SPECIFICATIONS OF WORK
INSTALLATION OF EXTRACTION WELL EW-1

Marathon Electric Manufacturing Company
Wausau, Wisconsin

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DECEMBER 1989
REF. NO. 2115(13)

CONESTOGA-ROVERS & ASSOCIATES

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SPECIFICATIONS OF WORK

SW-1 SITE LOCATION

The Site is located at the Marathon Electric Manufacturing Company, Wausau, Wisconsin.

SW-2 OVERVIEW

The Installation of Extraction Well EW-1 to be implemented by Marathon is comprised of the installation of a 16-inch diameter groundwater extraction well and associated work in the vicinity of the Marathon Manufacturing Facility.

SW-3 WORK INCLUDED

The Work to be performed under this Contract includes, but not limited to the following:

1. A pilot hole in the location of the extraction well.

2. The installation of a 16-inch diameter groundwater extraction well within a minimum 22-inch diameter borehole.

3. The development and the pump testing of the well installation.

Except for those materials, services and facilities which are specifically stated in the Specifications of Work is being supplied by Marathon, the Contractor shall provide and include in the rates entered in the Schedule of Prices for the execution of the whole of the Work complete in every respect in accordance with the Contract.

Work Not Included

The following items of Work associated with this project do not form part of this Contract:

1. Supply and installation of a 1,600 gallon per minute line shaft extraction pump.

2. The supply and installation of a pumphouse and discharge outlet structure.

SW-4 PRE-BID MEETING AND SITE VISIT

The Contractor shall be required to attend a pre-bid meeting and Site visit before submitting his bid and shall satisfy himself by personal examination as to the local conditions to be met with during the construction and conduct of the Work. Representatives of Marathon will be in attendance to discuss the Specifications of Work . The Contractor is not to claim at any time after submission of his bid that there was any misunderstanding of the terms and conditions related to the Site conditions or of the scope of work .

SW-5 STANDARD SPECIFICATIONS

Whenever a standard specification, code or recommended practice is referred to in the Project Specifications, it shall be the latest edition of that specification, code or

recommended practice and it shall be considered to be a part of these documents insofar as it applies.

SW-6 SAFETY RULES

The Contractor and his Subcontractors shall abide by all Federal, State, municipal and local safety codes and by-laws and ensure that all personnel employed on the Site abide by those same codes and by-laws. In addition, all personnel working on site shall satisfy applicable OSHA health and safety training requirements. Personnel who have not successfully completed the required training will not be permitted to perform work at the Site. All work shall be conducted in accordance with the Health and Safety Plan presented in Appendix A.

SW-7 CONSTRUCTION SCHEDULE

The Contractor shall commence work on the Site within seven (7) calendar days of Contract award. The Contractor shall within seven (7) days submit a detailed construction schedule to the Marathon for approval showing the commencement and completion dates for all phases of the project.

BID SUMMARY SHEET

INSTALLATION OF EXTRACTION WELL EW-1
MARATHON ELECTRIC MANUFACTURING COMPANY
WAUSAU, WISCONSIN

SECTION A:	PROJECT START-UP AND CLOSEOUT	$ _____
SECTION B:	EXTRACTION WELL INSTALLATION	$ _____
SECTION C:	WELL DEVELOPMENT AND TESTING	$ _____
	TOTAL CONTRACT PRICE	$

The undersigned bidder proposes to perform the Work, furnish all materials, and complete the Work in its entirety in the manner and under the conditions required at the prices listed above.

Name of Bidder: _____

Signature of Authorized Officer: _____

Name and Title: _____

Witness: _____

Date: _____

SCHEDULE OF PRICES

Item	Description	Estimated Quantity	Unit	Unit Price	Total Price
A.	PROJECT START-UP AND CLOSEOUT				
A-1	Mobilization/Demobilization	--	L.S.	--	$
A-2	Implementation of Health and Safety Plan and provision of health and safety personnel protective equipment	--	L.S.	--	$
	TOTAL SECTION A				$

SCHEDULE OF PRICES

Item	Description	Estimated Quantity	Unit	Unit Price	Total Price
B.	EXTRACTION WELL INSTALLATION				
B-1	Drill pilot hole including sample collection	150	V.F.	$	$
B-2	Drill minimum 22-inch diameter hole to bedrock	150	V.F.	$	$
B-3	Supply and install 16"ø steel casing to 4 feet above ground	114	V.F.	$	$
B-4	Supply and install 16"ø pipe size stainless steel well screen	40	V.F.	$	$
B-5	Supply and place sand pack	42	V.F.	$	$
B-6	Supply and place cement/ bentonite grout	108	V.F.	$	$
	TOTAL SECTION B				$

SCHEDULE OF PRICES

Item	Description	Estimated Quantity	Unit	Unit Price	Total Price
C.	WELL DEVELOPMENT AND TESTING				
C-1	Develop well to sand-free condition after completion	1	ea.	$	$
C-2	Extraction well pump test	1	ea.	$	$
	TOTAL SECTION C				$

SCHEDULE OF ADDITIONAL PRICES

The Contractor agrees to accept payment at the following Additional Unit Prices for work done and materials supplied if and when directed. The Unit Prices shall include material, labor, plant, repairs, fuel, maintenance, overheads, supervisions, profit and all applicable taxes in accordance with the specifications.

Item	Description		Unit	Unit Price
1.	Standby time for drill rig and crew			
	a)	Drill rig only	Hour	$
			Day	$
	b)	Drill rig and one man	Hour	$
			Day	$
	c)	Drill rig and two men	Hour	$
			Day	$
	d)	Additional man	Hour	$
			Day	$
2.	Operating rate for drill rig and crew		Hour	$
			Day	$
3.	Bentonite Pellets		50 lb keg	$
4.	Bentonite Powder		100 lb bag	$
5.	Portland Cement		94 lb bag	$
6.	Grouting operation including slurry, preparation and placement using positive placement techniques.			
	a)	8"ø borehole	V.F.	$
	b)	22"ø borehole	V.F.	$
7.	Methanol		gallon	$
8.	Hexane		gallon	$
9.	Personnel Protective Equipment			
	a)	Level C personnel protection equipment	Day	$
	b)	Level B personnel protection equipment	Day	$

The prices submitted in this Schedule of Additional Unit Prices do not affect the Contractor's bid price for the Works. The Owner reserves the right to delete any price form the Schedule of Additional Unit Prices that in the opinion of the Owner in unbalanced or excessive in such case work done under the item deleted will be negotiated with the Owner.

LIST OF SUBCONTRACTORS

The following is a list of Subcontractors or Subtrades together with a description of the items showing the portion of the Works to be undertaken by each.

	NAME	ADDRESS	ITEM DESCRIPTION
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

The employment of Subcontractors or Subtrades other than those listed above will not be permitted without written approval from the Engineer. Information indicating how the Subcontractors or Subtrades listed above qualify in experience and background may be requested by the Engineer before award of the Contract.

DATED THIS _____ DAY OF _____, 19___

_____ _____

Signature of Witness

Signature of Authorized Person signing for Contractor

PROJECT SPECIFICATIONS

Ps.1 SUMMARY OF WORK

Ps.1.01 DESCRIPTION OF PROJECT

This project consists of the supply, installation, development, and pump testing of a 16-inch diameter extraction well.

It is to noted that the work shall be conducted in accordance with the Health and Safety Plan presented in Appendix A.

Ps.1.02 LOCATION

The Site is located along the west side of the Wisconsin River within the City of Wausau, Wisconsin, at 100 East Randolph Street.

Ps.1.03 ACCESS TO SITE

Access to the Site is available via Cherry Street.

Ps.1.04 DESCRIPTION OF THE WORKS

The Works to be performed under this Contract include but are not limited to the following:

1. mobilization of all material, equipment, plant, and personnel necessary to perform the Works;
2. drill pilot hole in location of extraction well;
3. supply and installation of a 16-inch diameter extraction well;
4. the development of the extraction well; and
5. the pump testing of the extraction well.

Ps.1.05 DRAWINGS

Drawings issued with and forming part of the Specifications of Work are listed below:

Dwg. No.	*Rev. No.*	*Date of Drawing or Latest Rev.*	*Title*
A-1	0	September 1988	Extraction Well Location
A-2	0	January 1989	Typical Extraction Well Detail

Ps.2 GENERAL REQUIREMENTS

Ps.2.01 CONTRACTOR'S REPRESENTATIVE

During the performance of the Works, the Contractor shall have on the Site during working hours a designated Project Manager empowered to act on behalf of the Contractor in all matters pertaining to the Contract. The Contractor shall within seven days of execution of the Contract, nominate such person or persons, in writing, to Marathon. Such persons shall remain, in the context of this Contract, the Contractor's designated agent(s) until such time as notification to the contrary is received in writing by Marathon.

Ps.2.02 EXISTING UTILITIES

It shall be the Contractor's responsibility to field verify all existing utilities.

Existing aboveground utilities including but not limited to power transmission and distribution, telegraph, telephone, if shown on the Drawings or if easily identified, shall, at the Contractor's expense, be maintained, relocated, rerouted, removed and restored as may be necessary by the Contractor.

Existing major underground utilities and appurtenant structures whether shown on the Drawings or not shall, at the Contractor's expense, be maintained and restored by the Contractor.

Minor underground utility service lines adjacent to the Site, including but not limited to sanitary sewer services, gas services, water services, house or yard drains, and electric, cable television, or telephone services, shall be maintained, relocated, rerouted, removed and restored by the Contractor with the least possible interference with such services and in no case shall the interference of such service lines be considered for extra compensation under any of the special cases listed above. It is not anticipated that any of these utilities exist in the proposed work zone, but shall be Contractor field verified.

The right is reserved by owners of public utilities and franchises to enter upon any street, road, right-of-way, or easement for the purpose of maintaining their property during performance of the Works and for making necessary repairs caused by the work. The costs thus incurred shall be paid by the Contractor.

Ps.2.03 RESTORATION OF STRUCTURES AND SURFACES

A. STRUCTURES

The Contractor shall remove such existing structures as may be necessary for the performance of the Works, and shall rebuild the structures thus removed in as good a condition as found with minimum requirements as herein specified. The Contractor shall also repair all existing structures which may be damaged as a result of the Works.

B. CURBS, GUTTERS, DRIVEWAYS AND SIDEWALKS

All curbs, gutters, driveways, sidewalks and similar structures that are broken or damaged by the installation of the work, unless shown otherwise, shall be

reconstructed by the Contractor. Reconstruction shall be of the same kind of material with the same finish, and in not less than the same dimensions as the original work. All concrete shall be as specified by Marathon if required. Repairs shall be made by removing and replacing the entire portions between joints or scores and not merely refinishing any damaged part. All work shall match the appearance of the existing improvements as nearly as possible.

C. ROADS AND STREETS

All on-Site roads and streets in which the surface is removed, broken or damaged, or in which the ground has caved or settled due to work under this Contract, unless shown otherwise, shall be completely resurfaced and brought to the original grade unless otherwise indicated. Before resurfacing material is placed, edges of pavements shall be trimmed back far enough to provide clean, solid, vertical faces, and shall be free of any loose material. Roadways other than the special haul routes shown on the Drawings used by the Contractor for hauling materials, equipment, supplies, etc., shall be cleaned and repaired if the condition of the roadway is damaged or otherwise affected due to the Contractor's operations. These requirements are considered the Contractor's responsibility.

D. CULTIVATED AREAS AND OTHER SURFACE IMPROVEMENTS

All cultivated areas, either agricultural or lawns, and other surface improvements which are damaged by actions of the Contractor, unless otherwise shown, shall be restored as nearly as possible to their original condition. Altering of original conditions during restoration may be done only on written approval of Marathon.

E. EXISTING STAKES AND MARKS

All section, section subdivision, plot, U.S.E.D, U.S.C. & G.S., U.S.G.S. and other official monuments or bench marks shall be carefully preserved or replaced. In the event any such monument or marker is disturbed as a result of the Contractor's operations, the Contractor shall replace or reset such monument or marker in a manner satisfactory to Marathon. Replaced or reset monuments shall be of acceptable type and quality and shall be located so as to clear existing utilities or any other interferences. They shall be placed in a manner consistent with good and recognized engineering and surveying practice by a licenced surveyor.

Ps.2.04 WORKING AREAS

Designated areas will be available at the Site for the Contractor's storage as required during performance of the Works. No other areas on Site shall be used by the Contractor.

Additional areas required on Site by the Contractor for any purpose shall be developed by the Contractor at his own expense subject to Marathon's approval.

Ps.2.05 CONSTRUCTION UTILITIES AND MISCELLANEOUS FACILITIES

A. POWER

The Contractor shall provide at his own expense all necessary power.

B. WATER

The Contractor shall provide at his own expense a potable water supply.

C. SANITARY FACILITIES

Marathon shall make available sufficient sanitary facilities for the Contractor.

D. PARKING

The Contractor shall maintain Contractor parking areas as approved by Marathon.

E. TEMPORARY HEATING

The Contractor shall provide at his own expense, temporary heating, covering and enclosures as necessary, to protect all work and material against damage by dampness and cold and to facilitate completion of the Works. The Contractor shall supply all labor, fuel, equipment and material required for temporary heating.

Ps.2.06 WELL CONSTRUCTION STANDARDS

The extraction well installation shall be performed by a licensed well driller. Certification shall be presented to Marathon on request. The Contractor shall be required to conform to well construction standards required by the Wisconsin Department of Natural Resources.

Ps.2.07 PERMITS, CERTIFICATES, LAWS AND ORDINANCES

The Contractor shall, at his own expense, procure all permits, certificates, and licenses required of him by law for the execution of his work. Any waivers from Department of Natural Resources standards shall be requested and obtained by the Contractor and submitted to Marathon prior to commencement of site work. The Contractor shall comply with all Federal, State, and local laws, ordinances or rules and regulations relating to the performance of the Works. Upon completion of the Works, the Contractor shall submit soil samples, completion reports and other records required by the regulations.

Ps.2.08 PROTECTION OF WATER QUALITY

A. FOREIGN SUBSTANCES

The Contractor shall take the necessary precautions to prevent contamination of the water in the well by introduction of any foreign substances, including contaminated water, detergents, gasoline, cable lubricants and hammer oil. Any such substances required for the performance of the Works shall be precisely described and identified by the Contractor and approved by Marathon prior to use.

B. WATER FOR DRILLING OPERATIONS

The Contractor shall be responsible for furnishing or arranging for water required for drilling or cleaning the well. Water introduced into the well during drilling and completion, whether in washing, grouting or other activities shall be obtained from potable water sources.

Ps.2.09 RECORDS AND SAMPLES

A log or record of the pilot hole and the extraction well shall be kept by the Contractor on a form suitable to Marathon. This log shall indicate the general character, thickness and type of material encountered, the depth at which the water level stands in the well at the beginning and end of each shift, pumping tests, stabilization tests and the nature and extent of all other work performed, including the exact time spent on each item of work. The log shall be kept carefully and accurately at the time the work is being done. A copy of the log shall be maintained at all times at the job site and shall be available at any time for inspection by Marathon. Upon completion of the Works a complete copy shall be furnished to Marathon, and the Contractor shall further file, as required by the well construction permit, the necessary log, test results and record of forms provided by the regulatory authority. Samples of all materials penetrated during drilling shall be saved and maintained on the job site by the Contractor. These samples shall be of at least one-pint size, shall be kept in sample bags or jars and shall be clearly labeled to show the depth and well from which collected. Upon completion of the Works, the Contractor shall submit these samples to Marathon.

Ps.2.10 RECOVERY OF TOOLS

In the event of loss of tools or equipment during any phase of construction a well, the Contractor shall not be entitled to any additional payment for time spent or expense incurred in an attempt to fish out or recover the tools or equipment prior to possible abandonment of a well.

Ps.2.11 ABANDONMENT OF A WELL BEFORE COMPLETION

In the event that the Contractor should fail to complete the well as specified, or should the Contractor abandon the well because of loss of tools or equipment, or for any other cause, the Contractor, if requested and as directed by Marathon, shall fill the abandoned hole with cement-bentonite grout and salvage and remove such casing as can be salvaged. All salvaged casing or materials furnished by the Contractor shall remain his property. The cost of abandonment of an incomplete well, including the filling, shall be borne solely by

the Contractor and no allowance or payments will be made for the drilling, casing or other work performed by the Contractor on the abandoned well.

Ps.2.12 CLEANING UP

The Contractor shall not allow the Site to become littered with trash or waste material, and shall maintain the same in neat and orderly condition throughout the performance of the Works.

