



Rock Co.

250 EAST WISCONSIN AVENUE, SUITE 1500, MILWAUKEE, WISCONSIN 53202-4209
(414) 347-0800 FAX: (414) 347-0288

March 20, 1992

Mr. Ron Curtis
Department of Natural Resources
3711 Fish Hatchery Road
Madison, WI 53711

Dear Ron:

Please find enclosed the Phase III Subsurface Investigation Report for the **Ursula Borgerding Estate Property**. Please feel free to contact me if you have any questions.

Sincerely,

Dames & Moore, Inc.

A handwritten signature in blue ink, appearing to read "Kristine M. Stehr".

Kristine M. Stehr
Hydrogeologist

cc: Frances B. Sheehy
John Borgerding
Robert Consigny
Dick Freeze
Richard Hemming

RC - 3/23/92

COPY

**PHASE III
SUBSURFACE INVESTIGATION PLAN
URSULA BORGERDING ESTATE**

SUBSURFACE INVESTIGATION PLAN

for

URSULA BORGERDING ESTATE

435 Woodward Avenue

Beloit, Wisconsin

Prepared by:

Dames & Moore, Ltd.

250 E. Wisconsin Ave.

Suite 1500

Milwaukee, WI 53202

(414) 347-0800

SUBSURFACE INVESTIGATION PLAN

INTRODUCTION

The Ursula Borgerding Estate property is located at 435 Woodward Avenue, Beloit, Wisconsin. The property occupies a portion of the northeast $\frac{1}{4}$ of the northeast $\frac{1}{4}$ of Section 35, Township 1 north, Range 12 east (NE $\frac{1}{4}$, NE $\frac{1}{4}$, Sec. 35, T.1N, R.12E; Figure 1). The site is bounded by the Rock River to the west, Woodward Avenue to the south, and a City of Beloit "green area" to the north. East of the property is the Chicago, Milwaukee and St. Paul Chicago and Northwestern railroad line and commercial development.

The site is located on the flood plain of the Rock River. There is little topographic expression at the site; however, the ground elevation rises approximately 30 feet over a 500-foot distance immediately east of Pleasant Street, less than 200 feet east of the site.

In conjunction with plans to sell the property, six underground storage tanks and three above-ground tanks were removed and an environmental investigation, in accordance with Department of Industry, Labor and Human Relations (DILHR) was performed in November, 1989. During the closure investigation, it became apparent that the soil and ground water in the area of the underground storage tanks had been impacted.

A second subsurface investigation was performed at the property. The purpose of the investigation was to determine the lateral and vertical boundaries of soil and ground water impact at the site resulting from (1) the operation of underground petroleum storage tanks (2) the May 24, 1984, documented gasoline release, and (3) historical activities at the site.

The conclusions made in the second subsurface investigation were based upon a review of historical documents, the installation of eleven soil borings, and the installation of six ground water monitoring wells. During the installation of the soil borings and monitoring wells, strong petroleum odors, and in some cases, soils nearly saturated with dark brown to black, oily materials, were encountered in all of the borings except monitoring well number six (Figure 2). Dark brown, grey or black foundry sand fill material was encountered in all of the borings except boring B-8 (Figure 2).

Laboratory analyses indicated that soil impact due to diesel fuel was found throughout the site, but was not consistent with the historical use of the underground storage tanks. It was suggested that the diesel fuel impact may be due to above-ground storage tanks, possibly belonging to Deep Rock, foundry fill contaminated with diesel fuel, or past practices of using diesel fuel to control dust.

In monitoring wells MW-1, MW-2 and MW-3, detectable limits of benzene, toluene, ethylbenzene and xylene (BTEX) were identified. Method 8240 was performed on water samples collected from monitoring wells MW-6, MW-7 and MW-10. None of the compounds analyzed in method 8240 were detected in MW-6. Benzene was detected in MW-7 and MW-10. Also in MW-10, 2-hexanone and MIBK were identified. Additional data obtained regarding the ground water included hydraulic gradient, average linear velocity, and estimates of hydraulic conductivity.

Recommendations made as a result of the second subsurface investigation were constrained due to evidence of "historical contamination" of the site and surrounding area. A "pump and treat" attempt at ground water remediation was suggested to address the on-site impact, including a carbon adsorption phase. The final report was forwarded to the Wisconsin Department of Natural Resources (WDNR) for review.

U.S.T. related only or at least primarily.

In March, 1991, Mr. Ron Curtis, WDNR Project Manager for this case, forwarded the WDNR's recommendations for additional subsurface investigation, including a more detailed definition of the hydrogeology of the site, contaminant definition, and background definition of the surrounding properties. Based on those recommendations, the following additional subsurface investigation work plan is presented.

GOALS OF THE PHASE III INVESTIGATION

The goals of this subsurface investigation are:

- Define ground water flow characteristics.
- Define chemical background conditions of the ground water and soil.

- Define horizontal and vertical contaminant concentration boundaries, including horizontal and vertical contaminant migration potential.
- Develop remedial alternatives for restoration of impacted soil and ground water at the site.

PROCEDURES

Note: Prior to any soil boring or excavation activities, Digger's Hotline (259-1181) will be contacted at least three working days in advance.

To meet the objectives of the subsurface investigation, and to address the concerns voiced by the WDNR with respect to the site, several tasks must be accomplished. Each of the major tasks outlined below will, obviously, consist of many subtasks. Throughout the course of the investigation, generally acceptable investigation procedures will be followed, including standard ASTM methods, Wisconsin Administrative Code mandates (such as N.R. 141), federal safety regulations (29 CFR), and EPA approved procedures (such as analytical methods for soil and water samples). Prior to the initiation of any activities (for example, installation of monitoring wells), the WDNR project manager will be contacted for his concurrence and/or comments.

Necessary work tasks include, in approximately chronological order:

- Aerial photography and survey mapping of the site and surrounding area, to include approximately 40 acres around the property. The maps generated from the photography and survey will be used to identify well locations, ground elevation contours, ground water contours, ground water flow direction, and, if practical, distribution of impacted areas. All maps will conform to National Map Accuracy Standards and will reference USGS benchmarks and state plane coordinate system.
- Historical aerial photography review and historical records review. The purpose of the reviews will be to identify past uses of the property including

the surrounding areas. In particular, the location of the above ground storage tanks and fill operations on or near the property will be of significance.

- Identification of potential receptors of ground water down gradient from the site. The identification of such receptors will occur during the mapping of the property and the historical records review.
- Installation of additional soil borings and ground water monitoring wells. The purpose of the soil borings is to better define areas of impacted soil and potential sources of ground water impact. The purpose of the ground water monitoring wells is to aid in the definition of ground water characteristics, including flow direction, gradient and quality.
- Collection and laboratory analyses of soil and ground water samples. Analyses will include physical and chemical parameters, such as petroleum volatile organic compounds (PVOC, method 8021), grain size analysis, and total organic carbon. These parameters are required by the WDNR and are also required for the determination of contaminant transport factors at the site. Data collected will also be used to determine the background quality of soil and ground water in the vicinity of the site.
- Ground water flow characteristics testing, including water level measurements, slug testing, and velocity and gradient calculations. The ground water information is necessary to determine flow rates and directions, to include contaminant transport factors.
- Identification of impacted areas. Impacted areas will be identified as those areas impacted by: (1) gasoline, (2) diesel fuel, and (3) other identified compounds. The WDNR has requested the identification of impacted areas.
- Collection and laboratory analysis of the unidentified, dark-colored, oily product previously found in the soils at the site.
- Disposal of impacted soil, including drilling spoil and excavation material. The soil must be properly disposed to prevent additional impact to the site.

Other field and laboratory activities will also be conducted as necessary, or as deemed appropriate by the Project Manager. For example, computer modeling of the ground water flow parameters may provide useful information regarding contaminant transport potential.

Prior to the installation of new monitoring wells, the existing wells will be examined to ensure their integrity (i.e., check for vandalism, etc.). If the wells are in good condition, monthly water level measurements will be taken and recorded starting upon approval from the WDNR project manager. The water level measurements will be compiled and assessed for seasonal variations during the course of the investigation. The water level measurements will also be useful in identifying potential receptors of ground water.

Using the information gained from the first round of water level measurements, estimates of ground water contours will be plotted on a site map. From the ground water contours, estimates of ground water flow direction will be used in determining the locations of new monitoring wells. An estimated six new wells will be installed. (Prior to actual well installation, the WDNR project manager will be contacted for his/her approval of the recommended locations.) Proposed locations of the wells include two off-site wells to the east of the property, three off-site wells to the north of the property, and one well installed at the southwest corner of the property. The wells will be installed in accordance with N.R. 141, with variances as authorized by the WDNR project manager.

The wells will be developed as required in N.R. 141 prior to the collection of ground water sampling and other ground water characteristics testing. The locations and elevations of the wells (including ground elevation, top of casing elevation, ground water elevation, and top and bottom of screen elevations) will be measured (calculated), and plotted on the site maps prepared from the aerial photography. Horizontal measurements will be to the nearest 0.1 foot, vertical measurements will be to the nearest 0.01 foot. Ground water contours will be displayed in 1-foot contour intervals or an interval deemed appropriate, based on ground water gradient and map scale.

