

Site Investigation Field Procedures Workplan

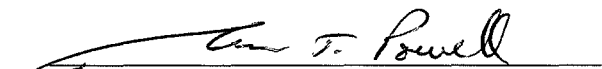
Luedtke Property
11 W Wisconsin Avenue
Tomahawk, Wisconsin

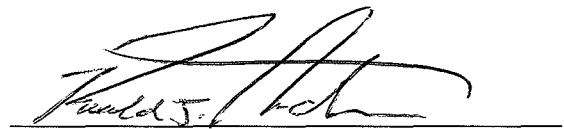
January 31, 2017
by METCO
WDNR File Reference #: 03-35-554426
PECFA Claim #: 54487-1334-11



Excellence through experience™

This document was prepared by:


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Staff Scientist


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January 31, 2017

WDNR BRRTS#: 03-35-554426

PECFA Claim #: 54487-1334-11

Todd Luedtke
426 Crowfoot Avenue
Fond du Lac, WI 54935

Dear Mr. Luedtke,

Enclosed is our "Site Investigation Field Procedures Workplan" concerning the Luedtke Property site in Tomahawk, 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: Carrie Stoltz – WDNR

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

Table of Contents

OBJECTIVES.....1

INTRODUCTION.....2

SITE BACKGROUND.....3

SITE CONDITIONS.....4

SCOPE OF WORK.....4

METCO PROCEDURES AND METHODS.....6

SCHEDULE FOR INVESTIGATION PROJECT.....9

APPENDIX A/SITE MAPS.....11

APPENDIX B/INVESTIGATION CHECKLIST.....12

APPENDIX C/LUST SAMPLING GUIDELINES.....13

APPENDIX D/DWR DOCUMENTS.....14

APPENDIX E/PROJECT DOCUMENTS.....15

APPENDIX F/HEALTH AND SAFETY PLAN.....16

APPENDIX G/QUALIFICATIONS.....17

APPENDIX H/LIST OF ACRONYMS.....18

Site Investigation Field Procedures Workplan - METCO Luedtke Property

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.

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

INTRODUCTION

Site Name

Luedtke Property

Site Address

11 W Wisconsin Avenue
Tomahawk, Wisconsin

Legal Description

SW ¼, SW ¼, Section 34, Township 35 North, Range 6 East, Lincoln County

Contact or Client

Todd Luedtke
426 Crowfoot Avenue
Fond du Lac, WI 54935
(920) 602-4910

WDNR Project Manager

Carrie Stoltz
WDNR Northern Region
107 Sutliff Avenue
Rhineland, WI 54501
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Consultant

METCO
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**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

SITE BACKGROUND

Facility

A gas station and repair shop (Country Co-op) operated on the subject property from approximately the 1940s until the mid 1980s. After the gas station closed, the building was converted to retail space and has been used for retail/office purposes since then.

In 1986, four 10,000-gallon leaded gasoline USTs were removed from the subject property.

On October 30, 2009, petroleum odors were noticed in the basement of the movie theater located on the adjacent property to the west and reported to the Tomahawk Fire Department. On November 2, 2009, John Sager of the WDNR visited the site to observe the petroleum odors in the basement and investigate possible petroleum sources. No petroleum sources were identified at that time. Further investigation by the WDNR revealed that four 10,000-gallon leaded gasoline USTs were registered on the Wisconsin tank database for the Luedtke Property at 11 W Wisconsin Avenue. Since the former gasoline tanks from the Luedtke Property were suspected to be the source of the petroleum release, the WDNR required that a site investigation be completed.

Numerous other LUST, ERP, and Spill sites exist in the City of Tomahawk. The closest being Les' Standard, which is located approximately 125 feet to the northeast of the subject property. The Les' Standard property is an active gas station and closed LUST site (BRRTS# 03-35-000361). Several Spill cases are also associated with the Les' Standard property.

Potential Risks and Impacts

The subject property and surrounding properties are all served by the City of Tomahawk municipal water supply. The City of Tomahawk has two municipal wells, which are located approximately 4,000 feet to the south of the subject property. The City of Tomahawk is not aware of any private water supply wells in this area. If any private wells do exist, they are not used for domestic purposes.

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

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

SITE CONDITIONS

Topography

According to the USGS Hydrologic Atlas, Tomahawk is located in the southern portion of the Upper Wisconsin River Basin. The topography of this area is characterized by pitted outwash plains with a poorly developed drainage network as indicated by the numerous lakes in the area.

The elevation of the site is approximately 1,450 feet above Mean Sea Level (MSL). See Appendix A for site location.

Geology

Native unconsolidated materials in this area generally consist of sand to silty sand. The unconsolidated materials are underlain by granite bedrock at approximately 50-100 feet below ground surface.

Hydrology

The nearest surface water is Lake Mohawksin, a reservoir on the Wisconsin River, which exists approximately 1,500 feet to the north of the subject property.

Hydrogeology

Based on nearby LUST sites, groundwater is expected to exist at approximately 5 to 10 feet below ground surface. Local groundwater flow is expected to be toward the north to slightly northwest.

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 20 to 25 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

Site Investigation Field Procedures Workplan - METCO Luedtke Property

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 5 to 8 boreholes to be completed on/off site. METCO has also proposed 4 to 7 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

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

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.

PID 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

Site Investigation Field Procedures Workplan - METCO Luedtke Property

- <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 PID probe is inserted into the plastic bag halfway between the sample and the highest meter response recorded. The samples are screened with a Rae Systems, Mini Rae Lite, Model PGM-7300 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

Site Investigation Field Procedures Workplan - METCO Luedtke Property

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.

Site Investigation Field Procedures Workplan - METCO Luedtke Property

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 (1/31/17).
- 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

Site Investigation Field Procedures Workplan - METCO Luedtke Property

summary report or final report and sends copies to client and WDNR (2 months after lab results are received).

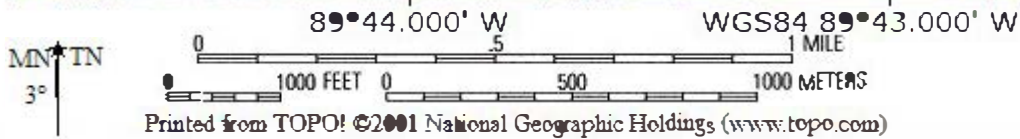
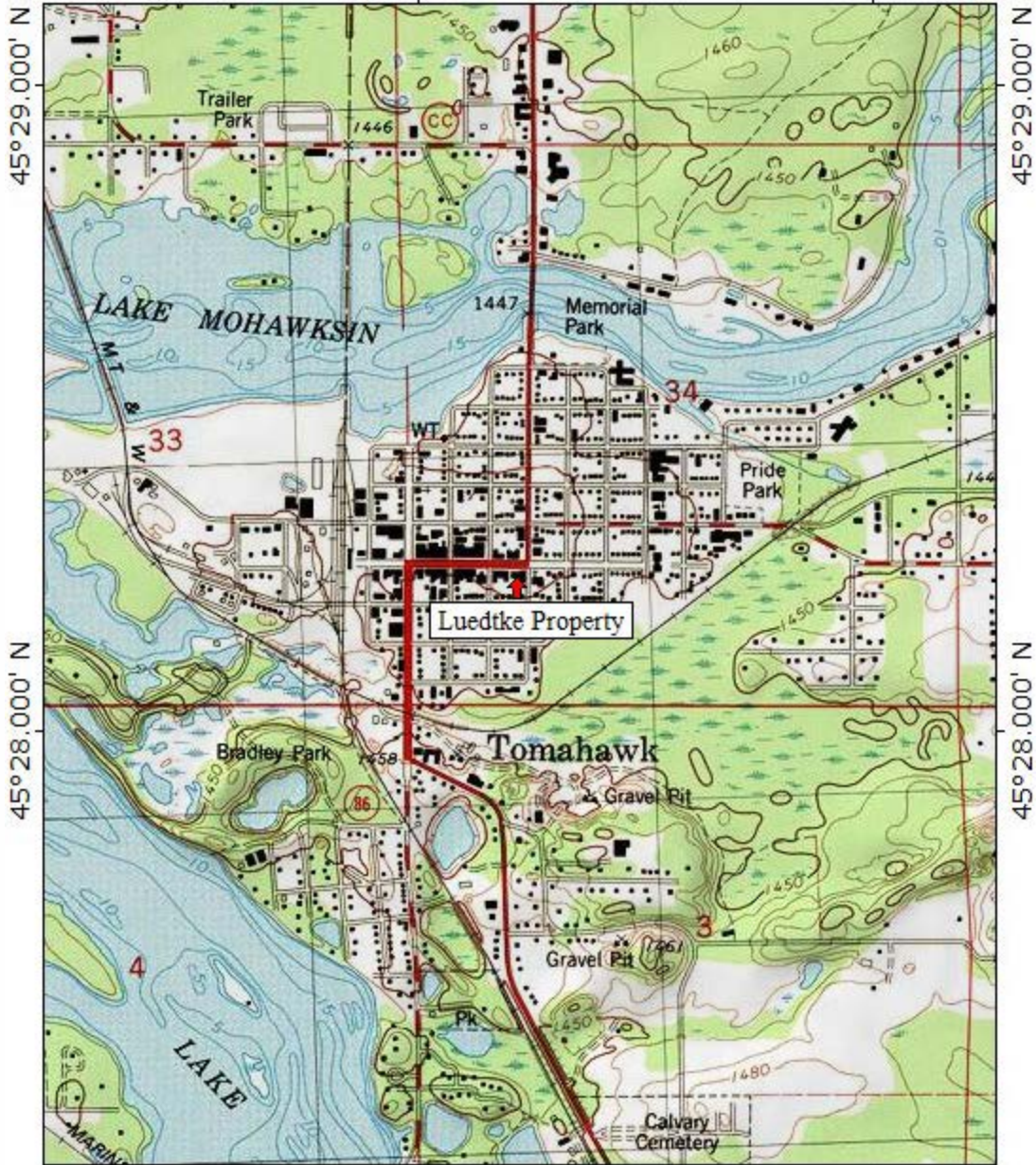
NOTE: If groundwater is found to be impacted or suspected of being impacted by released contaminants, the WDNR will require a Drilling Project with monitoring wells.

