OPERATIONS AND MAINTENANCE PLAN
WAUSAU SOIL VAPOR EXTRACTION SYSTEM

Wausau Water Supply NPL Site
Wausau, Wisconsin

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CONESTOGA-ROVERS & ASSOCIATES

ADDENDUM NO. 1

OPERATIONS AND MAINTENANCE PLAN
WAUSAU SOIL VAPOR EXTRACTION SYSTEM
Wausau Water Supply NPL Site
Wausau, Wisconsin

By this Addendum No. 1, dated June 15, 1994, the Operations and Maintenance Plan for the Wausau Soil Vapor Extraction System dated June, 1994 shall be amended as follows:

Procedure for effecting the removal of spent carbon from the containment vessel by Wausau PRP Group personnel.

Required Equipment

- vacuum equipped with HEPA filter on air exhaust;
- ladders and other equipment as needed to access vessels safely;
- socket wrench to remove vessel lid;
- air monitoring equipment; and
- DOT certified 55-gallon drums with lids for transportation of spent carbon.

Requirements for Personnel

- All workers must have been trained for handling of TCE, PCE, DCE and chemicals known to be contained in the carbon. Under the Worker-Right-To-Know (WRTK) Act (CFR 1910.1200), documentation of this training must be kept by the employer.

Procedure

1. Shut down the SVE system;
2. Remove all the bolts from the lid of the carbon containment vessel;
3. Monitor the air just inside the carbon vessel;
4. If readings indicate it is safe, proceed to remove lid, otherwise wear respirators and protective clothing as appropriate, and proceed;
5. Vacuum out carbon into drums, take care not to spill any carbon;
6. Clean-up any spilled carbon immediately and place into drums;

7. Seal and label all drums, manifest as required as hazardous waste;

8. Properly dispose of any contaminated protective clothing;

9. Place new carbon into the empty vessel, replace the lid and secure all of the bolts removed during step 2; and

10. Restart the system.

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1.0 INTRODUCTION

This report provides the Operation and Maintenance (O&M) Plan for the Wausau Water Supply NPL Site (Site) Soil Vapor Extraction (SVE) System. The respondents to the RD/RA Order are collectively known as the Wausau PRP Group. This plan is part of the Remedial Design (RD) Report submitted to the United States Environmental Agency (USEPA) and the Wisconsin Department of Natural Resources (WDNR) on June 30, 1993, and should be read in conjunction with the entire Remedial Design Report for a complete understanding of the Remedial Actions undertaken at the Site.

This plan provides information to cover the operation and maintenance of the SVE system.

1.1 SCOPE OF THE OPERATION AND MAINTENANCE MANUAL

This operation and maintenance (O&M) manual is intended to describe the procedures for inspecting and recording information related to the operation and maintenance of the SVE system components. Site remediation operations which are focused on the capture, monitoring and treatment of the groundwater are not described within this O&M manual.

2.0 BACKGROUND

The Site is located on the north end of the City of Wausau which is located in north-central Wisconsin along the Wisconsin River in Marathon County. The Site location is presented in Figure 1 and the Site plan is presented in Figure 2. The Site consists of two separate locations separated by the Wisconsin River. The property comprising the west bank location is currently owned by Marathon Electric Company and formerly was the City of Wausau municipal landfill. The east bank location is owned by the Wausau Chemical Corporation. The USEPA considered these two locations as the volatile organic compound (VOC) source areas of contaminants identified in the municipal water supply for the City of Wausau.

The City presently operates seven production wells, six of which are located on the north side of the City and are pertinent to this project. The City well field on the west bank contains wells CW-6, CW-7, CW-9 and CW-10, and the east well field contains wells CW-3 and CW-4. CW-4 has been shut down.

In 1982, the City of Wausau discovered that wells CW-3, CW-4 and CW-6 were contaminated with a variety of VOCs. Initially, water supplies were blended to decrease VOC levels in the drinking water. In 1984, through a USEPA grant, the City constructed and initiated operation of a temporary granular activated carbon (GAC) system and packed column air stripping towers. The air stripping towers were found to be effective in removing the VOCs so the GAC system was subsequently removed in October 1984.

Since 1984, numerous studies have been conducted to characterize the subsurface soils and groundwater conditions at the Site. In December 1985, the Site was listed on the National Priorities List and a Remedial Investigation/Feasibility Study (RI/FS) was initiated in 1987. The RI/FS further delineated the two VOC source areas impacting the Site groundwater and an interim Record of Decision (ROD) explaining the selection of the Site remedy and a Consent Decree were signed in 1988. An

interim action consisting of a groundwater extraction well and treatment system began operation in November 1990.

The Phase II RI/FS was completed in August 1989 and in 1990 a ROD for the final remedy was issued containing the requirement for the installation of two SVE systems with vapor phase off-gas treatment. The RI/FS identified three point source areas, one on the West Bank and two on the East Bank of the Wisconsin River. The USEPA designated the vertical distribution of VOC soil contamination in the northern end of the former City landfill as the West Bank point source for groundwater. It was additionally stated that wells CW-6 and CW-3 have pulled contaminated groundwater north and east under the Wisconsin River. The USEPA also designated two East Bank point source areas, the north loading dock area and the south drum and tank storage areas at the Wausau Chemical Corporation facility.

Wausau Chemical Corporation, Marathon Electric Manufacturing Corporation and the City of Wausau (Wausau PRP Group) negotiated a consent decree with the USEPA and the WDNR. The ROD and a scope of work were incorporated into the consent decree. The consent decree scope of work specified the design and implementation of the final remedy. In accordance with the consent order, a Remedial Design/Remedial Action (RD/RA) Work Plan was developed and was submitted to the USEPA and WDNR in June 1991. The RD/RA Work Plan covered four tasks which were: Project Plans, Remedial Design, Final Remedy Construction and Reports. The RD/RA Work Plan was approved by USEPA in consultation with the WDNR in a letter dated March 25, 1992.

In accordance with the RD/RA Work Plan, the Wausau PRP Group conducted an SVE pre-design investigation and constructed SVE systems to remediate the VOC soil contamination at both the East and West Bank source areas.

3.0 SYSTEM OVERVIEW AND ORGANIZATION

3.1 SYSTEM OVERVIEW

The SVE remedial action consists of two separate SVE systems, one installed on the East Bank of the Wisconsin River and one installed on the West Bank. The East Bank system was designed to remediate the two non saturated soil source areas previously identified on the East Bank. The West Bank system was designed to remediate the single non saturated soil area previously identified on the West Bank. Both systems are similarly designed and constructed. The locations of the East and West Bank facilities are presented on Figures 3 and 4, respectively.

The East Bank system consists of four soil vapor extraction wells connected to the inlet of a regenerative blower with piping. The regenerative blower extracts vapor from the soil around each well and exhausts the vapor through vapor phase granular activated carbon (VP carbon) to remove the VOCs. Water entrained in the soil vapor is removed by a moisture coalescer before entering the blower and is contained in the condensate tank. Water is pumped from the condensate tank into the Wausau Chemical Corporation air stripping tower for treatment. In the event it is not possible for the air stripping tower to treat the water, the water is temporarily stored in the condensate tank or other liquid tight vessels. When the air stripping tower is turned on again the water will be pumped into the air stripping tower for treatment. Particulates in the soil vapor are removed before entering the blower by a cartridge-style polyester filter.

The East Bank system withdraws approximately 60 to 85 cfm from each extraction well for a total of 280 cfm at a vacuum of 10 inches of water. The West Bank system is similar except that there are only two soil vapor extraction wells, and condensate is treated by being pumped through liquid phase granular activated carbon (LP carbon). The West Bank system withdraws approximately 480 cfm from SVE well ME-SVE-1 at a vacuum of 29 inches of water and 210 cfm from ME-SVE-2 at a vacuum of 30 inches of water. The SVE systems are expected to operate for three years. In order to monitor the effectiveness of the SVE system soil gas probes were installed on

both banks. The soil gas probes will be sampled over time as the system operates.

3.2 ORGANIZATION AND CUSTODIAL PERSONNEL

The Wausau PRP Group O&M personnel perform regular inspections of both SVE systems, supervise maintenance and repair work performed by contractors and keep records of the inspections, maintenance and repair work performed.

The O&M personnel are familiar with the Site and the Remedial Action operating systems within the Site. The O&M personnel are also familiar with the Site Health and Safety Plan (HASP) and meet the requirements within the HASP. The O&M personnel will ensure that all persons coming on Site are familiar with, and comply with the Site HASP. The O&M personnel are responsible for all aspects of mechanical operation of the SVE systems. This includes:

- routine meter readings;
- routine inspections of the complete SVE system;
- routine HNu readings at the various sampling locations at each SVE treatment system;
- scheduled maintenance and repairs to the system's electrical, mechanical, structural and architectural components; and
- handle emergency repairs by performing repairs or supervision of an emergency response contractor.

The O&M personnel will report to the Wausau PRP Group Project Manager all system events, system status, maintenance and repair activities and other pertinent observations associated with the Site.

The O&M personnel will arrange and supervise all maintenance, inspections and repairs as presented in the O&M Plan.

3.2.1 Qualifications and Training

Personnel conducting HNu readings shall be trained in calibration and instrument operation.