Ps.3 PROJECT START-UP AND CLOSEOUT

Ps.3.01 EXECUTION

A. MOBILIZATION/DEMOBILIZATION

The Contractor shall mobilize all workers, equipment, plant, and material to the Site, provide all Contractor required temporary facilities and services necessary for the performance of the Works, insurance, and necessary permits following mobilization and prior to commencing any drilling activities at the Site, steam clean the drill rig and equipment prior to commencing any drilling activities and prior to demobilization and removing all equipment, temporary facilities and services and materials from the Site upon completion of the drilling activities.

B. IMPLEMENTATION OF HEALTH AND SAFETY PLAN AND PROVISION OF HEALTH AND SAFETY PERSONNEL PROTECTIVE EQUIPMENT

The Contractor shall implement and conduct all Works in accordance with the site specific Health and Safety Plan (see Appendix A) and provide all Contractor required health and safety personnel protection equipment necessary to complete the Works.

The following levels of heath and safety equipment shall be utilized, at a minimum, for completion of the Works:

1. Pilot Hole and Extraction Well Installation - Level D
2. Well Development and Testing - Level D

It is to be noted that the levels of health and safety personnel protection equipment may be required to be upgraded to Level C or Level B, as specified for the individual task, in the Health and Safety Plan (see Appendix A).

Ps.3.02 MEASUREMENT AND PAYMENT

A. MOBILIZATION/DEMOBILIZATION

Payment for mobilization/demobilization will be made at the lump sum price bid in the Form of Bid for Item A-1 which price and payment shall be full compensation for furnishing insurance and permits; for movement of all equipment and materials to the Site of work, including all Contractor required services; cleaning of drilling rig and equipment prior to commencing the well installation program and prior to demobilization; and all other miscellaneous items for which separate payment is not provided under other Items.

B. IMPLEMENTATION OF HEALTH AND SAFETY PLAN AND PROVISION OF HEALTH AND SAFETY PERSONNEL PROTECTIVE EQUIPMENT

Payment for the implementation of the Health and Safety Plan and provision of health and safety personnel protection equipment will be made at the lump sum price stipulated in the Form of Bid for Item A-2 which price and payment shall be full compensation for implementation of the Health and Safety Plan; providing and

maintaining personnel health and safety equipment; and all other miscellaneous items for which separate payment is not provided under other Items.

Payment for increase in personnel health and safety equipment will be made at the unit price per day stipulated in the Schedule of Additional Unit Prices for Item 9 which price and payment shall be full compensation per day to be added to Item A-2 for increase in the level of personnel protection equipment required.

Ps.4 EXTRACTION WELL INSTALLATION

Ps.4.01 GENERAL

A. DESCRIPTION

The work of this Section consists of the supply and installation of a 16-inch diameter extraction well as specified and as shown on the Drawings.

Ps.4.02 PRODUCTS

A. GENERAL

Materials shall be provided form sources approved by Marathon.

B. MATERIALS

1. Well Casing

   The primary casing installed in the extraction well shall be nominal 16-inch diameter Sch.40 steel pipe complying with ASTM A53. Sections of pipe shall be joined by welding or threaded and coupled.

2. Well Screen

   The extraction well shall be equipped with a 16-inch diameter pipe size, Type 304 stainless steel continuous slot, wire would well screen (UOP - Johnson or equivalent).

3. Sand Pack

   Sand pack, if possible, shall be specified in the field by Marathon subsequent to the pilot borehole installation.

4. Cement/Bentonite Grout

   Cement/bentonite grout shall consist of a mixture of not more than six gallons of water per 94-pound sack portland cement and two percent bentonite.

Ps.4.03 EXECUTION

A. PILOT HOLE

A pilot hole shall be drilled, in the location of the extraction well, to allow the Contractor to confirm the hydrogeologic suitability and to establish the final well specification of the various components that comprise the well.

The Contractor shall provide representative samples of the aquifer material and shall make available to Marathon the sieve analyses obtained in the pilot hole.

Method of sampling shall be conducted using cable-tool 6-inch diameter drive pipe. Samples will be collected at each stratigraphic change or at a minimum at 5-foot intervals. The samples shall be suitably bagged and accurately labelled with the name of the well and depth interval. The design criteria of slot size and screen interval will be the responsibility of Contractor, subject to approval by Marathon. If the pilot hole is to be abandoned, it shall be secured by grouting in a method acceptable to Marathon.

Drill cuttings shall be field screened using a photoionization detector (PID) for organic vapors. Cuttings that yield vapor readings greater than background levels shall be collected and placed in containers for ultimate off-Site disposal. Appropriate containers shall be supplied by Marathon and all off-Site disposal of contaminated materials shall be conducted by Marathon, in compliance with local, state, and federal regulations. Soil cuttings that do not exhibit vapor readings greater than background readings (clean materials) shall be disposal off Site by the Contractor.

B. EXTRACTION WELL INSTALLATION

The extraction well shall be completed in accordance with the details shown on the Drawings. The well shall be installed using reverse circulation rotary method. Drilling mud will not be used. Drilling water will be obtained from potable water sources.

The Contractor shall install a suitably sized surface casing, if necessary. A minimum 22-inch diameter borehole shall be drilled to a depth specified by Marathon, to accommodate 16-inch nominal diameter casing. It is anticipated that the 16-inch casing will be set to a depth of approximately 110 feet below ground surface for extraction well EW-1.

A 16-inch diameter pipe size, 40-foot long, stainless steel screen shall be installed in the well. The screen shall be fitted with a wash-down fitting, and shall be welded to the casing. The slot-size shall be determined by the Contractor on the basis of sieve analyses of samples collected from the pilot hole the slot-size shall be approved by Marathon.

A sand pack shall be installed to a height of two feet above the screen unless subsurface conditions, as determined from the pilot hole, prohibit this. If a sand pack cannot be placed, the formation shall be allowed to collapse around the well screen. The remaining annulus between the borehole and the casing shall be filled with cement/bentonite grout using a positive displacement method approved by Marathon.

Drill cuttings shall be field screened using a photoionization detector (PID) for organic vapors. Cuttings that yield vapor readings greater than background levels shall be collected and placed in containers for ultimate off-Site disposal. Appropriate containers shall be supplied by Marathon and all off-Site disposal of contaminated materials shall be conducted by Marathon, in compliance with local, state, and federal regulations. Soil cuttings that do not exhibit vapor readings greater than background readings (clean materials) shall be disposal off Site by the Contractor.

Ps.4.04 MEASUREMENT AND PAYMENT

A. PILOT HOLE AND SAMPLING

1. Measurement

Measurement for pilot hole and sampling will be made in vertical feet for the actual depth of borehole measured in place by Marathon from existing ground surface to the approved bottom of the pilot borehole.

2. Payment

Payment for the quantity determined above will be made at the unit price per vertical foot bid in the Form of Bid for Item B-1 which price and payment shall be full compensation for all labor, supervision, materials and equipment required to drill the pilot hole; collect soil samples; collect and dispose of drill cuttings; logging the hole and providing Marathon of soil samples; and all other miscellaneous items for which separate payment is not provided under other Items.

B. DRILLING 22-INCH DIAMETER BOREHOLE

1. Measurement

Measurement for drilling 22-inch diameter borehole will be made in vertical feet for the actual depth of borehole measured in place by Marathon from existing ground surface to the approved bottom of the borehole.

2. Payment

Payment for the quantity determine above will be made at the unit price per vertical foot bid in the Form of Bid for Item B-2 which price and payment shall be full compensation for all labor, supervision, materials and equipment required to drill the boreholes; collect and dispose of all drill cuttings; and all other miscellaneous items for which separate payment is not provided under other Items.

C. STEEL CASING

1. Measurement

Measurement for steel casing will be made in vertical feet for the actual length of well casing measured in place by Marathon from the top of the screen to one feet above existing grade.

2. Payment

Payment for the quantity determined above will be made at the unit price per vertical foot bid in the Form of Bid for Item B-3 which price and payment shall be full compensation for supplying, and installing all 16-inch welded or threaded and coupled well casing and end caps; cleaning each length of well casing as directed by Marathon prior to installation; and all other

miscellaneous items for which separate payment is not provided under other Items.

D. WELL SCREEN

1. Measurement

Measurement for well screen will be made in vertical feet for the actual length of well screen measured in place by Marathon from the approved bottom of the borehole to the approved top of screen.

2. Payment

Payment for the quantity determine above will be made at the unit price per vertical foot bid in the Form of Bid for Item B-4 which price and payment shall be full compensation for supplying, and installing 16-inch diameter pipe size, Type 304 stainless steel continuous slot, wire round well screen; cleaning well screen prior to installation; and all other miscellaneous items for which separate payment is not provided under other Items.

E. SAND PACK

1. Measurement

Measurement for sand pack will be made in vertical feet for the actual length of sand pack measured in place by Marathon from the approved bottom of the borehole to two feet above approved top of screen.

2. Payment

Payment for the quantity determine above will be made at the unit price per vertical foot bid in the Form of Bid for Item B-5 which price and payment shall be full compensation for supplying, and placing sand pack graded as specified; and all other miscellaneous items for which separate payment is not provided under other Items.

F. CEMENT/BENTONITE GROUT

1. Measurement

Measurement for cement/bentonite grout will be made in vertical feet for the actual depth of grout measured in place by Marathon from existing ground surface to two feet above approved top of screen.

2. Payment

Payment for the quantity determine above will be made at the unit price per vertical foot bid in the Form of Bid for Item B-6 which price and payment shall be full compensation for supplying a cement/bentonite grout with minimum 2 percent bentonite; placing the grout to the ground surface by a positive

displacement method; and all other miscellaneous items for which separate payment is not provided under other Items.

Ps.5 WELL DEVELOPMENT AND TESTINGS

Ps.5.01 GENERAL

A. DESCRIPTION

Work of this Section consists of development and pump testing of the extraction well.

Ps.5.02 PRODUCTS

The pump, flow meters, discharge piping and all other related equipment necessary to conduct well development and pump testing shall be provided by the Contractor and approved by Marathon prior to commencing well development and testing.

Ps.5.03 EXECUTION

A. WELL DEVELOPMENT

The well shall be cleaned and developed to a sand-free condition after completion and subsequent to the installation of a treatment discharge outlet and rip-rap system to be installed by another Contractor. All equipment used in well development shall be cleaned prior to use in the well as specified. All development waters shall be discharged to the treatment/discharge outlet and rip-rap system. The Contractor shall provide Marathon with the method he proposes to use for well development and must receive approval of this method before commencing any well development.

B. EXTRACTION WELL TESTING

A pumping test shall be conducted on the extraction well to verify its yield and efficiency. Initially, a step-drawdown test, consisting of three 1-hour steps, shall be conducted at pumping test rates up to 1600 gpm. Subsequently, a 24-hour constant rate pumping test shall be performed on the well, at a rate determined by Marathon. Following pump shut down, water level recovery shall be measured for an additional eight hours, or until full recovery. Provisions shall be made by the Contractor to discharge pumping test waters to the treatment/discharge outlet and rip-rap system.

The Contractor shall furnish the test pump, discharge pipe, power supply and necessary valves and metering devices to control the flow rate. The Contractor shall also provide the necessary manpower and equipment to monitor the water level in the pumped well.

Ps.5.04 MEASUREMENT AND PAYMENT

A. WELL DEVELOPMENT

1. Measurement

Measurement for the well development shall be by number as determined by Marathon.

2. Payment

Payment for the quantity determined above will be made at the unit price bid in the Form of Bid for Item C-1 which price and payment shall be full compensation for supplying a pump and/or bailer and all other related equipment and manpower necessary for the purpose of developing the extraction well to a sand-free condition subject to the approval of Marathon; and all other miscellaneous items for which separate payment is not provided under other Items.

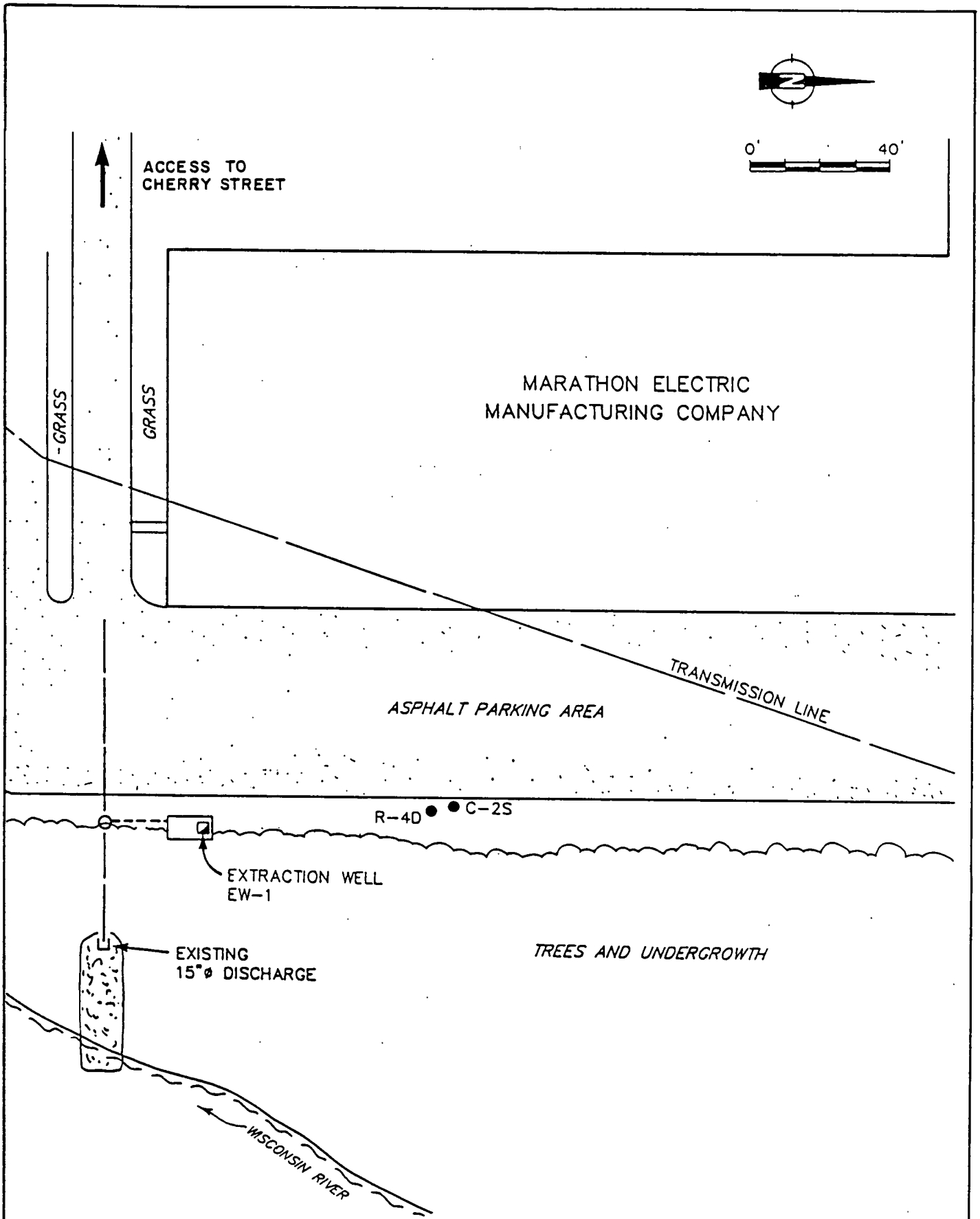
B. PUMP TEST

1. Measurement

Measurement for the pump test shall be by number as determined by Marathon.

2. Payment

Payment for the quantity determined above will be made at the unit price bid in the Form of Bid for Item C-2 which price and payment shall be full compensation for supplying a pump, flow meter, a discharge pipe and all other related equipment and manpower necessary to conduct the step-drawdown test and the 24-hour constant rate pump test subject to the approval of Marathon; and all other miscellaneous items for which separate payment is not provided under other Items.