Soil sampling activities will include the collection of soil samples on a continuous basis during the installation of the six new monitoring wells. Co-located samples will be collected, if possible, from each sampling location. The co-located sample will be field screened and the primary sample will remain sealed, pending laboratory analysis. This procedure will ensure the integrity of laboratory VOC analyses. Laboratory analysis results will be plotted on the

base map to form isoconcentration maps of the impacted soil. This procedure will allow easier interpretation and definition of impacted areas.

In addition to the installation of six new monitoring wells, three new wells will be installed as piezometers within ten feet of three of the existing wells. Installation of a piezometer within ten feet of an existing monitoring well will constitute a "well nest." The three well nests will be used to obtain data regarding the vertical component of ground water flow. At this time, it is not anticipated that soil samples will be collected from the piezometers, however, ground water samples will be collected and submitted for laboratory analysis in order to determine vertical ground water quality.

SOIL SAMPLING PLAN

Objectives

The objectives of this sampling plan are to:

- Summarize the rationale used to select sample locations.
- Describe the procedures used for sample collection, preservation, packaging and transport.
- Define the necessary documentation for sample custody and record keeping.

Sample Locations

Soil samples will be collected during the installation of six new ground water monitoring wells. Proposed locations of the wells include two off-site wells to the east of the property, three off-site wells to the north of the property, and one well installed at the southwest corner of the property. Soil samples collected and submitted for laboratory analysis from the new monitoring wells will be analyzed for TPH, total lead and PVOCs (method 8021).

Sample Collection Procedures

General procedures to be followed for collecting soil samples at the site are detailed below.

1. Standard undisturbed-soil sample collection procedures will be used in conjunction with the installation of ground water monitoring wells. A steel

split barrel sampling tube will be used for the collection and retrieval of the soil samples. Upon retrieval of the split barrel sampler, necessary field measurements (length of recovered sample, location of layers, etc.) and descriptions will be made. As soon as practically possible, a portion, or all, of the recovered soil will be containerized for eventual laboratory analysis.

2. Samples intended for PVOC or TPH analysis will be collected in 4-ounce glass jars without preservatives. The jars will be packed with as much soil as will fit and then securely capped with a teflon-lined lid. Co-located samples will be collected from each sampling point. The co-located sample will be loosely packed to provide sufficient head space to optimize PID analysis.
 - a. Samples intended for T.O.C. analysis will be containerized in a 4-ounce glass jar. The jar will be filled, but not necessarily packed.
 - b. Samples intended for grain size analysis (sieve analysis) will be containerized in an 8-ounce glass jar.
 - c. Samples intended for metals analysis will be containerized in 1-quart glass or plastic jars.
3. After the sample jar has been filled and closed, identification labeling will be completed with respect to sampling location, identifier and depth of sample. The jar will be placed in an insulated container to protect it from sunlight and temperature extremes.
4. Visual observation will be made of the materials encountered during drilling. Samples will be described in the field and may include information pertaining to the soil type, grain size distribution, gradation, plasticity, color, odor, moisture content, consistency, density, grain shape and lithology, structure, and photoionizable constituent content.

5. All sampling locations will be documented in a bound field notebook used to record all daily activities performed at the site. Entries will be written in sufficient detail so that a particular situation can be reconstructed.
6. Upon completion of sampling activities for the day, the co-located samples will be screened in the field using a PID. PID instrument readings will be recorded in the field notebook, as well as noted on the sample label for use by the laboratory.
7. PID readings from the co-located sample will be assumed to be similar to the primary sample. As such, the primary sample will not be screened using the PID. Instead, the primary sample will be submitted for laboratory analysis. This procedure will reduce the escape of volatile components from the sample submitted for laboratory analysis.
8. Two samples will be selected from each boring for submission to the laboratory. Criteria for selection will be, among other factors, the highest PID reading and the lowest extent of impact. Other factors may include soil conditions and depth to the water table.
9. Proper chain of custody documentation will be completed and the samples will be delivered to the laboratory for analysis. Copies of all documentation will be maintained in the project files.

Sample Custody

Sample custody procedures are designed to comply with U.S. EPA and National Enforcement Investigation Council (NEIC) requirements for sample control. Samples collected during the site investigation will be the responsibility of identified persons from the time they are collected until they or their derived data are incorporated into the final report. Stringent chain-of-custody procedures will be followed to maintain and document sample possession. A sample or evidence file is under your custody if it:

- Is in your possession.
- Is in your view, after being in your possession.

- Was in your possession and you placed them in a secured location.
- Is in a designated secure area.

Chain-of-custody forms will be completed to the fullest extent possible prior to sample shipment. They will include the following information: sample number, date collected, source of sample (including type of sample and site name), and name of sampler. These forms will be filled out in a legible manner using waterproof ink and will be signed by the sampler. Similar information will be provided on the sample tag, which will be securely attached to the sample bottle.

The following procedure will be used when transferring custody of samples:

- Samples will always be accompanied by a chain-of-custody record. When transferring samples, the individuals relinquishing and receiving them will sign, date and note the time on the record. This record documents sample custody transfer from the sampler, often through another person, to the laboratory.
- Samples will be packaged properly for shipment and dispatched to the appropriate laboratory for analysis with a separate custody record accompanying each shipment. Shipping containers will be sealed for shipment to the laboratory. The method of shipment, courier name and other pertinent information will be entered in the remarks section of the custody record.
- All shipment will be accompanied by the chain-of-custody record identifying its contents. The original record will accompany the shipment and a copy will be retained by the field sampler and filed immediately upon return to the office.
- Proper documentation will be maintained for shipment by common carrier.

The following procedures will be followed when shipping samples for laboratory analysis:

- Samples requiring refrigeration will be promptly chilled with "Blue Ice" to a temperature of 4° C (\pm 2° C) and packaged in an insulated container/shuttle for transport to the analyzing laboratory.
- Only shipping containers which meet all applicable state and federal standards for safe shipment will be used.
- The shipping containers will be sealed in a manner that will allow the receiver to quickly identify any tampering which may have taken place during transport to the laboratory.

- The field chain-of-custody document will be placed inside the shipping container in a sealed plastic envelope after the courier has signed the document.
- Shipment will be by overnight courier.

WATER SAMPLING PLAN

Objectives

The objectives of this sampling plan are to:

- Summarize the rationale used to select sample locations.
- Describe the procedures used for sample collection, preservation, packaging and transport.
- Define the necessary documentation for sample custody and record keeping.

Sample Locations

Ground water samples will be collected from all ground water monitoring wells presently on-site (and in acceptable condition) and from all ground water monitoring wells scheduled for installation. Water sample analysis parameters vary however, based on the location of each well.

A discussion of the degradation of ketones is included as Appendix A. Because ketones are not expected to degrade at the site, analysis for the degradation products will not be conducted.

As required by the WDNR project manager, all of the monitoring wells will be sampled and analyzed for PVOCs (method 8021), RCRA metals and MTBE. Additionally, the well located at the eastern edge of the property (MW-10) will be sampled and analyzed for method 8240. The piezometer to be installed at MW-10, the two new wells to be installed off-site to the east of the property, one off-site well to the north, and one on-site upgradient well, will be sampled for the individual parameters previously identified in MW-10. The previously identified compounds are 2-hexanone and MIBK, based on previous analysis of ground water from MW-10 using method 8240.

Sample Collection Procedures

Ground water samples collected for the analysis of PVOCs, MTBE, method 8240 and selected VOCs will be collected using PVC or teflon bailers that have been previously washed in a TSP solution and triple rinsed. Sample containers will be three 40 ml vials (unpreserved) per sample. Sample vials will be filled until a positive meniscus forms, securely capped, inverted and firmly tapped to check for the presence of air bubbles. If bubbles are present, the entire sample will be discarded in the purge water drum. If bubbles

are not present, the sample will be labeled and stored in accordance with the procedures outlined above.

Ground water samples collected for the analysis of metals will be collected using PVC or teflon bailers that have been previously washed in a TSP solution and triple rinsed. The sample container will be plastic, one liter, bottles preserved with nitric acid (HNO₃). Samples will be pressure-filtered through acetate 0.45 μm filters in the field, prior to containerization.

Sample Custody

Water sample custody procedures will be essentially identical to the procedures detailed for soil samples.

SCHEDULE

For a project of the complexity as this investigation, approximately six months time will be required from WDNR approval through PECFA documentation and project closure. A project "milestone" chart is attached to provide clarification of the time required for each major phase of the project.

COST ESTIMATE

Actual project costs will be billed on a time and materials basis in accordance with the attached Dames & Moore Standard Schedule of Charges. However, the total cost of the project will not exceed the estimated amount without prior permission of the Ursula Borgerding Estate. The following table details the cost estimate, including labor fees, subcontractor fees, laboratory fees, equipment costs, and project expenses.

HEALTH AND SAFETY PLAN

Introduction

This Personnel Site Health and Safety Plan (HASP) has been prepared for use in conjunction with the subsurface investigation work plan at the Ursula Borgerding Estate, Beloit, Wisconsin. The HASP was developed using Federal Regulations and published guidelines, texts and references. Guidelines provided by the above resources have been supplemented by a site visit.