Personnel conducting maintenance on electrical systems requiring a certified electrician will be certified electricians. Regular maintenance, such as changing light bulbs, etc., will be conducted by the Wausau PRP Group inspection personnel.

4.0 OPERATIONS AND MAINTENANCE PROGRAM

4.1 INTRODUCTION AND BASIS

A successful O&M program for the Site is dependent upon regular and thorough inspections of the Site, and early identification and correction of problems. The intent of the regular inspections is to identify and remediate problems as soon as possible. The goal of the O&M program is to maximize system operating time and to maintain the operation of the SVE to effectively remediate the Site.

The operations and maintenance program for this system includes periodic site inspections, a scheduled maintenance program and a spare equipment and materials inventory.

Inventory

An inventory of spare parts and materials will be kept at the Site. The parts and materials inventory will be composed of parts and materials which are:

- not readily available;
- commonly used in maintenance and repair procedures; and
- have a sufficient shelf life as to be placed in inventory.

The makeup of the inventory is revised based on system needs.

System Downtime

The causes of system downtime include the following:

Monitoring Activities

As specified in the Monitoring Program Plan (MPP), the SVE systems are to be shut down for at least 48 hours prior to the start of each quarterly soil gas monitoring round.

Scheduled Maintenance

Scheduled maintenance is the scheduled or periodic maintenance of a piece of equipment. The data gathered through a maintenance program is invaluable in determining the frequency of future maintenance and inspections. The O & M program is often revised throughout the life of the system to reflect system needs.

The SVE systems' components do not require scheduled maintenance during the anticipated operating period of three years.

Scheduled Repairs

There are two types of scheduled repairs. One type of scheduled repair is the repair scheduled when the near term failure of a piece of mechanical equipment is apparent. This is typically identified in the course of a periodic inspection and is the most common type of repair.

The other type of scheduled maintenance is that based on mechanical operating history of the piece of equipment (mean time to failure). Often the conditions under which the piece of equipment operates dictate the operating life of the component and as such an operating history must be developed before this type of repair is effectively scheduled. There are no mechanical parts for which a repair has been scheduled for this system. The system is designed to operate for its full term with minimal repairs. A list of product suppliers and manufacturers is presented in Table 1.

The replacement of filters would only be conducted on an as needed basis. The scheduled maintenance involves a short system

shutdown to inspect the filter. The filters will most likely not require replacement during the three year operation period.

Carbon Replacement

The VP carbon used to treat the soil vapor will become saturated with VOCs. At that time the affected system will be shut down for replacement of VP carbon.

Mechanical and Electrical Equipment Failures

Mechanical and electrical equipment failures may occur without prior warning or they may give warning and fail before repairs can be made. Failures of this type include motor failures, tripped breakers and blown fuses. An automatic telephone dialing system is connected to the system control panel. The auto dialer is triggered by loss of electricity, high pressure differential between blower inlet and exhaust and high water level in the condensate tank and will alert the assigned personnel of the system shutdown.

Electrical Service Failures

Power outages or surges are infrequent and usually short lived. Electric utilities have an excellent record of timely repairs to service interruptions. Typically, the automatic telephone dialing system will call to report such a failure.

4.2 SVE SYSTEM

4.2.1 Inspection Schedule

The SVE systems are to be inspected daily Monday through Friday for the first 30 days of operation and then weekly thereafter. The inspections will be documented by the completion of inspection notes placed into a log book. Items inspected include structural integrity, meter

readings for vacuum, flow and temperature, and HNu readings of the systems' extracted vapor. On a quarterly basis the well enclosures will be opened and inspected. An inspection schedule is presented in Table 2.

4.2.2 Daily and Weekly Inspections

The scope of work of the daily and weekly inspections includes a complete visual inspection of the treatment system building, treatment equipment skid, piping, manifold, valves, pressure gauges, air flow meters, LP and VP carbon vessels and electrical components. In addition, notable observations of the Site will be recorded. Inspection records will be recorded on the Daily Maintenance Inspection Form as presented in Table 3 and a copy will be kept on Site in the maintenance logbook.

4.2.3 Quarterly Inspections

The scope of work of the quarterly inspections is similar to the daily inspection scope of work with the addition of an inspection of the heat tracing tape, particulate filters, water pump, SVE well enclosures, more thorough inspection of carbon vessels and a test of the systems' automatic shut down systems. This includes testing of the auto dialer to insure it operates as expected and that the receiving personnel are trained as to the proper response action.

Inspection records will be recorded on the Inspection Quarterly Maintenance Inspection Form as presented in Table 4, and a copy will be kept on Site in the maintenance logbook.

4.2.4 Maintenance

As the expected operating period of the SVE systems is three years and the systems have been designed to require low maintenance, maintenance will only need to be performed as needed. The items requiring

maintenance will be identified through system inspections. Maintenance items which are currently known to be required include the change out of both VP carbon and LP carbon. Calibration of meters and gauges will be performed annually unless operating experience indicates more frequent calibration is needed.

4.2.4.1 Vapor Phase Carbon Replacement

Both the East and West Bank SVE systems are monitored and operated in a similar manner. Each SVE system makes use of two steel VP carbon vessels connected together in series. Each vessel is filled with 2,000 pounds of VP carbon. The soil vapor is treated by passing through the primary VP carbon vessel and then through the secondary VP carbon vessel. Monitoring the effluent soil vapor from the primary VP carbon vessel identifies when VOCs are beginning to pass through the VP carbon and that VP carbon is nearly saturated with VOCs and is due for replacement. The saturated VP carbon is then transported to a RCRA approved facility which will regenerate the saturated carbon. The exhaust pipe from the blower is disconnected from the inlet of the "primary" VP carbon vessel and is connected to the inlet of the "secondary" VP carbon vessel. This changes the former "secondary" VP carbon vessel into the current "primary" VP carbon vessel.

The removal of saturated VP carbon, installation of activated replacement VP carbon and transportation of the saturated VP carbon to a RCRA approved regeneration facility will be pre-arranged. When monitoring indicates that a change out of carbon is required, the changeout is scheduled for completion within three weeks.

The SVE system will continue to operate after detection of breakthrough of the "primary" VP carbon vessel as the secondary VP carbon vessel will continue to treat the soil vapor.

Monitoring the exhaust from the "secondary" VP carbon vessel will continue. The SVE system will be shut down if monitoring indicates that VOCs have broken through the "secondary" VP carbon vessel.

The primary carbon unit is to be changed out when effluent HNu readings exceed 1.0 ppm. This ensures breakthrough will not occur.

The changeout is to be completed within three weeks of the primary units saturation.

4.2.4.2 Wausau Chemical Air Stripping Tower

The condensate discharge line from the vapor treatment system leads into the air stripping tower. The condensate pump will be shut down during shut down of the air stripping tower. This is to eliminate the possibility of any condensate being pumped into the air stripping tower while it is non-operational.

4.2.5 Problem Identification and Correction

4.2.5.1 Problem Identification

The procedure for identifying problems which may occur with the operation of the SVE system will consist of comparing recorded operating parameters and information with expected operating parameters and equipment performance specifications.

4.2.5.2 Expected Operating Parameters

Each SVE system will be evaluated separately even though many of the parameters may be the same. Schematic diagrams of the East and West Bank SVE systems are presented in Figures 5 and 6,

respectively. As experience in operation is gained, the expected operating parameters may be revised. The current expected operating parameters for each system are as follows:

East and West Banks

The systems are expected to operate continuously. Each SVE system should be operated in the manner which provides for the most effective and efficient remediation of the Site area. Shutdowns are anticipated for change outs of the carbon and for the quarterly soil gas sampling rounds. The system will automatically shut down and restart when condensate is pumped from the holding tanks.

The system should be operated with the control switch for the blower and the water discharge pump both set to automatic. The control valves in the well enclosures at each of the SVE wells should be completely open. The position control valves located on the manifold may be adjusted to balance flow between the SVE wells. The air bleed in valve and sample ports should be closed during system operation. The expected meter and gauge readings are listed below.

The temperature inside the treatment building should be at a minimum of 45°F at all times to prevent freezing and less than 104°F to prevent motor and blower overheating. The start up and operating procedure is presented in Table 5.

East Bank

The total flow rate for the system is designed to be 200 cfm. The flow rate can be exceeded without restriction. Each SVE well is anticipated to have a minimum flow rate of 50 cfm. The vacuum at each well is expected to be approximately 8 inches to 16 inches measured in inches of water column.

The maximum blower exhaust air temperature is 250°F.

The flow metering system for the East Bank consists of a single panel mounted electronic meter with a probe. The probe is inserted into the pipe to measure the flow rate. The procedure for measuring the flow rates are as follows:

1. Plug in the electronic meter and turn on the meter power.

2. Remove the rubber cap from the probe tip.

3. Remove the stopper from the desired measurement location and insert the probe to the approximate center of the pipe.

4. Rotate the probe slowly to align the holes in the probe with the air flow.

5. Record the maximum steady flow rate measured. The electronic flow meter displays flow rate measurements in cubic feet per minute (cfm). Spike measurements are not considered to be representative of the average flow rate.