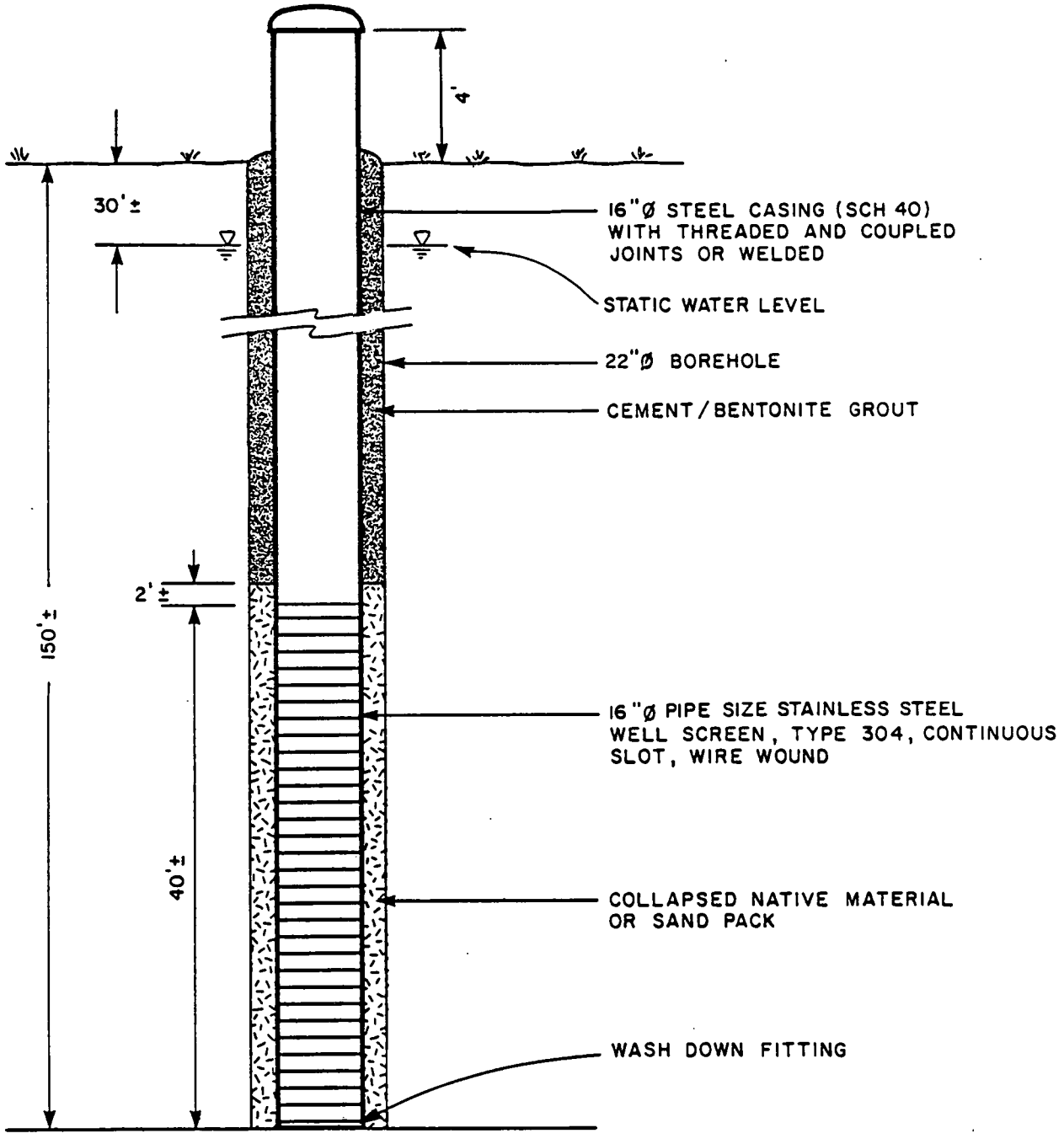
drawing A-1

EXTRACTION WELL LOCATION

Marathon Electric Manufacturing Co.

CRA

2115-24/01/89-7-D-0



N.T.S.

drawing A-2

TYPICAL EXTRACTION WELL DETAIL
Marathon Electric Manufacturing Co.

CRA

2115-16/09/88-7-D-0

APPENDIX A

HEALTH AND SAFETY PLAN

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1.0 SITE CHARACTERISTICS AND HAZARDS

1.1 GENERAL PROJECT DESCRIPTION

The field work for this project involves the installation of a groundwater extraction well and associated outlet structure to collect and discharge extracted groundwater to the Wisconsin River. Field tasks include:

- Mobilization
- Extraction well installation
- Extraction well development and pump testing
- Pumphouse installation
- Discharge manhole installation
- Discharge pipe installation
- Placement of concrete pad and rip rap at discharge outlet

1.2 SITE DESCRIPTION

The extraction well and associated discharge outlet structure will be installed at the Marathon Electric Manufacturing Company facility in Wausau, Wisconsin. The Site is located along the west side of the Wisconsin River within the City of Wausau. Access to the Site is available via Cherry Street slightly south of Randolph Street. A regional and site location map are shown in Figures 1.1 and 1.2, respectively. The location of the extraction well is shown on Figure 1.3.

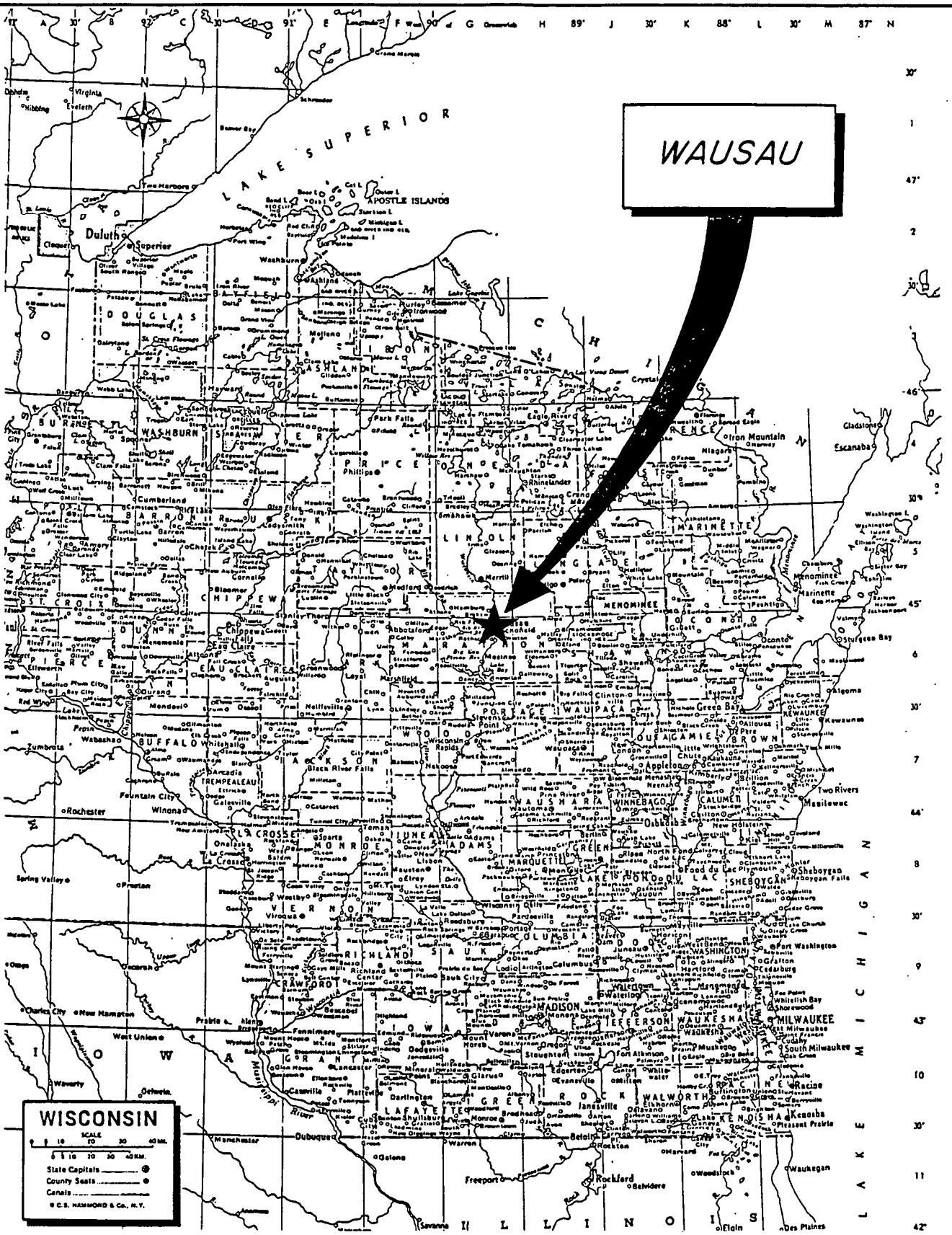

figure 1.1

REGIONAL LOCATION MAP

Marathon Electric Manufacturing Co.

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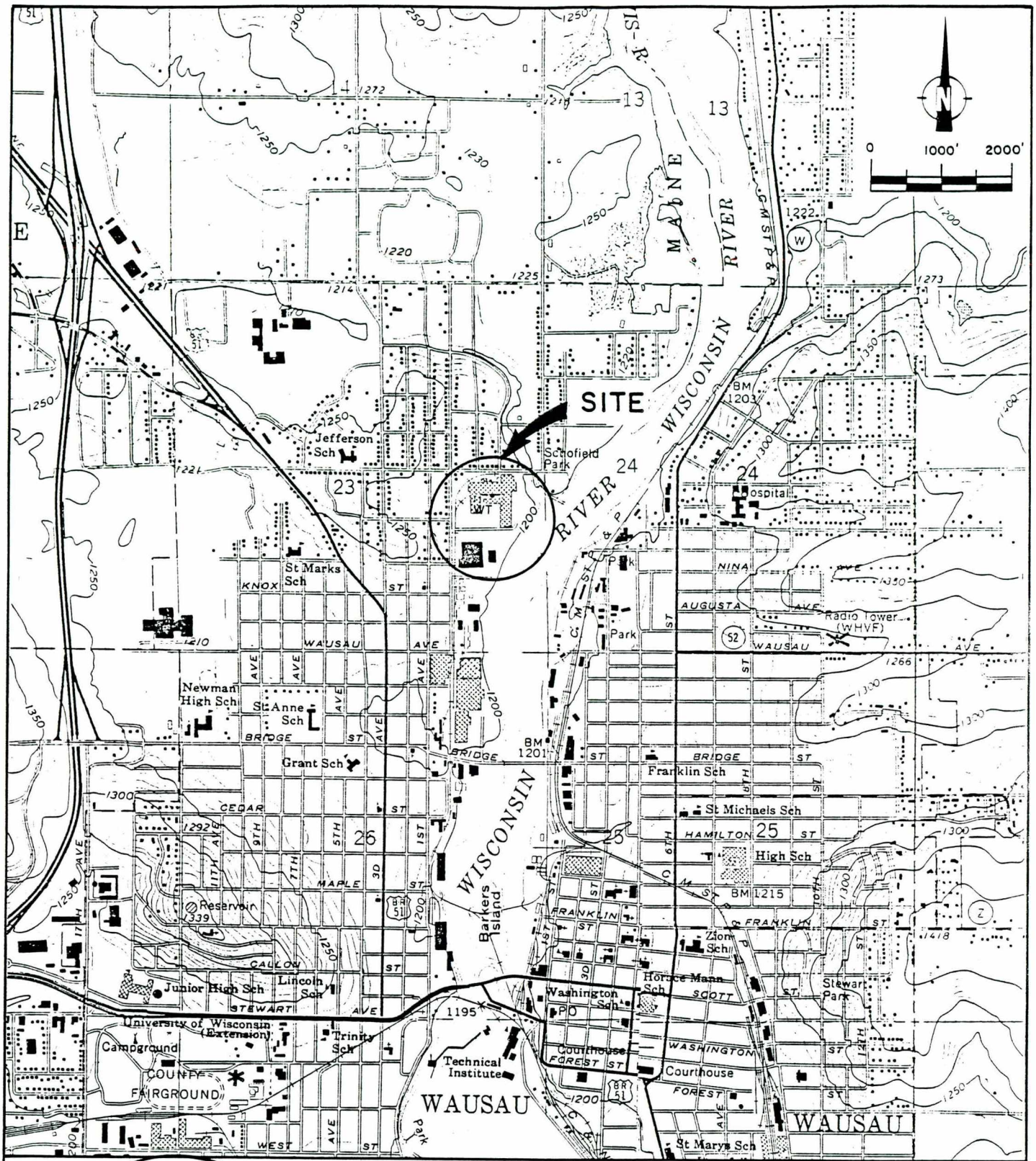

SOURCE : U.S.G.S. WAUSAU WEST QUADRANGLE MAP.

figure 1.2

SITE LOCATION

Marathon Electric Manufacturing Co.

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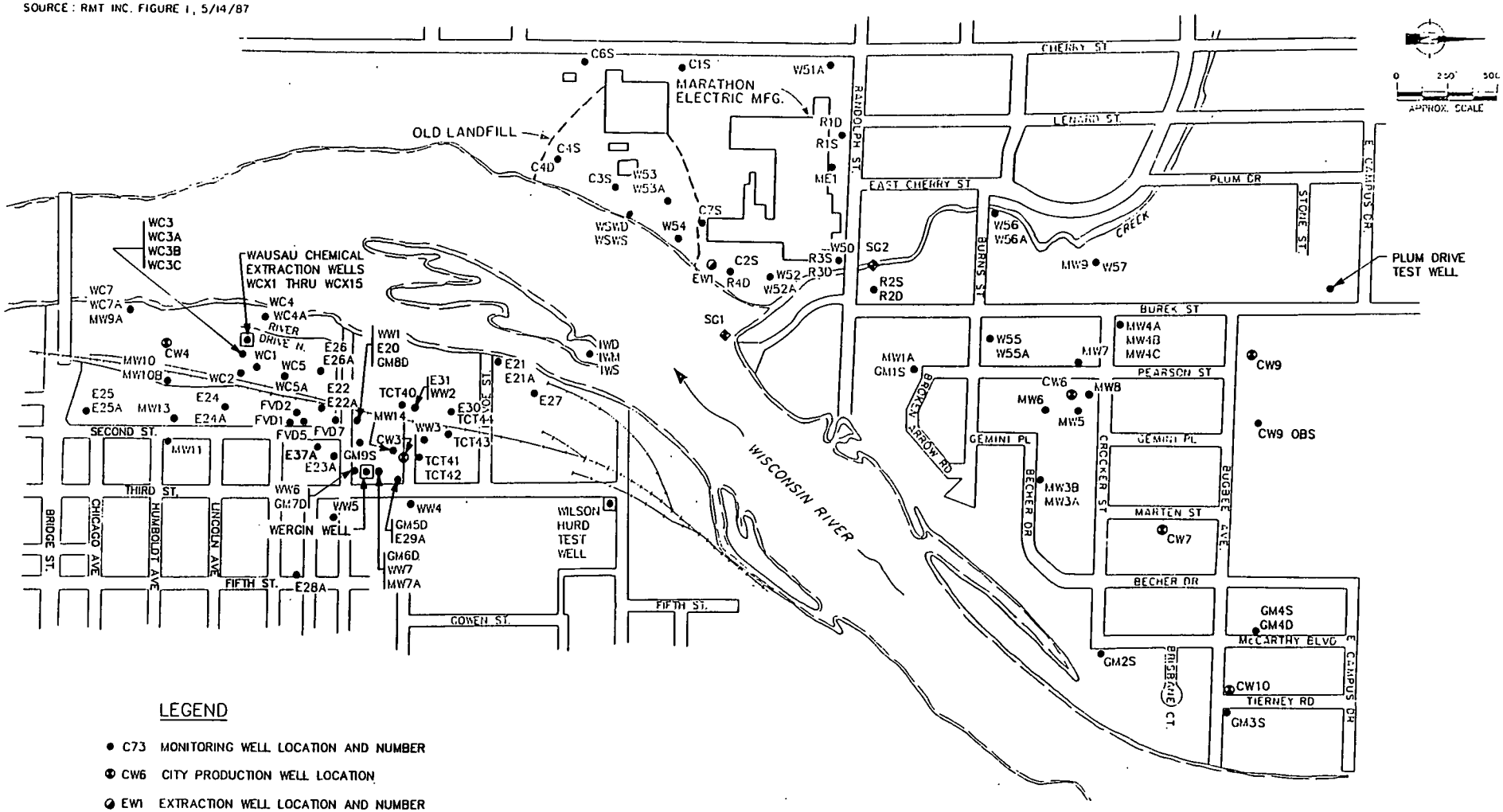

figure 1.3

EXTRACTION WELL AND MONITORING WELL LOCATIONS

Marathon Electric Manufacturing Co.

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1.3 SITE HISTORY

The City discovered in early 1982 that its production wells CW3, CW4, and CW6 were contaminated by volatile organic compounds (VOCs). Toluene, ethylbenzene, and xylene were also detected at CW4. Trichloroethene (TCE) is the predominant volatile organic compound detected at CW6, although below method detection limit (BMDL) concentrations for tetrachloroethene (PCE) and 1,2-Dichloroethene have also been previously reported (Weston, 1984). Since the contamination was first detected in early 1982, TCE concentrations from CW6 have ranged from 70 micrograms per liter (µg/L) to 260 µg/L. Sampling conducted in March 1988 indicated TCE concentrations of approximately 160 µg/L. Sample results from the East Well Field (CW3 and CW4) have indicated PCE, TCE, and DCE impact at both wells. CW4 has generally indicated steadily decreasing concentrations of the three constituents since February 1984. CW3 has indicated decreasing PCE and DCE concentration since the VOCs were discovered in early 1982. However, TCE concentrations at CW3 have remained relatively constant at concentrations ranging between 80 µg/L and 210 µg/L.