The protection of workers and environmental safety and health are major concerns on all projects and cannot be compromised. The objective of this health and safety plan is to assure that safe working conditions exist at the site. The safety organization and procedures have been established based on an analysis of potential hazards and personnel protection measures, which have been selected in response to these risks.

The elements of the HASP are based upon requirements described in the U.S. EPA Standard Operating Safety Guide, the U.S. Department of Labor, OSHA Standards 29 CFR Part 1910. All reasonable precautions shall be taken by Dames & Moore, Ltd. and its subcontractors to ensure the safety and health of workers and the general public. All work will be performed in accordance with applicable Federal, State and local regulations and recommendations.

Responsibility

Dames & Moore will be responsible for its personnel, subcontractors and site visitors' adherence to the HASP during the investigation and will ensure that all work is performed in accordance with the health and safety requirements described herein, the current edition of the Standard Operating Safety Guides prepared by the U.S. EPA office of Emergency and Remedial Response, Hazardous Response Support Division and all Federal, OSHA, State and local health and safety regulations.

Ms. Kristine Stehr has been designated as the Site Health and Safety Officer to implement, monitor and enforce the Site Health and Safety Plan. The Site Health and Safety Officer, or her designated representative, has the option to implement requirements in addition to those described herein on a case-by-case basis. Should an unforeseen or site-specific safety related factor, hazard or condition become evident during the investigation, Ms. Stehr will

take action to re-establish safe working conditions and to safeguard site personnel, the public and environment. Actions taken to safeguard workers beyond the measures described in this plan will be verbally communicated and subsequently submitted in writing.

Known and Suspected Physical and Chemical Hazards

The area of impact is known to contain varying concentrations of diesel fuel and gasoline. No smoking, eating, or drinking will be permitted in the vicinity of the impacted areas.

During the course of the remedial activities, as air, water, soil or other hazardous substance monitoring and sampling data become available, such hazards will be evaluated with respect to the risk to workers, and appropriate changes will be made to the safety plan.

Potential Contamination Sources and Hazard Evaluation

Constant attention shall be given to protecting on-site personnel from the physical and chemical hazards that may be encountered during the investigation. The field activities previously described consist generally of soil sampling. An evaluation of the potential hazards has been completed utilizing available site history and existing soil sample data. The following potential exposure pathways have been identified:

- Ingestion of contaminated sediments and surface soils (accidental/poor hygiene).
- Ingestion of contaminated particles.
- Dermal contact with contaminated sediments and surface soils.
- Inhalation of volatile contaminants during excavation operations.
- Dermal contact with contaminated equipment and structures.

Personnel Protection Program

A Personnel Protection Program has been established and will be maintained for Dames & Moore personnel working at the site. Dames & Moore will provide any necessary safety and health training to its employees assigned to the site for the purpose of performing or

supervising work, health and safety, security, administrative purposes or for any other site investigation-related function. Separate protocol will be followed for site visitors and is described in a later section. Separate protocol will be followed for subcontractor personnel as required by the subcontractor.

Based on the existing data collected at the site, the use of respiratory protective equipment is expected to be limited. Level D protection has been selected for site activities. Protection will be upgraded to Level C if on-site activities and/or monitoring results indicate a higher degree of hazard. If other contaminants are encountered on-site, all personnel will be made fully aware of their hazards and the appropriate procedures to be utilized to prevent exposure.

The levels of protection are defined as follows:

Level D: One-piece chemical-resistant splash suit
 Hard hat
 Chemical-resistant, steel toe boots
 Gloves -- surgical, nitrile or equivalent
 Safety glasses

Level C: One-piece chemical-resistant splash suit with hood
 Hard hat
 Full face respirators with appropriate cartridges
 Chemical-resistant, steel toe boots
 Inner gloves -- surgical type
 Outer gloves -- nitrile or equivalent

No changes to the specified level of protection shall be made without the approval of the Health and Safety Officer.

Air Monitoring

The evaluation of air quality in the breathing zone will be based on readings of organic vapors. Air monitoring equipment to be used for measurements will include, but not be limited to a field photoionization detector such as a Photovac MicroTIP. The air around the

excavation pit will be surveyed as well as the air at shoulder height (breathing zone). This survey will take place periodically during operations. The air monitoring equipment will be calibrated according to manufacturer's instructions. The Photovac MicroTIP is the preferred instrument primarily because a continuous concentration-modulated alarm can be set for a predetermined concentration level, such as 100 ppm. The alarm allows for continuous monitoring without direct operator supervision, if necessary. Upon alarm sounding, the appropriate procedures as described below would be implemented.

Level C protection will be required for airborne concentrations detected in the breathing zone that exceed 100 parts per million (ppm). The personnel protection level may be downgraded to Level D when all monitoring parameters remain below 10 ppm in the breathing zone for 10 minutes or more.

Decontamination Procedures

The following sections describe the decontamination procedures to be followed when working in a Level D work environment and for Level C, if required.

Level D Decontamination

Equipment Worn

The full decontamination procedure for workers in Level D conditions consist of wearing the following additional equipment and following the procedures described in the sections below.

- One piece chemical-resistant splash suit
- Hard hat
- Chemical-resistant steel toe boots
- Gloves -- surgical, nitrile or equivalent
- Safety glasses

Procedure for Decontamination (see Figure 3)

Station 1: Segregated Equipment Drop

Deposit equipment used on-site (tools, sampling devices and container, monitoring equipment, radios, clip boards) on a plastic drop cloth or in different container with plastic liners.

Equipment: Various size containers
Plastic liners

Station 2: Outer Garments, Boots and Gloves, Wash and Rinse

Scrub outer boots and gloves with the detergent/water. Rinse gloves, boots and garment with hand pump spray device.

Equipment: 2 containers (30-50 gallon)
Hand pump spray device
Water
Detergent
Scrub brushes

Station 3: Boots, Gloves and Outer Garment Removal

Boots and outer gloves are removed and placed outside of the decontamination zone. Inner gloves and Tyvek suit are deposited in separate containers lined with plastic.

Equipment: Containers (30-50 gallon)
Plastic liners

Station 4: Field Wash

Thoroughly wash hands and face. Shower as soon as possible.

Equipment: Water
Wash basin/bucket
Soap
Towels

Level C Decontamination

Equipment Worn

The full decontamination procedure for workers wearing Level C Protection (with taped joints between gloves, boots and suit), which consists of the following equipment, is described in the sections below.

- One-piece, chemical-resistant splash suit with hood
- Hard hat
- Full face respirator with appropriate cartridges
- Chemical-resistant, steel toe boots
- Inner gloves -- surgical type
- Outer gloves -- nitrile or equivalent

Procedure for Full Decontamination (Figure 4)

Station 1: Segregated Equipment Drop

Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clip boards, etc.) on plastic drop cloths or in different containers with plastic liners. Each may be contaminated to a different degree. Segregation at the drop reduces the probability of cross-contamination. (Decontamination of equipment will occur at the end of the work day.)

Equipment: Various size containers
Plastic liners
Plastic drop cloths

Station 2: Outer Garment, Boots and Gloves, Wash and Rinse

Scrub outer boots and gloves with detergent/water. Rinse gloves, boots and garment with hand pump spray bottle into plastic bucket.

Equipment: 2 containers (30-50 gallon)
Hand pump spray device (garden sprayer)
Water
Detergent
Scrub brushes

Station 3: Outer Boot and Glove Removal

Remove outer boots (if worn) and gloves with accompanying tape. Tape should be placed in a container with a plastic liner.

Equipment: 1 container (30-50 gallon)
Plastic liner
Bench

Station 4: Canister Change

If a worker leaves the exclusion zone to change a canister on his/her respirator, this is the last step in the decontamination procedure. Once the worker's canister is exchanged, the outer gloves and boot covers are donned with joints taped. The worker may then return to the exclusion zone.

Equipment: Respirator canisters
Tape
Extra gloves
Boot covers (if worn)

Station 5: Boots, Gloves and Outer Garment Removal

Removal of boots, gloves (inner) and outer garment. The outer chemical-resistant garment should be deposited in a plastic-lined container.

Equipment: Container (30-50 gallon)
Bench or stool
Plastic liner

Station 6: Respiratory Protection Removal

Remove the face piece respirator, deposit used cartridges in a plastic lined container and wipe the face piece with clean water and paper towels.

Equipment: Container (30-50 gallon)
Plastic liners
Paper towels
Detergent solution
Rinse water

Station 7: Field Wash

Wash hands and face

Equipment: Water
Soap
Wash basin/buckets
Towels

Site Visitor Protection

The entire boundary of the work site will be delineated using barricade tape. Included within the site boundaries will be the work areas, decontamination areas and support zone areas. All visitors to the property will be requested to remain outside of the site boundaries. All visitors requiring access to the work site shall be instructed to stay outside the clearly identified exclusion zone and remain within the support zone during the extent of their stay (refer to Figures 3 and 4).

Visitors shall be cautioned to avoid skin contact with contaminated or suspected contaminated surfaces. During visitation, hand-to-mouth transfers should be reduced with special precautions not to eat, drink, smoke or chew gum or tobacco. The use of alcohol or medicine is prohibited.