- 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.

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

APPENDIX A/SITE MAPS


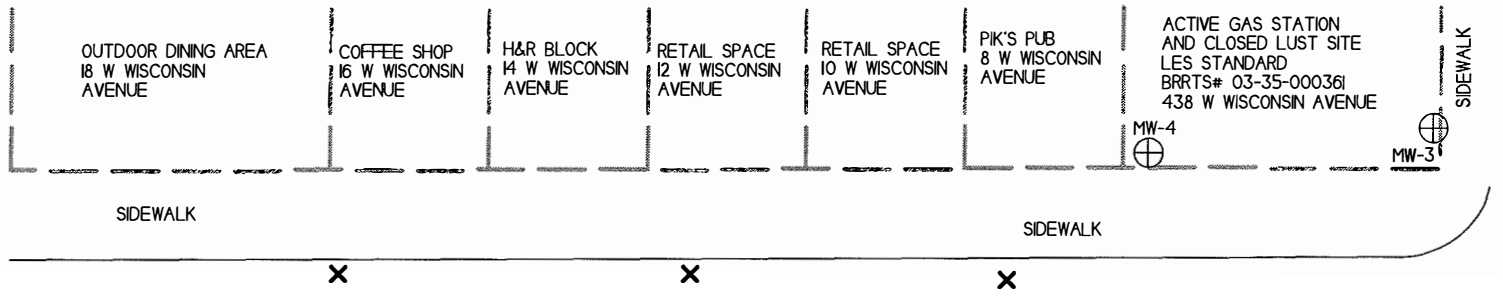
TOPO! map printed on 01/19/17 from "Wisconsin.tpo" and "Untitled.tpg"
89°44.000' W WGS84 89°43.000' W



B.1.a LOCATION MAP
CONTOUR INTERVAL 10 FEET
LUEDTKE PROPERTY – TOMAHAWK, WI
SEAMLESS USGS TOPOGRAPHIC MAPS ON CD-ROM

B.I.b DETAILED SITE MAP
LUEDTKE PROPERTY

METCO
 709 Gillette St, Suite 3
 La Crosse, WI 54603
 Tel: (608) 781-8879
 Fax: (608) 781-8893
 TOMAHAWK, WISCONSIN
 DRAWN BY: ED
 DATE: 04/18/2007

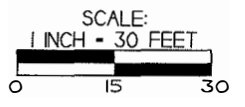
N 4TH ST

NOTE: INFORMATION BASED ON AVAILABLE DATA ACTUAL CONDITIONS MAY DIFFER

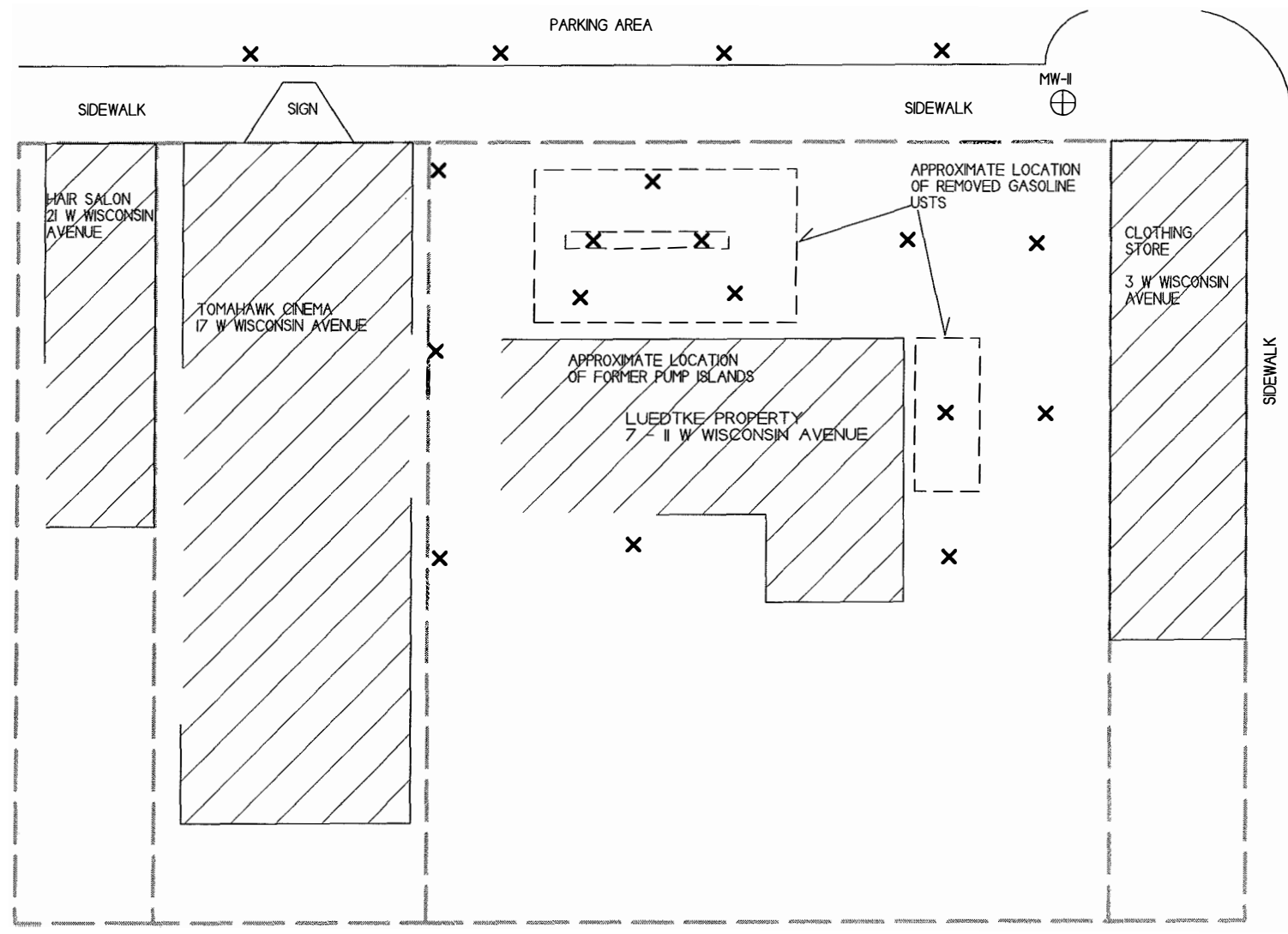
⊕ - FORMER MONITORING WELL LOCATION - LES STANDARD

X - PROPOSED SOIL BORING LOCATION

----- - PROPERTY BOUNDARY



W WISCONSIN AVENUE



S 4TH STREET

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

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 (3300-58)
 - d. chain of custody forms
 - e. lab/chemistry results
 - f. groundwater monitoring well information form (4400-89)
 - g. monitoring well development form (4400-1138)
- 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

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

APPENDIX C/LUST SAMPLING GUIDELINES

LUST and Petroleum Analytical and QA Guidance
July 1993 Revision

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 ₂ SO 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 ₂ SO 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 ₂ SO 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 ₂ SO 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 ₂ SO ₄	28 days
Organic Carbon SW846 9060/ EPA 415.1	40 ml Glass	4°C, pH<2 with H ₂ SO ₄ or HCL	28 days
Phenol, Total EPA 420.1	1 Liter Glass	4°C, pH<2 with H ₂ SO ₄	28 days
Phosphorus, Total EPA 365.3	250 mL HDPE	4°C, pH<2 with H ₂ SO 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.