West Bank

The design flow rate for the system is targeted to be 700 cfm. Each SVE well is anticipated to have a flow rate of 350 cfm. The vacuum at each SVE well is expected to be approximately 20 inches to 40 inches measured in inches of water column. The maximum blower exhaust air temperature is 250°C.

The flow metering system for the West Bank consists of a meter mounted on the wall with flexible tubing leading from each SVE well pipe. Valves on each pipe allow the user to measure SVE well ME-1 and SVE well ME-2 separately. To measure the flow from SVE well ME-1, open both valves for pipe 1 and close both valves for pipe 2. Wait until the meter needle has stabilized and record the flow rate. Use the same procedure for SVE well ME-2. Open the valve for SVE well ME-2 and close valves for SVE well ME-1 and record the flow rate observed.

4.3 MONITORING SYSTEM

SVE Wells

There are a total of six SVE wells at the Site. These wells are classified as being located on either the East Bank or the West Bank. East Bank wells are identified as WC-SVE-# and West Bank wells are identified as ME-SVE-#.

All the wells have the same type of subsurface enclosure. They enclosures have flush mounted, waterproof, cast-iron manholes. The enclosures are inspected periodically to check the piping and the structural integrity. The enclosure contains a flow control valve and sampling port for the SVE well.

The SVE wells were installed in two periods. Wells WC-SVE-1, WC-SVE-2 and ME-SVE-1 were installed as part of the pilot study in 1991 and SVE wells WC-SVE-3, WC-SVE-4 and ME-SVE-2 were installed in October 1993 as part of the final remedial action.

Soil Gas Probes

Soil gas probes were installed at the Site to allow for sampling of the soil gas at a variety of depths. The samples are used in evaluating the performance of the SVE system and the progress of remediation. The location of the soil gas probes for the East and West Banks are presented in Figures 7 and 8, respectively.

A total of sixty five (65) probes were installed. Thirty seven probes at 21 locations were installed on the East Bank and 28 probes at 18 locations were installed on the West Bank. There are two types of soil gas probe installations, flush mounted tops and extension tops. The extension tops are protected by a steel casing and a locking cap. The flush mounted caps are bolted to a frame and are waterproof. Probes are installed with one probe at a sampling location or in nests of two to three probes at a sampling

location. The top of each probe is color coded to indicate the depth of the screened section. Probe identification and installation information are presented in Table 6.

4.3.1 Inspections

The SVE wells and the soil gas probes will be inspected quarterly, two weeks prior to the time of the soil gas sampling round. Deficiencies will be corrected before sampling is performed. The sampling schedule is contained in the Monitoring Program Plan. Table 2 provides a schedule for inspections and Tables 6 and 7 provide a checklist of inspection items. These tables should be used in conjunction with the product information provided by the contractor. A copy of this information is kept on Site.

4.3.2 Maintenance

The maintenance of the SVE wells and soil gas probes will be conducted by the maintenance personnel or a qualified contractor. Maintenance and repair activity is recorded on the form presented in Table 8. Keeping the probes clearly labeled with the proper identification is a primary part of maintenance.

4.3.3 Potential Problems

Probes can be damaged by heavy equipment, vandalism and weather. The most likely problem is that SVE wells and probes will be covered with snow and become difficult to locate. The flush mounted probes could also be damaged by snow plows and the watertight seals may leak. Problems may be alleviated by clearly labeling the SVE wells and soil gas probes, and informing snow plow operators of the well and probe locations and their potential for damage. Clearly labeling the SVE well and probe

covers and informing the personnel operating snow plows to be aware of the care required will alleviate much of the problem.

Other problems which may occur include the damage of probes with extension tops by heavy equipment, traffic and snow plows. In areas which are trafficked, protective posts have been installed around probes with extension tops. Vandalism is a possibility with all the SVE wells and probes. Vandalism, however, is not expected as there is no history of vandalism at the Site. All SVE well enclosure manhole cover bolts, SVE well caps and probe cover bolts should be snugged tight to maintain water or airtight seals.

4.4 RECORD KEEPING

Completed inspection forms with information describing all inspections and maintenance work for both the East and West Bank systems performed shall be kept on Site in a maintenance log book located within the respective treatment system buildings. Tables 3, 4, 6, 7 and 8 provide forms for recording the information from inspections and maintenance work.

4.5 CORRECTIVE ACTION

In the event that a problem is identified, corrective action shall be taken as soon as possible to minimize SVE system down time and to minimize any interference with the scheduled monitoring activities. Inspection personnel shall notify the Wausau PRP Group immediately of problems identified at the Site. The Wausau PRP Group or its designee will implement the corrective action to restore the system to the approved design specifications or functional equivalent.

5.0 REPORTING

The Consent Decree requires that monthly progress reports be submitted in letter form to the USEPA and WDNR. The maintenance and inspection records will be used to provide data for the monthly progress reports. The reports will be submitted to the USEPA and WDNR on the 15th of the month following the end of the reporting period.

.5.1 EMERGENCY NOTIFICATIONS

Whenever notice is required to be given or a report or other document is required to be forwarded by one party to another in accordance with the provisions of this O&M Plan, the communication, notice or report will be directed, in writing, to the following individuals at the addresses specified below (or to such other addresses as such individual may, from time to time, designate by written notice):

USEPA:

1. Office of Director, Waste Management Division
   Remedial Project Manager
   United States Environmental Protection Agency
   77 West Jackson Boulevard
   Chicago, IL 60604-3590

   Attn: Wausau Water Supply NPL Site
   Jennifer Wendel Mail Code: HSRM-6J
   (312) 886-0394

WDNR:

Wisconsin Department of Natural Resources
1681 Second Avenue South
Wisconsin Rapids, Wisconsin 54494

Attn: Don Grasser
(715) 421-7840

Wausau PRP Group

Wausau PRP Group
Wausau Water and Sewerage Utilities
407 Grant Street
Wausau, Wisconsin 54401

Attn: Mr. Joseph Gehin
(715) 843-1134

In the event that reporting to the National Response Center, as per Section 103 of CERCLA 42 U.S.C. 9603 is required, the Contractor will promptly notify, by telephone, the USEPA Remedial Project Manger (RPM). If the RPM is unavailable, the Emergency Response Branch - Region V- USEPA will be contacted (telephone number: (312) 335-2318).

Within twenty (20) days of such an event, a written report will be completed and submitted to the USEPA and the WDNR. The report will discuss the chain of events that occurred and the measurements to be taken.

Within thirty (30) days of the conclusion of such an event, a report will be completed and submitted to the USEPA and WDNR. This report will summarize and discuss all actions taken in response to the event and measures taken to prohibit such events in the future.

6.0 SUMMARY

The O&M manual is meant to provide a thorough basis for operating and maintaining the SVE system and the SVE monitoring system. The information, forms and schedules contained in this plan should be used in conjunction with the Wausau Water Supply NPL Site Final Remedial Design, Wausau, Wisconsin, CRA, August 11, 1993, and the contractor supplied O&M manual. As experience is gained through operation of the system, revisions to the O&M manual will be added as attachments and kept on Site with the O&M manual original.