Visitors requesting observation of the work in the exclusion zone must read the HASP and sign form (Attachment 1) stating they have read and understand the safety protocol and will abide by it. All visitors entering the exclusion zone must wear appropriate personnel protective gear. Should respiratory protective devices be necessary (Level C), visitors who require entrance to the exclusion zone must produce evidence that they have had a complete physical examination, have received respiratory protection training and have been certified by a physician to use a respirator. In addition, visitors who require entrance to the exclusion zone will be required to provide their own equipment, as on-site personnel will not provide any "loaner" protective equipment.

Visitor inspection of the exclusion zone will be left to the direction of the on-site Health and Safety Officer.

Soil and Ground Water Sampling

Soil samples will be collected during the course of the investigation as described in the Sampling Plan. Project personnel should take precaution to avoid dermal and inhalation exposure at all sample locations.

Air monitoring equipment shall be used to determine airborne concentrations of volatile organic sampling. Surgical gloves should be worn during all routine sampling tasks to avoid dermal contact.

Emergency Procedures

The following standard emergency procedures will be used by on-site personnel. The Health and Safety Officer shall be notified of any on-site emergencies and be responsible for ensuring that the appropriate procedures are followed. The step-wise approach for dealing with emergency situations is shown in Figure 5.

An emergency report (Figure 6) must be completed and submitted to the site Health and Safety Officer for each instance of employee injury or possible exposure.

Personal Injury in the Exclusion Zone

In the event of an injury in the exclusion zone, all site personnel shall assemble at the decontamination line. The project manager should evaluate the nature of the injury and the affected person should be decontaminated to the extent possible prior to movement to the support zone. Appropriate first aid should be initiated, and contact should be made for an ambulance and with the hospital (if required). No persons shall reenter the exclusion zone until the cause of injury or symptoms are determined.

If an ambulance or other rescue team is summoned to the site, responding rescue members will be allowed access to all areas of the property. Furthermore, responding rescue teams will not require any specialized training (such as level B or A training) to enter the exclusion zones. On-site personnel will aid rescue teams by providing them with all pertinent information regarding present hazards and/or specific incident information.

Personnel Injury in the Support Zone

Upon notification of an injury in the support zone, the project manager and Health and Safety Officer will assess the nature of the injury. If the cause of the injury or loss of the injured person does not affect the performance of site personnel, operations may continue, the appropriate first aid and necessary follow up as stated above should be initiated.

Fire/Explosion

Upon notification of a fire or explosion on the site, all personnel will assemble at the contamination control line. The fire department shall be alerted and all personnel moved to a safe distance from the involved area.

Personal Protective Equipment Failure

If any site worker experiences a failure or alteration of Level C protective equipment that affects the protection factor, that person and his/her buddy shall immediately leave the exclusion zone. Reentry shall not be permitted until the equipment has been replaced.

Emergency Phone Numbers

Emergency phone numbers will be posted at a conspicuous place in the support zone (Table 1). Directions to the Hospital are shown in Figure 7. The County Sheriff and Fire Departments will be notified of the site investigation and potential hazards prior to implementation of the field work.

Inclement Weather

The Site Health and Safety Officer will have the authority to cease all operations, if in her opinion, the safety of personnel or the integrity of the project will be threatened by incoming inclement weather. Additionally, the Safety Officer will be responsible for observing all workers for effects of temperature extremes. Specific problems to watch for are heat stress and cold exposure hazards.

Heat-related problems are:

Heat Rash: caused by continuous exposure to heat and humid air and aggravated by chafing clothes. Decreases ability to tolerate heat as well as being a nuisance.

Heat cramps: caused by profuse perspiration with inadequate fluid intake and chemical replacement. **Signs:** muscle spasm and pain in the extremities and abdomen.

Heat exhaustion: caused by increased stress on various organs to meet increased demands to cool the body. **Signs:** shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.

Heat stroke: the most severe form of heat stress. Body must be cooled immediately to prevent severe injury and/or death. **Signs and symptoms:** red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

Cold-exposure problems are:

Frost nip or incipient frostbite: characterized by suddenly blanching or whitening of skin.

Superficial frostbite: skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.

Deep frostbite: tissues are cold, pale, and solid (extremely serious injury).

Systemic hypothermia: caused by exposure to freezing or rapidly dropping temperature. **Symptoms**: usually exhibited in five states: (1) shivering; (2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95° F; (3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate; (4) freezing of the extremities; (5) death.

SUMMARY

A subsurface investigation has been outlined for the Ursula Borgerding Estate property in Beloit, Wisconsin. The purpose of the investigation is to define impacted areas and the ground water characteristics, including flow direction, velocity, and contaminant migration potential. To meet the goals of the investigation, six new monitoring wells will be installed and three piezometers will be installed. All new and existing wells will be measured and sampled during the course of the investigation. Field and laboratory data will be analyzed, summarized, and reported in a final report to be reviewed and approved by the WDNR. Included in the final report will be analyses of potential soil and ground water remedial alternatives. The project is expected to require six months time from start to completion.

Respectfully submitted,

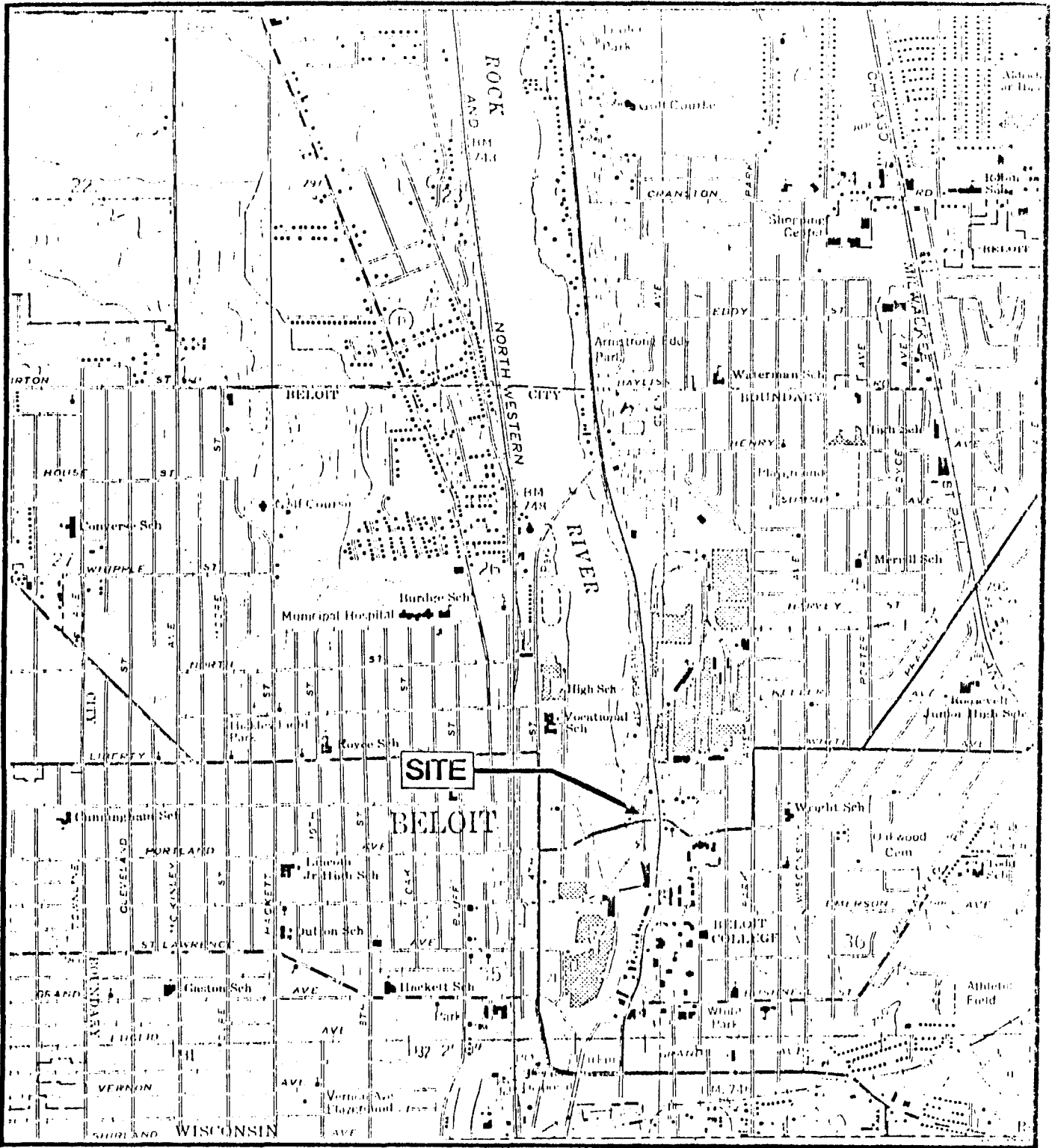
DAMES & MOORE, A professional limited partnership

Kristine M. Stehr
Hydrogeologist and Project Manager

Bruce L. Cutright
Managing Principal in Charge

Attachments

COPY



ADAPTED FROM U.S.G.S. 7.5 MINUTE SERIES BELOIT QUADRANGLE, 1976

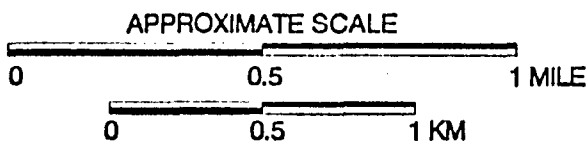
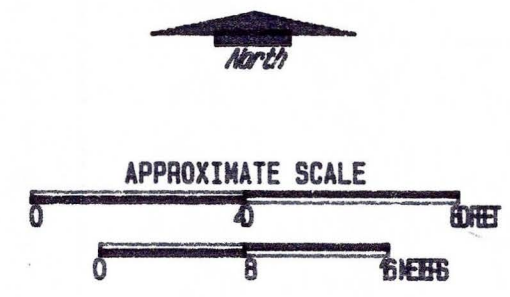
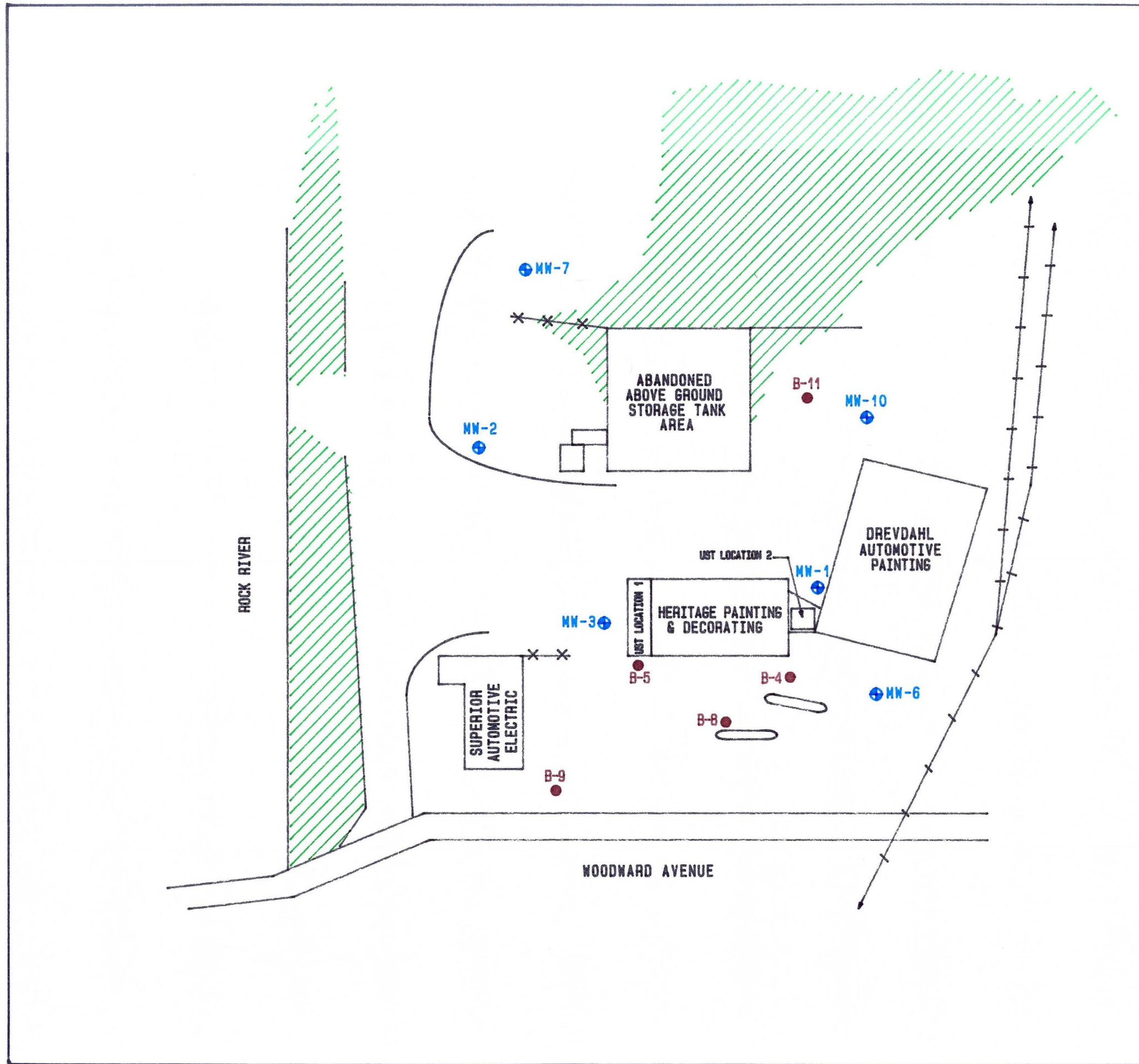


FIGURE 1
SITE LOCATION MAP
URSULA BORGERDING ESTATE
435 WOODWARD AVENUE
BELOIT, WISCONSIN



- LEGEND**
- SOIL BORING LOCATION
 - ⊕ MONITORING WELL LOCATION
 - - - GROUND WATER CONTOURS
 - x- FENCE
 - + ABANDONED RAIL ROAD TRACKS
 - /// HEAVILY VEGETATED AREA

FIGURE 2
 LOCATION OF SOIL BORINGS AND
 MONITORING WELLS
 URSULA BORGERDING ESTATE
 435 WOODWARD AVENUE
 BELOIT, WISCONSIN