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

APPENDIX D/WDNR DOCUMENTS

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			1.12E-02		
Acetone	67-64-1	-	9000	1.85E+00			3.69E+00		
Alachlor	15972-60-8	2	2	1.65E-03			3.30E-03		
Aldicarb	116-06-3	3	10	2.49E-03			4.99E-03		
Aluminum	7429-90-5	-	200	3.01E+02			6.01E+02		
Antimony	7440-36-0	6	6	2.71E-01			5.42E-01		
Anthracene	120-12-7	-	3000	9.84E+01			1.97E+02		
Arsenic	7440-38-2	10	10	2.92E-01			5.84E-01		
Atrazine, total chlorinated residues	1912-24-9	3	3	1.95E-03			3.90E-03		
Barium	7440-39-3	2000	2000	8.24E+01			1.65E+02		
Bentazon	25057-89-0	-	300	6.59E-02			1.32E-01		
Benzene	71-43-2	5	5	2.56E-03			5.12E-03		
Benzo(a)pyrene (PAH)	50-32-8	0.2	0.2	2.35E-01			4.70E-01		
Benzo(b)fluoranthene (PAH)	205-99-2	-	0.2	2.40E-01			4.80E-01		
Beryllium	7440-41-7	4	4	3.16E+00			6.32E+00		
Boron	7440-42-8	-	1000	3.20E+00			6.40E+00		
Bromodichloromethane (THM)	75-27-4	80	0.6	1.63E-04			3.26E-04		
Bromoform (THM)	75-25-2	80	4.4	1.17E-03			2.33E-03		
Bromomethane	74-83-9	-	10	2.53E-03			5.06E-03		
Butylate	2008-41-5	-	400	3.88E-01			7.76E-01		
Cadmium	7440-43-9	5	5	3.76E-01			7.52E-01		
Carbaryl	63-25-2	-	40	3.64E-02			7.27E-02		
Carbofuran	1563-66-2	40	40	1.56E-02			3.12E-02		
Carbon disulfide	75-15-0	-	1000	2.97E-01			5.93E-01		
Carbon tetrachloride	56-23-5	5	5	1.94E-03			3.88E-03		
Chloramben	133-90-4	-	150	3.63E-02			7.27E-02		
Chlorodifluoromethane	75-45-6	-	7000	2.89E+00			5.79E+00		
Chloroethane	75-00-3	-	400	1.13E-01			2.27E-01		
Chloroform (THM)	67-66-3	80	6	1.67E-03			3.33E-03		
Chlorpyrifos	2921-88-2	-	2	2.95E-02			5.90E-02		
Chloromethane	74-87-3	-	30	7.76E-03			1.55E-02		
Chromium (total)	7440-47-3	100	100	1.80E+05			3.60E+05		
Chrysene (PAH)	218-01-9	-	0.2	7.25E-02			1.45E-01		Re-assess if Cr-VI present
Cobalt	7440-48-4	-	40	1.81E+00			3.62E+00		
Copper	7440-50-8	1300	1300	4.58E+01			9.16E+01		
Cyanazine	21725-46-2	-	1	4.68E-04			9.37E-04		
Cyanide, free	57-12-5	200	200	2.02E+00			4.04E+00		
Dacthal (DCPA)	1861-32-1	-	70	8.56E-02			1.71E-01		
1,2-Dibromoethane	106-93-4	0.05	0.05	1.41E-05			2.82E-05		
Dibromochloromethane (THM)	124-48-1	80	60	1.60E-02			3.20E-02		
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	0.2	0.2	8.64E-05			1.73E-04		
Dibutyl phthalate	84-74-2	-	1000	2.52E+00			5.04E+00		
Dicamba	1918-00-9	-	300	7.76E-02			1.55E-01		
1,2-Dichlorobenzene	95-50-1	600	600	5.84E-01			1.17E+00		
1,3-Dichlorobenzene	541-73-1	-	600	5.76E-01			1.15E+00		
1,4-Dichlorobenzene	106-46-7	75	75	7.20E-02			1.44E-01		
Dichlorodifluoromethane	75-71-8	-	1000	1.54E+00			3.08E+00		
1,1-Dichloroethane	75-34-3	-	850	2.42E-01			4.84E-01		
1,2-Dichloroethane	107-06-2	5	5	1.42E-03			2.84E-03		
1,1-Dichloroethylene	75-35-4	7	7	2.51E-03			5.02E-03		
1,2-Dichloroethylene (cis)	156-59-2	70	70	2.06E-02			4.12E-02		
1,2-Dichloroethylene (trans)	156-60-5	100	100	2.94E-02			5.88E-02		
2,4-Dichlorophenoxyacetic acid (2,4-D)	94-75-7	70	70	1.81E-02			3.62E-02		
1,2-Dichloropropane	78-87-5	5	5	1.66E-03			3.32E-03		
1,3-Dichloropropane (cis/trans) (Telone)	542-75-6	-	0.4	1.43E-04			2.85E-04		
Di (2-ethylhexyl) phthalate	117-81-7	6	6	1.44E+00			2.88E+00		
Dimethoate	60-51-5	-	2	4.51E-04			9.02E-04		
2,4-Dinitrotoluene	121-14-2	-	0.05	6.76E-05			1.35E-04		
2,6-Dinitrotoluene	606-20-2	-	0.05	6.88E-05			1.38E-04		
Dinitrotoluene, Total Residues	25321-14-6	-	0.05	6.89E-05			1.38E-04		
Dinoseb	88-85-7	7	7	6.15E-02			1.23E-01		
1,4-Dioxane (p-dioxane)	123-91-1	-	3	6.18E-04			1.24E-03		
Dioxin (2,3,7,8-TCDD)	1746-01-6	0	0	1.50E-05			3.00E-05		
Endrin	72-20-8	2	2	8.08E-02			1.62E-01		
EPTC	759-94-4	-	250	1.32E-01			2.64E-01		
Ethylbenzene	100-41-4	700	700	7.85E-01			1.57E+00		
Ethyl Ether (Diethyl Ether)	60-29-7	-	1000	2.24E-01			4.47E-01		
Ethylene glycol	107-21-1	-	14000	2.82E+00			5.64E+00		
Fluoranthene	206-44-0	-	400	4.44E+01			8.88E+01		
Fluorene (PAH)	86-73-7	-	400	7.41E+00			1.48E+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!	Type BRRTS No. Here (If Known). Assess groundwater levels separately.
Fluoride	7782-41-4	4000	4000	6.01E+02		1.20E+03			
Fluorotrichloromethane	75-69-4	-	3490	2.23E+00		4.47E+00			
Formaldehyde	50-00-0	-	1000	2.02E-01		4.04E-01			
Heptachlor	76-44-8	0.4	0.4	3.31E-02		6.62E-02			
Heptachlor epoxide	1024-57-3	0.2	0.2	4.08E-03		8.16E-03			
Hexachlorobenzene	118-74-1	1	1	1.26E-02		2.52E-02			
n-Hexane	110-54-3	-	600	4.22E+00		8.44E+00			
Lead	7439-92-1	15	15	1.35E+01		2.70E+01			
Lindane	58-89-9	0.2	0.2	1.16E-03		2.32E-03			
Manganese	7439-96-5	-	300	1.96E+01		3.91E+01			
Mercury	7439-97-6	2	2	1.04E-01		2.08E-01			
Methanol	67-56-1	-	5000	1.01E+00		2.03E+00			
Methoxychlor	72-43-5	40	40	2.16E+00		4.32E+00			
Methylene chloride	75-09-2	5	5	1.28E-03		2.56E-03			
Methyl ethyl ketone (MEK)	78-93-3	-	4000	8.39E-01		1.68E+00			
Methyl isobutyl ketone (MIBK)	108-10-1	-	500	1.13E-01		2.26E-01			
Methyl tert-butyl ether (MTBE)	1634-04-4	-	60	1.35E-02		2.70E-02			
Metolachlor/s-Metolachlor	51218-45-2	-	100	1.17E-01		2.34E-01			
Metribuzin	21087-64-9	-	70	2.14E-02		4.28E-02			
Molybdenum	7439-98-7	-	40	8.08E-01		1.62E+00			
Monochlorobenzene	108-90-7	100	100	6.79E-02		1.36E-01			
Naphthalene	91-20-3	-	100	3.29E-01		6.59E-01			
Nickel	7440-02-0	-	100	6.50E+00		1.30E+01			
N-Nitrosodiphenylamine (NDPA)	86-30-6	-	7	3.82E-02		7.64E-02			
Pentachlorophenol (PCP)	87-86-5	1	1	1.01E-02		2.02E-02			
Phenol	108-95-2	-	2000	1.15E+00		2.30E+00			
Picloram	1918-02-1	500	500	1.39E-01		2.78E-01			
Polychlorinated biphenyls (PCBs)	1336-36-3	0.5	0.03	4.69E-03		9.38E-03			
Prometon	1610-18-0	-	100	4.75E-02		9.49E-02			
Propazine	139-40-2	-	10	8.86E-03		1.77E-02			
Pyrene (PAH)	129-00-0	-	250	2.72E+01		5.45E+01			
Pyridine	110-86-1	-	10	3.44E-03		6.87E-03			
Selenium	7782-49-2	50	50	2.60E-01		5.20E-01			
Silver	7440-22-4	-	50	4.25E-01		8.50E-01			
Simazine	122-34-9	4	4	1.97E-03		3.94E-03			
Styrene	100-42-5	100	100	1.10E-01		2.20E-01			
Tertiary Butyl Alcohol (TBA)	75-65-0	-	12	2.45E-03		4.90E-03			
1,1,1,2-Tetrachloroethane	630-20-6	-	70	2.67E-02		5.33E-02			
1,1,2,2-Tetrachloroethane	79-34-5	-	0.2	7.80E-05		1.56E-04			
Tetrachloroethylene (PCE)	127-18-4	5	5	2.27E-03		4.54E-03			
Tetrahydrofuran	109-99-9	-	50	1.11E-02		2.22E-02			
Thallium	7440-28-0	2	2	1.42E-01		2.84E-01			
Toluene	108-88-3	1000	800	5.54E-01		1.11E+00			
Toxaphene	8001-35-2	3	3	4.64E-01		9.28E-01			
1,2,4-Trichlorobenzene	120-82-1	70	70	2.04E-01		4.08E-01			
1,1,1-Trichloroethane	71-55-6	200	200	7.01E-02		1.40E-01			
1,1,2-Trichloroethane	79-00-5	5	5	1.62E-03		3.24E-03			
Trichloroethylene (TCE)	79-01-6	5	5	1.79E-03		3.58E-03			
2,4,5-Trichlorophenoxyacetic acid (2,4,5-TCPA)	93-72-1	50	50	2.75E-02		5.50E-02			
1,2,3-Trichloropropane	96-18-4	-	60	2.60E-02		5.20E-02			
Trifluralin	1582-09-8	-	7.5	2.48E-01		4.95E-01			
2,4-Dichlorophenoxyacetic acid (2,4-DCPA)	95-63-6 / 108-67-8	-	480	6.90E-01		1.38E+00			
Vanadium	7440-62-2	-	-	-		-			
Vinyl chloride	75-01-4	2	0.2	6.90E-05		1.38E-04			
Xylenes (m-, o-, p- combined)	1330-20-7	10000	2000	1.97E+00		3.94E+00			