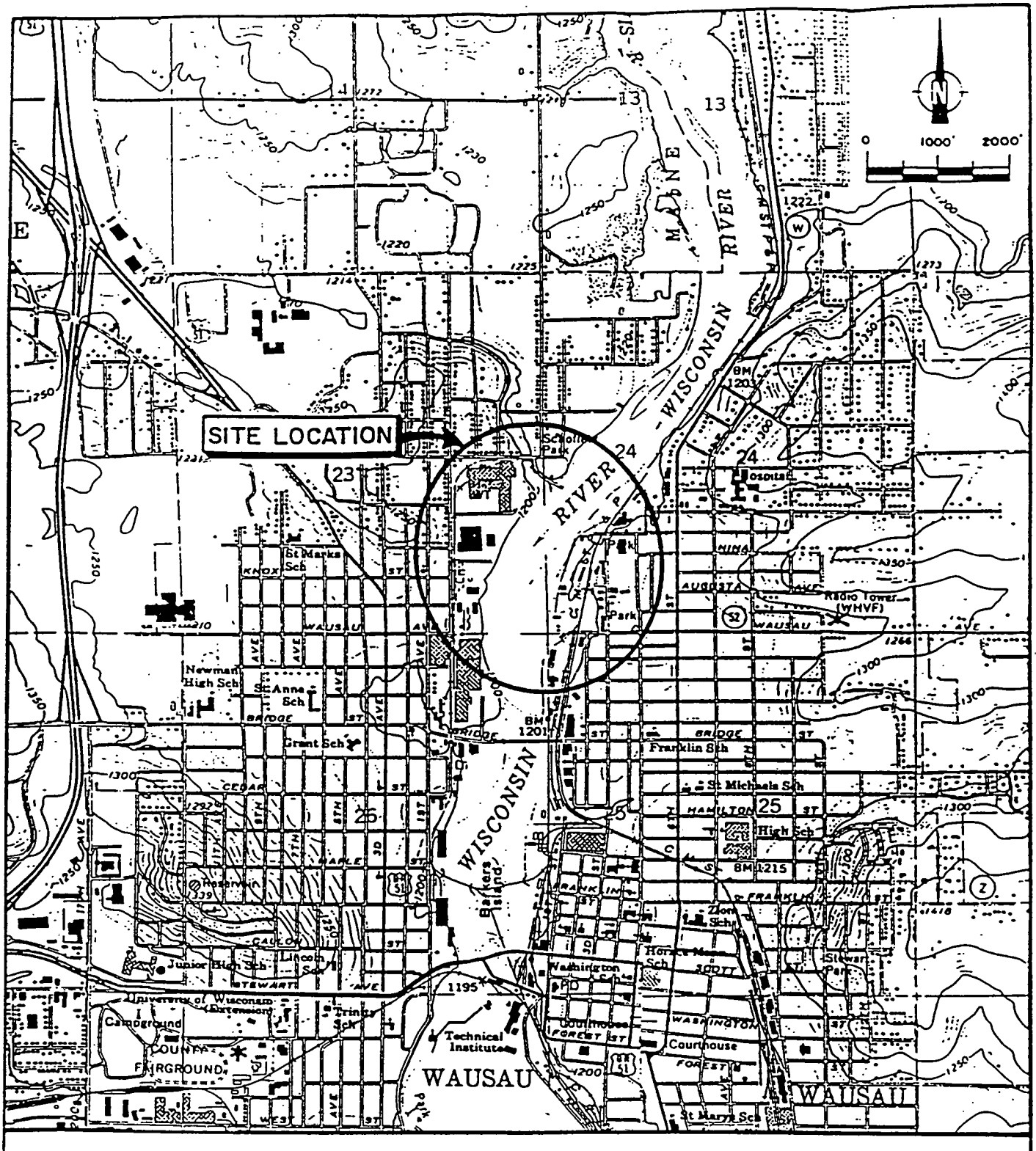
All of Which is Respectfully Submitted,

CONESTOGA-ROVERS & ASSOCIATES

Brian C. Boevers

Charles F. Cooke, P.E.

Miles Phillips



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

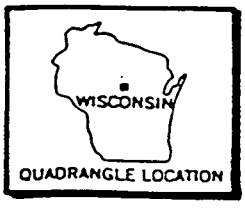


figure 1
SITE LOCATION
Wausau Water Supply Site

CRA

3978-21/01/93-M

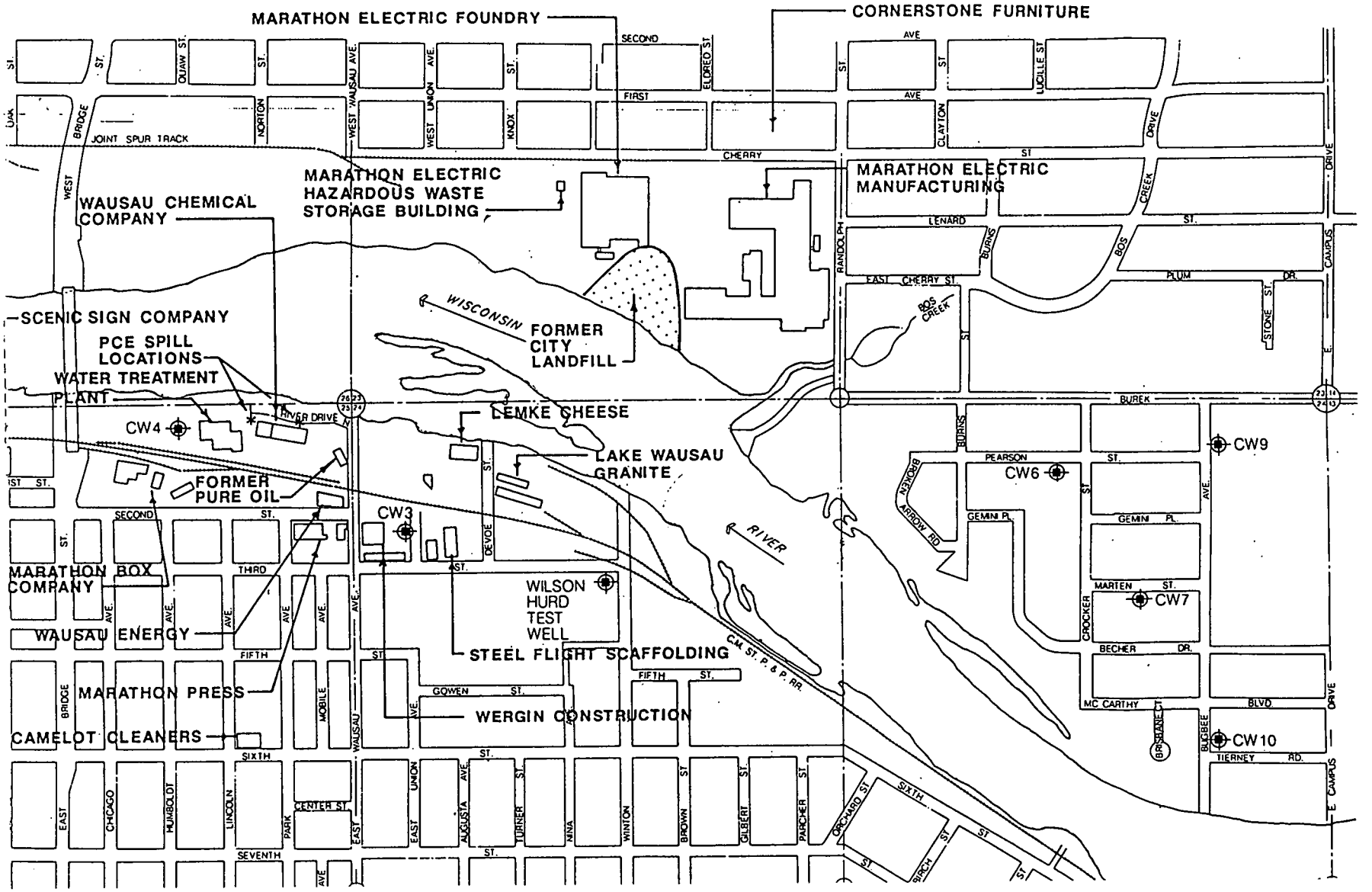


figure 2
SITE PLAN
Wausau Water Supply Site

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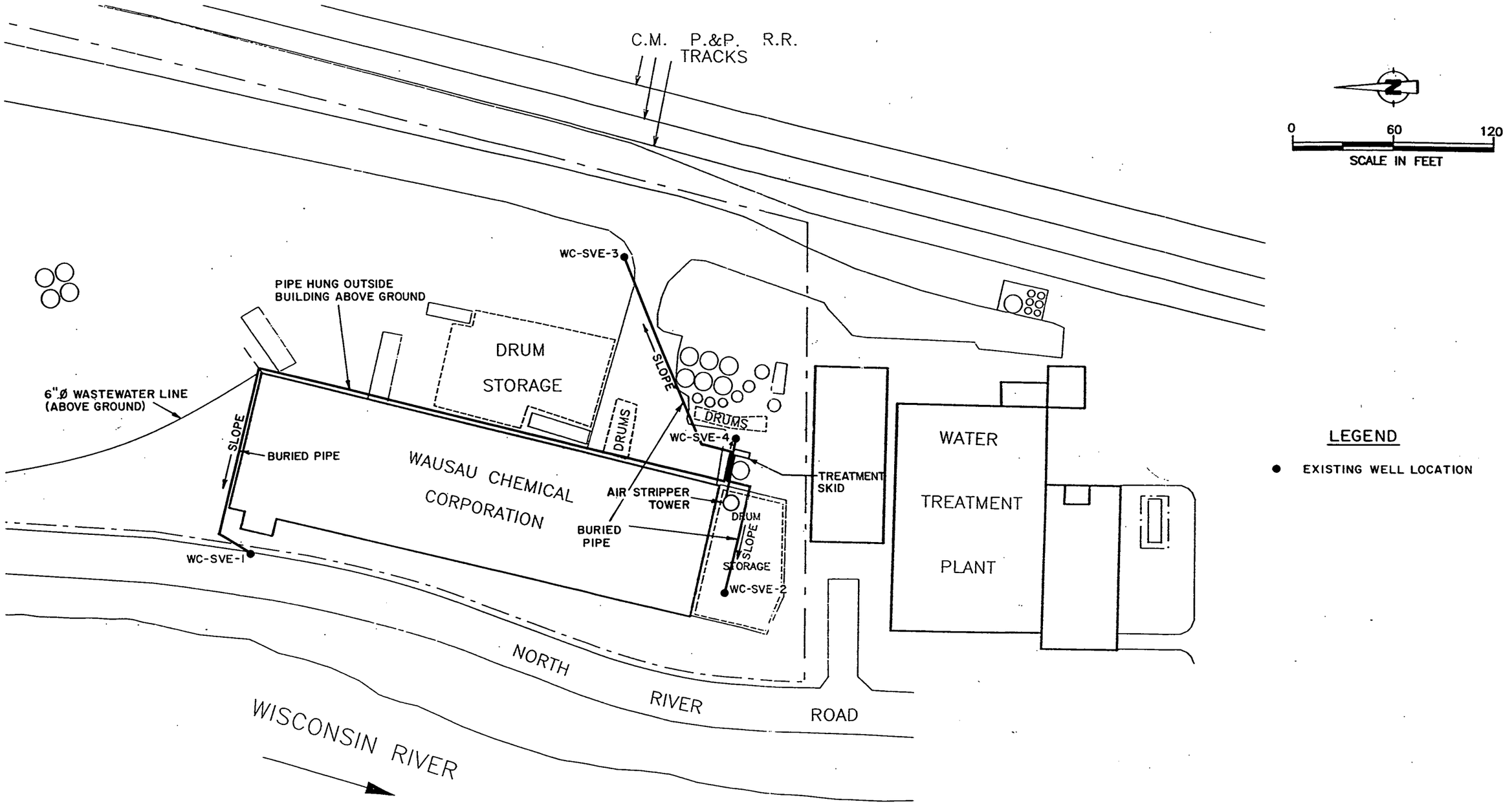

BASE MAP AFTER HYDRO GEO CHEM, INC.