To reduce VOC concentrations, the City originally instituted a program where uncontaminated water from CW9 and CW7 was blended with water from CW3, CW4, and CW6 to dilute the VOC concentrations. However, increasing VOC concentrations in groundwater caused this method to be ineffective, and resulted in then current regulatory limits being exceeded.

In 1983, the United States Environmental Protection Agency (U.S. EPA) awarded the City of Wausau a federal grant to help fund the design and installation of a packed tower VOC stripper in order to provide sufficient water of acceptable quality to City residents. However, because VOC levels in the distribution system continued to increase, U.S. EPA's emergency response team was asked for assistance. As an interim measure in June 1984, the U.S. EPA installed a granular activated carbon (GAC) treatment system on CW6. VOC stripping towers were installed in the Summer and Fall of 1984 at the City water treatment plant to treat water from CW3 and CW4. Subsequently, the GAC system was removed from service in October 1984. In December 1985 the Wausau Groundwater Contamination site was added to the National Priorities List (NPL) for remedial activities under Superfund.

The City blends water treated for VOC removal with water from uncontaminated supply sources (CW7, CW9 and CW10) to reduce VOC concentrations in the water supply distribution system. Following installation of the packed tower VOC strippers, the water supply distribution system has had relatively low levels of VOCs (generally below detection limits of 0.5 to 1.0 µg/L). These levels are dependent on continued effective operation of the treatment system for CW3 and CW4, the influent VOC concentration for each well, and continued use of the three uncontaminated wells (CW7, CW9 and CW10).

In accordance with a Consent Decree, entered with the court on September 9, 1989, Marathon Electric is proceeding with an extraction well and associated discharge outlet installation. The purpose of

the extraction well is to create a cone of depression capable of containing an identified contaminant plume source to prevent further migration toward City production wells.

1.4 SITE FEATURES

Topography: The extraction well is to be installed in a relatively flat area behind the Marathon Electric Facility adjacent to the bank of the Wisconsin River. The bank has a relatively steep slope.

Buildings: Marathon Electric Facility (see Figure 3)

Waterways: Wisconsin River

Utilities: To be notified prior to drilling activities; consult local utilities

Area Population: 45,000

1.5 PRINCIPAL CHEMICAL EXPOSURE HAZARDS

The principal hazardous materials of concern are the following volatile organic compounds:

Chemical	*Maximum Concentration in Monitoring Well (µg/L)*
Perchloroethylene (PCE)	55
Trichloroethylene (TCE)	3200
1,2-Dichloroethylene (DCE)	641

The concentrations listed above reflect the maximum concentrations of the principal hazardous materials detected in the west side plume monitoring wells.

1.6 SAFETY HAZARDS

Safety hazards unique to site operations include the operation of drilling rigs, construction equipment, and use of manually operated equipment. These hazards vary with the specific tasks and are addressed under the tasks in Section 3.0: Task Evaluation. The Health and Safety Plan, contained herein, is specifically for the installation and construction phase of the groundwater extraction, treatment and discharge system.

1.7 HEAT STRESS

The possibility of heat stress will be addressed by the Site Safety Officer in the daily safety briefings if it becomes applicable. The content of heat stress review is contained in Appendix A.

1.8 COLD EXPOSURE

The possibility of cold exposure will be addressed by the Site Safety Officer in the daily briefings if it becomes applicable. The content of cold exposure review is included in Appendix B.

1.9 ELECTRICAL HAZARDS

Electrical hazards may occur from overhead lines or buried lines during drilling operations or excavating operations. The work site will be cleared by the local utilities prior to the start of activities. The Contractor's discretion will be used for the avoidance of overhead lines.

1.10 SITE CONTROL PROCEDURES

A site such as the Wausau NPL Site possesses characteristics that make conditions different from a more typical abandoned hazardous waste site. Because the sources and spread of chemical contamination are below ground, the concepts of restricted access, exclusion zones, and support areas do not readily apply from the U.S. Army model for chemical, biological, radiological warfare.

A temporary exclusion zone will, however, be set up around the extraction well location during drilling and during the

installation of the discharge outlet manhole and discharge pipe. The exclusion zone will extend approximately 20 feet beyond the drill rig or excavation, as appropriate, and will be delineated in the field by caution tape or other appropriate means. All unauthorized personnel shall not be allowed to enter this exclusion zone.

All other operations shall not require the establishment of an exclusion zone. As conditions warrant, unauthorized personnel will be requested to stay at safe distances from the work area by field personnel.

1.11 ORGANIZATIONAL STRUCTURES

Overall field management will be provided by Marathon Electric's designated Field Supervisor. Health and Safety issues will also be the purvey of Marathon Electric's designated Field Supervisor/Site Safety Officer. Safety monitors will be provided as a part of each Contractor field team. Safety monitors will report safety concerns, including air monitoring results and personnel protection equipment and practices employed, to the Site Safety Officer. All personnel will be required to employ safe operating practices at all times.

1.12 MEDICAL MONITORING REQUIREMENTS

As required by 29 CFR 1910.120[f] (OSHA) on-site personnel that have a potential for exposure to hazardous material, or will be

required to wear a respirator, must receive a physical examination that will determine their fitness for these tasks. This determination will be made by a qualified physician and its documentation will be received before field work will begin.

1.13 PERSONNEL TRAINING

Pursuant to 29 CFR 1910.120 [e] (OSHA) on-site personnel involved in the extraction well, discharge manhole outlet structure and discharge pipe installation shall receive a minimum of 40 hours of off-site classroom training. This training shall include, but not be limited to, those topics addressed in that section.

All other on-site personnel that may perform other related work such as the installation of the pumphouse or discharge outlet (rip-rap) shall not be required to have completed the OSHA 40-hour training program. These personnel will not come in contact with potentially contaminated material.

2.0 CHEMICAL HAZARD INFORMATION

2.1 CHEMICAL HAZARD INFORMATION

The following summarizes chemical hazard information.

Chemical Properties

Name	*Specific Gravity*	*Flash Point*	*Flam. Limits*	*Vapor Pressure*	*Vapor Density*	*Ionization Potential*	*Solubility*
Perchloroethylene	1.63	Not Combustible		14 mmHg	5.83	9.32 eV	0.015%
Trichloroethylene	1.46	89.6°F	11-41%	58 mmHg	4.53	9.47 eV	0.1%
1,2-Dichloroethylene	1.27	37.0°F	9.7-12.8%	180-265 mmHg	3.34	9.65 eV	0.35 - 0.63%

Health Properties

Name	*Odor Characteristic*	*Threshold*	*TLV*	*IDLH*	*Dermal Toxicity*	*Approved Cartridge*
Perchloroethylene	chloroform-like	4.7 ppm	50 ppm	500 ppm	moderate	organic vapor
Trichloroethylene	chloroform-like	21.4 ppm	40 ppm	1000 ppm	skin irritant	organic vapor
1,2-Dichloroethylene	chloroform-like	0.085 ppm	200 ppm	4000 ppm	moderate	organic vapor

3.0 TASK EVALUATION

3.1 SUBTASK ANALYSIS

The field investigation includes the following subtasks. Specific hazards and levels of protection are described for each subtask.

Subtask 1 Extraction Well Installation

Level D, C, and/or B Protection

The drilling rig will be supervised by Marathon Electric's designated Field Supervisor/Site Safety Officer.

Well drilling will be performed utilizing a normal or reverse circulation method. The pilot hole to be drilled prior to the extraction well drilling may be conducted using hollow stem augers. Soil samples will be collected from the pilot hole.

In addition to the chemical hazards involved with contact of contaminated soils and groundwater, personnel must address the physical hazards of operating machinery. Professional caution, especially with regard to the limitations presented by protective equipment, must be stressed for all personnel engaged in drilling operations.

Personal protection will be guided by air monitoring of the drilling crew's breathing zones with a PID. Operations may begin in level

D protection. Upgrade to level C (breathing zone PID readings greater 2 ppm over background level, but less than 200 ppm over background) and to level B (breathing zone PID readings greater than 200 ppm over background level) may be necessary as the borehole is advanced. The rationale for selection of these actions levels is presented in Section 3.2. Upgrade of personal protection may be necessary as an interim measure in some situations; if PID readings show a persistent return to below action levels, work may proceed with upgraded protection at the ready.

Subtask 2 Well Development and Testing

Level D and/or C Protection

The extraction well will be developed subsequent to installation and a pumping test conducted. Purge water from the well will be discharged to the treatment/discharge outlet and rip-rap system.

The potential for dermal contact with the dissolved chlorinated solvents exists, and should be kept to a minimum by the use of dermal protection and eye and face protection (level D). If air monitoring indicates significant vapor concentrations of the solvents (PID readings greater than 2 ppm over background level), air purifying respirators should be utilized (level C). The rational for selection of the action levels is presented in Section 3.2.

Air monitoring will be performed during well development and testing with a photoionization detector (PID). The action

level for upgrade to level C is any persistent reading in the sampler's breathing zone greater than background (as ppm benzene).

Subtask 3 Pumphouse Installation

Level E Protection

A prefabricated fiberglass pumphouse will be erected over the extraction well and all mechanical and electrical components of the pumping system installed.

Hazards other than those provided by normal field operations are not anticipated.

Air monitoring will not be included for this subtask.

Subtask 4 Discharge Manhole Installation

Level E, D or C Protection

Activities conducted under this subtask will include excavation, installation of a prefabricated manhole, connection of the manhole to the existing storm sewer discharge line and backfilling. It is not anticipated that workers will contact any potentially contaminated groundwater. Should groundwater be encountered during excavation, personnel protection shall be upgraded to level D.

Air monitoring of the excavated soils will be performed during excavation with a PID. The action level for upgrade to level C will be a persistent reading in the breathing zone greater than background (as ppm benzene).

Subtask 5 Discharge Pipe Installation

Level E, D, or C Protection

A discharge pipe will be installed to a depth of approximately five feet extending between the pumphouse and the discharge manhole. It is not anticipated that workers will contact any potentially contaminated groundwater. Should groundwater be encountered during excavation, personnel protection shall be upgraded to level D.

Air monitoring of the excavated soils will be performed during excavation with a PID. The action level for upgrade to level C will be a persistent reading in the breathing zone greater than background (as ppm benzene).

Subtask 6 Placement of Concrete Pad and Rip Rap

Level E Protection

At the existing storm sewer discharge point, a concrete pad and rip rap will be installed. The rip rap will be placed from the base of the existing discharge outlet to the Wisconsin River (approximately 20 feet).

Hazards other than those provided by normal field operations are not anticipated.

Air monitoring will not be included for this subtask.

Subtask 7 Location and Elevation Survey

Level E Protection

A location and elevation survey of the extraction well and discharge outlet structure will be performed by Marathon Electric following installation.

Air monitoring is not anticipated for this subtask.

3.2 LEVELS OF PROTECTION

The following section describes the levels of protection which may be implemented during the site activities. If upgraded from one level to another is required, authorized site visitors will be advised at that time.

Level E

Level E is to be implemented when work activities (e.g. site setup, pumphouse installation) take place where there are no anticipated or known environmental health hazards. Level E may include the following:

- steel toe boots
- hard hat
- disposable latex gloves (when needed)
- coveralls
- participation in medial monitoring program and Health and Safety trained, according to OSHA 20 CFR 1910.120.

Level D

Level D is to be worn during activities which do not suggest any initial respiratory protection, but where dermal protection is warranted. The following list outlines the personal protective equipment to be utilized for Level D:

- Polyethylene (PE) coated Tyvek coveralls
- steel toe/steel shank leather work boots with latex overboots or steel toe/steel shank neoprene boot
- disposable latex gloves
- Nitrile or neoprene gloves
- eye protection (safety glasses or face shield)
- hard hat

Level C

Level C is to be worn when work area organic vapor air contamination is between 2 ppm over background concentration and 200 ppm greater than background (according to the PID readings). The following outlines this level of protection.

- PE coated tyvek coveralls
- steel toe/steel shank leather work boots with latex overboots or steel toe/steel shank neoprene boots
- disposable latex gloves
- nitrile or neoprene gloves
- full face, air purifying respirator with combination organic vapor/dust and mist cartridge
- hard hat

Level B

Level B protection is worn when work area organic vapor air contamination is between 200 and 500 ppm (according to PID readings). The following outlines this level of protection:

- PE coated tyvek coveralls
- Steel toe/steel shank leather work boots with latex overboots or steel toe/steel shank neoprene boots
- disposable latex gloves

- nitrile or neoprene gloves
- positive pressure self-contained breathing apparatus (SCBA) or airline supplied respirator with 5-minute escape pack
- hard hat

The action level criteria presented in this plan are based on the historical data base developed for the Wausau site areas. Contaminants identified are included in Section 2 of this Plan, which include chlorinated ethylene compounds. The ACGIH had defined the TLV as the time-weighted average concentration for a normal 8-hour workday and a 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect. Because the lower TLV for the contaminants of concern is 50 ppm, the basis of upgrade from level D to level C may be placed at 50 ppm. Because field photoionization detectors (PID) typically measure chlorinated ethylene at about 50 percent efficiency compared to their calibration standard (HNU Systems, Inc. literature), a reading of 25 ppm greater than background level on a field PID would represent the TLV. CRA has selected a level of about one tenth this meter reading, 2 ppm, as its action level for upgrade of respiratory protection to full face air purifying respirators with organic vapor cartridge.

The action level for upgrade to a supplied air system is developed on the same basis. Because the maximum use concentration (MUC) is based on the TLV of the known contaminant and the protection factor (PF) of the selected respirator by the relationship:

$$MUC = TLV \times PF$$

an action level based on site conditions can be developed. With a PF of 100 for a full face purifying respirator (ANSI 288.2-1980), the MUC would be 5000 ppm. However, NIOSH approval of the purifying respirators used, limits their use to 1000 ppm organic vapors. With a 50 percent efficiency of PID air monitor, the MUC would read 500 ppm. CRA's action level of 200 ppm is well below this value. The action level is also less than the IDLH values for the chlorinated ethylenes of concern.

The action levels for respiratory protection were developed for known chemical contaminants unique to the Wausau project area. Their determination was made on a conservative basis, not only from the hazard of chemical exposure, but also to avoid unnecessary exposure to the physical hazards of restricted vision and mobility inherent in the use of respiratory protection equipment.

3.3 DECONTAMINATION PROCEDURES

Personnel Decontamination

A decontamination line will be established by the Site Safety Officer. The decontamination line will be set up such that no cross contamination will take place when disposing of contaminated personal protection equipment. Decontamination procedures should be followed including washing hands and face, upon finishing a field activity.

Drill Rig and Related Equipment Decontamination

Steam cleaning the drilling rig after the completion of the extraction well installation will be conducted at a decontamination (decon) area. The decon area will be located in the Marathon Electric parking area adjacent to the work site. Decon water will be collected and either discharged to the sanitary sewer or the storm sewer. Decon water will not be discharged to the storm sewer if PID screening indicates elevated levels of contaminants in the rinse water (i.e. PID readings greater than background). In such cases the decon water will be discharged to the sanitary sewer.

Securing provisions for drums containing contaminated soil cuttings will also be provided. Level C personal protection may possibly be required for decontamination of grossly contaminated equipment, based on PID measurements of the equipment.

Equipment Decontamination

All sampling and monitoring equipment will be cleaned with Alconox or equivalent, triple rinsed with deionized water and allowed to air dry prior to use. All rinsings will be collected and either discharged to the sanitary sewer or the storm sewer. Rinse water will not be discharged to the storm sewer if PID screening indicates elevated levels of contaminants in the rinse water (i.e. PID readings greater than background). In such cases the rinse water will be discharged to the sanitary sewer.

3.4 INVESTIGATION-DERIVED WASTES

Extraction well development and pump test water will be discharged to the treatment/discharge outlet and rip-rap system. Decon water will be collected and either discharged to the sanitary sewer or the storm sewer. Decon water will not be discharged to the storm sewer if PID screening indicates elevated levels of contaminants in the rinse water (i.e. PID readings greater than background). In such cases the decon water will be discharged to the sanitary sewer.

Bagged disposable protective equipment will be disposed at locations determined by Marathon Electric in compliance with local, state and federal regulations.

Boring cuttings will be field screened with a PID for organic vapors. Cuttings that yield vapor readings greater than background levels will be contained in drums and disposed of using a method determined to be in compliance with local, state and federal regulations.

It is unlikely that contaminated soils will be encountered during excavation for the installation of the discharge outlet manhole/structure or the discharge pipe. In the event that contaminated soils are encountered, based on visual or olfactory evidence or elevated PID measurements, the contaminated material will be excavated and will be contained in drums or other suitable containers. This material will be disposed at a location determined by Marathon Electric in compliance with local, state and federal regulations.