Residential setting. Not-To-Exceed D-C RCLs from web-calculator at: http://epa-prgs.cerl.gov/cgi-bin/chemicals/csl_search (Chicago as climatic zone).

Basis: ca

= cancer; nc = non-cancer; Csat = soil saturation concentration; ceiling = 10%.

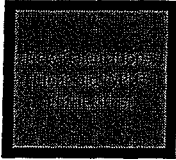
-----> If web-calculator result or Csat exceeds 10% by weight (the ceiling limit concentration defined in RSL Users Guide), Not-to-Exceed D-C RCL defaults to 100,000 ppm.

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:



Comparison / Hazard Index / Cumulative Cancer Risk

Target CR used:
1.00E-06

Contaminant	GAS Number	NC RCL (mg/kg)	CRCL (mg/kg)	Not-To-Exceed D-C RCL (mg/kg)	Basis	INPUT Site Data (mg/kg)	Flag E = Individual Exceedance?	Hazard Quotient (HQ) from Data	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				
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				
Lead and Compounds	7439-92-1	400	-	400	nc				

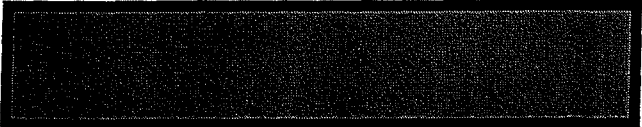
03-14-563925

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

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

Bottom-Line:

Soil Data Entry Needed!



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	CAS Number	Mutagen?	VOC?	Ingestion		Inhalation		Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ³)	Chronic RfC Ref
				SF (mg/kg-day) ⁻¹	SFO Ref	Unit (ug/m ³) ⁻¹	IUR Ref				
Benzene	71-43-2	No	Yes	5.50E-02	I	7.80E-06	I	4.00E-03	I	3.00E-02	I
Dibromoethane, 1,2-	106-93-4	No	Yes	2.00E+00	I	6.00E-04	I	9.00E-03	I	9.00E-03	I
Dichloroethane, 1,2-	107-06-2	No	Yes	9.10E-02	I	2.60E-05	I	6.00E-03	S	7.00E-03	P
Ethylbenzene	100-41-4	No	Yes	1.10E-02	C	2.50E-06	C	1.00E-01	I	1.00E+00	I
Lead and Compounds	7439-92-1	No	No	-	-	-	-	-	-	-	-
Methyl tert-Butyl Ether (MTBE)	1634-04-4	No	Yes	1.80E-03	C	2.60E-07	C	-	-	3.00E+00	I
Acenaphthene	83-32-9	No	Yes	-	-	-	-	6.00E-02	I	-	-
Anthracene	120-12-7	No	Yes	-	-	-	-	3.00E-01	I	-	-
Benz[a]anthracene	56-55-3	Yes	Yes	7.30E-01	W	1.10E-04	C	-	-	-	-
Benzo(j)fluoranthene	205-82-3	No	No	1.20E+00	C	1.10E-04	C	-	-	-	-
Benzo[a]pyrene	50-32-8	Yes	No	7.30E+00	I	1.10E-03	C	-	-	-	-
Benzo[b]fluoranthene	205-99-2	Yes	No	7.30E-01	W	1.10E-04	C	-	-	-	-
Benzo[k]fluoranthene	207-08-9	Yes	No	7.30E-02	W	1.10E-04	C	-	-	-	-
Chrysene	218-01-9	Yes	No	7.30E-03	W	1.10E-05	C	-	-	-	-
Dibenz[a,h]anthracene	53-70-3	Yes	No	7.30E+00	W	1.20E-03	C	-	-	-	-
Dibenzo(a,e)pyrene	192-65-4	No	No	1.20E+01	C	1.10E-03	C	-	-	-	-
Dimethylbenz(a)anthracene, 7,12-	57-97-6	Yes	No	2.50E+02	C	7.10E-02	C	-	-	-	-
Fluoranthene	206-44-0	No	No	-	-	-	-	4.00E-02	I	-	-
Fluorene	86-73-7	No	Yes	-	-	-	-	4.00E-02	I	-	-
Indeno[1,2,3-cd]pyrene	193-39-5	Yes	No	7.30E-01	W	1.10E-04	C	-	-	-	-
Methylnaphthalene, 1-	90-12-0	No	Yes	2.90E-02	P	-	-	7.00E-02	A	-	-
Methylnaphthalene, 2-	91-57-6	No	Yes	-	-	-	-	4.00E-03	I	-	-
Naphthalene	91-20-3	No	Yes	-	-	3.40E-05	C	2.00E-02	I	3.00E-03	I
Nitropyrene, 4-	57835-92-4	No	No	1.20E+00	C	1.10E-04	C	-	-	-	-
Pyrene	129-00-0	No	Yes	-	-	-	-	3.00E-02	I	-	-
Toluene	108-88-3	No	Yes	-	-	-	-	8.00E-02	I	5.00E+00	I
Trimethylbenzene, 1,2,4-	95-63-6	No	Yes	-	-	-	-	-	-	7.00E-03	P
Trimethylbenzene, 1,3,5-	108-67-8	No	Yes	-	-	-	-	1.00E-02	S	-	-
Xylenes	1330-20-7	No	Yes	-	-	-	-	2.00E-01	I	1.00E-01	I