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3978-21/01/93-M

figure 3
LOCATION OF FACILITIES
EAST BANK
Wausau Water Supply Site

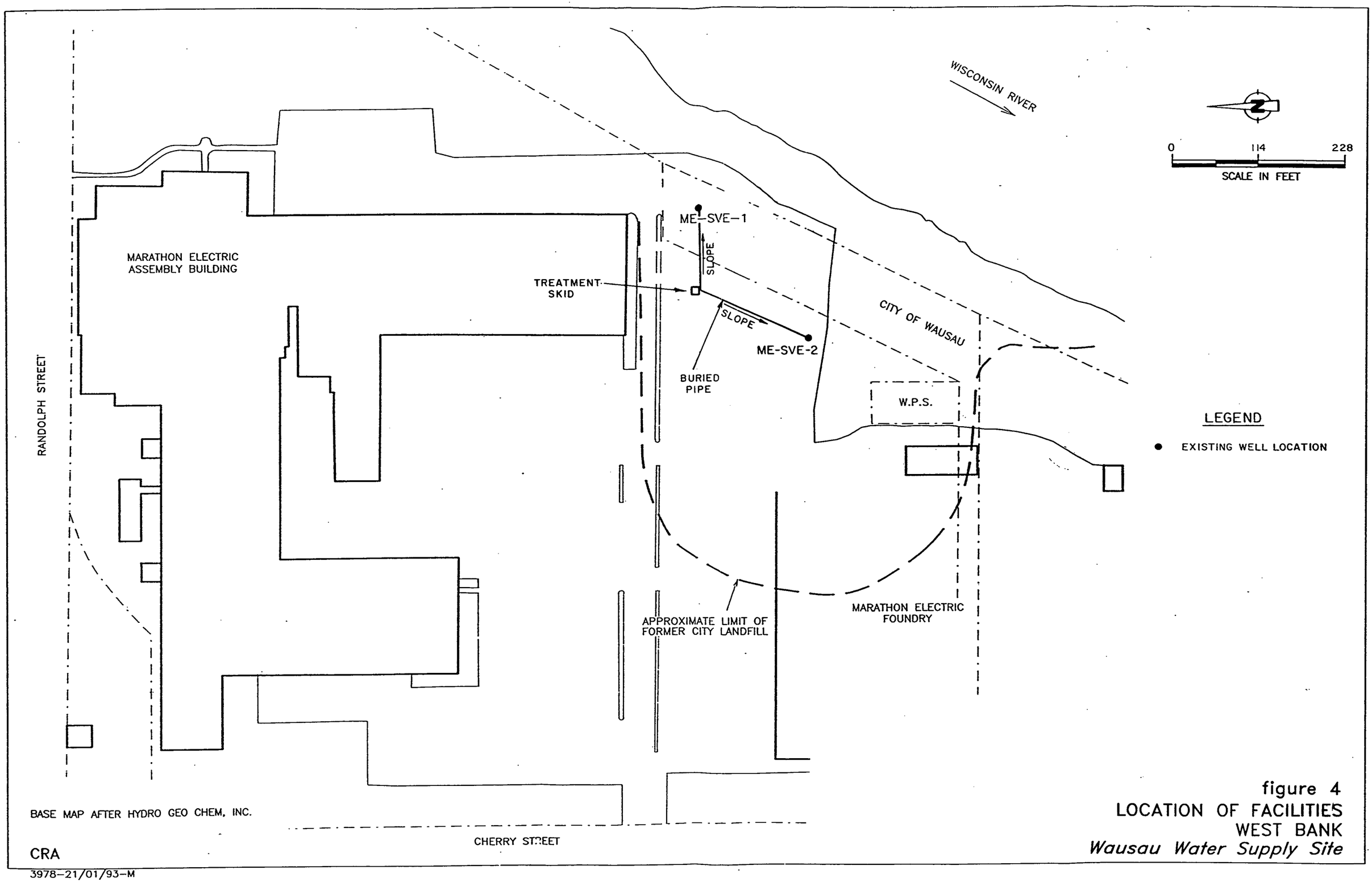


figure 4
LOCATION OF FACILITIES
WEST BANK
Wausau Water Supply Site

FIGURE 5
SCHEMATIC DIAGRAM OF SOIL VAPOR EXTRACTION SYSTEM EAST BANK AT WAUSAU CHEMICAL COMPANY

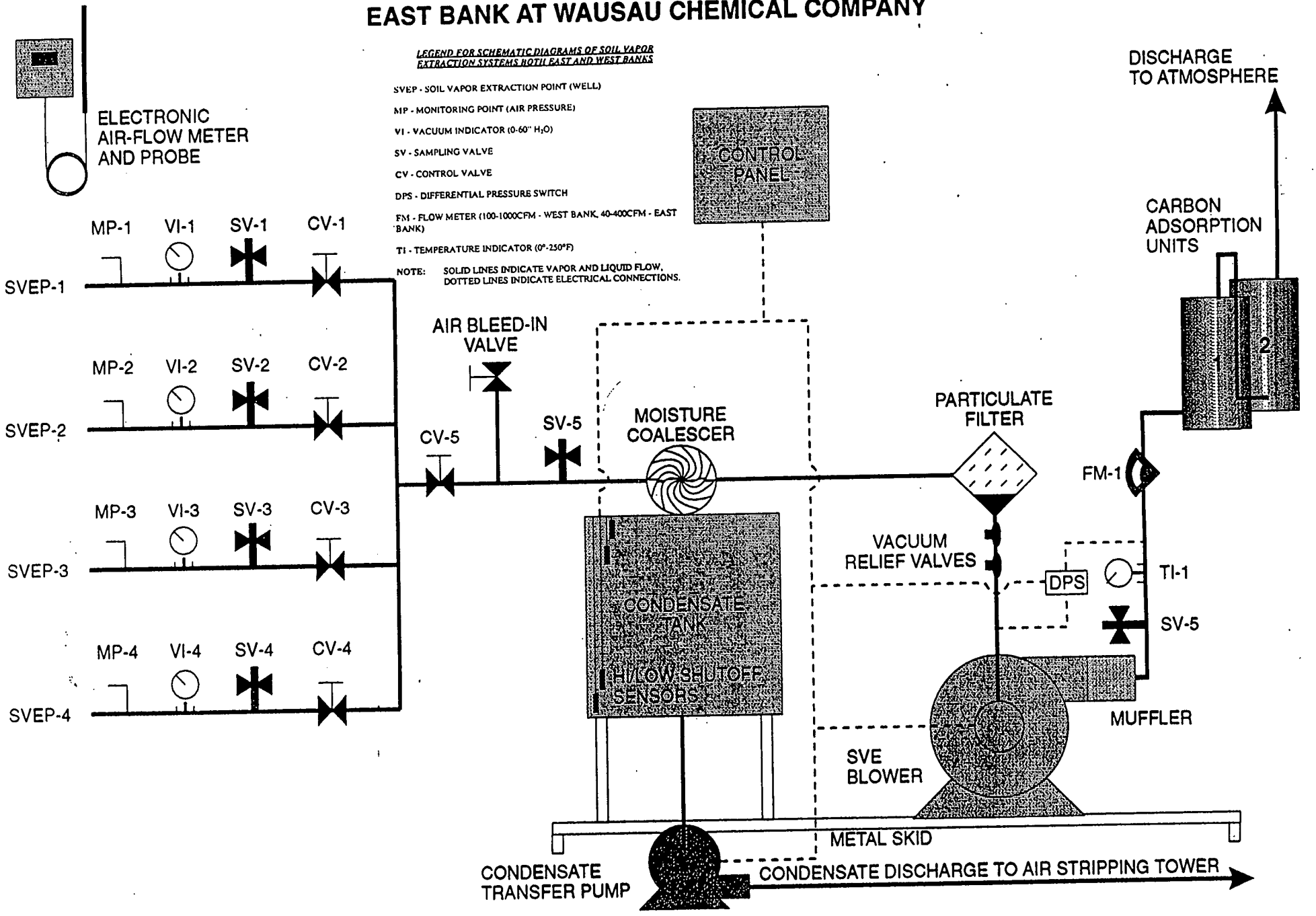
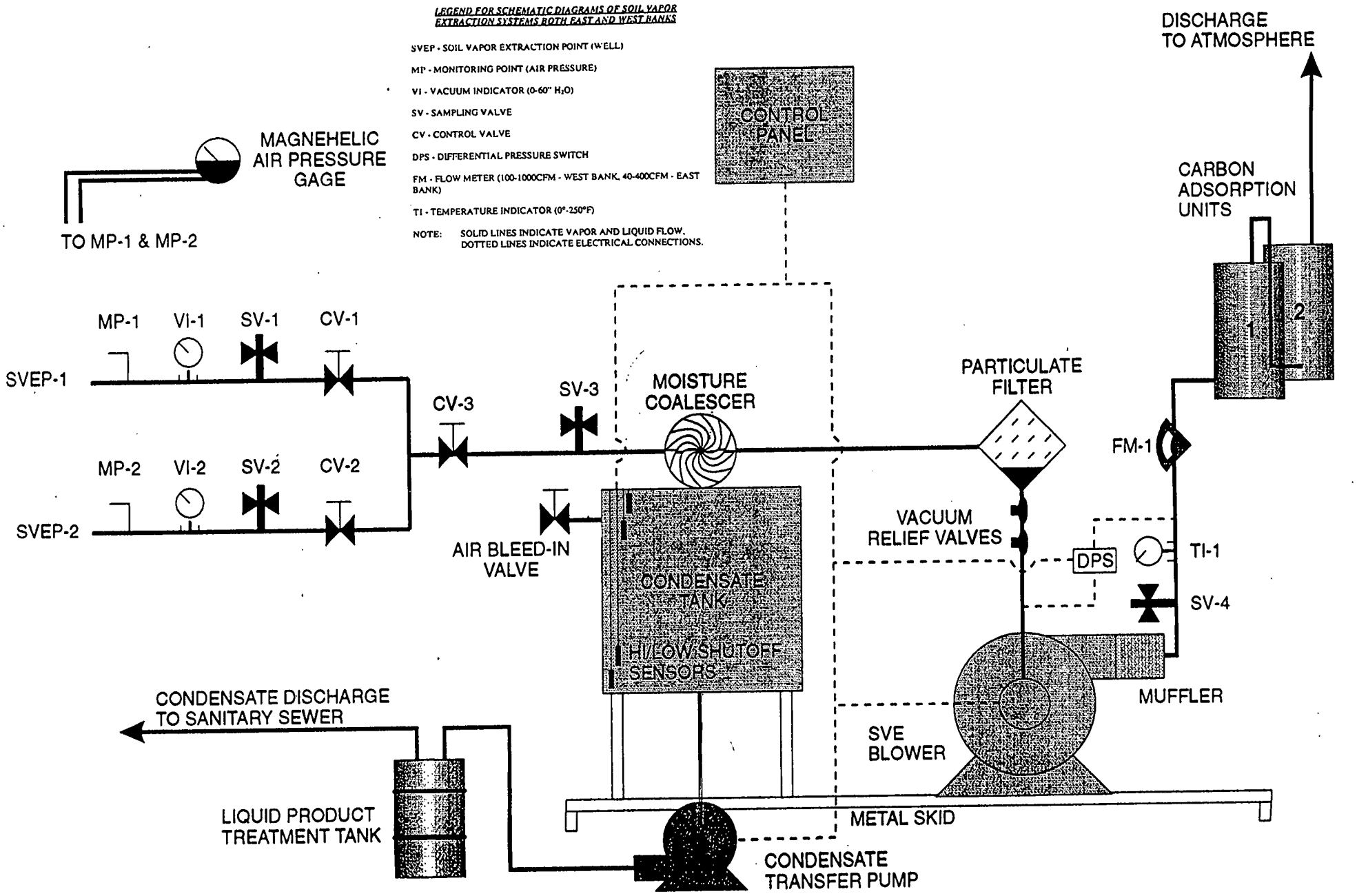
