, Applied Hydrogeology, Environmental Geology, Hydrogeology-Groundwater Flow Modeling, Groundwater Management, Structural Geology, Mineralogy, Glacial Geology, Soils, Soil Physics, Hydrology, Geochemistry, Water Chemistry, Organic Chemistry, General Chemistry, Environmental Issues.

Post-Graduate Education

40-hour OSHA Hazardous Materials Safety Training course with 8-hour refresher course.

Work Experience

With METCO since May 1992 as a Geoprobe Assistant and Geoprobe Operator. In June 1995 to July 1996 as a Environmental Technician. In July 1996 as a Staff Scientist. Duties have included: LUST investigations; general geotechnical/environmental investigations; Geoprobe projects (soil, groundwater sampling); drilling projects (soil boring and monitoring wells); remedial projects (sampling, pilot tests, system operation/maintenance) and project management.

Eric J. Dahl

Professional Title

- Hydrogeologist

Credentials

- Recognized by the State of Wisconsin Department of Natural Resources (Chapter NR712) as a qualified Hydrogeologist.
- Registered through the Wisconsin Department of Safety and Professional Services as a PECFA consultant (#823519).
- Member of the Geological Society of America

Education

Includes B.S. in Geology from the University of Wisconsin-Eau Claire. Applicable courses successfully completed include Environmental Geology, Physical Hydrogeology, Chemical Hydrogeology, Computer Modeling in Hydrogeology, Aqueous Geochemistry, Field Geology I and II, Mineralogy and Petrology I and II, Sedimentology and Stratigraphy, Petroleum and Economic Geology, Earth Resources, Earth History, and Structural Geology.

Post-Graduate Education

40-hour OSHA Hazardous Materials Safety Training course with 8-hour refresher course.

Work Experience

With METCO since November 1999 as a Hydrogeologist. Duties have included: Site Investigations, Phase I and Phase II Environmental Site Assessments, Case Closure Requests/GIS Registry, geoprobe projects (oversight, direction, and sampling), drilling projects/monitoring well installation (oversight, direction, and sampling), soil excavation projects (oversight, direction, and sampling), geoprobe operation, and operation and maintenance of remedial systems.

Thomas P. Pignet, P.E.

Professional Titles

- Chemical Engineer
- Industrial Engineer

Credentials

- Licensed Professional Engineer in Wisconsin

Education

Undergraduate: B.S. in Chemical Engineering from the University of Wisconsin. Applicable courses include the standard chemistry curriculum - basic, physical, organic, etc. - plus engineering transport phenomena, chemical unit operations (e.g. separations), fluid mechanics, etc.

Post-Graduate Education

Ph.D. in Chemical Engineering from the University of Minnesota - with applicable special training in absorption & catalysis; M.S. in Industrial Engineering from the University of Wisconsin - Milwaukee - with special emphasis on statistical techniques and data analysis. Applicable further training: continuing education, semester-length courses in [1] Understanding Environmental & Safety Regulation; [2] Hazardous & Toxic Waste Management; plus a number of 1-2 day workshops - Fire & Explosion Safety; Small Quantity Generations of Hazardous Waste.

Work Experience

Includes ten years as a research chemical engineer with a large chemical manufacturer; one year as process development engineer and demonstration-scale test analyst on a unique coal gasification project; ten years in association with UW-M, teaching and consulting to industry on energy efficiency, waste minimization and productivity improvement. One year working with a small engineering consulting firm on energy, environmental, and process improvement projects, including LUST Investigations and Remediations. With METCO since February 2000. Duties include Remedial Action Plan preparation, pilot test design and performance, remedial systems design and implementation, and general management of METCO's remedial projects.

Brandon A. Walker

Professional Title

- Staff Scientist

Credentials

- Registered through the Wisconsin Department of Safety and Professional Services as a PECFA consultant (#1052577).

Education

Includes B.S. in Geography and a minor in Environmental Studies from the University of Wisconsin- La Crosse. Applicable courses successfully completed include Water Resources, Ecology, Climate Systems, Earth Science, Zoology, Fundamentals of Cartography, Interpretation of Aerial Photography, Global Issues, Urban Geography, Environmental Sociology, and Environmental Studies.

Work Experience

With METCO since April 2007 as a Staff Scientist. Duties have included: soil and groundwater sampling, operation and maintenance of remedial systems, geoprobe projects (oversight, direction, and sampling), site mapping, data reduction and analysis, and reporting.

Matt Michalski

Professional Title

- Staff Scientist

Credentials

- Registered through the Wisconsin Department of Safety and Professional Services as a PECFA consultant (# 1228116).

Education

Includes B.S. In Geography and a minor in Environmental Studies from University of Wisconsin – La Crosse: Applicable courses successfully completed include Geographic Field Methods, Water Resources, Environmental Hazards and Land Use, and Advanced Map Design.

Work Experience

With METCO since August 2012 as Staff Scientist. Duties include: soil and groundwater sampling, operation and maintenance of remedial systems, geoprobe projects (oversight, direction, and sampling), site mapping, data reduction and analysis, and reporting.