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	GIABS	ABS	RBA	Volatilization	Soil	Particulate	Ingestion	Dermal	Inhalation	Carcinogenic
				Factor (m ³ /kg)	Saturation Concentration (mg/kg)	Emission Factor (m ³ /kg)	SL TR=1.0E-6 (mg/kg)	SL TR=1.0E-6 (mg/kg)	SL TR=1.0E-6 (mg/kg)	SL TR=1.0E-6 (mg/kg)
Benzene	1	-	1	5.10E+03	1.82E+03	1.56E+09	1.26E+01	-	1.84E+00	1.60E+00
Dibromoethane, 1,2-	1	-	1	1.25E+04	1.34E+03	1.56E+09	3.48E-01	-	5.84E-02	5.00E-02
Dichloroethane, 1,2-	1	-	1	6.60E+03	2.98E+03	1.56E+09	7.64E+00	-	7.13E-01	6.52E-01
Ethylbenzene	1	-	1	8.18E+03	4.80E+02	1.56E+09	6.32E+01	-	9.19E+00	8.02E+00
Lead and Compounds	1	-	1	-	-	1.56E+09	-	-	-	-
Methyl tert-Butyl Ether (MTBE)	1	-	1	7.08E+03	8.87E+03	1.56E+09	3.86E+02	-	7.64E+01	6.38E+01
Acenaphthene	1	0.13	1	2.03E+05	-	1.56E+09	-	-	-	-
Anthracene	1	0.13	1	7.56E+05	-	1.56E+09	-	-	-	-
Benz[a]anthracene	1	0.13	1	6.37E+06	-	1.56E+09	2.10E-01	6.29E-01	5.85E+01	1.57E-01
Benzo(j)fluoranthene	1	0.13	1	-	-	1.56E+09	5.79E-01	1.58E+00	3.98E+04	4.24E-01
Benzo[a]pyrene	1	0.13	1	-	-	1.56E+09	2.10E-02	6.29E-02	1.44E+03	1.57E-02
Benzo[b]fluoranthene	1	0.13	1	-	-	1.56E+09	2.10E-01	6.29E-01	1.44E+04	1.57E-01
Benzo[k]fluoranthene	1	0.13	1	-	-	1.56E+09	2.10E+00	6.29E+00	1.44E+04	1.57E+00
Chrysene	1	0.13	1	-	-	1.56E+09	2.10E+01	6.29E+01	1.44E+05	1.57E+01
Dibenz[a,h]anthracene	1	0.13	1	-	-	1.56E+09	2.10E-02	6.29E-02	1.32E+03	1.57E-02
Dibenzo(a,e)pyrene	1	0.13	1	-	-	1.56E+09	5.79E-02	1.58E-01	3.98E+03	4.24E-02
Dimethylbenz(a)anthracene, 7,12-	1	0.13	1	-	-	1.56E+09	6.13E-04	1.84E-03	2.23E+01	4.59E-04
Fluoranthene	1	0.13	1	-	-	1.56E+09	-	-	-	-
Fluorene	1	0.13	1	4.06E+05	-	1.56E+09	-	-	-	-
Indeno[1,2,3-cd]pyrene	1	0.13	1	-	-	1.56E+09	2.10E-01	6.29E-01	1.44E+04	1.57E-01
Methylnaphthalene, 1-	1	0.13	1	8.46E+04	3.94E+02	1.56E+09	2.40E+01	6.55E+01	-	1.76E+01
Methylnaphthalene, 2-	1	0.13	1	8.37E+04	-	1.56E+09	-	-	-	-
Naphthalene	1	0.13	1	6.69E+04	-	1.56E+09	-	-	5.52E+00	5.52E+00
Nitropyrene, 4-	1	0.13	1	-	-	1.56E+09	5.79E-01	1.58E+00	3.98E+04	4.24E-01
Pyrene	1	0.13	1	3.43E+06	-	1.56E+09	-	-	-	-
Toluene	1	-	1	6.19E+03	8.18E+02	1.56E+09	-	-	-	-
Trimethylbenzene, 1,2,4-	1	-	1	1.14E+04	2.19E+02	1.56E+09	-	-	-	-
Trimethylbenzene, 1,3,5-	1	-	1	9.54E+03	1.82E+02	1.56E+09	-	-	-	-
Xylenes	1	-	1	8.28E+03	2.60E+02	1.56E+09	-	-	-	-

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	Ingestion	Dermal	Inhalation	Noncarcinogenic	Ingestion	Dermal	Inhalation	Noncarcinogenic	Screening Level (mg/kg)
	SL Child THQ=1 (mg/kg)	SL Child THQ=1 (mg/kg)	SL Child THQ=1 (mg/kg)	SL Child THI=1 (mg/kg)	SL Adult THQ=1 (mg/kg)	SL Adult THQ=1 (mg/kg)	SL Adult THQ=1 (mg/kg)	SL Adult THI=1 (mg/kg)	
Benzene	3.13E+02	-	1.60E+02	1.06E+02	3.34E+03	-	1.60E+02	1.52E+02	1.60E+00 ca*
Dibromoethane, 1,2-	7.04E+02	-	1.17E+02	1.00E+02	7.51E+03	-	1.17E+02	1.15E+02	5.00E-02 ca
Dichloroethane, 1,2-	4.69E+02	-	4.82E+01	4.37E+01	5.01E+03	-	4.82E+01	4.77E+01	6.52E-01 ca*
Ethylbenzene	7.82E+03	-	8.53E+03	4.08E+03	8.34E+04	-	8.53E+03	7.74E+03	8.02E+00 ca
Lead and Compounds	-	-	-	-	-	-	-	-	4.00E+02 nc
Methyl tert-Butyl Ether (MTBE)	-	-	2.21E+04	2.21E+04	-	-	2.21E+04	2.21E+04	6.38E+01 ca
Acenaphthene	4.69E+03	1.52E+04	-	3.59E+03	5.01E+04	9.12E+04	-	3.23E+04	3.59E+03 nc
Anthracene	2.35E+04	7.61E+04	-	1.79E+04	2.50E+05	4.56E+05	-	1.62E+05	1.79E+04 nc
Benz[a]anthracene	-	-	-	-	-	-	-	-	1.57E-01 ca
Benzo(j)fluoranthene	-	-	-	-	-	-	-	-	4.24E-01 ca
Benzo[a]pyrene	-	-	-	-	-	-	-	-	1.57E-02 ca
Benzo[b]fluoranthene	-	-	-	-	-	-	-	-	1.57E-01 ca
Benzo[k]fluoranthene	-	-	-	-	-	-	-	-	1.57E+00 ca
Chrysene	-	-	-	-	-	-	-	-	1.57E+01 ca
Dibenz[a,h]anthracene	-	-	-	-	-	-	-	-	1.57E-02 ca
Dibenzo(a,e)pyrene	-	-	-	-	-	-	-	-	4.24E-02 ca
Dimethylbenz(a)anthracene, 7,12-	-	-	-	-	-	-	-	-	4.59E-04 ca
Fluoranthene	3.13E+03	1.01E+04	-	2.39E+03	3.34E+04	6.08E+04	-	2.15E+04	2.39E+03 nc
Fluorene	3.13E+03	1.01E+04	-	2.39E+03	3.34E+04	6.08E+04	-	2.15E+04	2.39E+03 nc
Indeno[1,2,3-cd]pyrene	-	-	-	-	-	-	-	-	1.57E-01 ca
Methylnaphthalene, 1-	5.48E+03	1.77E+04	-	4.18E+03	5.84E+04	1.06E+05	-	3.77E+04	1.76E+01 ca
Methylnaphthalene, 2-	3.13E+02	1.01E+03	-	2.39E+02	3.34E+03	6.08E+03	-	2.15E+03	2.39E+02 nc
Naphthalene	1.56E+03	5.07E+03	2.09E+02	1.78E+02	1.67E+04	3.04E+04	2.09E+02	2.05E+02	5.52E+00 ca*
Nitropyrene, 4-	-	-	-	-	-	-	-	-	4.24E-01 ca
Pyrene	2.35E+03	7.61E+03	-	1.79E+03	2.50E+04	4.56E+04	-	1.62E+04	1.79E+03 nc
Toluene	6.26E+03	-	3.23E+04	5.24E+03	6.67E+04	-	3.23E+04	2.18E+04	5.24E+03 sat
Trimethylbenzene, 1,2,4-	-	-	8.34E+01	8.34E+01	-	-	8.34E+01	8.34E+01	8.34E+01 nc
Trimethylbenzene, 1,3,5-	7.82E+02	-	-	7.82E+02	8.34E+03	-	-	8.34E+03	7.82E+02 sat
Xylenes	1.56E+04	-	8.64E+02	8.18E+02	1.67E+05	-	8.64E+02	8.59E+02	8.18E+02 sat

(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 rec. (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; correction in (20) made under s. 13.92 (4) (b) 6, Stats., Register January 2012 No. 673.

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 1 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

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Table 1 – Continued
Public Health Groundwater Quality Standards

Substance¹	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

Substance¹	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

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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 1 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 (MIMO-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:

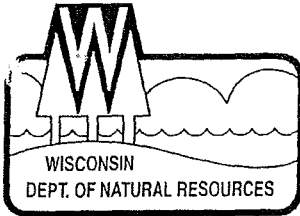
1. The substance has been analytically confirmed to be present in the same sample using an equivalently sensitive analytical method or the same analytical method, and

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

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

APPENDIX E/PROJECT DOCUMENTS



State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Jim Doyle, Governor
Matthew J. Frank, Secretary
John Gozdziński, Regional Director

Northern Region Headquarters
107 Suttiff Ave.
Rhinelander, Wisconsin 54501-3349
Telephone 715-365-8900
FAX 715-365-8932
TTY Access via relay - 711

Mr. Todd Luedtke
426 Crowfoot Avenue
Fond Du Lac, WI 54935

SUBJECT: Possible contamination from former underground storage tanks,
11 West Wisconsin Avenue, Tomahawk, Lincoln County
WDNR BRRTS #:01-35-554426

Dear Mr. Luedtke:

The Wisconsin Department of Natural Resources ("Department") has been notified of petroleum contamination at the theater located at 17 W. Wisconsin Avenue, Tomahawk. On October 30, 2009 the Tomahawk Fire Department responded to a complaint of petroleum odors associated with a water leak in the eastern basement wall of the theater. I visited the theater on November 2, 2009 and observed the basement and the petroleum odors. Based on the information available there does not appear to be a source of petroleum contamination on the theater property.

As part of the on-going investigation, the Department is looking for potential sources of this contamination. Your property, located immediately east of the theater, has been identified as a potential source of contamination, due to its proximity to the site, the fact that four underground storage tanks were in use at the property until 1986 and potential contamination was not investigated at the time the tanks were removed. I attempted to contact you by telephone on November 4, 2009 to discuss this situation.