4.0 SITE EMERGENCY CONTINGENCY PLAN

4.1 CHEMICAL EXPOSURE SYMPTOMS

Vapors of chlorinated organic solvents are irritating to the eyes, nose, and throat. If inhaled in high concentration they can cause difficult breathing, nausea or dizziness.

Liquids containing these solvents can be irritating to the eyes and skin. If swallowed, they may produce nausea.

4.2 FIRST AID TREATMENT

For vapor exposure, remove victim to fresh air. If breathing has stopped, begin artificial respiration.

For liquid exposure, remove contaminated clothing and flush affected skin with plenty of water. If in eyes, hold eye lids open and flush with plenty of water. If swallowed and the victim is conscious, have him drink water or milk and induce vomiting. If swallowed and the victim is unconscious, do nothing except keep him warm and contact emergency medial help.

4.3 RESOURCES

Service or Organization	*Location*	*Phone Number*
Hospital: Wausau Hospital Center	Wausau, WI 333 Pine Ridge Blvd.	715-847-2121
Fire Department	Wausau, WI	715-845-1111
Poison Control Center	Green Bay, WI	414-433-8100
Police	Wausau, WI	715-842-2055
Rescue/Ambulance	Wausau, WI	715-845-1111

4.4 HOSPITAL ROUTE

Take Cherry Street south (left) to Wausau Avenue. Go west (right) one block to First Avenue. Go south (left) to Bridge Street. Go west (right) on Bridge Street about 500 feet west of U.S. 51, to West Wood Drive. Go south (left) on West Wood about 0.2 mi. to Pine Ridge Blvd. Go west (right) on Pine Ridge Blvd. to the hospital, about 0.2 mi.

Personnel should ascertain that this route is available prior to the start of field activities.

APPENDIX A

HEAT STRESS

STANDARD OPERATING PROCEDURES FOR EMERGENCIES DUE TO HEAT AND HEAT STRESS MONITORING

Field operations during the summer months can create a variety of hazards to the employee. Heat cramps, heat exhaustion, and heat stroke can be experienced and, if not remedied, can threaten life or health. Therefore, it is important that all employees be able to recognize symptoms of these conditions and be capable of arresting the problem as quickly as possible.

THE EFFECTS OF HEAT

As the result of normal oxidation processes within the body, a predictable amount of heat is generated. If the heat is liberated as it is formed, there is no change in body temperature. If the heat is liberated more rapidly, the body cools to a point at which the production of heat is accelerated and the excess is available to bring the body temperature back to normal.

Interference with the elimination of heat leads to its accumulation and thus to the elevation of body temperature. As a result, the person is said to have a fever. When such a condition exists, it produces a vicious cycle in which certain body processes speed up and generate additional heat. Then the body must eliminate not only the normal but also the additional quantities of heat.

Heat produced within the body is brought to the surface largely by the bloodstream and escapes to the cooler surroundings by conduction and radiation. If air movement or a breeze strikes the body, additional heat is lost by convection. However, when the temperature of the surrounding air becomes equal to or rises above that of the body, all of the heat must be lost by vaporization of the moisture or sweat from the skin surface. As the air becomes more humid (contains more moisture), vaporization from the skin slows down. Thus, on a day when the temperature is 95 to 100°F, with high humidity and little or no breeze, conditions are ideal for the retention of heat within the body. It is on such a day or, more commonly, a succession of such days (a heat wave) that medical emergencies due to heat are likely to occur. Such emergencies are classified in three categories: heat cramps, heat exhaustion, and heat stroke.

HEAT CRAMPS

Heat cramps usually affect people who work in hot environments and perspire a great deal. Loss of salt from the body causes very painful cramps of the leg and abdominal muscles. Heat cramps also may result from drinking iced water or other drinks either too quickly or in too large a quantity.

Heat Cramp Symptoms. The symptoms of heat cramp are:

- Muscle cramps in legs and abdomen,
- Pain accompanying the cramps,
- Faintness, and
- Profuse perspiration.

Heat Cramp Emergency Care. Remove the patient to a cool place. Give him sips of liquids such as "Gatorade" or its equivalent. Apply manual pressure to the cramped muscle. Remove the patient to a hospital if there is any indication of a more serious problem.

HEAT EXHAUSTION

Heat exhaustion occurs in individuals working in hot environments, and may be associated with heat cramps. Heat exhaustion is caused by the pooling of blood in the vessels of the skin. The heat is transported from the interior of the body to the surface by the blood. The blood vessels in the skin become dilated and a large amount of blood is pooled in the skin. This condition, plus the blood pooled in the lower extremities when an individual is in an upright position, may lead to an inadequate return of blood to the heart and eventually to physical collapse.

Heat Exhaustion Symptoms. The symptoms of heat exhaustion are:

- Weak pulse;
- Rapid and usually shallow breathing;
- Generalized weakness;
- Pale, clammy skin;
- Profuse perspiration;
- Dizziness;
- Unconsciousness; and
- Appearance of having fainted (the patient responds to the same treatment administered in cases of fainting).

Heat Exhaustion Emergency Care. Remove the patient to a cool place and remove as much clothing as possible. Administer cool water, "Gatorade," or its equivalent. If possible, fan the patient continually to remove heat by convection, but do not allow chilling or overcooling. Treat the patient for shock, and remove him to a medical facility if there is any indication of a more serious problem.

HEAT STROKE

Heat stroke is a profound disturbance of the heat-regulating mechanism, associated with high fever and collapse. Sometimes this condition results in convulsions, unconsciousness, and even death. Direct

exposure to sun, poor air circulation, poor physical condition, and advanced age (over 40) bear directly on the tendency to heat stroke. It is a serious threat to life and carries a 20% mortality rate. Alcoholics are extremely susceptible.

Heat Stroke Symptoms. The symptoms of heat stroke are:

- Sudden onset;
- Dry, hot, and flushed skin;
- Dilated pupils;
- Early loss of consciousness;
- Full and fast pulse;
- Breathing deep at first, later shallow and even almost absent;
- Muscle twitching, growing into convulsions; and
- Body temperature reaching 105 to 106°F or higher.

Heat Stroke Emergency Care. Remember that this is a true emergency. Transportation to a medical facility should not be delayed. Remove the patient to a cool environment if possible, and remove as much clothing as possible. Assure an open airway. Reduce body temperature promptly--preferably by wrapping in a wet sheet or else by dousing the body with water. If cold packs are available, place them under the arms, around the neck, at the ankles, or at any place where blood vessels that lie close to the skin can be cooled. Protect the patient from injury during convulsions, especially from tongue biting.

AVOIDANCE OF HEAT-RELATED EMERGENCIES

Please note that, in the case of heat cramps or heat exhaustion, "Gatorade" or its equivalent is suggested as part of the treatment regime. The reason for this type of liquid refreshment is that such beverages will return much-needed electrolytes to the system. Without these electrolytes, body systems cannot function properly, thereby increasing the represented health hazard. Therefore, when personnel are working in situations where the ambient temperatures and humidity are high--and especially in situations where protection Levels A, B, and C are required--the site safety officer must:

- Assure that all employees drink plenty of fluids ("Gatorade" or its equivalent);
- Assure that frequent breaks are scheduled so overheating does not occur; and
- Revise work schedules, when necessary, to take advantage of the cooler parts of the day (i.e., 5:00 a.m. to 1:00 p.m., and 6:00 p.m. to nightfall).

If protective clothing must be worn, especially Levels A and B, the suggested guidelines for ambient temperature and maximum wearing time per excursion are:

Ambient Temperature (°F)	Maximum Wearing Time per Excursion (Minutes)
Above 90	15
85 to 90	30
80 to 85	60
70 to 80	90
60 to 70	120
50 to 60	180

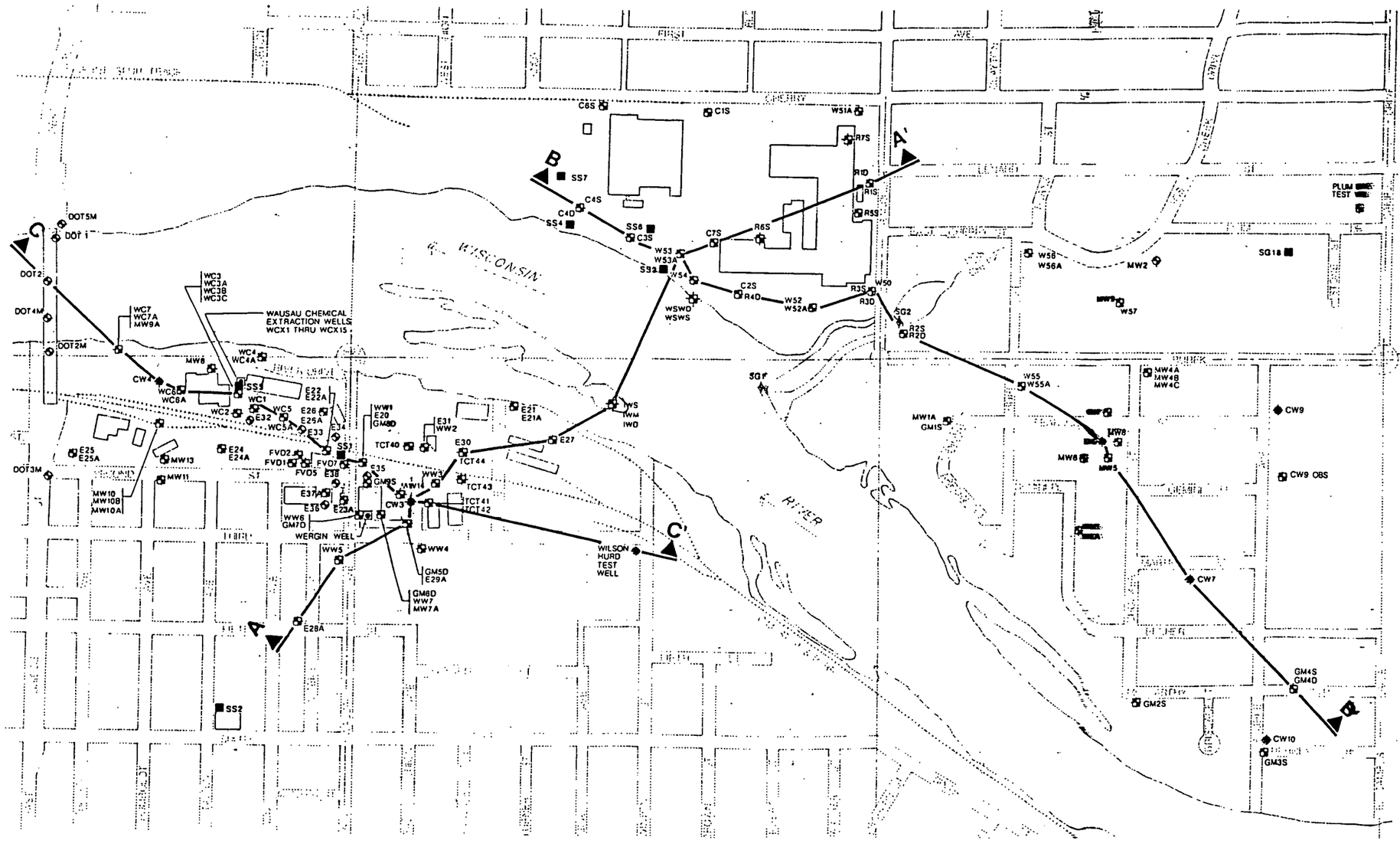
One method of measuring the effectiveness of employees' rest-recovery regime is by monitoring the heart rate. The "Brouha guideline" is one such method:

- During a three-minute period, count the pulse rate for the last 30 seconds of the first minute, the last 30 seconds of the second minute, and the last 30 seconds of the third minute.
- Double the count.

If the recovery pulse rate during the last 30 seconds of the first minute is at 110 beats/minute or less and the deceleration between the first, second, and third minutes is at least 10 beats/minute, the work-recovery regime is acceptable. If the employee's rate is above that specified, a longer rest period is required, accompanied by an increased intake of fluids.

APPENDIX B

COLD EXPOSURE



LEGEND

- MW6 — MONITORING WELL LOCATION AND NUMBER
- CW9 — CITY PRODUCTION WELL LOCATION AND NUMBER
- E35 — SOIL BORING LOCATION AND NUMBER
- A ▲ — GEOLOGIC CROSS SECTION LOCATION
- SG1 — STAFF GAUGE LOCATION AND NUMBER
- SS1 SG18 — SURFICIAL SOIL SAMPLE LOCATION AND NUMBER

NOTES

1. REFER TO FIGURE 2 FOR BASE MAP LEGEND AND NOTES.
2. SOIL BORING AND MONITORING WELL LOCATIONS ARE BASED ON FIELD MEASUREMENTS FROM EXISTING STRUCTURES AND FEATURES.
3. MONITORING WELL LOCATIONS AND ELEVATIONS OBTAINED BY WARZYN ENGINEERING INC. SURVEYORS, DECEMBER 1987 AND JANUARY 1988.
4. PRE-EXISTING MONITORING WELL LOCATIONS AND ELEVATIONS WERE SURVEYED BY RMT INC. SEPTEMBER 1986.
5. REFER TO APPENDICES C AND D FOR "W, E AND DOT" SERIES SOIL BORING LOGS, AND MONITORING WELL CONSTRUCTION DETAILS, RESPECTIVELY.
6. ALL OTHER BORING LOGS AND CONSTRUCTION DETAILS ARE AVAILABLE FROM PREVIOUSLY RELEASED REPORTS.

NORTH

0 400 800

SCALE IN FEET

FIGURE 7.

Drawn by JC
Checked by CSR
Date 7/24/89
Approved by R. HASSETT
Revisions

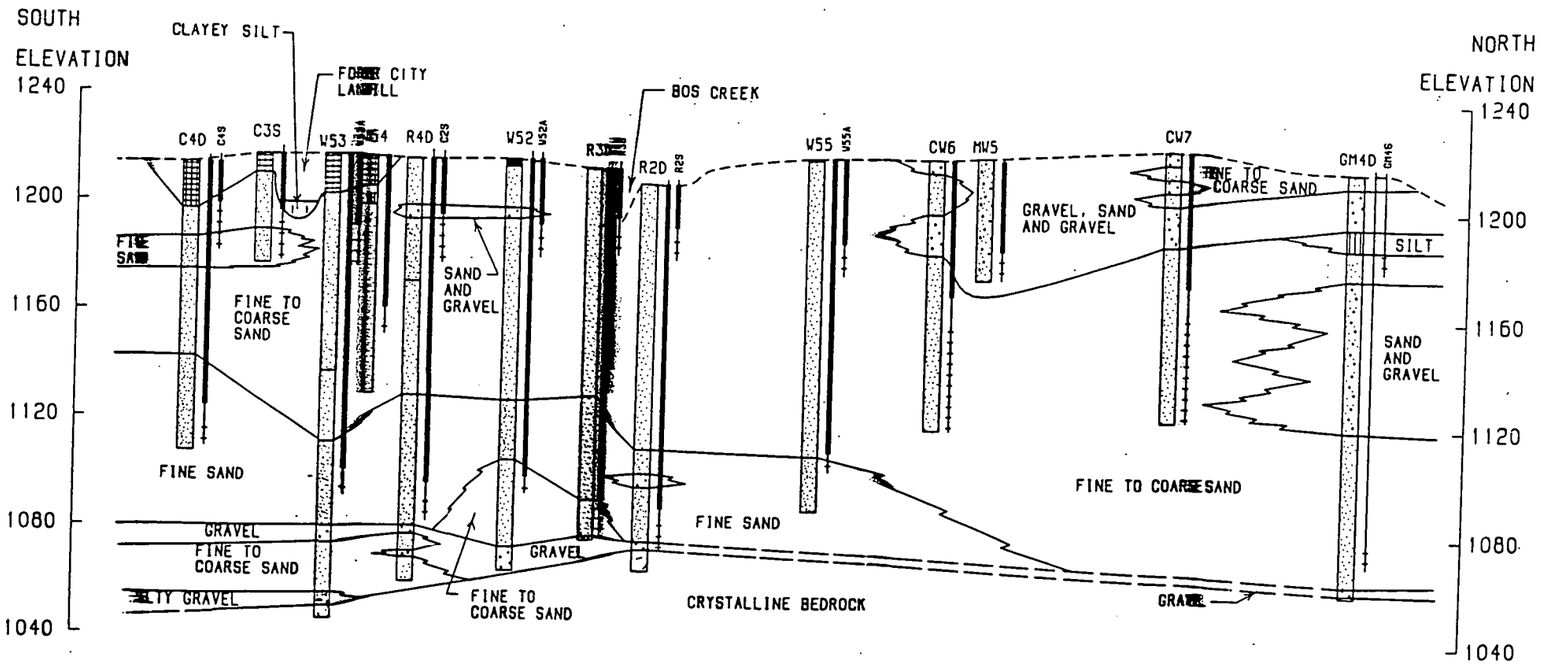
WARZYN

CROSS SECTION LOCATION MAP

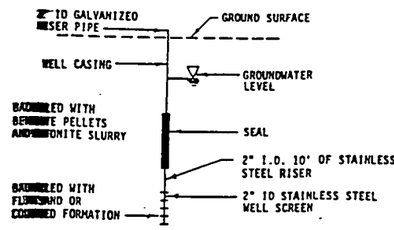
REMEDIAL INVESTIGATION
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