Exclusion Zone



Segregated Equipment Drop

Hotline



Outer Garment, Boots and Gloves Wash and Rinse



Boots, Gloves and Outer Garment Removal

Contaminant
Reduction Zone

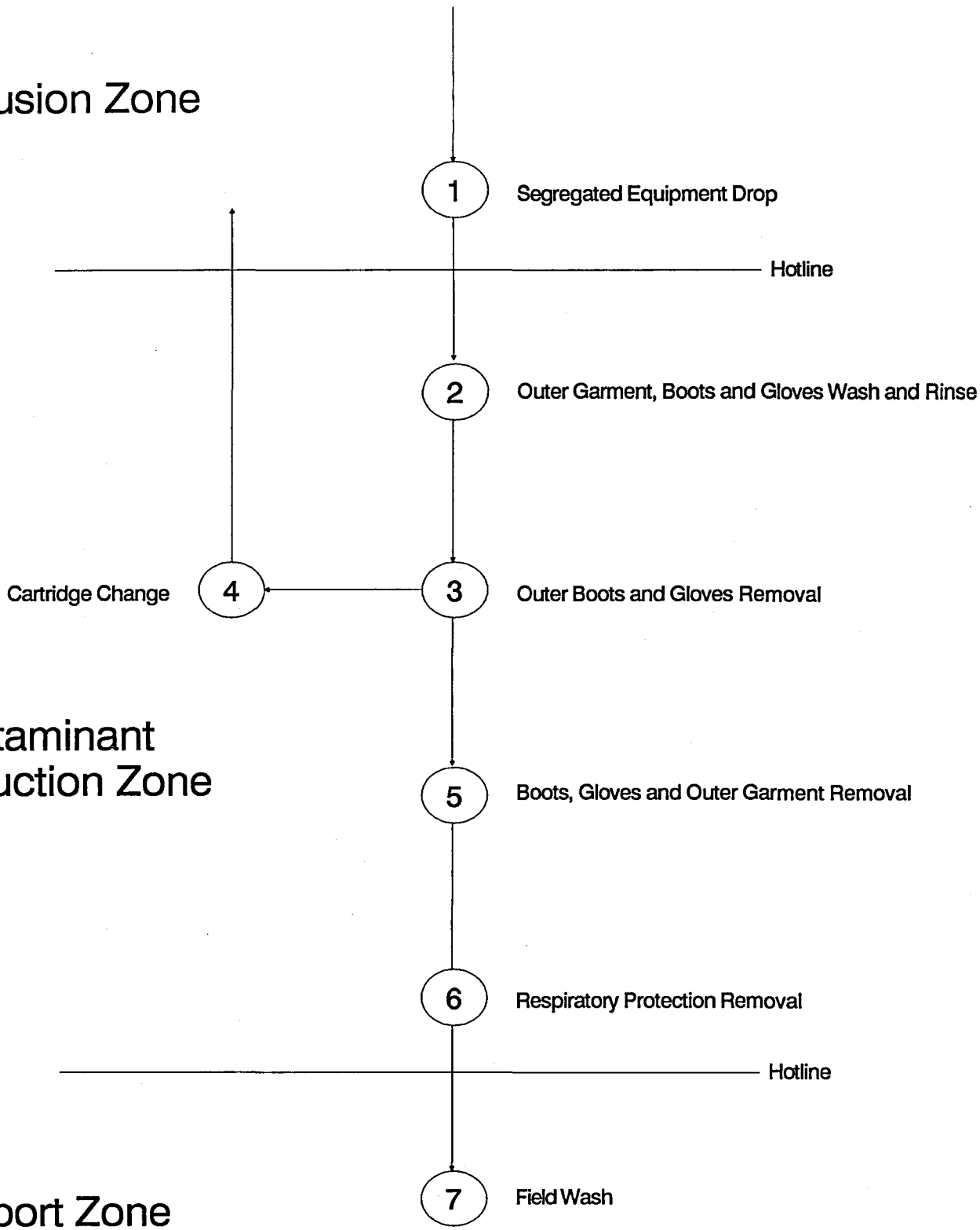
Hotline



Field Wash

Support Zone

Exclusion Zone



Contaminant Reduction Zone

Support Zone

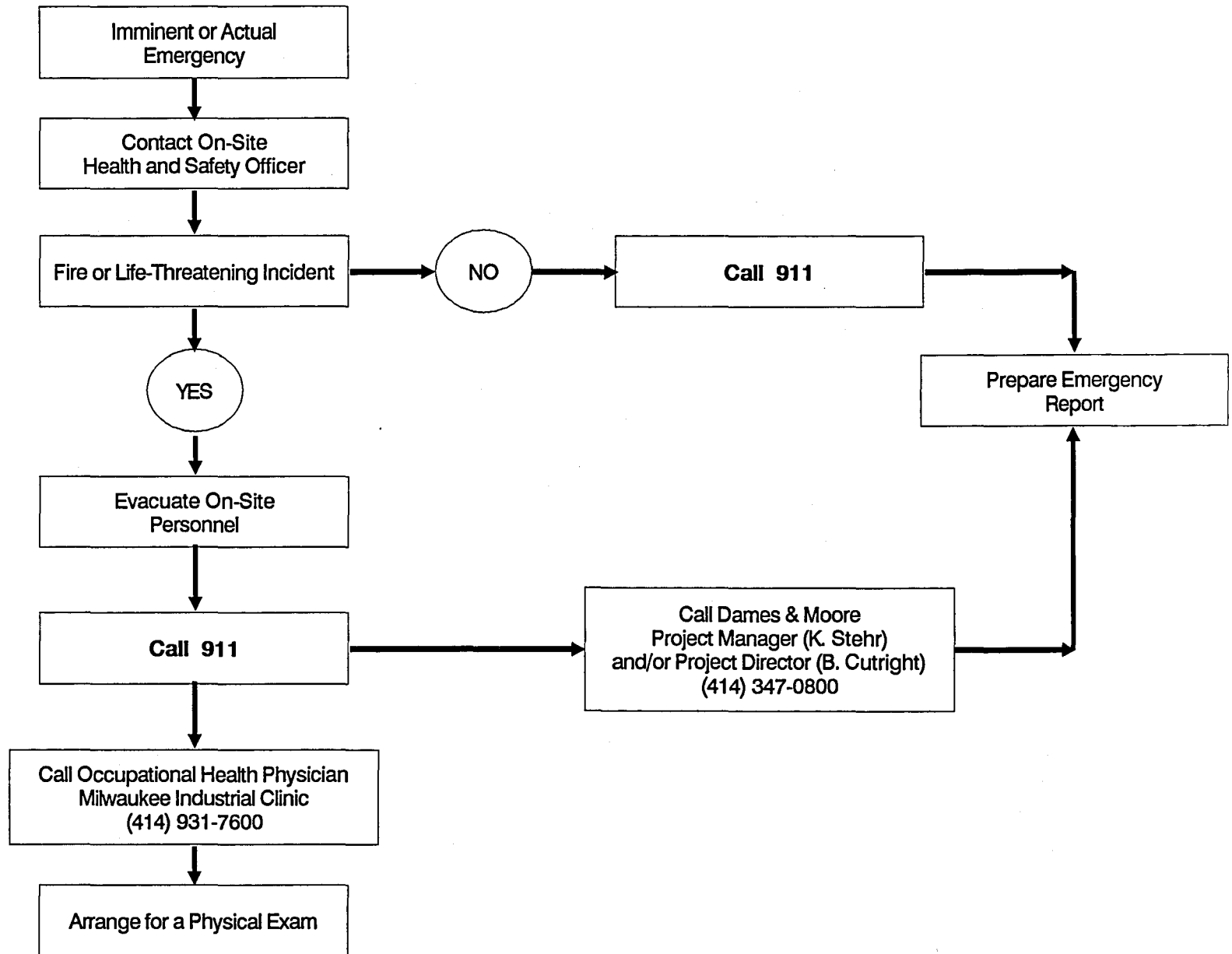


FIGURE 6
EMERGENCY REPORT FORM

1. DATE _____
2. ACCIDENT _____
CLIMATIC CONDITIONS _____
3. ON-SITE COORDINATION _____
4. EMPLOYEE INJURED _____
5. COMPANY AFFILIATION _____
6. SOCIAL SECURITY NUMBER _____
7. INSURANCE COMPANY _____
8. NUMBER OF WORKERS AT SITE _____

NAMES OF WORKERS

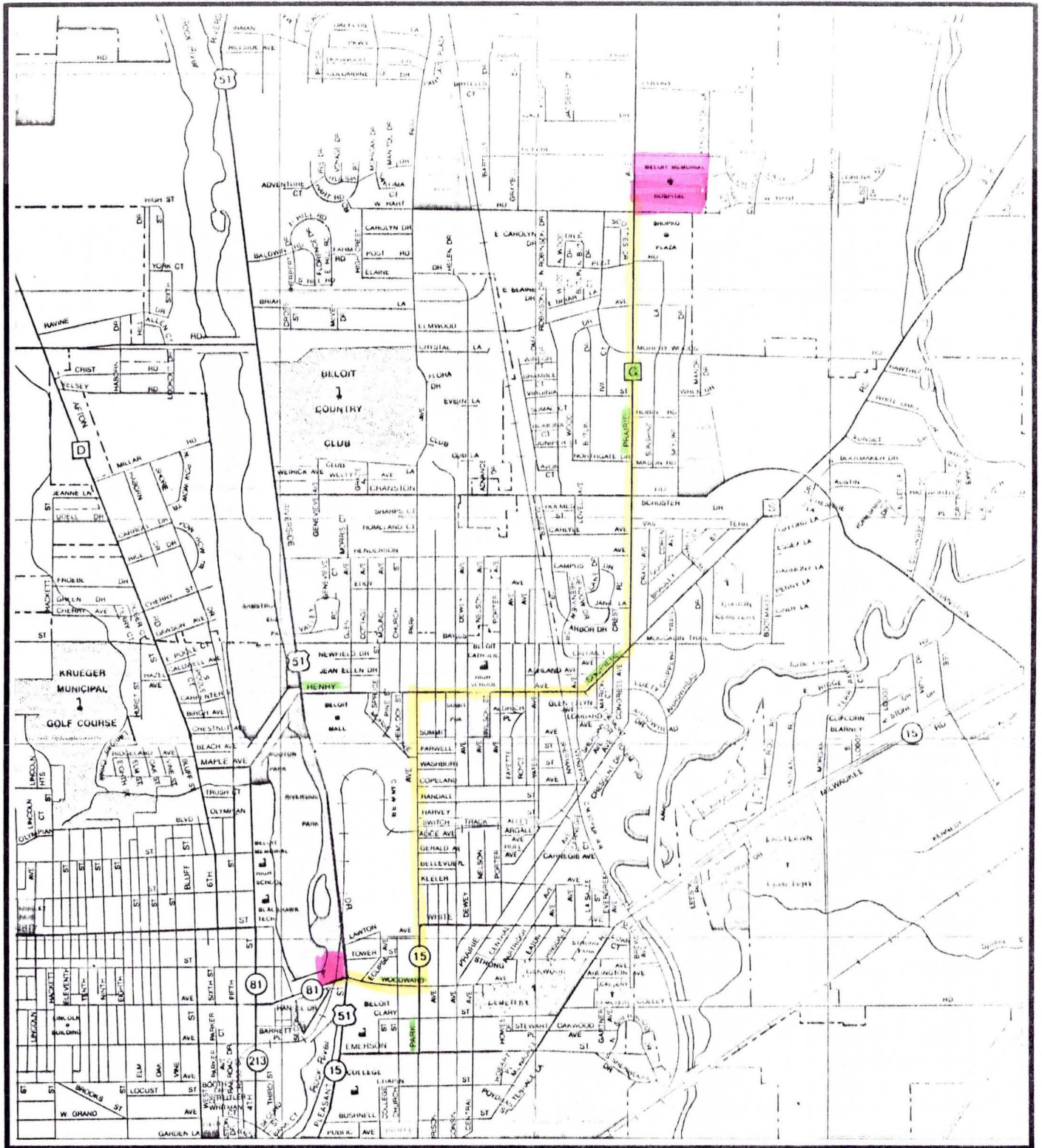
COMPANY AFFILIATION

1. _____
2. _____
3. _____
4. _____
5. _____

1. _____
2. _____
3. _____
4. _____
5. _____

9. CIRCUMSTANCES OF THE INJURY/EMERGENCY ACTION _____

10. EMERGENCY ACTIONS TAKEN _____
11. WHAT FIRST AID WAS PROVIDED? _____
12. WAS AN EMERGENCY PHONE CALL MADE TO THE PROJECT SAFETY OFFICER? _____ IF SO, TIME: _____
13. AMBULANCE SERVICE USED _____
14. HOSPITAL USED _____
15. ATTENDING PHYSICIAN _____
16. COMPANY REPRESENTATIVES CONTACTED _____
17. CONTRACTOR REPRESENTATIVES CONTACTED _____



ADAPTED FROM THE SEEGER MAP CO./MAPCO STREET MAP OF JANESVILLE AND BELOIT.