The Department is sending this letter to request you conduct an environmental assessment of your property to determine if past petroleum storage on the property is the source of the petroleum contamination found at the theater.

An environmental assessment typically consists of investigation of the history and uses of the property to determine potential areas of environmental concerns. On your property this would include investigation of the former underground storage tanks ("USTs") including the dates the USTs were in use, the location of the USTs, pump islands, and petroleum piping to determine likely source areas of potential contamination. Following the initial investigation of the site soil and groundwater samples would be collected and analyzed to determine if past petroleum storage on your property caused soil and groundwater contamination. The environmental assessment is typically conducted by a professional environmental consultant. Attached is a

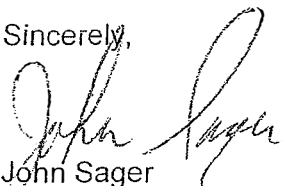
list of some environmental consultants in the area. A comprehensive list can be found on the Department's internet site <http://dnr.wi.gov/org/aw/rr/archives/pubs/RR024.pdf>.

Be aware that the Wisconsin Department of Commerce administers the Petroleum Environmental Cleanup Fund (PECFA) Program that reimburses money spent conducting investigation and cleanup of underground storage tank sites. An environmental consultant can provide you with information on the PECFA Program or you can contact the Department of Commerce (608) 266-7605. Information on PECFA is also available on the internet <http://commerce.wi.gov/ER/ER-PECFA-Home.html>.

Within 30 days of receipt of this notice, please provide me with a letter containing information on how you intend to respond to this situation. This information is requested by the Department under the authority of s. 292.11(7)(a) and s. 292.11(8), Wis. Stats.

Your cooperation in this matter is appreciated. Please contact me at (715) 365-8959 to discuss this correspondence.

Sincerely,



John Sager
Hydrogeologist
Bureau for Remediation & Redevelopment

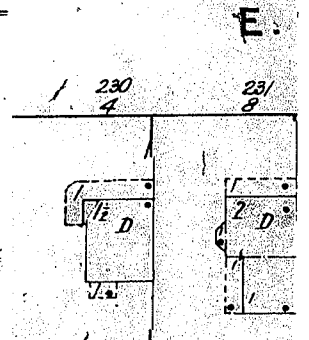
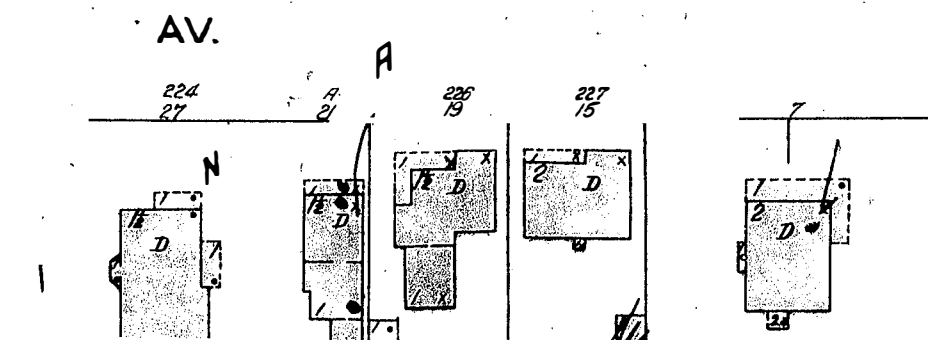
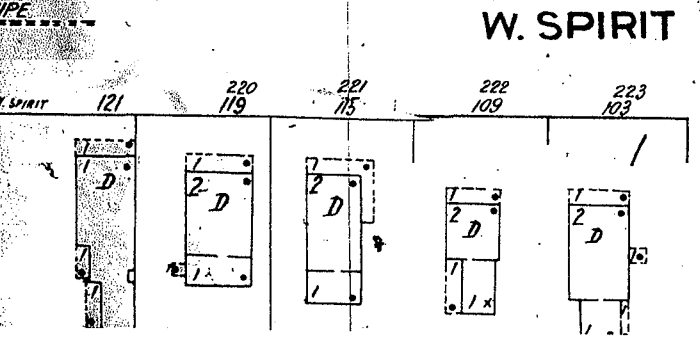
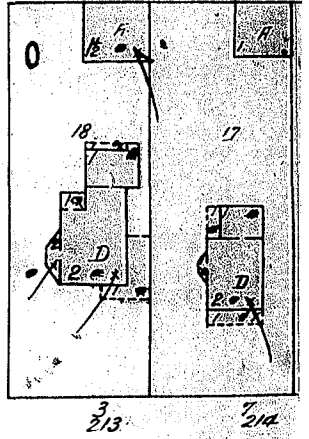
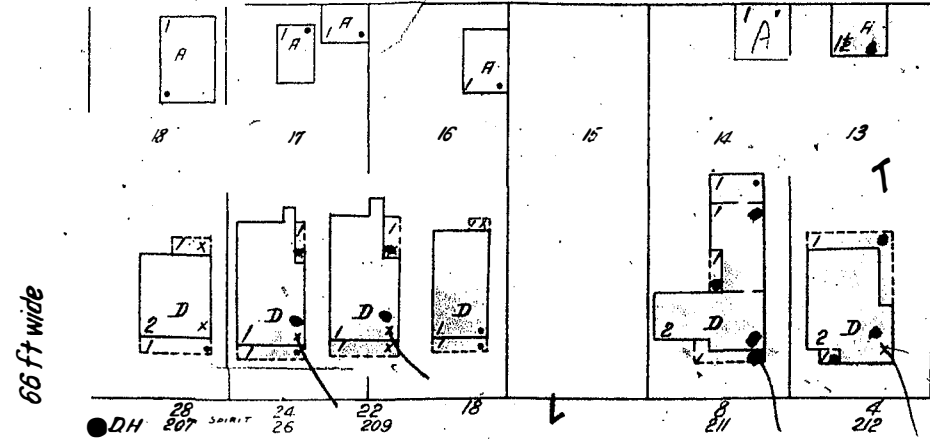
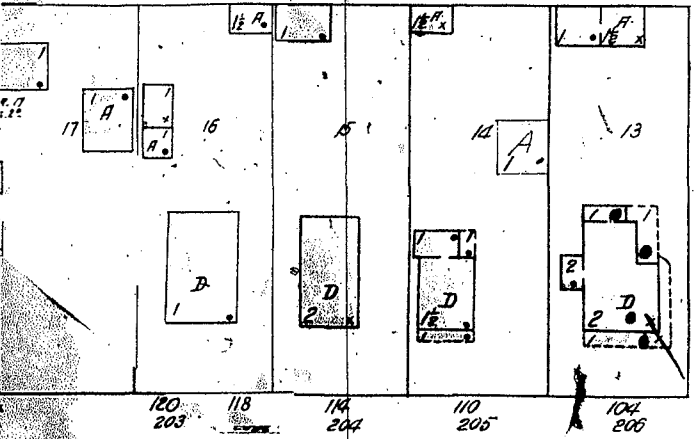
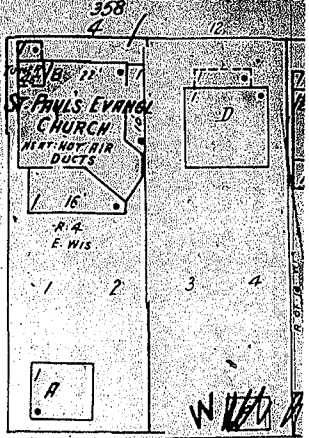
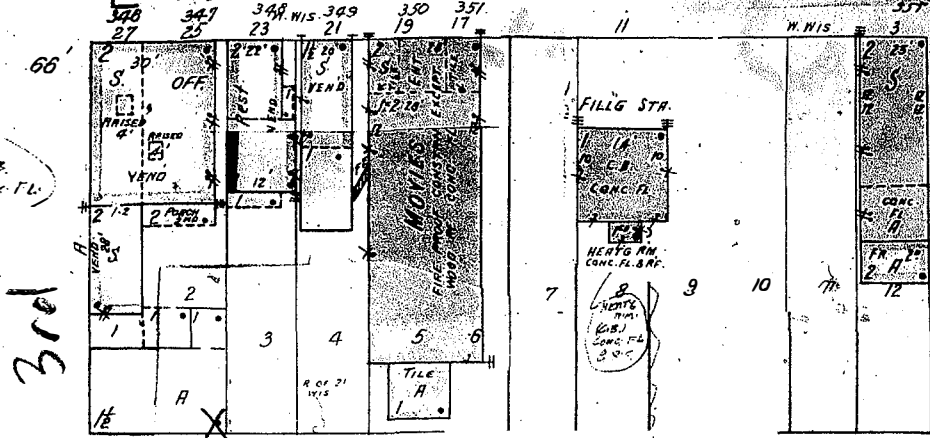
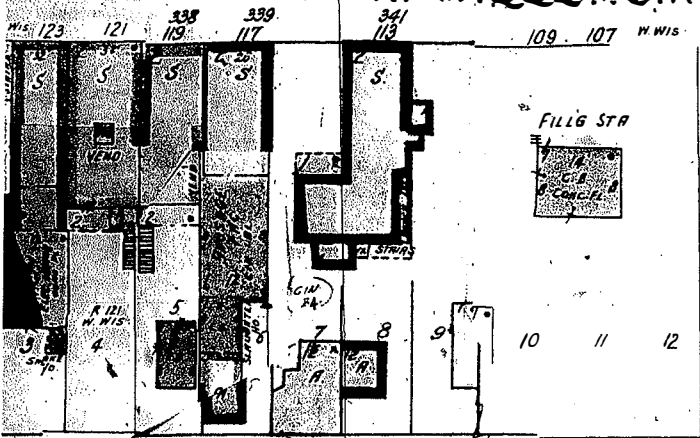
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W. WISCONSIN

2 AV.

E. WISCO



**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

APPENDIX F/HEALTH AND SAFETY PLAN

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

Safety Plan Information

Company Name: METCO

Contact Information: Jason Powell
709 Gillette Street, Suite 3
La Crosse, WI 54603
(608) 781-8879

Site Information

METCO Project #: C2578

Site Name: Luedtke Property
Site address: 11 W Wisconsin Avenue
Tomahawk, WI 54487

County: Lincoln

WDNR Contact: Carrie Stoltz
107 Sutliff Avenue
Rhinelander, WI 54501
(715) 365-8942

WDNR BRRTS Case #: 03-35-554426

Purpose of Activity (Check all that apply)

Petroleum Release Investigation	<input checked="" type="checkbox"/>
Ag Chemical Release Investigation	<input type="checkbox"/>
Install Soil Borings/Monitoring Wells	<input checked="" type="checkbox"/>
Tank/Piping Removal	<input type="checkbox"/>
Tank/Piping Closure Assessment	<input type="checkbox"/>
Phase 1/Phase 2 Environmental Site Assessment	<input type="checkbox"/>
Install Remedial System	<input type="checkbox"/>
Other	<input type="checkbox"/>

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

Tank Information

Tank Size (Gallons)	Contents	Age
10,000	Leaded Gasoline	Removed (1986)
10,000	Leaded Gasoline	Removed (1986)
10,000	Leaded Gasoline	Removed (1986)
10,000	Leaded Gasoline	Removed (1986)

Potential Health and Safety Hazards (Check all that apply)

Handling/Transfer of Product (Fire, Explosions)	<input type="checkbox"/>
General Construction (Electrical Hazards, Physical Injury)	<input checked="" type="checkbox"/>
Confined Space Entry (Explosions)	<input type="checkbox"/>
Heavy Equipment	<input checked="" type="checkbox"/>
Noise	<input checked="" type="checkbox"/>
Underground and Overhead Utilities	<input checked="" type="checkbox"/>
Site Traffic	<input checked="" type="checkbox"/>
Oxygen Depletion	<input type="checkbox"/>
Excavation (Cave Ins, Falls, Slips)	<input type="checkbox"/>
Poisonous Plants	<input type="checkbox"/>
Snakes, Insects, Rodents	<input type="checkbox"/>
Heat, Cold	<input checked="" type="checkbox"/>
Other	<input type="checkbox"/>

Evaluation of Chemical Hazards

Name	Physical State	Route of Entry	TWA/STEL	Symptoms of Exposure
Gasoline	Vapor/Liquid	Inhalation/Skin	300/500 ppm	Irritation, Nausea, Vomiting, Dizziness, Unconsciousness

On-Site Personnel Responsibilities

	Team Member	Responsibility
1.	Ron Anderson	Senior Project Manager
2.	Jason Powell	Site Project Manager
3.	Eric Dahl	Hydrogeologist
4.	Jon Jensen	Staff Scientist
5.	Matt Michalski	Hydrogeologist
6.	Bryce Kujawa	Hydrogeologist

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

Method to Control Potential Health and Safety Hazards

Monitoring Instruments

Photoionization Detector (PID)	X
Flame Ionization Detector (FID)	
Combustible Gas Indicator	
Four Gas Meter	
Detector Tubes	

Action Levels	Action
0-10% LEL (No Explosion Hazard)	None
Oxygen Deficient (Less Than 21%)	Notify Health & Safety Officer
Oxygen Deficient (Less Than 19%)	Evacuate

Personal Protective Equipment

Minimum Requirements:

1. Hardhat
2. Safety Glasses/Goggles
3. Steel Toe Shoes or Boots
4. Flame Retardant Coveralls
5. Hearing Protection (Muffs or Ear Plugs)

Is additional PPE required? 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 Cartridge:	
SCBA/SAR	
Other	

Level of Protection Designated: D

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

Site Control

Work Zones

Support Zone: Beyond a 25 foot radius of drilling or excavation and upwind of operation.
Contamination Reduction Zone: Between 15 and 25 foot radius of drilling or excavation.
Exclusion Zone: Within 15 foot radius of of drilling or excavation.

Site Entry Procedure: Obtain all approval and instructions from project manager.

Decontamination Procedures:

Personnel: Remove protective equipment and wash hands prior to eating.
Equipment: Wash with brush and Alconox soap, rinse with fresh tap 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 minimum.

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

Employee Limitations:

Site Resources:

Shower	<input type="checkbox"/>
Water Supply	<input checked="" type="checkbox"/>

Contingency Planning

<u>Emergency Contacts</u>	Phone Number
Ambulance: Tomahawk	911
Hospital Emergency Room: Sacred Heart Hospital	(715) 453-7700
Poison Control Center: Milwaukee	(800) 222-1222
Police: Tomahawk	911
Fire Department: Tomahawk	911
Hazardous Waste Response Center: Wisconsin	(800) 943-0003
EPA	(800) 424-8802

Location Address: 11 W Wisconsin Avenue, Tomahawk, WI 54487

Site Investigation Field Procedures Workplan - METCO Luedtke Property

Hospital: Sacred Heart Hospital
401 W Mohawk Drive
Tomahawk, WI 54487
(715) 453-7700

Emergency Route:

1. Head **east** on **W Wisconsin Ave** toward **S 4th St** 102 ft
2. Turn **left** onto **N 4th St** 1.3 mi
3. Turn **left** onto **W Mohawk Dr** 0.2 mi
4. Turn **left** 0.1 mi
5. Turn **left** 98 ft
Destination will be on the right

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 manager.
- 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 Manager: Jason Powell	work	(608) 781-8879
	cell	(608) 385-1467
METCO Safety Officer: Brian Hora	work	(800) 236-0448
	cell	(608) 604-2933
METCO Corporate Contact: Paul Knower	work	(800) 236-0448
	cell	(608) 604-2931
Client Contact: Todd Luedtke		(920) 602-4910

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. Emergency Phone Numbers
10. Know Where the Site Safety Plan Is