JULY 24, 1989

13076 B53



SECTION B-B'



TYPICAL WELL INSTALLATION DETAIL

NOT TO SCALE

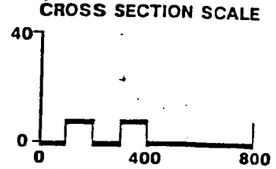
LEGEND

- FILL
- CLAY
- MED. TO COARSE SAND, TRACE GRAVEL, TRACE SILT
- FINE TO MED. SAND, LITTLE SILT
- SAND AND GRAVEL
- WEATHERED ROCK
- SILT, FINE TO MED. SAND, LITTLE GRAVEL

NOTES

1. THE STRATUM LINES ARE BASED ON INTERPOLATION BETWEEN BORINGS AND MAY NOT REPRESENT ACTUAL SUBSURFACE CONDITIONS.
2. CROSS SECTION LOCATIONS ARE SHOWN ON FIGURE 7.
3. FOR THE PURPOSE OF ILLUSTRATING SUBSOIL CONDITIONS ON THE CROSS SECTIONS, SOME OF THE BORING LOGS HAVE BEEN SIMPLIFIED. FOR A DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT INDIVIDUAL BORINGS, REFER TO SOIL BORING LOGS, APPENDIX C OF TEXT.
4. FOR COMPLETE MONITORING WELL INSTALLATION DETAILS, REFER TO APPENDIX D OF TEXT.
5. CROSS SECTIONS HAVE BEEN VERTICALLY EXAGGERATED TEN (10) TIMES.
6. HORIZONTAL DISTANCES ARE MEASURED WITH RESPECT TO THE CENTER OF EACH SOIL BORING LOCATION.
7. ELEVATIONS ARE SHOWN IN U.S.G.S. DATUM.
8. DASHED GEOLOGIC CONTACT LINES ARE INFERRED.
9. GEOLOGIC BORING LOGS AND WELL CONSTRUCTION DETAILS FOR WELLS IWS, IWM AND IWD WERE PROVIDED BY GERAGHTY AND MILLER, INC. REFER TO APPENDIX C.
10. TYPICAL WELL INSTALLATION DETAILS REPRESENT E AND W SERIES MONITORING WELLS INSTALLED BY WARZYN ENGINEERING INC. PRE-EXISTING MONITORING WELL CONSTRUCTION MAY VARY.

CROSS SECTION SCALE



SCALE IN FEET
VERTICAL EXAGGERATION: TEN TIMES

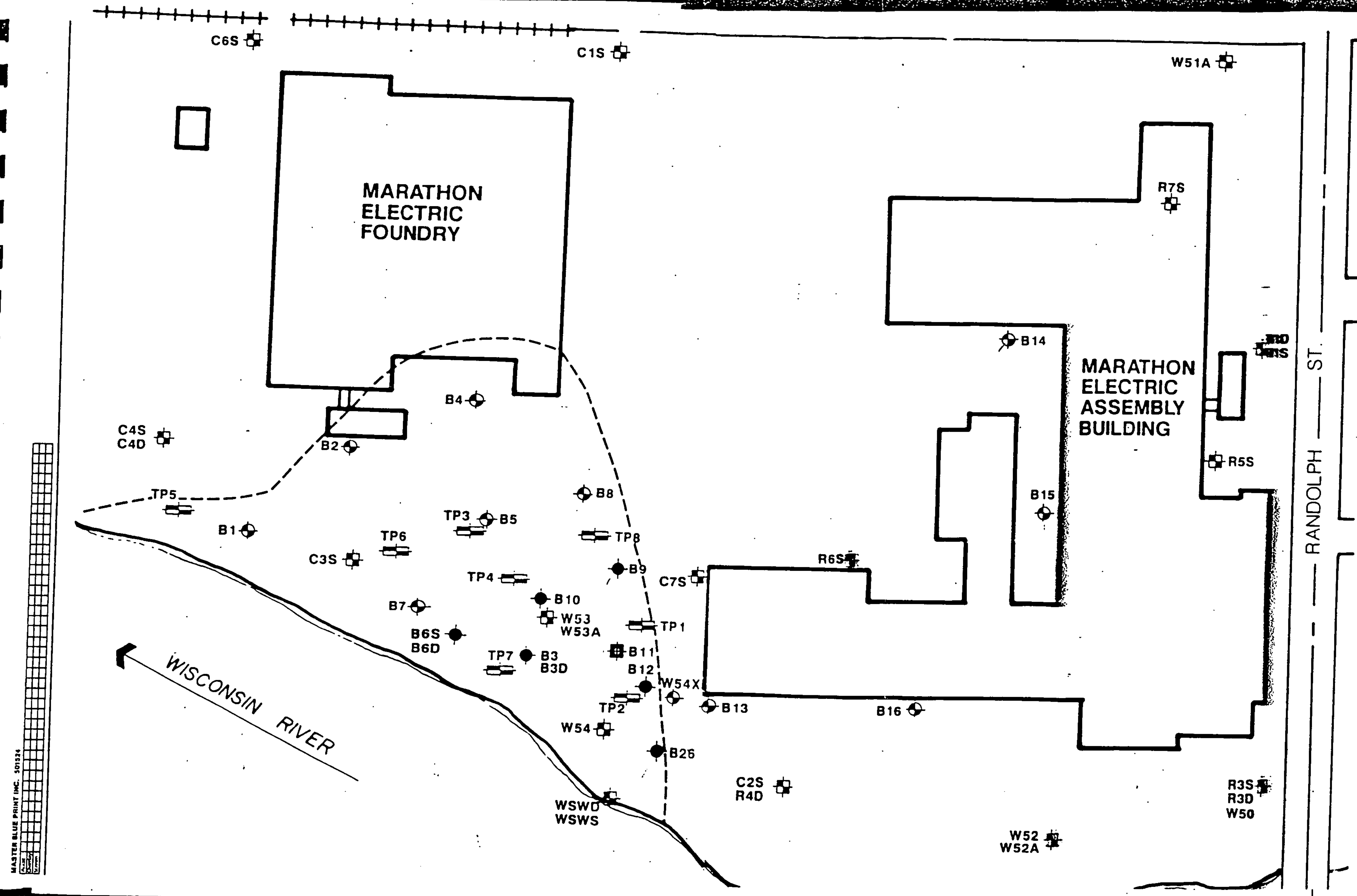
FIGURE 9

WARZYN

GEOLOGIC CROSS SECTION B-B'
REMEDIAL INVESTIGATION
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

JULY 24, 1989

13076 B55



LEGEND

- W54 — [illegible]ITORING WELL L[illegible] AND NUMBER
- B1 — [illegible] BORING LOCAT[illegible] NUMBER
- TP1 — [illegible] PIT LOCATION [illegible]BER
- B11 — [illegible] GAS EXTRACTI[illegible] LOCATION AND NUMBER
- B10 — [illegible] BORING WITH [illegible]ENT GAS MONITORING PROBE [illegible]ATION AND NUMBER
- ----- [illegible]IMATE LIMITS[illegible]FILL

NOTES

1. REFER [illegible]PENDIX C FOR [illegible] AND TEST PIT LOGS.
2. REFER [illegible]PENDIX D FOR [illegible] CONSTRUCTION DETAILS.
3. TEST P[illegible] BORING LOCAT[illegible] ARE APPROXIMATE BASED ON FIE[illegible]ASUREMENTS OBT[illegible] ON JULY 8, 1988.
4. REFER [illegible]PENDIX N FOR RE[illegible] OF SOIL GAS EXTRACTION TESTING.
5. REFER [illegible]PENDIX H FOR RE[illegible] OF SOIL/WASTE ANALYSES.

north

0 100 [illegible]

SCALE IN FEET

FIGURE [illegible]

Drawn by JC | Checked by CSK | Date 2/24/89
Approved by R. Hosfeld

WARZYN
WARZYN ENGINEERING INC.

LOCATION OF PHASE II SOIL BORINGS AND TEST PITS-WEST STUDY AREA
REMEDIAL INVESTIGATION
WAUSAU WATER SUPPLY NPL SITE

JULY 24, 19[illegible]

13076 B5

WARZYN

FIRST AID FOR HYPOTHERMIA VICTIMS

Incorrect treatment of hypothermia victims may induce a condition known as "after-drop." This is caused by improper rewarming, allowing cold, stagnant blood from the extremities to return to the core of the body. This may cause the core temperature to drop below the level which will sustain life.

(1) Move the victim to shelter and warmth. *Do not allow victim to walk.*

(2) Remove all wet clothing, but handle the victim gently.

(3) Apply heat to the victim's *trunk* by using a warm bath, shower, hot water bottles or *heated* blankets. Do not wrap a hypothermic in a blanket *without* an auxiliary source of heat unless it is to protect him against further heat loss before treatment. An effective field treatment is for one or more of the rescuers to remove their own clothing, using their bodies to warm the victim's naked body. If the victim appears dead, heart massage and mouth-to-mouth resuscitation should be administered.

(4) In cases of mild hypothermia, shelter and dry clothing may be all that is needed. If the victim is conscious and can swallow without difficulty, he may be given a hot sugary drink. Care must be taken to ensure that the victim does not take the liquid into the lungs. Do *not* give the victim alcohol.

NEVER put an unconscious victim in a bathtub.

ALL hypothermia victims should be seen by a doctor.

Some of the information in this brochure has been taken from "Man in Cold Water" with permission of Dr. Martin Collis, University of Victoria, British Columbia, Canada; and from the U.S. Coast Guard publication, "Hypothermia and Cold Water Survival."

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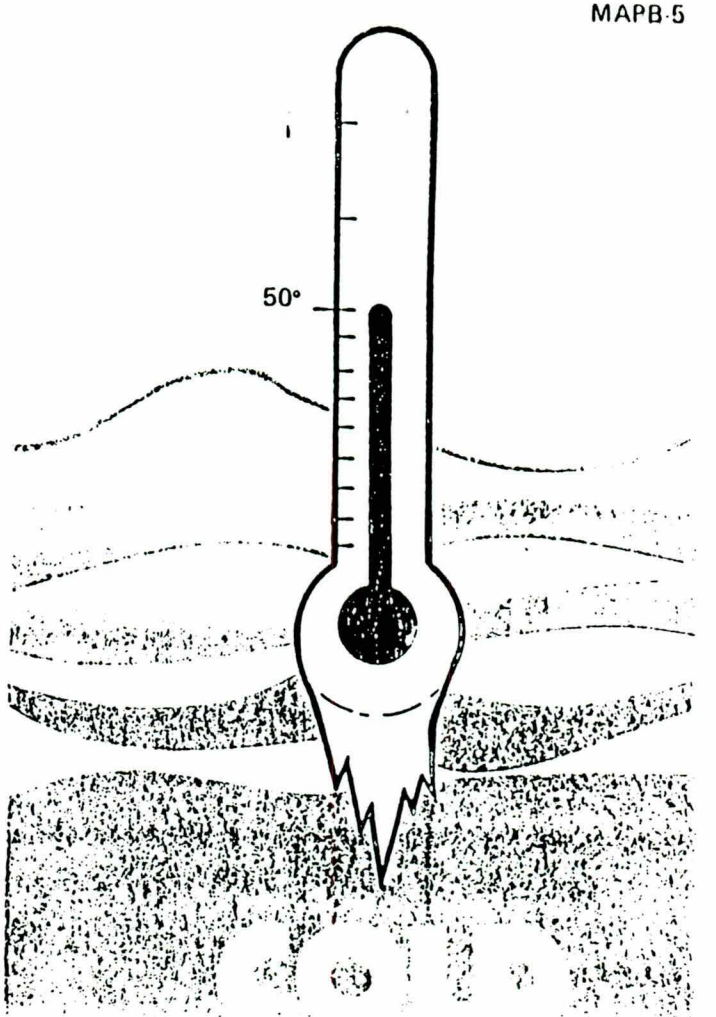
MAPB-5



Staying Alive at Low Temperatures

INTRODUCTION

Even in the Sunshine State, cold water can be a menace.

All boaters and others in danger of accidental immersion in cold water should be aware of the factors that determine body cooling rate and eventual death from hypothermia as well as survival techniques.

The following information focuses on the major problems of cold water immersion and provides recommendations for survival.

HYPOTHERMIA - Lowered Deep Body Temperature

In cold water, the skin and nearby tissues become cooled very rapidly, but it takes 10-15 minutes before the temperature of the heart and brain begin to cool. Intensive shivering occurs in an attempt to counteract large heat loss.

COLD WATER SHOCK

Immersion in cold water causes immediate major changes in body functions, occasionally resulting in heart attacks or ruptured blood vessels. However, this is unlikely to occur in someone with a healthy heart and circulatory system. Also, cold water shock causes immediate hyperventilation (overbreathing) which could lead to uncontrolled inhalation of water and drowning.

IF AN ACCIDENT HAPPENS

Remember that water conducts heat many times faster than air. Most boats will float even when capsized or swamped. Therefore, get in or on the boat to get as far out of the water as possible. Wearing a personal flotation device (PFD) is a must. It will keep you afloat even if you are unconscious.

SURVIVAL FACTORS

Temperature of the water is not the only factor to be considered in cold water survival. Activity in the water, body size and fat have an effect. Small, thin people cool faster than large, fat people. Children cool faster than adults. The following table shows predicted survival times for the "average" person in 50°F water.

SITUATION	Predicted Survival Time (Hours)
NO FLOTATION	
Drownproofing	1.5
Treading Water	2.0
WITH FLOTATION	
Swimming	2.0
Holding-still	2.7
H.E.L.P.	4.0
Huddle	4.0

Treading water and drownproofing are anti-drowning techniques used when the person is without a PFD. Treading water is the continuous movement of arms and legs in certain patterns which keeps the head out of the water. Body cooling rate is 34% faster when treading water than while holding still in a life jacket.

Drownproofing, which involves restful floating with lungs full of air and raising the head out of the water every 10-15 seconds to breathe causes a person to cool 82% faster than while holding still in a life jacket. This is mostly due to putting the head, a high heat loss area, into the water along with the rest of the body. Drownproofing appears to be the *fastest way to die* from hypothermia.

Swimming is not recommended unless the individual is absolutely certain of reaching safety. Some good swimmers have been able to swim 8/10 of a mile in 50°F water before being overcome by hypothermia. Others have not been able to swim 100 yards.

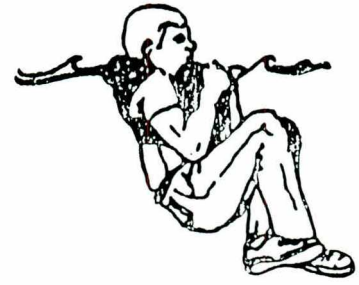
Although the body produces almost three times as much heat when swimming slowly and steadily in cold water compared to holding-still, this extra heat (and more) is lost to the cold water due to more blood circulation to the arms, legs and skin. The average person swimming in a life jacket cools 35% faster than when holding still.

CRITICAL BODY HEAT LOSS AREAS

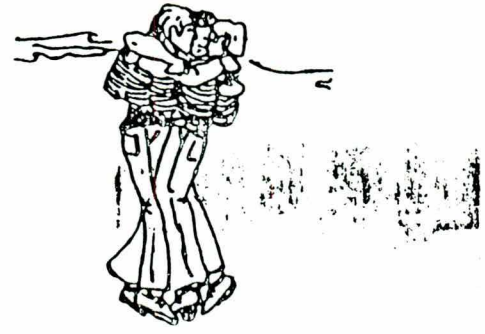
In addition to the head (which is normally out of the water) certain other body regions have high rates of heat loss while a person is holding-still in cold water. The sides of the chest, where there is little muscle or fat, is a major route for heat loss from the warm chest cavity. Also, the groin region loses much heat due to large blood and lymph vessels near the surface. The following survival techniques focus on these areas.

TECHNIQUES THAT INCREASE SURVIVAL TIME APPROXIMATELY 50%

H.E.L.P. (Heat Escape Lessening Posture) - Hold the inner side of the arms tight against the side of the chest over the warm chest cavity and raise the thighs to close off the groin region - similar to the fetal position.