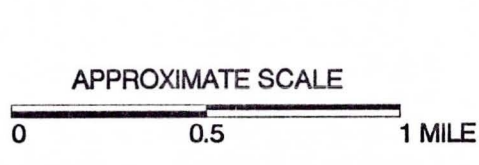
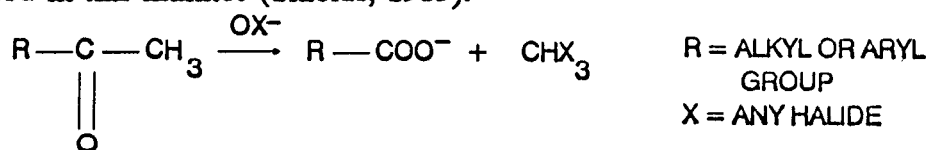


FIGURE 7
DIRECTIONS TO
BELOIT MEMORIAL HOSPITAL

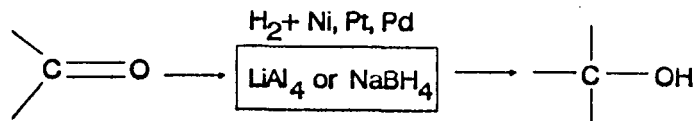
DEGRADATION OF KETONES--URSULA BORGERDING ESTATE

This list contains the possible laboratory reactions of ketones (Morrison and Boyd, 1987). It should be noted that such reactions are governed by certain preset conditions that are carefully maneuvered by scientists to produce the desired organic compounds. The environment is another matter. Due to nature's dynamic and unpredictable personality we can only draw probable conclusions on the outcome of these reactions at the site.

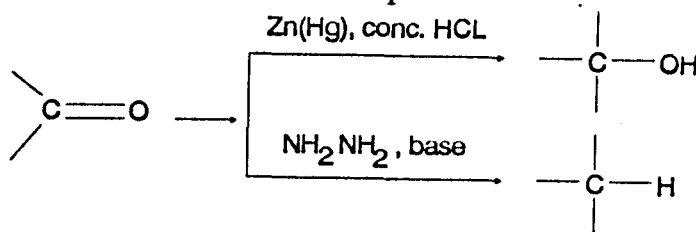
Ketones are difficult to oxidize and all these types of reactions take place only under the most vigorous of conditions except for one--this is done by means of hypohalite in the haloform reaction (a hypohalite is an oxygenated halogen, or in this case either iodine, chlorine, or fluorine). As halogens exist in soil in negligible amounts, it is highly unlikely that the corresponding hypohalite is present. Therefore, the ketones present at the site will likely not be degraded in this manner (Shields, 1985).



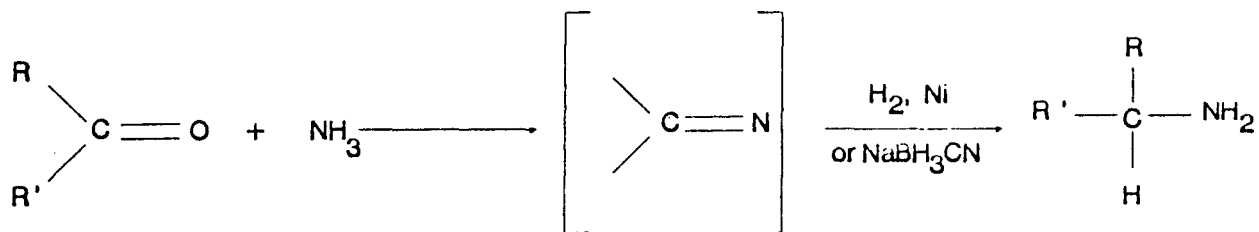
Ketones can also be reduced to alcohols (reduction is the addition of an electron to a chemical bond). Again, it is highly unlikely that the necessary chemicals for the reaction to take place to be found in the soils at the site. Ketones will not degrade in this fashion, either.



Ketones can be reduced to hydrocarbons as well. However, either amalgamated zinc and concentrated acid or hydrazine plus a strong base is required for this type of reduction to occur. The site does not have strong enough acidic or basic conditions to meet these requirements, and so this reduction will not take place.

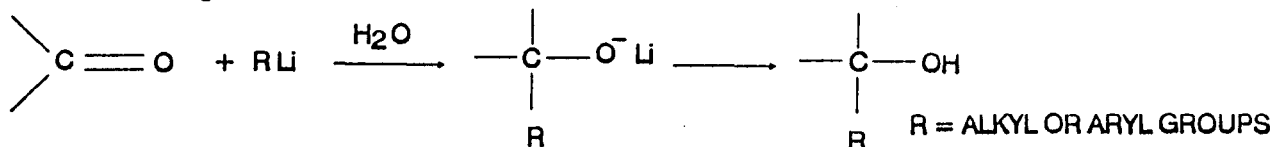


Lastly, ketones can be reduced in the presence of ammonia. These reaction conditions are difficult to meet out in the field, as both liquid ammonia and hydrogen gas in the presence of nickel are needed to reduce ketones in this manner. These conditions are highly improbable, so this reduction will not occur.

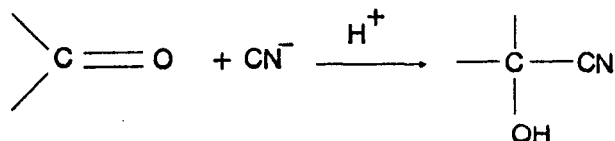


R AND R' = ALKYL OR ARYL GROUPS

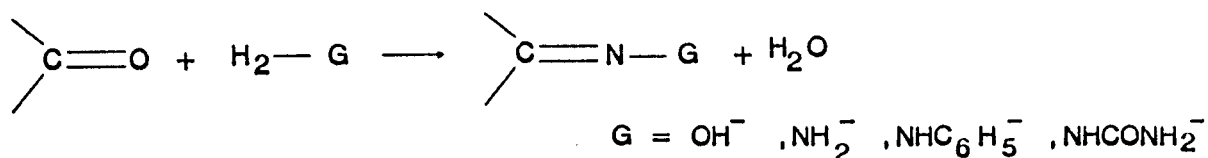
Ketones also react with organolithiums to produce alcohols. However, the preparation of organolithiums requires addition of organic halides to lithium in the presence of anhydrous ether (no water present). Since water is obviously present at the site, this reaction is impossible.



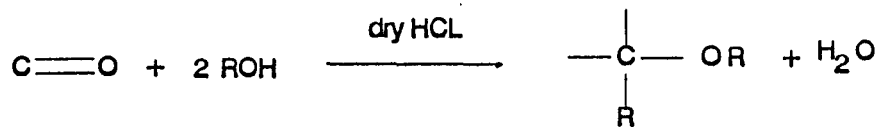
The addition of cyanide to ketones causes cyanohydrin formation. but since the site is not within an acid environment and cyanide salts are not present, this reaction will not take place.



Ketones react with derivatives of ammonia as well. However, these derivatives are not naturally occurring and thus are likely not to be found at the site, so this reaction is not a possibility.

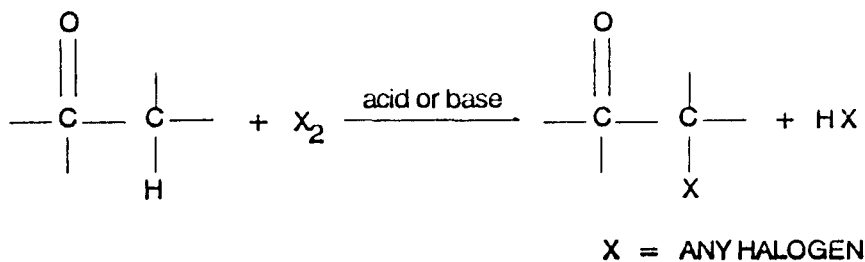


Addition of alcohols forms ketals. As an anhydrous (no water), acidic environment is required for this synthesis but is not to be found at the site, ketal formation will not take place.



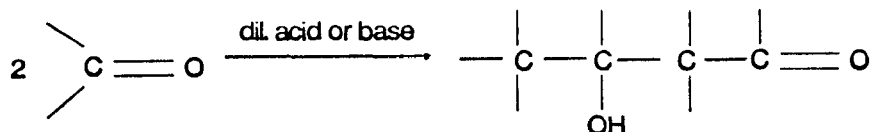
R = ALKYL OR ARYL GROUP

Ketones can be halogenated (addition of fluorine, chlorine, bromine, or iodine) to form enols. It is doubtful that these halogens are present because neither fluorine, chlorine, bromine, nor iodine are naturally present in soils in significant amounts to noticeably react (Shields, 1985).

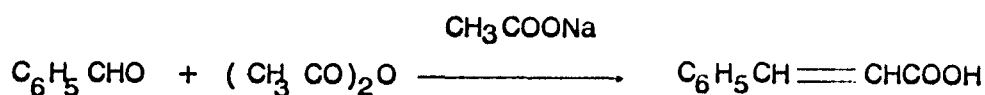


Addition of carbanions (an organic compound with a negative charge on a carbon atom) produces a variety of related reactions. Because few studies have been implemented regarding the possible degradation of ketones by these reactions in the natural environment, we have included these reactions in our discussion. However, it should be noted that these reactions are based on laboratory conditions which may or may not be reproducible in nature.

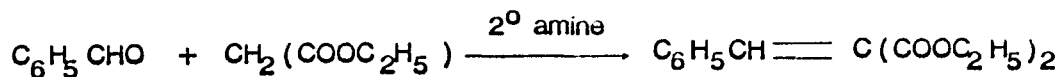
A). The aldol condensation reaction may be catalyzed by either dilute acid or dilute base. Because of the large amount of calcium carbonate deposits within the bedrock, a slightly basic environment is created and may possibly catalyze this reaction (calcium carbonate dissociates to calcium hydroxide in water which has a large pH value, and when diluted may create the correct environment for this condensation to occur--Handbook of Chemistry and Physics, 1970-1971). However, stereochemical effects may prevent this condensation from occurring (the ketones present at the site are rather large and therefore may interfere with the way the molecules "fit together" during a reaction).



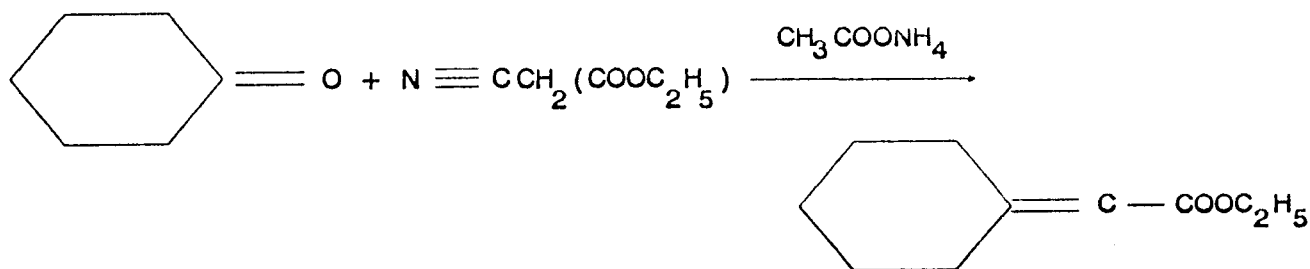
B). The Perkin condensation is characterized by the presence of acidic anhydrides. However, these acidic compounds would, if present at the site, create an acidic environment. As this type of environment is not to be found at the site, this condensation will not occur.



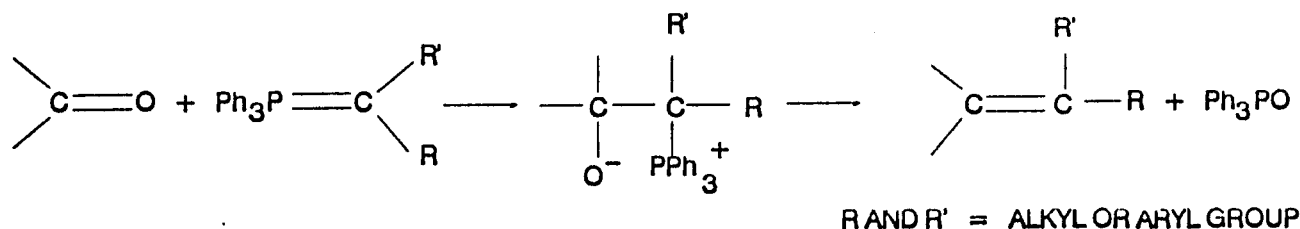
C). The Knoevenagel reaction requires secondary amines. Secondary amines are not naturally occurring compounds. This will not occur.



D). The Cope reaction utilizes ammonium-based compounds. As the equation below states, these compounds are exceedingly complex and are formed under acidic conditions; again, the environment is not acidic, so these ammonium-based compounds cannot form. This reaction will not take place.



E). The Wittig reaction utilizes ylides (a phosphorus atom bonded to three phenyl groups and doubly bonded to a carbon attached to an alkyl or aryl group). Ylides are synthesized in a two-stage process usually requiring alkoxides or organometallics, a process that is complicated and has virtually no chance of occurring naturally. This reaction will not take place.



Finally, ketones are not easily oxidized to carboxylic acids, either, so degradation of ketones in this manner is improbable.

The other three ways that ketones can be degraded are through biodegradation (degradation by living organisms), volatilization (evaporation to the atmosphere), and photolysis (breakdown in the presence of light, in this case the ultraviolet portion of the sun's spectrum). The first is certainly a possibility, although data on the biodegradability of these compounds are scarce. It is known, however, that ketones are readily biodegradable if enough microorganisms are present (Pitter, 1990).

Volatilization of these ketones is not expected at the subsurface level, but is a problem at the surface. Unfortunately, data on this topic is limited as well. According to Rathbun and Taj (1981), a physical representation of the volatilization process in the laboratory can be applied to ketones. The model is based on the two-film model of Lewis and Whitman (1924) which assigns mass-transfer coefficients to the solute and gas. The basic equation attempts to determine the overall mass-transfer coefficient, the inverse of which is the overall resistance to mass transport. This overall resistance to mass-transport indicates how easily a solute is transferred to the atmosphere (Rathbun and Taj, 1981). The model is seriously flawed for four reasons: The study does not indicate how these coefficients depend on mixing conditions in the gas and liquid and on the physical characteristics of the solute being transported; the model assumes that the solute is absolute purity, yet this is not the case in nature; the model assumes steady-state conditions which are also not the case in nature; the model assumes constant temperature, an impossibility. We conclude that conclusions drawn from this model are highly suspect in a natural environment, and we therefore cannot predict the volatilization of ketones in nature.

The third and last possibility, photolysis, is applicable to the site in the top layer of soil to the depth that light penetrates. Data for the two ketones of concern, hexanone and

4-methyl-2-pentanone, are unavailable, and thus this process remains a possible method of degradation (Sear, 1985). However, photolysis is not likely to occur, as the ketones are found in the soil and ground water beyond the depths at which ultraviolet light will penetrate. Additionally, the ketones of concern are not electron-rich, and are not expected to readily react by photolysis.

References

Appendix D, Subsurface Investigation--Ursula Borgerding Estate.

Gosselin, Smith, and Hodge, Clinical Toxicology of Commercial Products, 5th Ed., (Williams and Wilkins: Baltimore, Maryland), 1984, pp. VI-59 and II-323.

Handbook of Chemistry and Physics, 51st Ed., Ed. Robert C. Weast, (The Chemical Rubber Co.: Cleveland, Ohio), 1970-1971.

Morrison and Boyd, Organic Chemistry, 5th Ed., (Allyn and Bacon, Inc.: Boston, Massachusetts), 1987, pp. 653-659, 771-787, and 920-924.

Pavia, Lampman and Krig, Introduction to Organic Laboratory Techniques, 3rd Ed., (Saunders College Publishers: New York, New York), 1988, pp. 443-444.

Pitter, Pavel, Biodegradability of Organic Substances in the Aquatic Environment, (C.R.C. Press: Boca Raton, Florida), 1990, pp. 181-182.

Rathbun, R. E., and D. Y. Taj, "Volatilization of Ketones from Water", Water, Air, and Soil Pollution, Vol. 17, No. 3, Ed. Billy M. McCormac, (D. Reidel Publishing Co.: Boston, Massachusetts), April 1982, pp. 281-293.

Saar, Robert A. and Gisella M. Spreizer, Guidance Manual for the Selection of Chemical Waste Parameters at Hazardous Waste Facilities, (Geraghty & Miller: Syosset, New York), 1985

3150 North Brookfield Road
 Brookfield, Wisconsin 53045
 telephone (414) 783-6111
 FAX (414) 783-5752



WDNR Certification #268181760

ANALYTICAL REPORT

REPORT NUMBER: B7866

Wisconsin Power & Light Company
 222 West Washington Avenue
 Madison, WI 53701

Attn: Ms. Jackie Haley

DATE: January 13, 1992

PURCHASE ORDER:

SEI NO: WL9541

DATE COLLECTED: 12/11&12/91

DATE RECEIVED: 12/17/91

Groundwater Sample (Beloit)

Units: ug/l (ppb)

<u>Parameter</u>	<u>SEI ID Sample ID</u>	<u>9541-1 Well #4</u>	<u>9541-2 Trip Blank</u>
EPA Method 502.2			
1,2-Dichloroethylene, trans		<0.5	<0.5
Dichloromethane		<1.0	1.0
1,2-Dichloropropane		<0.5	<0.5
1,3-Dichloropropane		<0.5	<0.5
1,1-Dichloropropene		<0.5	<0.5
2,2-Dichloropropane		<0.5	<0.5
1,3-Dichloropropene		<0.5	<0.5
Ethylbenzene		<0.5	<0.5
Ethylene dibromide		<1.0	<1.0
Styrene		<0.5	<0.5
1,1,1,2-Tetrachloroethane		<0.5	<0.5
1,1,2,2-Tetrachloroethane		<0.5	<0.5
Tetrachloroethylene		<0.5	<0.5
Toluene		<0.5	<0.5
1,1,1-Trichloroethane		<0.5	<0.5
1,1,2-Trichloroethane		<0.5	<0.5
Trichloroethylene		<0.5	<0.5
1,2,3-Trichloropropane		<0.5	<0.5
Vinyl chloride		<0.3	<0.3
o-Xylene		<0.5	<0.5
Xylenes, meta & para		<0.5	<0.5

Reviewed and Approved by

Rosemary L. Dineen
 Laboratory Director