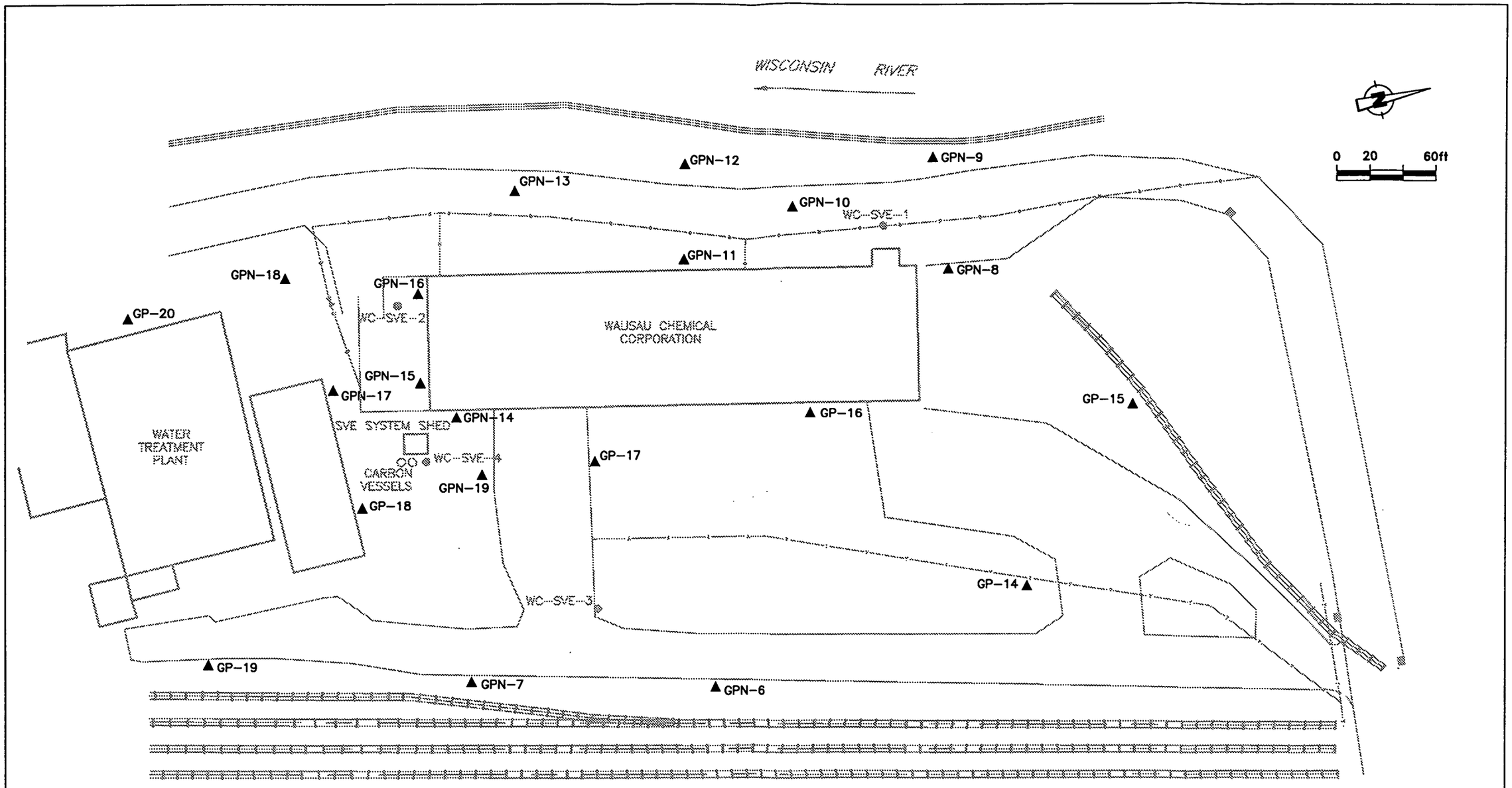


FIGURE 6
SCHEMATIC DIAGRAM OF SOIL VAPOR EXTRACTION SYSTEM WEST BANK AT MARATHON ELECTRIC





LEGEND

⊛	SOIL VAPOR EXTRACTION WELL LOCATION
▲	SOIL GAS PROBE LOCATION
GPN	NESTED PROBES (4',8') EXCEPT GPN–15 & GPN–16 (4',8',11')
GP	SINGLE PROBE (2'–12')

figure 7
SOIL GAS PROBE LOCATIONS
EAST BANK
Wausau, Wisconsin

CRA

3978( )–FEB. 1/94–REV.0 (P–06)(MN)

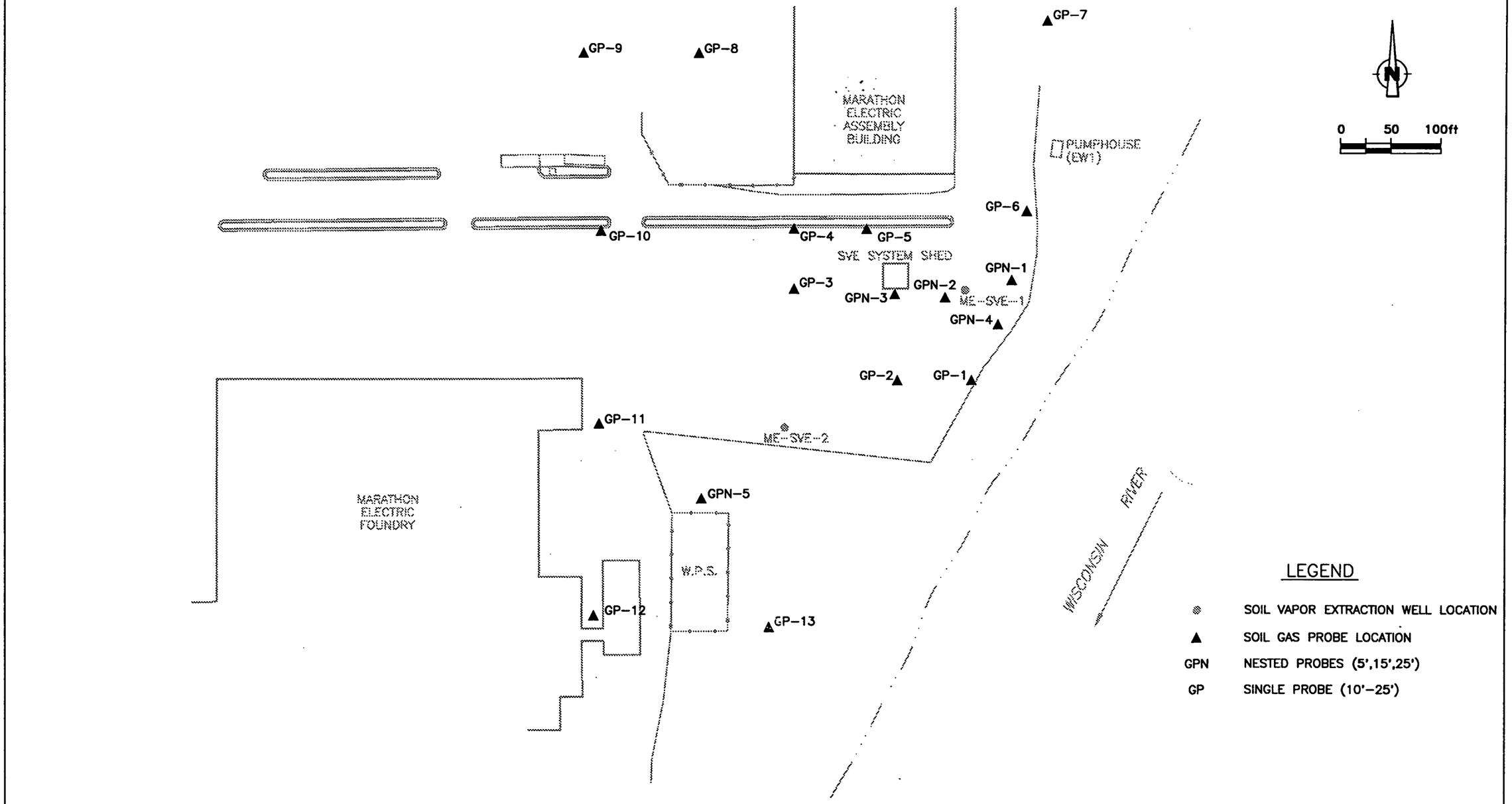


figure 8
SOIL GAS PROBE LOCATIONS
WEST BANK
Wausau, Wisconsin

CRA

3978( )FEB. 1/94-REV.0 (P-05)(MN)

TABLE 1

PRODUCT SUPPLIERS AND MANUFACTURERS LIST
EAST AND WEST BANK
SOIL VAPOR EXTRACTION SYSTEMS
WAUSAU WATER SUPPLY NPL SITE

1. **System Descriptions**
   System Supplier
   Diversified Remediation Controls
   7904 73rd Avenue N.
   Brooklyn Park, MN 55428
   (612) 424-2421

2. **Electrical Systems**
   Control Panel
   Diversified Remediation Controls
   7904 73rd Avenue N.
   Brooklyn Park, MN 55428
   (612) 424-2421

   Relays
   R. Stahl, Inc.
   150 New Boston St.
   Woburn, MA 01801
   (800) 782-4357

   Water Level Sensing Circuit
   Warrick Controls
   4237 Norandy Ct.
   Royal Oak, MI 48073
   (313) 545-2512

   Time Switch
   Diehl
   Borg Instruments
   701 Enterprize Dr.
   Delevan, WI
   (414) 72805538

3. **Auto Dialers**
   Omega Engineering, Inc.
   One Omega Drive, Box 4047
   Stamford, CT 06907-0047
   (203) 359-1660

4. **Pitot Tubes and Pressure Gauges**
   Dwyer
   P.O. Box 373
   Michigan City, IN 46360
   (129) 879-8000

5. **Regenerative Blowers**
   EG & G Rotron
   Industrial Division
   North Street
   Saugerties, NY 12477
   (914) 246-3401

6. **Pressure Differential Switch**
   Dwyer
   P.O. Box 373
   Michigan City, IN 46360
   (219) 879-8000

7. **Particulate Filter**
   Solberg MFG, Inc.
   P.O. Box 309
   Itasca, IL 60143
   (708) 773-1363

8. **Vacuum Relief Valves**
   EG & G Rotron
   Industrial Division
   North Street
   Saugerties, NY 12477
   (914) 246-3401

TABLE 1

PRODUCT SUPPLIERS AND MANUFACTURERS LIST
EAST AND WEST BANK
SOIL VAPOR EXTRACTION SYSTEMS
WAUSAU WATER SUPPLY NPL SITE

9. **Flow Meters**
   See-Flo
   Ercco Engineering
   P.O. Box 6318
   Evanston, IL 60202
   (708) 328-0550

10. **Centrifugal Water Pump**
    Price Pump Co.
    19672 - 8th Street East
    P.O. Box Q
    Sonoma, CA 95476
    (707) 938-8441

11. **Moisture Coalescer**
    Diversified Remediation Controls
    7904 73rd Avenue N.
    Brooklyn Park, MN 55428
    (612) 424-2421

12. **Liquid and Vapor Phase Carbon Absorption Units**
    TIGG Corporation
    Box 11661
    Pittsburgh, PA 15228
    (412) 563-4300

13. **Miscellaneous Components Data**
    Butterfly Valves
    Asahi/America

    Muffler
    EG & G Rotron
    Industrial Division
    North Street
    Saugerties, NY 12477
    (904) 246-3401

TABLE 2

INSPECTION SCHEDULE
WAUSAU WATER SUPPLY NPL SITE

EAST AND WEST BANK
SOIL VAPOR EXTRACTION SYSTEMS

Month 1	Daily
Months 2 and 3	3 times/week
Quarter 2	1 time/week
Quarters 3 and 4	1 time/2 weeks
Years 2 and 3	1 time/2 weeks

SVE WELLS AND SOIL GAS PROBES

Quarterly	2 weeks before start of sampling round

Notes:

The inspection schedule may be revised to increase the frequency of full or partial inspections but shall not be decreased.

TABLE 3

DAILY MAINTENANCE INSPECTION FORM
EAST AND WEST BANK SOIL VAPOR EXTRACTION SYSTEMS
WAUSAU WATER SUPPLY NPL SITE

Reference No. 3978
Date: _____
Time: _____
Name: _____

Site Location-Circle Correct Location
East Bank West Bank

Inspection Item:	Condition: (Fill In Or Cirlce Correct Box)		
Main Circuit Breaker (In Waterwell Pumphouse)	x	Off	On
Panel Circuit Breaker (Outside)	x	Off	On
Blower Circuit Breaker (Inside)	x	Off	On
Water Pump Circuit Breaker (Inside)	x	Off	On
Locks Locked	Panel	Building	Other
Visible Piping Connections	x	Intact	Other
Saturation Tubes (Wednesdays)	Purple	Brown	Black
Blower	x	On	Off
(If Blower is Off, Indicate Cause)	Diff. Pres.	W. Pump	Other
Temperature	x		F
Total Air Flow	x		CFM
Air Flow - SVE Well 1	x		CFM
Air Flow - SVE Well 2	x		CFM
Air Flow - SVE Well 3	x		CFM
Air Flow - SVE Well 4	x		CFM
Vacuum - SVE Well 1	x		"H2O
Vacuum - SVE Well 2	x		"H2O
Vacuum - SVE Well 3	x		"H2O
Vacuum - SVE Well 4	x		"H2O
Control Valve Position - Well 1	Full Open	Closed	Partial
Control Valve Position - Well 2	Full Open	Closed	Partial
Control Valve Position - Well 3	Full Open	Closed	Partial
Control Valve Position - Well 4	Full Open	Closed	Partial
Valve Position - Total Flow	Full Open	Closed	Partial
Valve Position - Bleed In Valve	Full Open	Closed	Partial
HNu Reading (Monthly)	x	x	

Miscellaneous Observations: (Explain all Items marked "Other")
Indicate Any Changes Made To System Controls