HUDDLE - If there are several people in the water, form a huddle so that the sides of the chests of different persons are held close together.



APPENDIX B

SITE BORINGS AND CROSS-SECTION

WARZYN

LOG OF TEST BORING

Project Wausau RI/FS Phase II - Soil Gas

Location Wausau, Wisconsin

Boring No. W-54X
Surface Elevation
Job No. 13076.31
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth	VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES qu (qa) (tsf)	HNu	Explosive Gas	Soil Gas	Monoto
						6" Bituminous Asphalt					
1			M	34		Red to Black Fine to Coarse SAND, Some Crushed Rock (Fill)					
					5			0.4			
						Medium Dense, Reddish Brown, Fine to Medium SAND, Trace Silt (SP)					
						End Boring at 5'					
					10						
					15						
					20						
					25						
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽ _____ Upon Completion of Drilling _____
Time After Drilling _____
Depth to Water _____ ▼
Depth to Cave in _____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 11/11/87 End 11/11/87
Driller _____ Chief JW Rig D 51
Logger CSR Editor _____
Drill Method _____

WARZYN

LOG OF TEST BORING

Project: Wausau RI/FS Phase II - Soil Gas

Location: Wausau, Wisconsin

Boring No. B-1
Surface Elevation
Job No. 13076.31
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	HNu	Explosive Gas	Soil Gas	Monoto
						Loose, Gray Very Fine Sand and Silt (Fill)					
1		0	D	2				0.6			
2		14	M	11	5	Medium Dense, Rust Brown Medium SAND, Some Silt, Trace Clay (Fill)		4.0		8	
3		18	M	57		Very Dense, Rust Brown Medium to Coarse SAND, Some Fine to Coarse Gravel (SP)		5.0			
4		18	M	76	10	Collected Soil Sample SSB01-7.5'		4.0			
5		14	M	39	15	End Boring at 15'					
					20	*Background					
						**Below minimum detectable limit					
					25						
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽ _____ Upon Completion of Drilling _____
Time After Drilling _____
Depth to Water _____ ▼
Depth to Cave in _____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/27/88 End 6/27/88
Driller ETI Chief LL Rig CME
Logger _____ Editor CSR 750
Drill Method HSA 0-15'

WARZYN

LOG OF TEST BORING

Project Wausau RI/FS Phase II - Soil Gas

Location Wausau, Wisconsin

Boring No. B-2
Surface Elevation
Job No. 13076.31
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	HNu	Explosive Gas	Soil Gas	Monoto
						Blacktop					
1		12		26		Red-Brown Fine to Coarse SAND, Some Fine Gravel (Fill)		0.0			
2		18		12	5	Gray, Medium Dense, Fine to Coarse SAND, Cinders, Ash, Some Metallic Debris, Some Concrete Rubble (Fill)		0.0			
3		18		6				0.0			
4		18		13	10	Dark Gray, Loose to Medium Dense SILT with Some Medium Sand Layers, Little Ash, Cinders and Metallic Debris (Fill)		0.0			
5		18		22	15	Brown Fine to Coarse SAND, Some Fine Gravel, moist (SP)		0.0			
6		6		27							
					20			0.0			
						End Boring at 19.5'					
						**Below maximum detectable limit					
					25	***Not detected					
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽ _____ Upon Completion of Drilling _____
Time After Drilling _____
Depth to Water _____ ▼
Depth to Cave in _____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/27/88 End 6/27/88
Driller ETI Chief Mike Rig CME
Logger _____ Editor CSR 45
Drill Method FA 0-19.5'

WARZYN

LOG OF TEST BORING

Project Wausau RI/FS Phase II - Soil Gas

Location Wausau, Wisconsin

Boring No. B-3
Surface Elevation
Job No. 13076.31
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	HNu	Explosive Gas	Soil Gas	Monoto
						6" Asphalt		0.4			
1		18	M	25		Loose, Brown Medium to Coarse Sand FILL				57	
					5						
2		18	M	8		Medium Dense, Black Silty Sand FILL, Some Fine to Coarse Gravel with Cinders, Ash and Glass		1.0			
3		10	M	13				1.0		90	
					10	Color Variations from Black to Rust Brown to Gray					
4		10	M	19		*Background		0.8			
					15						
5		18	M	12				0.8		83	
					20						
6		18	M	35				0.6			
					25	Stiff, Gray SILT, Some Clay (ML)					
7		18	M	25				0.6			
					30	Medium Dense, Rust Brown Fine to Medium SAND, Trace Fine Gravel (SP)					
8		14	W	49				0.5			
					35	End Boring at 35'					
						Collected screened auger water sample GD-B3-35'					
						Install Gas Probe Nest with Bottoms at 16.5' & 24'					
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 31.0 Upon Completion of Drilling _____
Time After Drilling _____ _____ _____ _____
Depth to Water _____ _____ _____ _____ ▼
Depth to Cave in _____ _____ _____ _____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/28/88 End 6/28/88
Driller ETI Chief LL Rig CME
Logger Editor CSR 750
Drill Method HSA 0-35'

WARZYN

LOG OF TEST BORING

Project Wausau RI/FS Phase II - Soil Gas

Location Wausau, Wisconsin

Boring No. B-4
Surface Elevation
Job No. 13076.31
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth	VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES qu (qa) (tsf)	HNu	Explosive Gas	Soil Gas	Monoto
1		12	M	57		6" Blacktop		0.0			
						Dense, Black, Fine to Coarse SAND, Some Fine to Coarse Gravel Some Ash and Cinders (Fill)					
2		12	M	18	5	Collected Soil Sample SSB4-2.5'		0.0		***	
						Medium Dense, Brown Fine to Coarse SAND, Little Gravel (SP)					
					10	End Boring at 6.5'					
						***Not detected					
					15						
					20						
					25						
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽ _____ Upon Completion of Drilling _____
Time After Drilling _____ _____ _____ _____
Depth to Water _____ _____ _____ _____ ▽
Depth to Cave in _____ _____ _____ _____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/30/88 End 6/30/88
Driller ETI Chief Mark Rig D 50
Logger Editor CSR
Drill Method FA 0-6.5'

WARZYN

LOG OF TEST BORING

Project Wausau RI/FS Phase II - Soil Gas

Location Wausau, Wisconsin

Boring No. B-5
Surface Elevation
Job No. 13076.31
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	HNu	Explosive Gas	Soil Gas	Monoto
						Dense, Rust Brown to Black Fine to Coarse SAND, Some Fine to Coarse Gravel, Trace to Little Silt Some Refuse and Metal, Wood, Glass, Etc. (Fill)		0.6			
1		18	M	36				0.6			
					5						
2		8	M	13				6.0		2	
						Soil Sample ASB5-7.5 Fill becomes Silter with Some Clay at depth					
3		4	M	10				5.0			
					10						
4		18	M	55		**Below minimum detectable limit		5.0		**	
					15						
5		6	M	47				3.0			
						Medium Dense, Fine SAND, Some Wood and Glass Refuse, Little to Some Silt (Fill)					
6		8	M	22	20			5.0		**	
7			M	5		Soft, Gray SILT, Some Clay, Some Fine to Coarse Sand, Viscous Oily Tar at Surface of Silt (ML-CL)		4.0			
					25						
8			W	60/5"	30			6.0			
						Very Dense, Gray Fine to Coarse SAND, Some Fine to Coarse Gravel (SP)					
9			W	45	35			0.6			
						End Boring at 35' Collected Screened Auger Water Sample GD-B5-35'					
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 30.0 Upon Completion of Drilling _____
Time After Drilling _____
Depth to Water _____ ▼
Depth to Cave in _____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/29/88 End 6/29/88
Driller ETI Chief LL Rig CME 750
Logger _____ Editor CSR
Drill Method HSA 0-35'

WARZYN

LOG OF TEST BORING

Project Wausau RI/FS Phase II - Soil Gas

Location Wausau, Wisconsin

Boring No. B-6
Surface Elevation
Job No. 13076.31
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth	VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES qu (qa) (tsf)	HNu	Explosive Gas	Soil Gas	Monoto
						Loose, Brown Fine to Coarse SAND, Some Fine Gravel (Fill)					
1		12	M	20				0.0			
						Loose, Black Fine to Coarse SAND, Some Fine to Coarse Gravel, Little Silt, Trace Glass and Metal (Fill)					
2		12	M	9	5			0.5		5	
3		12	M	5	10	Collected Soil Sample SSB6-11'		4.0			
4		6	M	9	15	Loose, Red Brown to Black Fine to Coarse SAND and Fine to Coarse GRAVEL (Fill)		2.0		22	
						Soft, Light Brown to Gray SILT, Little to Some Clay (ML-CL)					
5		0		2	20						
6		18	W	2	25			0.0			
						Medium Dense, Brown Fine to Coarse SAND, Some Fine to Coarse Gravel (SP)					
7		18	W	35	30			0.0			
						End Boring at 31.5'					
					35						
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽ _____ Upon Completion of Drilling _____
Time After Drilling _____ _____ _____ _____
Depth to Water _____ _____ _____ _____ ▼
Depth to Cave in _____ _____ _____ _____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/27/88 End 6/27/88
Driller ETI Chief Mike Rig D 45
Logger Editor CSR
Drill Method FA 0-31.5'

WARZYN

LOG OF TEST BORING

Project: Wausau RI/FS Phase II - Soil Gas

Location: Wausau, Wisconsin

Boring No. B-7
Surface Elevation
Job No. 13076.31
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	SOIL PROPERTIES HNu	Explosive Gas	Soil Gas	Monoto
						Loose, Dark Brown Silty SAND, Much Glass (Fill)		0.6			
1		12	M	8				0.6			
2		14	M	32	5	Dense, Rust Brown to Black SAND & GRAVEL Fill, Some Silt, Cinders and Glass (Fill)		0.8			
3		14	M	51				1.0		45	
4		8	M	60/4"	10	Refusal at 9.5', Pull Ahead Blind Drill to 10'		2.0		39	
5		0	M	7	15	Very Soft Gray Brown SILT, Some Clay, Trace Fine Sand (ML-CL)		0.6			
6		18	W	1	20			0.6			
7		18	M	38	25	Dense, Rust Brown Fine to Coarse SAND, Some Fine Gravel (SP)		0.6			
8		18	W	25	30			0.6			
					35	End Boring at 33'					
					40	Collected Screened Auger Water Sample GD-B7-33'					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 28.5 Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/27/88 End 6/27/88
Driller ETI Chief LL Rig CME 750
Logger Editor CSR
Drill Method HSA 0-33'

WARZYN

LOG OF TEST BORING

Project: Wausau RI/FS Phase II - Soil Gas

Location: Wausau, Wisconsin

Boring No. B-8
Surface Elevation
Job No. 13076.31
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	HNu	Explosive Gas	Soil Gas	Monoto
						4" Asphalt					
1		18	M	9		Dark Brown Silty SAND and GRAVEL (Fill)		1.5			
2		18	M	70	5	Loose, Gray Very Fine SAND, Some Silt (SP)		1.5		**	
3		18	M	18		Very Dense, Rust Brown Fine to Coarse SAND, Little Silt (SM-SP) Trace Fine Gravel		1.5			
4			M	26	10	Collected Soil Sample SSB8-5.0'		1.5			
					15	Medium Dense, Brown Fine to Coarse SAND, Some Fine to Coarse Gravel (SP)					
						End Boring at 10'					
					20	Install Gas Probe at 10'					
						**Below minimum detectable limit					
					25						
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽ _____ Upon Completion of Drilling _____
Time After Drilling _____ _____ _____ _____
Depth to Water _____ _____ _____ _____ ▼
Depth to Cave in _____ _____ _____ _____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/29/88 End 6/29/88
Driller ETI Chief LL Rig CME
Logger _____ Editor CSR 750
Drill Method HSA 0-10'

WARZYN

LOG OF TEST BORING

Project: Wausau RI/FS Phase II - Soil Gas

Location: Wausau, Wisconsin

Boring No. B-9
Surface Elevation
Job No. 13076.31
Sheet 1 of 1

ONE SCIENCE COURT • P.O. BOX 5385, MADISON, WIS. 53705 • TEL.(608) 273-0440

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	HNu	Explosive Gas	Soil Gas	Monoto
						Blacktop					
1		6		26				0.0			
						Medium Dense, Dark Brown Fine to Coarse SAND, Some Fine Gravel with Ash and Cinders (Fill)					
2		1		16	5			0.0		2	
						Medium Dense, Brown Fine to Coarse SAND, Little to Some Silt and Clay (Fill)					
3		6		24				0.0			
						Medium Dense, Light Brown SAND and Fine to Coarse Crushed Rock Fragments (Fill)					
4		8		16	10			0.0			
						Brown Fine to Medium SAND (SP)					
					15	End Boring at 11.5'					
					20						
					25						
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽ _____ Upon Completion of Drilling _____
Time After Drilling _____
Depth to Water _____ ▼
Depth to Cave in _____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/29/88 End 6/29/88
Driller ETI Chief Mark Rig D 45
Logger _____ Editor CSR
Drill Method FA 0-11'

WARZYN

LOG OF TEST BORING

Project Wausau RI/FS Phase II - Soil Gas

Location Wausau, Wisconsin

Boring No. B-10
Surface Elevation
Job No. 13076.31
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth	VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES qu (qa) (tsf)	HNu	Explosive Gas	Soil Gas	Monoto
						Blacktop					
1		12		10		Loose, Black Fine to Coarse Silty SAND and GRAVEL Some Ash, Cinders, Glass, Wood and Metallic Debris (Fill)		0.0			
2		6		2	5			1.0		21	
3		6		69				0.5			
4		1		44	10			0.0		22	
5		1		10	15			0.0			
6		0		13	20					28	
						Medium Dense, Brown Fine to Coarse SAND, Some Fine to Coarse Gravel (SP)					
7		3		15	25			0.0			
						End Boring at 25'					
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽ _____ Upon Completion of Drilling _____
Time After Drilling _____
Depth to Water _____ ▼
Depth to Cave in _____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/28/88 End 6/28/88
Driller ETI Chief Mark Rig D 45
Logger Editor CSR
Drill Method FA 0-25'

WARZYN

LOG OF TEST BORING

Project Wausau RI/FS Phase II - Soil Gas

Location Wausau, Wisconsin

Boring No. B-12
Surface Elevation
Job No. 13076.31
Sheet 1 of 1

ONE SCIENCE COURT • P.O. BOX 5385, MADISON, WIS. 53705 • TEL.(608) 273-0440

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth	VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES qu (qa) (tsf)	HNu	Explosive Gas	Soil Gas	Monoto
						6" Asphalt		0.4			
1		18	M	58		Very Dense, Black Silty Fine to Coarse Sand Fill with Glass, Cinders, Brick (Fill)		3.0			
								4.0			
2		18	M	15	5					13	
						Soil Sample SSB12-2.5'		2.0			
3		6	M	4							
4			M	10	10			2.0		122	
5		1	M	6	15			3.0			
6		18	M	35	20	Dense, Rust Brown Fine to Coarse SAND, Some Fine to Coarse Gravel (SP)		0.4			
						End Boring at 20'					
					25	Install Gas Probe at 15'					
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽ _____ Upon Completion of Drilling _____
Time After Drilling _____ _____ _____ _____
Depth to Water _____ _____ _____ _____ ▼
Depth to Cave in _____ _____ _____ _____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/29/88 End 6/29/88
Driller ETI Chief LL Rig CME 750
Logger Editor CSR
Drill Method HSA 0-20'

WARZYN

LOG OF TEST BORING

Project: Wausau RI/FS Phase II - Soil Gas

Location: Wausau, Wisconsin

Boring No. B-13
Surface Elevation
Job No. 13076.31
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth	VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES qu (qa) (tsf)	HNu	Explosive Gas	Soil Gas	Monoto
						Blacktop					
1		12		12				0.0			
						Medium Dense, Gray to Black Fine to Coarse SAND, Some Clay, Little Fine to Coarse Gravel (Fill)					
2		12		17	5			0.0		**	
						Medium Dense, Reddish Brown Fine to Medium SAND, Little to Trace Silt (SP)					
3		12		27				0.0			
4		12		12	10	Medium Dense, Brown Fine to Coarse SAND, Little Fine to Coarse Gravel (SP)		0.0		45	
5		12		18	15			0.0			
6		12		16	20			0.0			
						Medium Dense, Light Brown Fine to Medium SAND (SP)					
7		12		26	25			0.0			
8		0		25	30			0.0			
						Collected Screened Auger Groundwater Samples GDB13-34, GDB13-34D					
					35	End Boring at 34.0'					
						**Below minimum detectable limit					
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 30.8 Upon Completion of Drilling _____
Time After Drilling _____
Depth to Water _____ ▼
Depth to Cave in _____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/29/88 End 6/29/88
Driller ETI Chief Mark Rig D 45
Logger _____ Editor CSR
Drill Method FA 0-34.0'