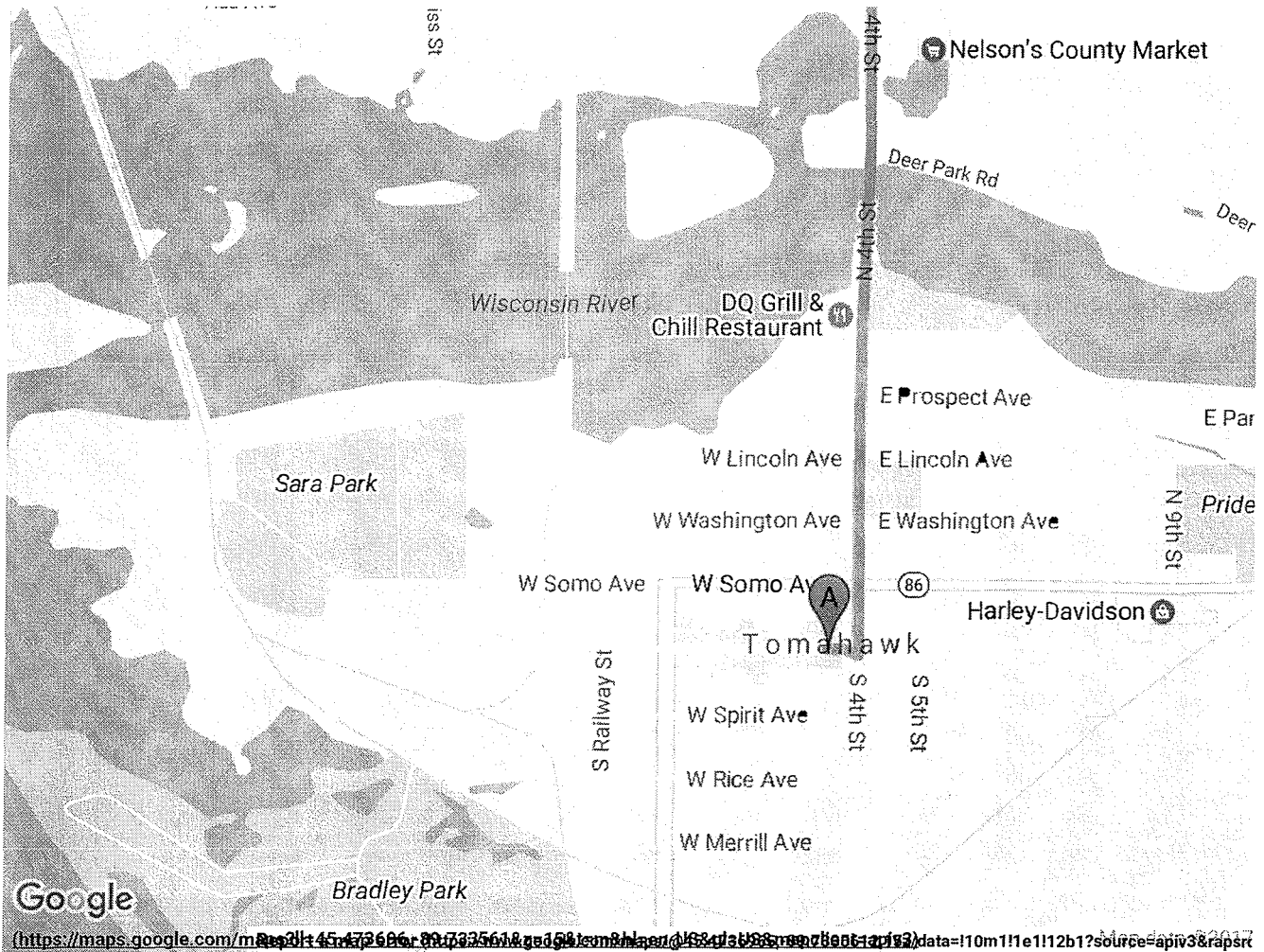
US Hospital Finder (//)™: Directions

From: 11 W Wisconsin Avenue, Tomahawk, WI

To: Sacred Heart Hospital 401 West Mohawk Drive Tomahawk, WI 54487

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Enter your zip code and find a doctor nearby who can provide help and treatment. Go to F treatment website



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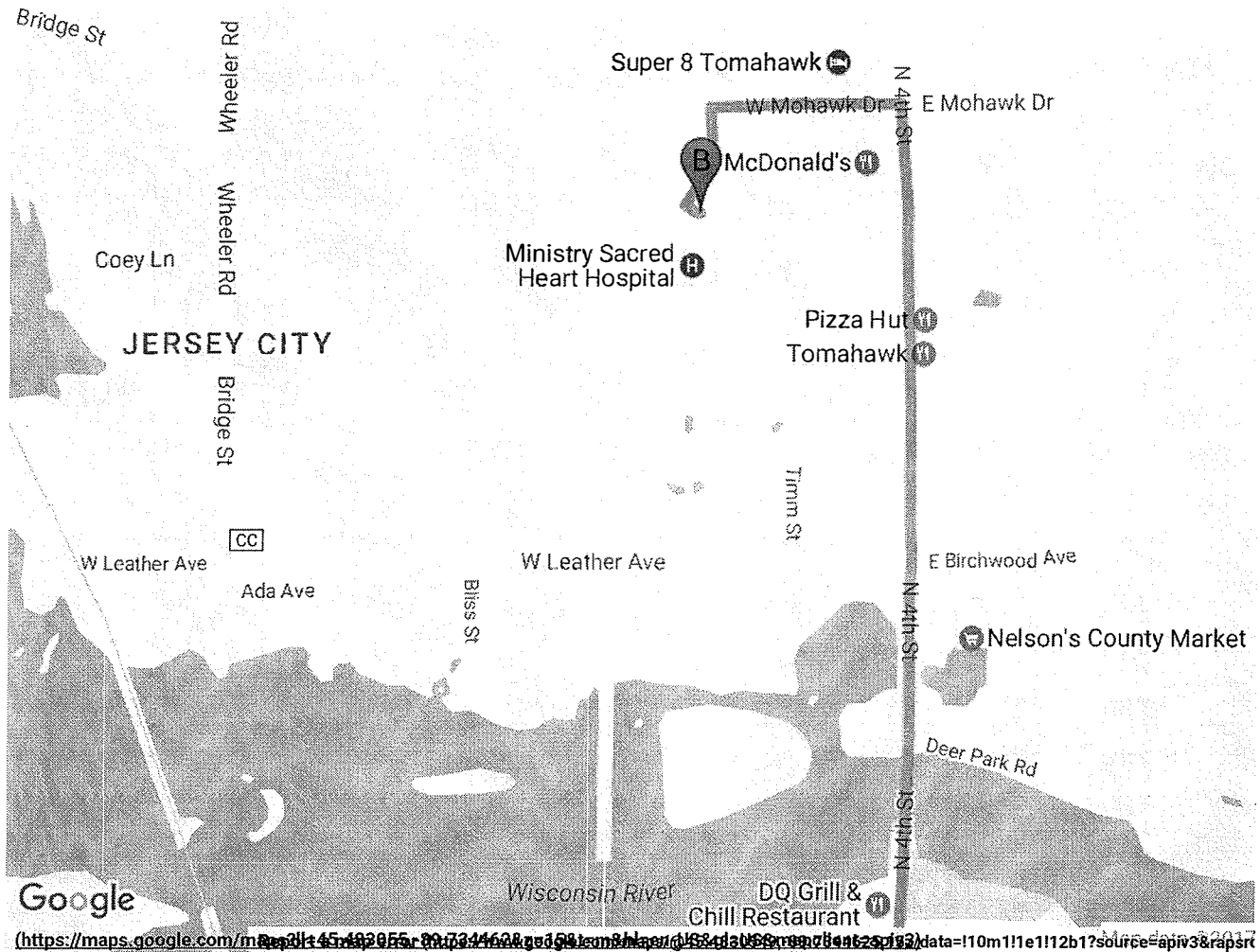
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To: Sacred Heart Hospital 401 West Mohawk Drive Tomahawk, WI 54487

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(https://maps.google.com/maps?hl=en&ll=45.493955,-89.734462&gl=us&data=!1m1!1e1!1m2b1?source=apiv3&rapr...

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**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

APPENDIX G/QUALIFICATIONS

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

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 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.

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 1,465 environmental sites.

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

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.

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

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).

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.

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

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.

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

Jon Jensen

Professional Title

- Staff Scientist

Credentials

- Registered through the Wisconsin Department of Safety and Professional Services as a PECFA consultant (#1294924).

Education

Includes B.S. in Geography with and Environmental Science minor from University of Wisconsin – La Crosse: Applicable courses successfully completed include Interpretation of Aerial Photographs, Intro to GIS, Advanced Remote Sensing, Fundamentals of Cartography, Biogeography, and Conservation of Global Environments.

Work Experience

With METCO since July, 2014 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.

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

Matthew C. Michalski

Professional Title

- Hydrogeologist

Credentials

- Registered through the Wisconsin Department of Safety and Professional Services as a PECFA consultant (#1261443).
- Member of the Wisconsin Groundwater Association
- Member of the Minnesota Groundwater Association
- Member of the National Groundwater Association
- Member of the American Institute of Professional Geologist
- Member of the Geological Society of America

Education

Includes B.S. in Geology with an emphasis in Hydrogeology and Water Chemistry from the University of Wisconsin-Eau Claire, completion of Western Michigan University's Hydrogeology Field Camp, a B.S. In Geography from the University of Wisconsin-La Crosse. Applicable courses successfully completed include Hydrogeology, Contaminant Hydrogeology, Aqueous Geochemistry, Geomorphology and Aerial Photography interpretation, Sedimentology and Stratigraphy, Structural Geology, Mineralogy and Petrology, Hazardous Waste Operation and Emergency Response, Surface Geophysics, Principles and Practices of Groundwater Sampling and Monitoring, Principles and Practices of Aquifer Testing, Principles of Well Drilling and Installation, Remediation Design and Implementation, Water Resources, Environmental Hazards and Land Use, and Advanced Map Design.

Post-Graduate Education

40-hour OSHA Hazardous Materials Safety Training course.

Work Experience

With METCO since May 2016 as a Hydrogeologist and from August 2012 to August 2014 as a Staff Scientist. Duties have included: soil and groundwater sampling, 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), and operation and maintenance of remedial systems, site mapping, data reduction and analysis, and reporting.

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

Bryce Kujawa

Professional Title

- Staff Scientist

Credentials

- Registered through the Wisconsin Department of Safety and Professional Services as a PECFA consultant (#17138).
- 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 Hydrogeology, Contaminant Hydrogeology, Field Geology I and II, Mineralogy and Petrology I and II, Sedimentology and Stratigraphy, Petroleum and Economic Geology, Earth History, Physical Geology, Structural Geology, Computers in Geology, Geographic Informational Systems, Global Environmental Change, and General Chemistry.

Work Experience

With METCO since June, 2016 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.

**Site Investigation Field Procedures Workplan - METCO
Luedtke Property**

APPENDIX H/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