TABLE 4

QUARTERLY MAINTENANCE INSPECTION FORM
EAST AND WEST BANK SOIL VAPOR EXTRACTION SYSTEMS
WAUSAU WATER SUPPLY NPL SITE

Reference No. 3978

Date: _____

Site Location-Circle Correct Location — Time: _____

East Bank West Bank — Name: _____

Inspection Item:		Condition:	
East Bank Items are for East Bank only		(Fill In Or Circle Correct Box)	
Main Circuit Breaker	x	Off	On
Panel Circuit Breaker (Outside)	x	Off	On
Blower Circuit Breaker (Inside)	x	Off	On
Water Pump Circuit Breaker (Inside)	x	Off	On
Locks Locked	Panel	Building	Other
Visible Piping Connections	x	Intact	Other
Saturation Tubes (Wednesdays)	Purple	Brown	Black
Blower	x	On	Off
(If Blower is Off, Indicate Cause)	Diff. Pres.	W. Pump	Other
Temperature	x		F
Total Air Flow	x		CFM
Air Flow - SVE Well 1	x		CFM
Air Flow - SVE Well 2	x		CFM
Air Flow - SVE Well 3	x		CFM
Air Flow - SVE Well 4	x		CFM
Vacuum - SVE Well 1	x		"H2O
Vacuum - SVE Well 2	x		"H2O
Vacuum - SVE Well 3	x		"H2O
Vacuum - SVE Well 4	x		"H2O
Control Valve Position - SVE Well 1	Full Open	Closed	Partial
Control Valve Position - SVE Well 2	Full Open	Closed	Partial
Control Valve Position - SVE Well 3	Full Open	Closed	Partial
Control Valve Position - SVE Well 4	Full Open	Closed	Partial
Control Valve Position - Total Flow	Full Open	Closed	Partial
Control Valve Position - Bleed In Valve	Full Open	Closed	Partial
Heat Tape - East Bank	On	Off	Other
HNu Reading (Monthly)	x	x	
Building Construction	OK	x	Other
Carbon Vessel Condition	x	x	
Autodialer	x	x	
Retraining of Call Receiving Personnel	Yes	Date:	
DPS Switch Shutdown Setting	x		"H20
Water Level Switches & Pump	All Function	x	Other
Control Panel Switches & Lights	All Function	x	Other
Batteries (in Auto-Dialer)	OK	Replaced	Other
Particulate Filter	Clean	x	Replaced*
SVE Well Enclosure 1/ Cover	OK	/Bolted	Other
SVE Well Enclosure 2/ Cover	OK	/Bolted	Other
SVE Well Enclosure 3/ Cover	OK	/Bolted	Other
SVE Well Enclosure 4/ Cover	OK	/Bolted	Other

Miscellaneous Observations: (Explain all Items marked "Other")

Indicate Any Changes Made To System Controls.

*If maintenance Work was performed fill out the Maintenance Form (Table 8)

TABLE 5

STARTUP AND OPERATING PROCEDURE
EAST AND WEST BANK
SOIL VAPOR EXTRACTION SYSTEMS
WAUSAU WATER SUPPLY NPL SITE

The East Bank and West Bank startup procedures are the same:

1) Ensure that the outside circuit breakers are ON.

2) Unlock the control panel. Unlock the treatment building, turn on the light.

3) Inspect the SVE system to ensure all control valves in the SVE well enclosures and at the manifold are full open or set to the desired position.

4) Check all outside and inside piping connections for proper fit and condition.

5) Ensure all inside circuit breakers are in the ON position.

6) At the control panel turn the water discharge switch to AUTO and then start the system by turning the Blower switch to AUTO.

7) To shut the system down turn the Blower switch to OFF or turn one of the Blower circuit breakers off.

Note:

If the system automatically shuts off go to the control panel and check the indicator lights for a red light. The red lights will indicate if the differential pressure switch or the water level sensor shut the system down. If the water pump panel switch green light is not ON, refer to the product manufacturer information and check the current overload reset switch inside of the control panel. If the reset switch has tripped, reset it and reduce the vacuum pressure on the Blower.

TABLE 6

SOIL GAS PROBE INSPECTION LIST
WAUSAU WATER SUPPLY NPL SITE

Soil Gas Probe Name	*ID#*	*Probe Screened Depth*	*Probe ID Color Marking*	*Flush Mounted Cover Condition*	*Extension Top Cover Condition*	*Remarks*
West Bank						
GP	1	10'-25'	--	Yes	NA	
GP	2	10'-25'	--	Yes	NA	
GP	3	10'-25'	--	Yes	NA	
GP	4	10'-25'	--	Yes	NA	
GP	5	10'-25'	--	Yes	NA	
GP	6	10'-25'	--	Yes	NA	
GP	7	10'-25'	--	NA	Yes	
GP	8	10'-25'	--	NA	Yes	
GP	9	10'-25'	--	Yes	NA	
GP	10	10'-25'	--	Yes	NA	
GP	11	10'-25'	--	Yes	NA	
GP	12	10'-25'	--	Yes	NA	
GP	13	10'-25'	--	NA	Yes	
GPN	1	5'	Blue	Yes	NA	
GPN	1	15'	Red	Yes	NA	
GPN	1	25'	Black	Yes	NA	
GPN	2	5'	Blue	Yes	NA	
GPN	2	15'	Red	Yes	NA	
GPN	2	25'	Black	Yes	NA	
GPN	3	5'	Blue	Yes	NA	
GPN	3	15'	Red	Yes	NA	
GPN	3	25'	Black	Yes	NA	
GPN	4	5'	Blue	Yes	NA	
GPN	4	15'	Red	Yes	NA	
GPN	4	25'	Black	Yes	NA	
GPN	5	5'	Blue	NA	Yes	
GPN	5	15'	Red	NA	Yes	
GPN	5	25'	Black	NA	Yes	
East Bank						
GP	14	2'-12'	--	NA	Yes	
GP	15	2'-12'	--	NA	Yes	
GP	16	2'-12'	--	NA	Yes	
GP	17	2'-12'	--	NA	Yes	
GP	18	2'-12'	--	NA	Yes	
GP	19	2'-12'	--	NA	Yes	
GP	20	2'-12'	--	NA	Yes	
GPN	6	4'	Blue	NA	Yes	
GPN	6	8'	Black	NA	Yes	

TABLE 6

SOIL GAS PROBE INSPECTION LIST
WAUSAU WATER SUPPLY NPL SITE

Soil Gas Probe Name	ID#	Probe Screened Depth	Probe ID Color Marking	Flush Mounted Cover Condition	Extension Top Cover Condition	Remarks
East Bank (Cont'd)						
GPN	7	4'	Blue	NA	Yes	
GPN	7	8'	Black	NA	Yes	
GPN	8	4'	Blue	NA	Yes	
GPN	8	8'	Black	NA	Yes	
GPN	9	4'	Blue	Yes	NA	
GPN	9	8'	Black	Yes	NA	
GPN	10	4'	Blue	Yes	NA	
GPN	10	8'	Black	Yes	NA	
GPN	11	4'	Blue	Yes	NA	
GPN	11	8'	Black	Yes	NA	
GPN	12	4'	Blue	Yes	NA	
GPN	12	8'	Black	Yes	NA	
GPN	13	4'	Blue	Yes	NA	
GPN	13	8'	Black	Yes	NA	
GPN	14	4'	Blue	NA	Yes	
GPN	14	8'	Black	NA	Yes	
GPN	15	4'	Blue	NA	Yes	
GPN	15	8'	Red	NA	Yes	
GPN	15	11'	Black	NA	Yes	
GPN	16	4'	Blue	NA	Yes	
GPN	16	8'	Red	NA	Yes	
GPN	16	11'	Black	NA	Yes	
GPN	17	4'	Blue	NA	Yes	
GPN	17	8'	Black	NA	Yes	
GPN	18	4'	Blue	Yes	NA	
GPN	18	8'	Black	Yes	NA	
GPN	19	4'	Blue	NA	Yes	
GPN	19	8'	Black	NA	Yes	

Soil Gas Probe Identification
65 Total Probes 39 Total Probe Locations
GP = Single Depth Averaged Probe
GPN = Nested Multiple Probes With 1' Screen Lengths

TABLE 7

SVE WELL INSPECTION LIST
WAUSAU WATER SUPPLY NPL SITE

SVE Extraction Well	*Interval*	*Enclosure (Wet/Dry)*	*Well Head Piping Condition*	*Gas Sample Port Condition*	*Manhole Sealed and Cover Bolts In Place (Yes No)*
West Bank					
ME-SVE-1	6' - 37'				
ME-SVE-2	6' - 35'				
East Bank					
WC-SVE-1	6' - 16'				
WC-SVE-2	6' - 16'				
WC-SVE-3	6' - 17'				
WC-SVE-4	6' - 17'				

Remarks:

TABLE 8

MAINTENANCE AND REPAIR FORM
EAST AND WEST BANK SOIL VAPOR EXTRACTION SYSTEMS
WAUSAU WATER SUPPLY NPL SITE

Date: _____
Name: _____

(Circle option or write in data)
East Bank West Bank

Item requiring maintenance:
(If the item has a part #, model #, etc., please include that information here)

_____
_____
_____
_____
_____

Describe how problem was identified:

_____
_____
_____

Work performed - (describe in detail and include model #s, etc. on any new parts used)

_____
_____
_____
_____
_____

Persons and company performing maintenance work:
(Please include address and phone number)

_____
_____
_____
_____
_____

Other Information and Comments:

_____
_____
_____
_____
_____