WARZYN

LOG OF TEST BORING

Project Wausau RI/FS Phase II - Soil Gas

Location Wausau, Wisconsin

Boring No. B-14
Surface Elevation
Job No. 13076.31
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth	VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES qu (qa) (tsf)	HNu	Explosive Gas	Soil Gas	Monoto
						Blacktop					
1		6		13				0.0			
						Hard, Brown SILT, Little Clay, Some Fine Sand (Fill)					
2		12		8	5			0.0			
						Loose, Light Brown Fine to Medium SAND (SP)					
3		12	M	15	10	Medium Dense, Brown Fine to Coarse SAND, Some Fine to Coarse Gravel (SP)		0.0		104	
4		12	M	13	15						
5		12	M	20	20					11	
6		12	M	20	25						
7		12	W	13	30	Collected Screened Auger Groundwater Sample GD-B14-31'					
					35	End Boring at 34'					
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 30.1 Upon Completion of Drilling _____
Time After Drilling _____
Depth to Water _____ ▼
Depth to Cave in _____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/6/88 End 7/6/88
Driller ETI Chief Mike Rig D 45
Logger Editor CSR
Drill Method HSA 0-34'

WARZYN

LOG OF TEST BORING

Project: Wausau RI/FS Phase II - Soil Gas

Location: Wausau, Wisconsin

Boring No. B-15
Surface Elevation
Job No. 13076.31
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth	VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES qu (qa) (tsf)	HNu	Explosive Gas	Soil Gas	Monoto
						Blacktop					
1		8	M	17							
						Medium Dense, Brown Fine to Coarse SAND, Trace to Little Silt (Fill)					
2		4	M	75	5						
3		6	M	9	10						
4		6	M	10	15						
						Medium Dense, Brown Fine to Coarse SAND, Little to Some Fine to Coarse Gravel (SP)					
5		12	M	38	20					***	
6		12	M	27	25						
7		12	W	18	30						
						Collected Screened Auger Groundwater Sample GDB14-34'					
					35	End Boring at 34'					
					40	***Not detected					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 31.1 Upon Completion of Drilling _____
Time After Drilling _____
Depth to Water _____ ▼
Depth to Cave in _____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/7/88 End 7/7/88
Driller ETI Chief Mike Rig D 45
Logger _____ Editor CSR
Drill Method HSA 0-34'

WARZYN

LOG OF TEST BORING

Project: Wausau RI/FS Phase II - Soil Gas

Location: Wausau, Wisconsin

Boring No. B-16
Surface Elevation
Job No. 13076.31
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	Type	Rec (in.)	Moist	N	Depth	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	HNu	Explosive Gas	Soil Gas	Monoto
						4" Asphalt		0.6			
1		18	M	10		Crushed Granite (Fill)		4.0			
2		18	M	26	5	Loose, Rust Brown Fine to Medium SAND, Some Silt, Trace Fine Gravel (SM-SP)		2.0			
3		18	M	56		Soil Sample SSB16-2.5 + Duplicate		2.0			
4		18	M	36	10	Dense to Very Dense, Brown Fine to Coarse SAND, Trace Fine to Coarse Gravel (SP)		2.0		3	
5		18	VM	93	15			2.0			
6		6	VM	71	20			2.0		11	
7		1	VM	132	25			2.0			
8		11	W	50+	30			2.0			
9		0	W	50+	35	End Boring at 35' Collect Screened Auger Water Sample GDB16-35'		3.0			
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 31.0 Upon Completion of Drilling ____
Time After Drilling ____
Depth to Water ____
Depth to Cave in ____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/30/88 End 6/30/88
Driller ETI Chief LL Rig CME 750
Logger Editor CSR
Drill Method HSA 0-35'

WARZYN

LOG OF TEST BORING

Project Wausau RI/FS Phase II - Soil Gas

Location Wausau, Wisconsin

Boring No. B-26
Surface Elevation
Job No. 13076.31
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	HNu	Explosive Gas	Soil Gas	Monot
						Blacktop					
1		12		29		Medium Dense, Brown Fine to Coarse SAND and Fine to Coarse GRAVEL with Black Ash and Cinders (Fill)		0.0			
2		12		7	5	Collected Soil Sample SSB26-7.5'		3.0		73	
3		12		62							
4		12		14	10			3.0		81	
						Collected Soil Sample SSB26-11.0'		7.0			
5		12		9	15	Medium Dense, Brown Fine to Coarse SAND, Some Fine Gravel (SP)		7.0			
6		12		37	20			1.0			
						End Boring at 20'					
					25						
					30						
					35						
					40						

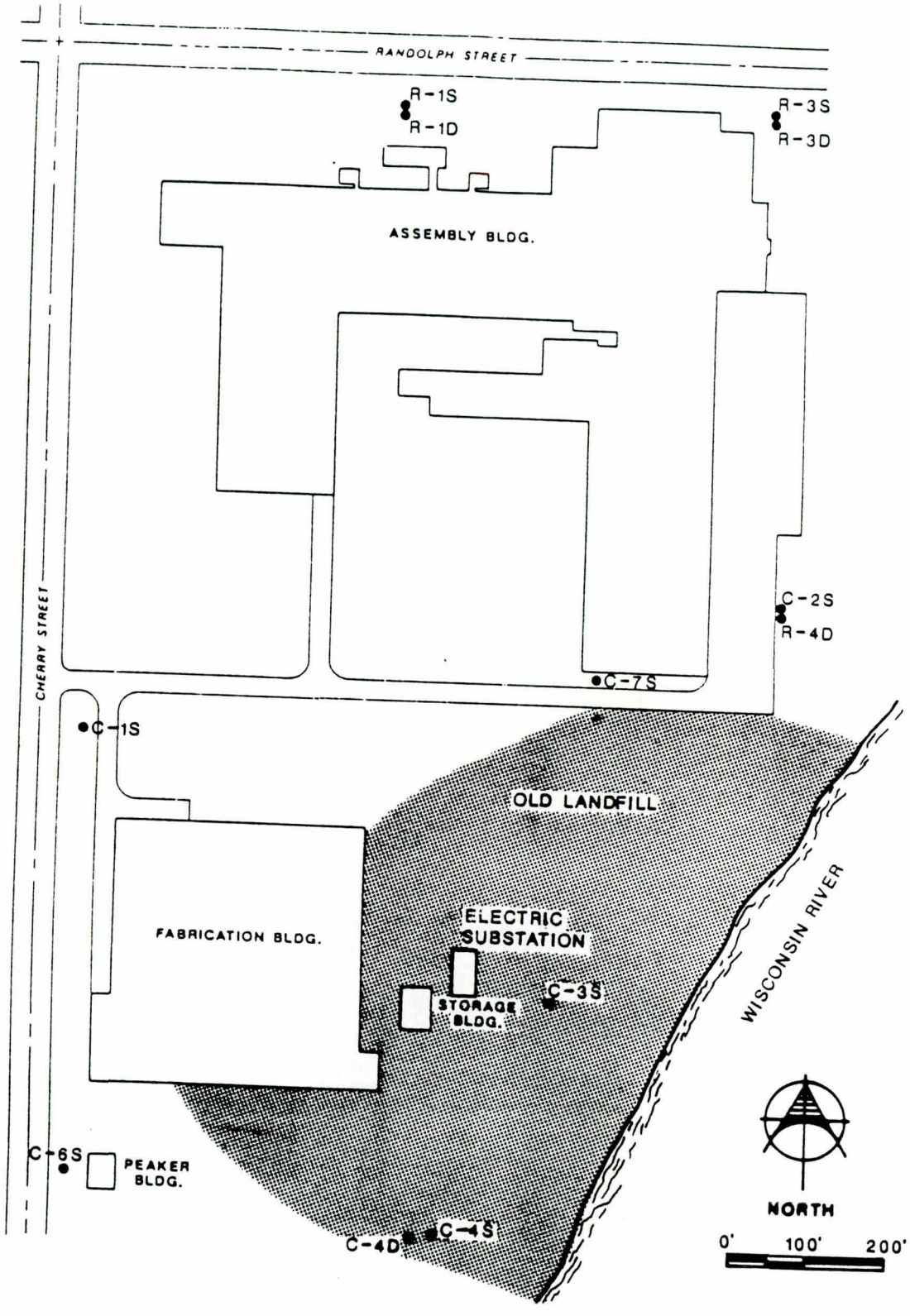
WATER LEVEL OBSERVATIONS

While Drilling ▽ _____ Upon Completion of Drilling _____
Time After Drilling _____
Depth to Water _____ ▼
Depth to Cave in _____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/30/88 End 6/30/88
Driller ETI Chief Mike Rig D 50
Logger Editor CSR
Drill Method FA 0-20'



MARATHON ELECTRIC / OLD CITY LANDFILL PROPERTY

● LOCATIONS OF MONITORING WELLS

RMT NC

Dwn. by	JM
Date	5/7/87
Proj #	222.04

FIGURE 11

RMT, Inc.
F-204 (R2-81)

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: Wausau, Wisconsin
DRILLED BY: Len J./ Layne Northwest
LOGGED BY: T. Fox
DATE: 8/11/86

JOB NO.: 222.04
BORING NO.: R-3D
SURFACE ELEV.: 1213.09
SHEET NO.: 1 of 4

SAMPLE No.	SAMPLE Type	Recovery	Moisture	HNU	Depth	VISUAL CLASSIFICATION and Remarks
1	Jar			9.5		. Brown Gray F-M Sand, Some Silt
					5	
2	Jar			0.5		. Gray Brown F-C Sand, Trace-Little M-C Sand and Gravel, Trace Silt
					10	
3	Jar					
					15	
4	Jar			No Detect		
					20	
5	Jar			No Detect		
					25	
6	Jar					
					30	. Brown-Gray Fine Sand
7	Jar			No Detect		
					35	
8	Jar					
					40	

GENERAL NOTES

START: 8/11/86 10:45
COMPLETE: 8/11/86 11:55
RIG: IR TM 60
CREW CHIEF: Len J.
DRILLING METHOD: Dual Tube Reverse Air Rotary & H.O

WATER LEVEL OBSERVATIONS

WHILE DRILLING:
UPON COMPLETION:
TIME AFTER DRILLING:
DEPTH OF WATER:
DEPTH OF CAVE-IN:

F-204 (cont'd.)

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION:
DRILLED BY: Len J./ Layne Northwest
LOGGED BY: T. Fox
DATE: 8/11/86

JOB NO.: 222.04
BORING NO.: B-3D
SURFACE ELEV.: 1213.09
SHEET NO.: 2 of 4

SAMPLE No.	SAMPLE Type	Recovery	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks
9	Bag				45	Grayish-Brown Fine Sand
10	Jar				50	Trace Fine Gravel at 50'-55'
11	Jar		No Detect		55	
					60	
					65	
12	Jar				70	
					75	
13	Jar				80	
					85	

MT, Inc.
F-204 (cont'd)
Pg. 3

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION:
DRILLED BY: Len J./Layne Northwest
LOGGED BY: T. Fox
DATE: 8/11/86

JOB NO.: 222.04
BORING NO.: R-3D
SURFACE ELEV.: 1213.00
SHEET NO.: 3of 4

SAMPLE No.	Type	Recovery	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks
14	Jar			No Detect	90	Brown-Gray Fine Sand
					95	
15	Jar				100	
					105	
16	Jar			No Detect	110	
					115	
17	Jar				120	
					125	
18 19	Jar Bag			No Detect	130	Yellowish Brown F-C Sand, Little to Some Silt, Little to Some Gravel

F-203 (R2-81)

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: Wausau, WI
DRILLED BY: Len J./ Layne Northwest
LOGGED BY: T. Fox
DATE: 8/11/86

JOB NO.: 222.04
BORING NO.: R-3D
SURFACE ELEV.: 1213.09
SHEET NO.: 4 of 4

SAMPLE No.	SAMPLE Type	Recovery	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks
19	Jar Bag				135	
					140	Driller indicates fractured bed rock at 135' to 137' - No Sample Returned End of Drilling at 137'
					145	
					150	
					155	
					160	
					165	
					170	

GENERAL NOTES

START:
COMPLETE:
RIG:
CREW CHIEF:
DRILLING METHOD:

WATER LEVEL OBSERVATIONS

WHILE DRILLING:
UPON COMPLETION:
TIME AFTER DRILLING:
DEPTH OF WATER:
DEPTH OF CAVE-IN:

RMT, Inc.
F-204 (R2-81)

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: 8' South of C-25
DRILLED BY: Len J. / Layne Northwest
LOGGED BY: T. E. Fox
DATE: 8/12/86

JOB NO.: 222.04
BORING NO.: R-4D
SURFACE ELEV.: 1216.05
SHEET NO.: 1 of 4

SAMPLE No.	Type	Recovery / Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks
		2)40ml H_2O samples w/bailer thru Dual Tube			
1	Jar			5	Brown F-M Sand, Little F-M Gravel, Trace-Little Silt
2	Jar			10	
3	Jar			15	
4	Jar			20	Brown F-C Gravel, Some Sand with Cobbles
5	Jar			25	Very Dense Fine Sand, Some Silt
6	Jar			30	Brown F-M Sand, Trace Silt, Trace Fine Gravel
7	Jar			35	
		H_2O Sample			Mostly Fine Sand at 35-40'
8	Bag			40	

GENERAL NOTES
START: 8/12/86
COMPLETE: 9/13/86
RIG: 1R TH 60
CREW CHIEF: Len J/John J
DRILLING METHOD: Dual Tube Reverse Air Rotory

WATER LEVEL OBSERVATIONS
WHILE DRILLING: 31.25 with bit at 36'
UPON COMPLETION:
TIME AFTER DRILLING:
DEPTH OF WATER:
DEPTH OF CAVE-IN:

Introduced H_2O at 17' to

F-204 (cont'd.)

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: 8' South of C-25
DRILLED BY: Len J. / Layne Northwest
LOGGED BY: T. E. Fox
DATE: 8/12/86

JOB NO.: 222.04
BORING NO.: R-4D
SURFACE ELEV.: 1216.05
SHEET NO.: 2 of 4

SAMPLE No.	SAMPLE Type	Recovery	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks
					45	Brown F-M Sand, Trace Silt
9	Jar					
					50	Brown F-C Sand, Trace Silt Trace F Gravel
10	Jar					
11	Jar				55	
		H_2O Sample				
12	Jar				60	
						Brown F-M Sand, Trace Silt
13	Jar				65	
14	Jar				70	
15	Jar				75	
		H_2O Sample				
16	Jar				80	
17	Jar				85	

MT, Inc.
F-204 (cont'd)
g. 3

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: 8' South of C-25
DRILLED BY: Len J. / Layne Northwest
LOGGED BY: T. E. Fox
DATE: 8/12/86

JOB NO.: 222.04
BORING NO.: R-4D
SURFACE ELEV.: 1216.05
SHEET NO.: 3 of 4

SAMPLE No.	Type	Recovery	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks
18	Jar				90	Brown F-M Sand
19	Jar				95	
20	Bag	H_2O Sample				Brown Fine Sand, Some Silt with Few Thin Layers of Fine to Medium Sand
21	Jar				100	
					105	
22	Jar				110	
					115	
23	Jar				120	
					125	
					130	

F-203 (R2-81)

LOG OF TEST BORING
RESIDUALS MANAGEMENT TECHNOLOGY, INC.

PROJECT: Foley & Lardner
LOCATION: 8' South of C-25
DRILLED BY: Len J. / Layne Northwest
LOGGED BY: T. E. Fox
DATE: 8/12/86

JOB NO.: 222.04
BORING NO.: R-4D
SURFACE ELEV.: 1216.05
SHEET NO.: 4 of 4

SAMPLE No.	SAMPLE Type	Recovery	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks
24	Bag				135	
25	Jar	H_2O Sample				F-C Gravel; Some F-C Sand
					140	Return H_2O turned brown at 138'
26						Brown F-C Sand, Some Gravel, Trace of Some Silt
					145	Possible Rock at 144.5' Hard Drilling at 144.5 to 147.5'
						No Recovery at 144.5 to 156
					150	Probable Fine Sand at 147.5 to 156 (came up drill tools)
					155	
						End of Drilling at 156' (no more drill rod left)
					160	
					165	
					170	

GENERAL NOTES

START:
COMPLETE:
RIG:
CREW CHIEF:
DRILLING METHOD:

WATER LEVEL OBSERVATIONS

WHILE DRILLING:
UPON COMPLETION:
TIME AFTER DRILLING:
DEPTH OF WATER:
DEPTH OF CAVE-IN: