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April 21, 2004

Reference No. 3978

Mr. Jeff Gore
UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY
77 West Jackson
Chicago, Illinois 60604

Ms. Eileen Kramer
WISCONSIN DEPARTMENT OF
NATURAL RESOURCES
1300 W. Clairemont, Box 4001
Eau Claire, Wisconsin 54702

Dear Mr. Gore and Ms. Kramer:

Re: 2003 Annual Monitoring Report
Wausau Water Supply NPL Site

On behalf of the Wausau Water Supply PRP Group, Conestoga-Rovers & Associates (CRA) is pleased to submit the 2003 Annual Monitoring Report for the Wausau Water Supply NPL Site. This Report has been prepared as required by the Groundwater Monitoring Plan for the Wausau Water Supply NPL Site.

Please call me at (651) 639-0913 if you have any questions or comments.

Sincerely,

CONESTOGA-ROVERS & ASSOCIATES

Jason Twaddle

JT/jla/34
Enc.

c.c.: Dave Erickson; City of Wausau
Wally Mattson; Marathon Electric
Jim Cherwinka: Wausau Chemical

2003 ANNUAL MONITORING REPORT

WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

2003 ANNUAL MONITORING REPORT

WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

Prepared by:
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1.0 INTRODUCTION

Conestoga-Rovers and Associates (CRA) has prepared this 2003 Annual Monitoring Report (Report) for the Wausau Water Supply NPL Site (Site) in Wausau, Wisconsin, on behalf of the Wausau Potential Responsible Party (PRP) Group. This Report presents the results of groundwater and extraction well monitoring at the Site during 2003. This Report also presents operational data for the remediation systems.

1.1 HISTORY

The Wausau PRP Group initiated remedial action at the Site in the early 1990s in accordance with the September 29, 1990, Record of Decision (ROD) and the Consent Decree (CD) entered with the court on January 24, 1991. The final remedial action at the Site consisted of two soil vapor extraction (SVE) systems to address the source areas and groundwater extraction and treatment utilizing existing municipal production wells and an extraction well. Figure 1.1 provides the Site location and Figure 1.2 provides a Site plan.

Source area remediation was accomplished by the installation of SVE Systems at Marathon Electric (West Bank) and Wausau Chemical (East Bank) in January 1994. Off-gas treatment was provided by vapor phase carbon. The SVE system at Marathon Electric operated until April 1996, when the West Bank source remediation was approved as complete. The East Bank SVE system was modified in 1996 and continued to operate. In January 2001 the East Bank system was shut down while evaluation for final closure occurred.

Groundwater remediation is provided through two existing municipal production wells (CW3 and CW6) and one extraction well installed at Marathon Electric (EW1). Air strippers at the Wausau water treatment plant treat water from the municipal supply wells. Water from EW1 is also treated by air stripping (over riprap on the riverbank) before being discharged to the Wisconsin River.

The pumping rates for the three extraction wells were originally defined in the CD. In the Groundwater Flow Model report (CRA, May 1993), CRA established a range of pumping rates that would maintain capture of the groundwater plume. Then, in an August 4, 1995 letter, the United States Environmental Protection Agency (USEPA) approved the optimum pumping configuration range from that report for the three extraction wells. Those pumping rates are:

- CW3: 65 hours per week at 1,200 gallons per minute (gpm) to 100 hours per week at 1,100 gpm.
- CW6: 85 hours to 100 hours per week at 1,400 gpm.
- EW1: 800 to 900 gpm continuously.

Additional groundwater remediation was provided by an extraction system operated by Wausau Chemical between 1985 and 1996 as an interim remediation measure. The extraction system at Wausau Chemical consisted of a series of shallow wells at the south end of the Wausau Chemical property. Groundwater was treated by air stripping. This system was not part of the ROD or the CD and operation ceased in 1996.

Historically, groundwater monitoring was conducted according to the Monitoring Program Plan (CRA, 1994). The Monitoring Program Plan consisted of a complex system of monthly, quarterly, semiannual, and annual monitoring. In June 2000, the Groundwater Monitoring Plan replaced the Monitoring Program Plan as the approved groundwater-monitoring program. The Groundwater Monitoring Plan consists of annual monitoring well sampling and quarterly sampling of EW1.

The Groundwater Monitoring Plan requires an annual report on the activities occurring the previous calendar year. This Report fulfills that requirement.

1.2 BACKGROUND

Groundwater monitoring at this Site is a combination of hydraulic and water quality monitoring designed to verify that the groundwater extraction wells are containing the contaminant plume and that groundwater quality is improving because of source remediation and volatile organic compound (VOC) removal from the aquifer.

Groundwater remediation at a site like Wausau is a long-term process that cannot be readily measured on a short-term basis using water quality data alone. Because of the time necessary to achieve groundwater remediation, containment of contaminated groundwater is the primary measurable and achievable short-term objective.

Actual remediation of the groundwater is a slower process that is more difficult to measure using field data on a short-term basis. Accordingly, water quality data is measured periodically on a long-term basis to show the downward trend of VOC concentrations in groundwater. Significant VOC reductions are measured over a period of years.

For the purpose of evaluation, groundwater monitoring at Wausau has been divided into two areas, the East Bank and the West Bank of the Wisconsin River, corresponding to the two original source areas. The river forms a natural hydraulic division of the Site. There are three active groundwater extraction wells designed to contain and remove VOC contaminated groundwater. Two of the extraction wells are on the West Bank, (CW6 and EW1) and one is on the East Bank (CW3) (Figure 1.2).

1.3 SITE GEOLOGY

The Site is underlain by glacial outwash and alluvial sediments, which have filled in the preglacial stream valley in which the Wisconsin River now flows. This alluvial aquifer ranges from 0 to 160 feet thick and has an irregular base and lateral boundaries. The relatively impermeable bedrock that underlies the aquifer and forms its lateral boundaries within the preglacial valley defines the boundaries of the aquifer. Six production wells in the Site area provide drinking water for the City of Wausau. These wells are screened in the glacial outwash and alluvial sand and gravel deposits that underlie and are adjacent to the Wisconsin River.

1.4 GROUNDWATER CLEANUP STANDARDS

The Groundwater Monitoring Plan was developed to monitor compliance with cleanup standards for the groundwater at the Site. The groundwater cleanup standards for the Site are the USEPA maximum drinking water contaminant levels (MCLs). The MCLs for the primary VOC contaminants of concern at the Site are:

- Trichloroethylene (TCE) 5 µg/L
- Tetrachloroethylene (PCE) 5 µg/L
- cis-1,2-Dichloroethylene (DCE) 70 µg/L
- Vinyl chloride 2 µg/L

c/u goals in CD are different

2.0 2003 MONITORING

Groundwater monitoring, which included water level measurements and water sampling, was conducted in October in accordance with the Groundwater Monitoring Plan.

2.1 WATER LEVEL MONITORING

Table 2.1 presents the groundwater elevation data measured on October 6-7, 2003. Water table contours based on these measurements are presented on Figure 2.1. Field staff measured water levels on the East Bank on October 6, 2003, while CW3 was running. CW3 was shut-off and CW6 was turned on on October 6, 2003, after water levels were measured in the East Bank wells. West Bank water levels were then measured on October 7, 2003, after CW6 had been running for 24 hours.

The East Bank and West Bank contours are consistent with flow patterns observed in previous years. The flow patterns are controlled by the operation of EW1 and the City production wells. Under natural conditions, groundwater would flow toward and discharge to the Wisconsin River and its tributary, Bos Creek. Under existing conditions however, groundwater flows toward EW1 and the production wells. The operation of EW1 has created groundwater flow divides between the west and east City well fields and has isolated the former landfill source of contaminated groundwater from the production wells.

2.2 GROUNDWATER SAMPLING

Annual groundwater samples were collected on October 6-7, 2003, according to the Groundwater Monitoring Plan. Monitoring well samples were analyzed by EPA Method 8260 for the Site specific VOC list presented in Table 2.2. Based on the recommendation in the 2002 Annual Monitoring Report, sampling for bis(2-ethylhexyl)phthalate at C4S and W53A was discontinued. The USEPA and WDNR approved this modification to the monitoring plan in early October 2003.

Additional groundwater samples were collected from WC3B and WC5A at Wausau Chemical on January 13, April 11, and July 2, 2003, according to the requirements stated in a November 13, 2002, letter for permanent closure of the East Bank SVE System. These samples were also analyzed for Site specific VOCs.

Groundwater sampling was conducted according to the Quality Assurance Project Plan (QAPP), February 1994, as amended by a June 11, 1999, letter to the USEPA. All samples were analyzed by Severn Trent Laboratories (STL) in North Canton, Ohio. Laboratory results are being submitted electronically in the Region V Electronic Data Deliverable (EDD) format for inclusion in the Region V EPA database. Copies of Data Quality Validation memorandums for 2003 data are included in Appendix A.

2.3 EXTRACTION WELL EW1 SAMPLING

The monitoring program for EW1 was designed to measure long term water quality improvement in the groundwater and to measure the treatment of the groundwater extracted by EW1. This data is also used to measure the contaminant levels discharged to the Wisconsin River from the EW1 treatment system. The discharge should meet the substantive requirements of the Wisconsin Pollutant Discharge Elimination System (WPDES).

Influent and Effluent samples were collected from EW1 quarterly in January, April, July, and October according to the Groundwater Monitoring Plan. Both the influent and effluent samples were analyzed using EPA Method 8260 for the Site specific VOCs (Table 2.2).

All samples were analyzed by STL in North Canton, Ohio. Laboratory results are being submitted electronically in the Region V EDD format for inclusion in the Region V EPA database. Copies of the Data Quality Validation memorandums for the 2003 data are included in Appendix A.

3.0 OPERATION AND MAINTENANCE

Operation and maintenance activities reported in this section cover EW1, the city production wells, the groundwater monitoring wells and, the East Bank SVE system.

3.1 EXTRACTION WELL (EW1)

The West Bank extraction well (EW1) at Marathon Electric ran with a few minor incidents in 2003. Approximately 429,018,000 gallons of water were extracted and treated during the year. The extraction well pumped at a flow rate of 799 gallons per minute averaged over the entire year. Table 3.1 summarizes EW1 operational data for 2003, including the number of gallons pumped and flow rate.

The flow meter began functioning improperly in June. On June 24, EW1 was shut off for four hours to clean the flow meter. However, the meter still did not function correctly; therefore, on July 15, EW1 was shut off to remove the flow meter for repairs. The pump was down for four hours on this date, while other preventive maintenance was completed on the motor. On August 29, EW1 was shut down for one hour to reinstall the repaired meter.

Flow rates for the period from June 5 to August 29 were estimated since the flow meter was not functioning during this time. From June 5 to July 1, an 830 gpm flow rate was assumed. That was the average flow rate for the two months prior to June 5. From July 1 to August 29, a flow rate of 800 gpm was assumed, the measured flow rate when the meter was reinstalled.

The pumping rate began declining during the last two to three months of 2003. During December, the pumping rate averaged 763 gpm. Efforts to increase the pumping rate have not been successful. Possible causes of the decline in the pumping rates are being evaluated. A significant maintenance effort, including cleaning the well screen, was completed in April 2001.

3.2 CITY PRODUCTION WELLS

The City of Wausau completed maintenance work on two production wells in 2003. Maintenance of CW3 consisted of cleaning iron and bacteria from the well screen causing it to be shut down from March 13 to April 10. CW9 has not been used since August due to iron bacteria clogging the screen; however, it is not part of the remediation system.

Maintenance at CW3 was scheduled because of declining pumping rates at the end of 2002. The pumping rate had fallen below the optimum pumping rate for the remediation due to iron and bacteria buildup on the well screen. To compensate for the reduced pumping rate, the pumping schedule for CW3 had been increased from 3 days per week to 4 days per week before the repairs. After the well screen was cleaned, the pumping rate improved from 750 gpm to 1,650 gpm.

Table 3.2 presents pumping data for all six City wells. The table shows, by month, the number of hours each well was operated and the number of gallons pumped from each well. While only CW3 and CW6 are part of the remediation system, data for all six City wells is presented, as has been done historically.

3.3 EAST BANK SVE SYSTEM

The East Bank SVE system (at Wausau Chemical) has been shut off since January 10, 2001, because of inefficient removal rates. A March 8, 2002, letter report recommended permanent closure of the East Bank source area remediation system based on soil sample results from the two "hot spots", a statistical analysis, and continued decrease in the groundwater VOC concentrations.

At a meeting in October 2002, the WDNR and the USEPA requested quarterly groundwater sampling at select wells in the vicinity of Wausau Chemical to verify that there is no significant contamination in the soil still contributing to the groundwater plume. Monitoring wells WC3B and WC5A were sampled in January, April, July, and October 2003 for Site Specific VOCs (Table 2.2). The results of these sampling events are reported in Section 4.2 and in a March 5, 2004, letter report.

Based on the results of that groundwater sampling, the continued overall decreases in the East Bank plume, and historical soil sampling, Wausau Chemical has requested permanent closure of the East Bank SVE System in the March 5, 2004, letter report.

3.4 MONITORING WELL MAINTENANCE

The top of casing (TOC) elevations for all wells were resurveyed in December 2003 based on a recommendation in the 2002 Annual Monitoring Report. The water levels calculated for this report are based on these new TOC elevations. Table 3.3 presents a comparison of the previous TOC elevations to the resurveyed elevations. The resurveyed elevations of the majority of the wells were consistently 0.10 feet to 0.15 feet

lower than the old TOC elevations, indicating little change relative to each other. Wells with elevation changes significantly different than the norm include Wilson Hurd (0.45 feet change), CW7 (0.21 feet change), CW10 (-5.91 feet change), C3S (0.14 feet change), MW4A (0.22 feet change), MW4B (-0.54 feet change), and W5WS (0.21 feet change).

4.0 EVALUATION OF GROUNDWATER DATA

The objectives of groundwater monitoring at the Wausau Site are to monitor the containment of the contaminant plume and the long-term improvement in groundwater quality.

Table 4.1 presents the laboratory results for monitoring well samples collected during 2003. The data indicate that, in general, the plume size continues to decrease. Total chlorinated VOC data, included in Table 4.1 and presented on Figure 4.1, illustrates the plume configuration based on the October 2003 data.

4.1 WEST BANK

The primary VOC found on the West Bank is trichloroethene (TCE). The degradation product cis-1,2-dichloroethene (C12DCE) was detected at a few locations with relatively low concentrations. Vinyl chloride was detected in one well on the West Bank. Monitoring wells with TCE concentrations greater than the MCL of 5 μg/L include R2D, R3D, R4D, EW1, W55, W53A, and CW6. Monitoring well C4S had a vinyl chloride concentration of 1.8 μg/L, which is less than the MCL of 2 μg/L.

The West Bank plume remained fairly stable in 2002. Most of the monitoring wells on the West Bank had total chlorinated volatile organic compound (CVOC) concentrations in 2003 that are comparable to the 2002 concentrations.

The one well with a significant decrease in CVOC concentration was R3D, where the CVOC concentration decreased from 1,200 μg/L to 980 μg/L. As discussed in the 2001 Annual Monitoring Report, the high concentration of total CVOCs in R3D is probably due to a slug of CVOCs that began in the vicinity of R2D, near the flow divide between EW1 and CW6 and is moving slowly towards EW1. Historical data for these two wells is shown below:

	Total CVOCs (µg/L)	
Year	*R2D*	*R3D*
1993	3635	4
1994	2130	11
1995	152	5
1996	1600	2
1997	720	5
1998	320	580
1999	110	1200
2000	45	1800
2001	17	1500
2002	15	1200
2003	10	980

The 2000 through 2003 data for R3D show a decrease in CVOC concentration from 1,800 µg/L to 980 µg/L. This data suggests that the center of this CVOC slug has begun to move past R3D (see Figure 4.1). However, the CVOC concentrations in the two wells between R3D and EW1 have not increased. Concentrations at W52 have remained steady, at less than 2 µg/L.

The total CVOC concentration in City production well CW6 and W55 were consistent with 2001 concentrations (Figure 4.1). This area of the plume appears to be stable.

It appears that the plume is naturally attenuating in the southern portion of the West Bank plume under the old landfill. At W53A, the degradation product C12DCE (12 µg/L) was found at a concentration similar to TCE (1.3 µg/L). Historically, the concentration of C12DCE at W53A has been equivalent to or greater than the TCE concentration. At C4S, vinyl chloride was the only parameter detected, which is also consistent with historical data.

In the vicinity of the old landfill, CVOCs are located in the shallower portions of the aquifer at relatively lower concentrations. In the portion of the plume north of EW1, CVOCs are located in the deeper portions of the aquifer.

4.2 EAST BANK

As shown on Table 4.2, tetrachloroethene (PCE) and its degradation products, TCE, C12DCE, and vinyl chloride are the primary contaminants on the East Bank. The substantial presence of C12DCE and vinyl chloride indicate that natural attenuation of the plume continues to occur on the East Bank. Two wells, E22A and E23A, had PCE concentrations in October that exceeded the MCL of 5 μg/L. In addition, WW6 had a vinyl chloride concentration that exceeded the MCL of 2 μg/L. Also, the concentration of TCE increased at IWD to 5.6 μg/L, just above the MCL.

The overall size of the East Bank plume has decreased historically (see Figure 4.1). Total CVOC concentrations at wells within the plume continued to decrease in 2003. Most of the monitoring wells on the East Bank had lower total CVOC concentrations in 2003 than in 2002. Wells with significant decreases of CVOCs from 2002 to 2003 include:

Well	*2002*	*2003*
WW6	23.6 μg/L	10.6 μg/L
E37A	8.5 μg/L	3.4 μg/L
E22A	11.7 μg/L	10 μg/L
WC5A	11.4 μg/L	5.6 μg/L
E24A	2.8 μg/L	1.2 μg/L
WC3B	32.7 μg/L	3.1 μg/L

The concentration in five of the six wells listed above, decreased by more than half. Total CVOC concentrations only increased at one well on the East Bank plume when comparing the October 2003 data to the October 2002 data. The concentration at E23A increased from 7.3 μg/L to 15.6 μg/L.

As discussed in Section 3.3, quarterly samples were collected from two East Bank wells, WC3B and WC5A, as a final step in the permanent closure process for the East Bank source remediation. As shown on Table 4.1, the total CVOC concentration changed significantly at WC3B during 2003. In October 2002, the concentration was 32.7 μg/L. The total CVOC concentration increased to 556 μg/L in January, then decreased throughout the year until the concentration in October 2003 was 3.1μg/L, an order of magnitude lower than the previous year.

The estimated groundwater travel time from WC3B to CW3 is less than two years, based on the evaluation presented in the Groundwater Flow Model (CRA, 1993). Therefore, one would expect any increase in concentration at WC3B to show up in WC5A, which is

directly down gradient of WC3B, sometime during 2003. However, the total CVOC concentrations at WC5A consistently decreased from 16.5 μg/L in January, to 5.6 μg/L in October. In fact, as discussed in the previous paragraphs, concentrations in all but one East Bank well were lower in October 2003 compared to October 2002. The highest concentration at any well in October 2003 was 15.6 μg/L at E23A.

The declining concentration at WC5A, and the overall reduction in the plume concentration, indicate that whatever caused the spike at WC3B was limited in size. With the travel time from WC3B to CW3 less than two years, if the CVOCs detected at WC3B were of significant size, some increase would certainly have been detected down gradient.

The data indicate that CW3 continues to effectively capture the East Bank plume and is effective at remediating the groundwater on the East Bank.

The concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX) at monitoring well FVD5 were higher in 2003 than in 2002, but still consistent with historical data.

4.3 EW1

The influent and effluent laboratory results for EW1 are presented in Table 4.2. TCE was the primary VOC detected. C12DCE was detected in samples from most sampling events, but its concentration was less than 1 μg/L.

Influent concentrations of TCE decreased from 14 μg/L in January to 10 μg/L in October. The effluent concentrations indicate that the EW1 treatment system removes 50 percent or more of the VOCs in the extracted groundwater.

The results of the effluent samples were compared to surface water discharge limits for discharge to the Wisconsin River, as calculated by the WDNR. Those discharge limits were presented in the Remedial Action Plan, Groundwater Extraction, Treatment, and Discharge System, Marathon Electric Manufacturing Co., Wausau, Wisconsin. None of the discharge limits were exceeded during 2003. Results of quarterly EW1 influent and effluent sampling are also reported quarterly for the purpose of the WPDES.

4.4 HYDRAULIC CAPTURE

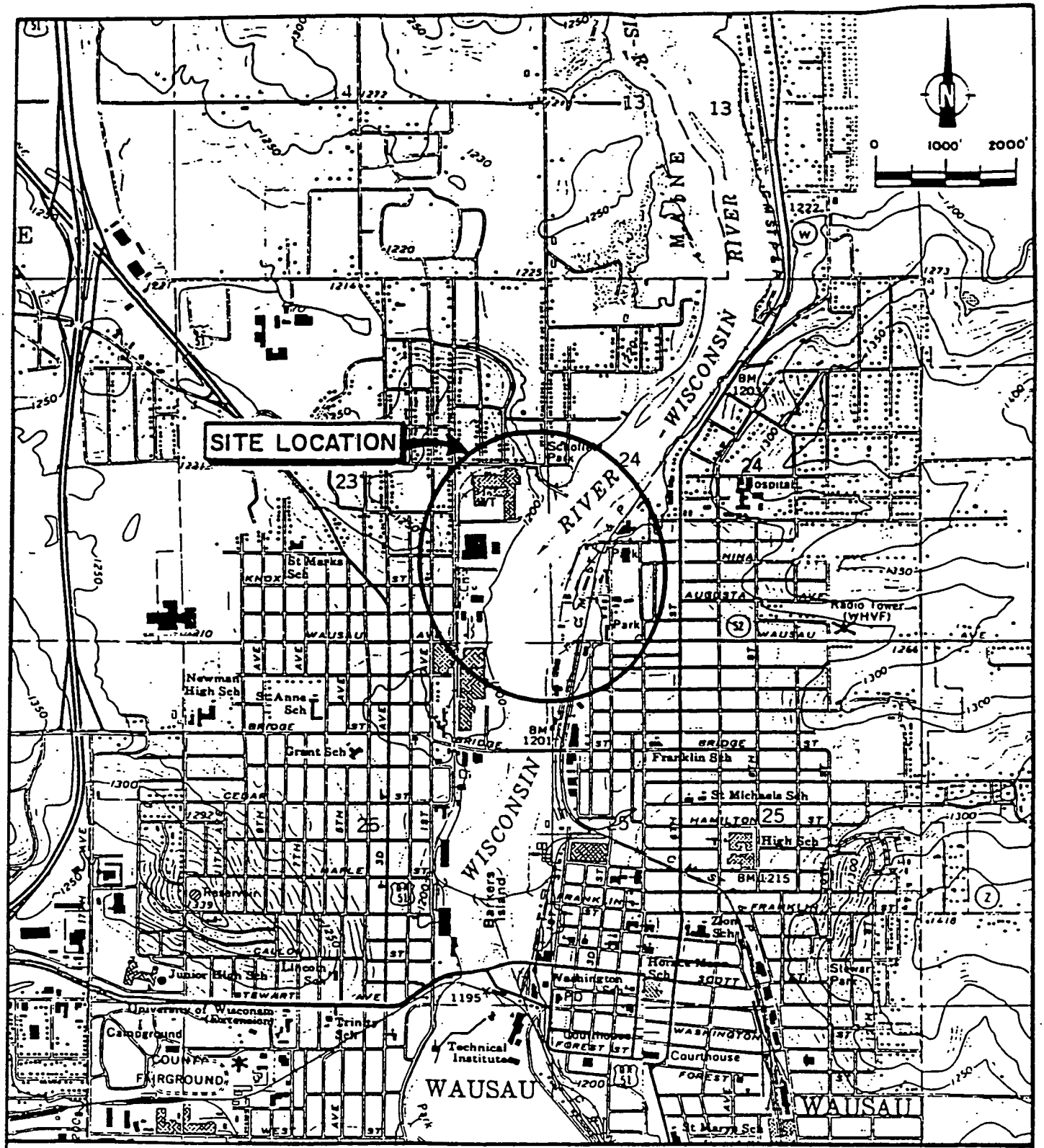
Horizontal and vertical capture of the contaminant plume is demonstrated on Figure 2.1. The water table contours indicate that groundwater flow in the contaminated portions of

the Site is toward the three extraction wells - CW3, CW6, and EW1, which is supported by the analytical data as discussed in Sections 4.1 and 4.2. At nested well locations, the water table elevations for shallow and deep wells are similar, indicating horizontal flow and hydraulic containment of the shallow and deeper portions of the aquifer. Figure 4.1 also demonstrates that hydraulic containment of the contaminants has been maintained.

5.0 CONCLUSIONS AND RECOMMENDATIONS

- The Marathon Electric extraction well (EW1) and the two City production wells (CW3 and CW6) continue to capture the CVOC plume as evidenced by analysis of the hydraulic data and the chemical data.
- The East Bank CVOC plume has decreased in size historically and the concentrations within the plume decreased significantly in 2003.
- Quarterly sampling of two wells, WC3B and WC5A, was completed in 2003, to provide supportive documentation for permanent closure of the East Bank SVE system. While there was a spike in CVOC concentrations at WC3B in January, by October, the CVOC concentration had decreased to concentrations below 2002 levels. Furthermore, the overall decrease in the plume concentration supports the conclusion that the spike detected at WC3B was limited in size. Wausau Chemical has requested permanent closure of the East Bank SVE system in a separate letter report.
- The CVOC plume on the West Bank remained fairly stable in size and concentrations within the plume. The high concentration slug of CVOCs documented in previous reports continued to move towards EW1. There is evidence of natural attenuation in the area of the plume under the old landfill. The plume is shallower and less concentrated here than in other areas of the West Bank plume.
- EW1 removed approximately 429,018,00 gallons of water in 2003 at a pumping rate of 799 gallons per minute averaged over the entire year. Flows for June, July, and August were estimated because of a malfunctioning flow meter that was repaired by the end of August. The flow rate at EW1 was declining at the end of 2003.
- The EW1 treatment system removed greater than 50 percent of the VOCs from the extracted groundwater. The effluent concentrations from the treatment system were well below the discharge limits.
- The City production wells operated as scheduled except for approximately one month in March/April when CW3 was shut down to clean the well screen.
- The monitoring wells were resurveyed for top of casing (TOC) elevations in December 2003. With a few exceptions, the change in TOC elevations was fairly consistent for all of the wells.
- Chemical analysis for bis(2-ethylhexyl)phthalate was eliminated from the monitoring program in 2003 as recommended in the 2002 Annual Monitoring Report.
- Monitoring in 2004 should continue as described in the Groundwater Monitoring Plan with slight modifications discussed in previous reports (WC2 and W51A were

eliminated because of abandonment as described in the 2000 Annual Monitoring Report), and the elimination of bis(2-ethylhexyl)phthalate analysis. .



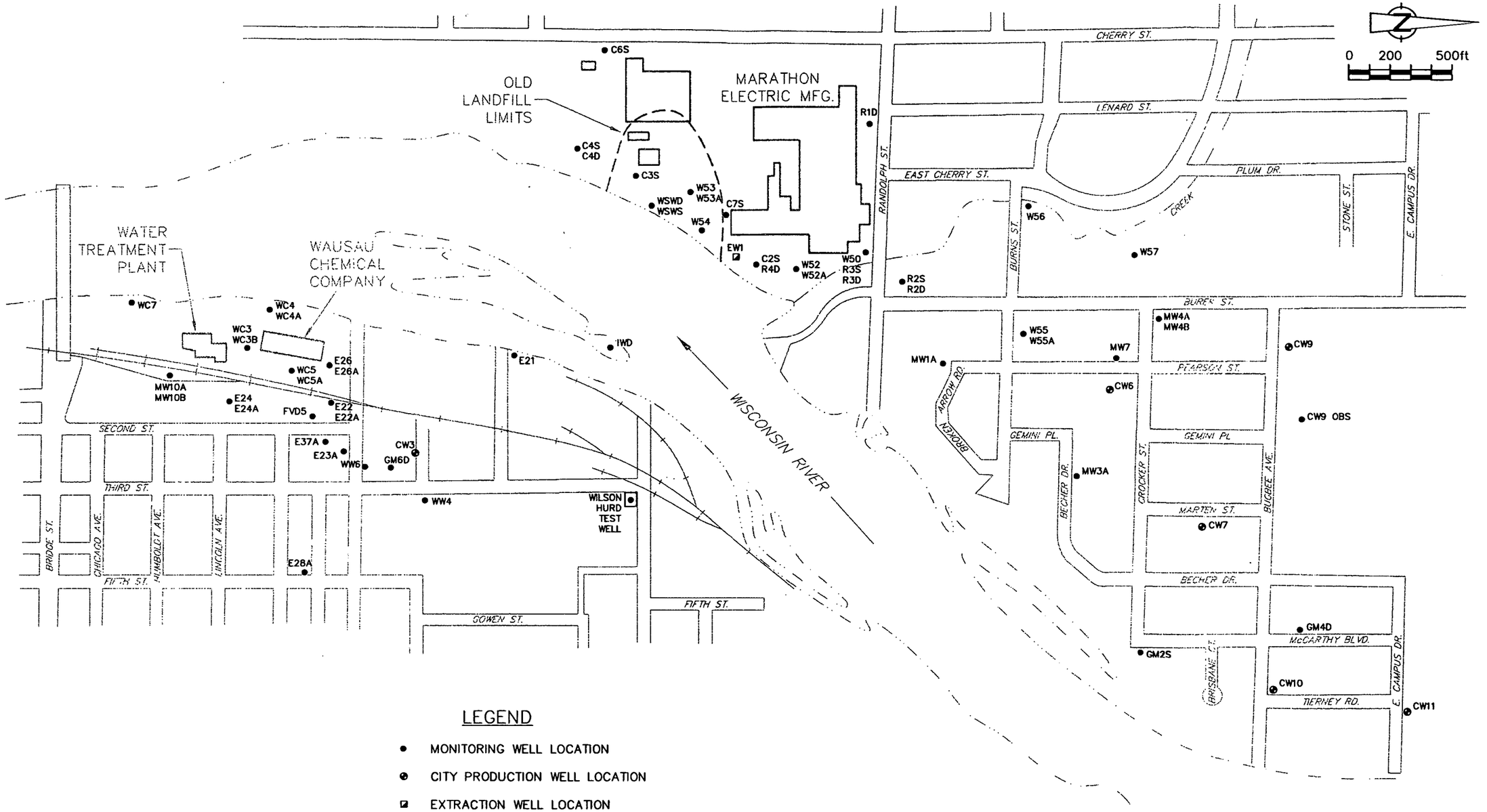
SOURCE: U.S.G.S. WAUSAU WEST QUADRANGLE MAP.

figure 1.1

SITE LOCATION
WAUSAU WATER SUPPLY NPL SITE
Wausau, Wisconsin

CRA

03978-00(022)GN-SP JAN 20/2004



LEGEND

- MONITORING WELL LOCATION
- CITY PRODUCTION WELL LOCATION
- EXTRACTION WELL LOCATION
- INDUSTRIAL WELL LOCATION

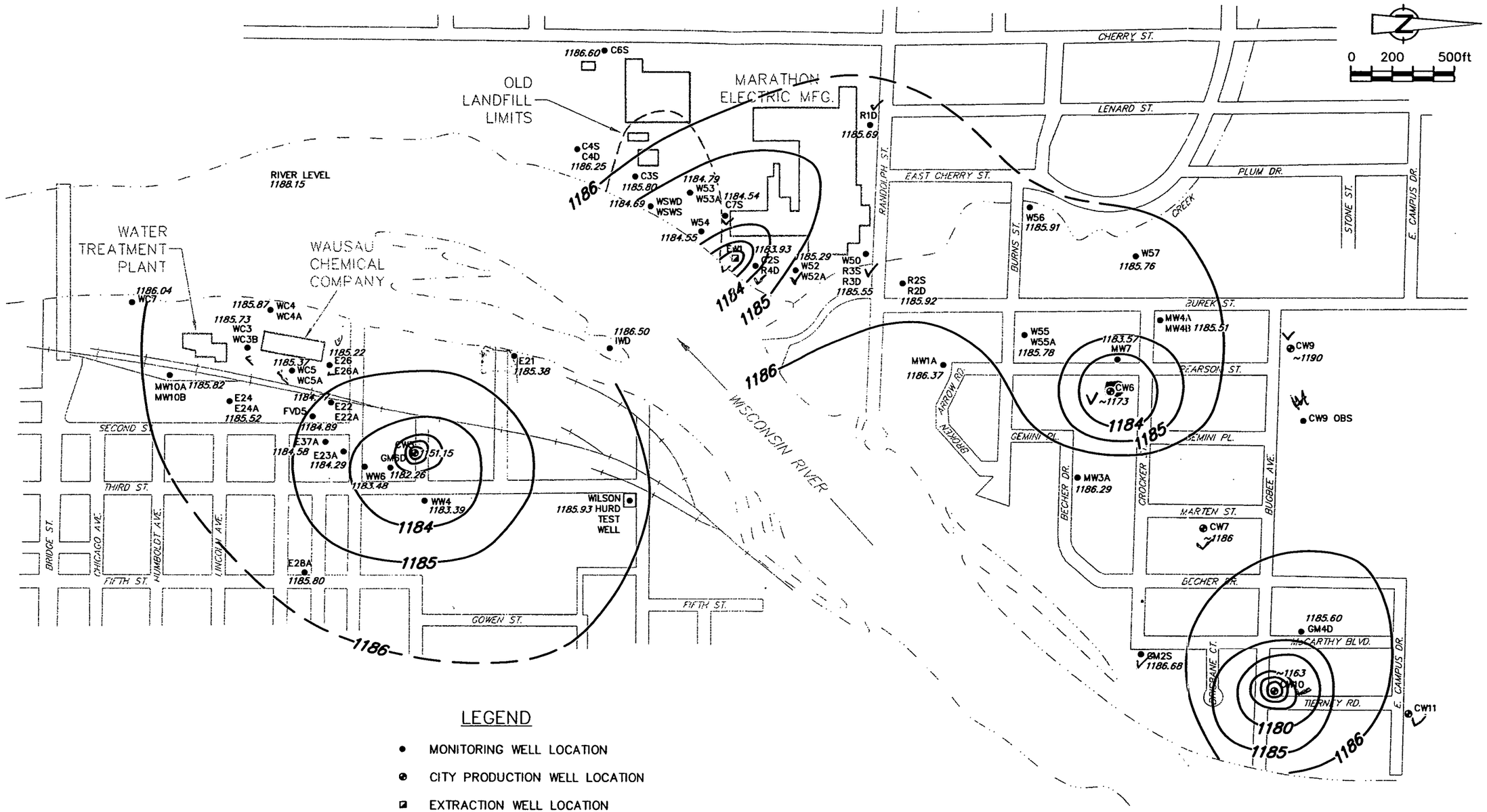
SOURCE: RMT INC. FIGURE 1, 5/14/87.

figure 1.2

SITE PLAN
WAUSAU WATER SUPPLY NPL SITE
Wausau, Wisconsin

CRA

03978-00(022)GN-SP001 JAN 12/2004



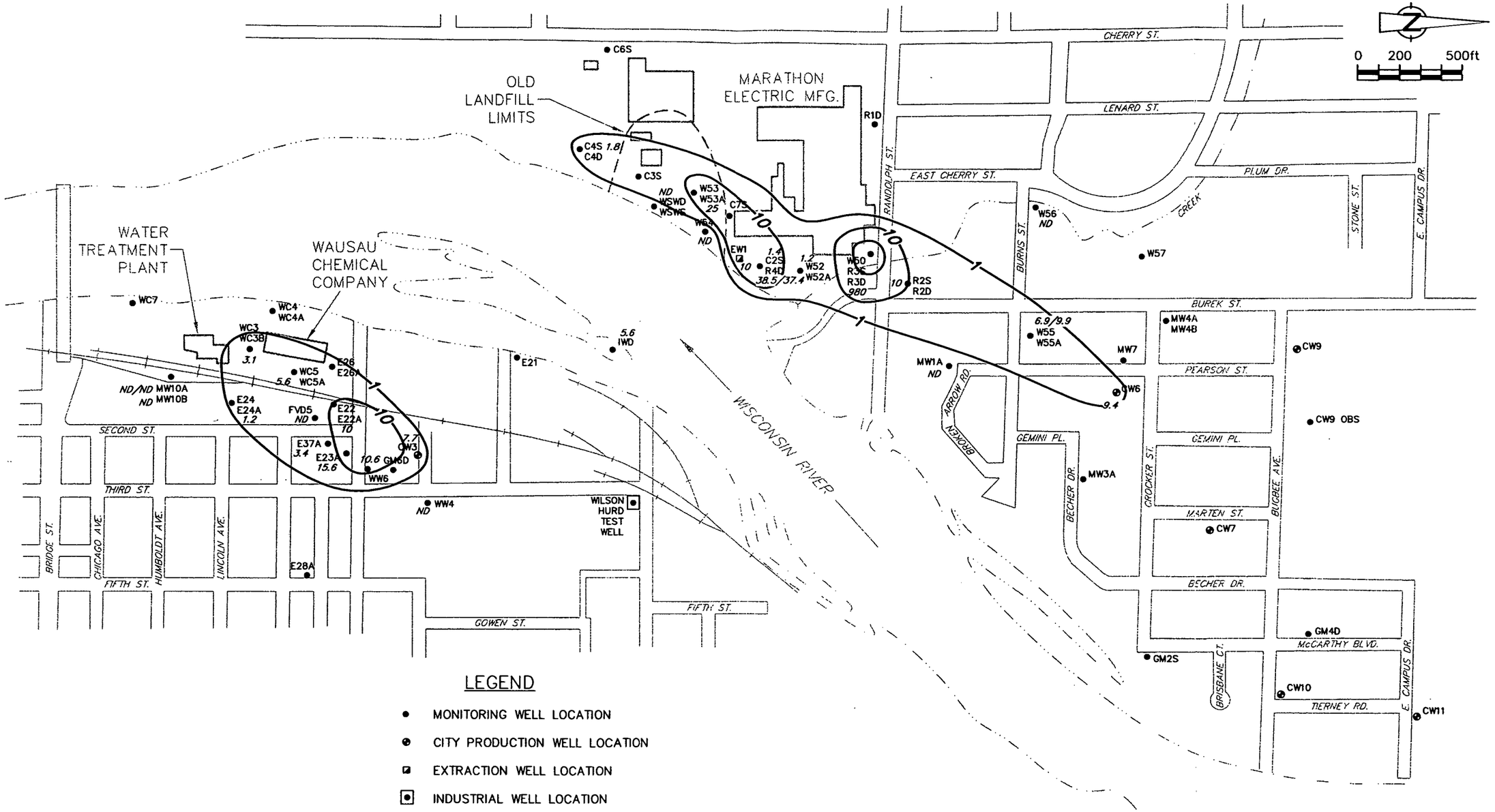
SOURCE: RMT INC. FIGURE 1, 5/14/87.

CRA

03978-00(022)GN-SP002 FEB 02/2004

figure 2.1

WATER TABLE CONTOURS (10/6-7/03)
WAUSAU WATER SUPPLY NPL SITE
Wausau, Wisconsin



LEGEND

- ● MONITORING WELL LOCATION
- ⊕ CITY PRODUCTION WELL LOCATION
- ◪ EXTRACTION WELL LOCATION
- ⊡ INDUSTRIAL WELL LOCATION
- *17* TOTAL CHLORINATED VOC CONCENTRATION IN ug/L
- —— TOTAL CHLORINATED VOC CONTOUR
- *ND* NOT DETECTED

WHERE NO VALUE IS SHOWN, WELL WAS NOT SAMPLED

SOURCE: RMT INC. FIGURE 1, 5/14/87.

CRA

03978-00(022)GN-SP003 JAN 20/2004

figure 4.1

TOTAL CHLORINATED VOCs IN GROUNDWATER (OCTOBER 2003)
WAUSAU WATER SUPPLY NPL SITE
Wausau, Wisconsin

TABLE 2.1

GROUNDWATER ELEVATIONS
WAUSAU WATER SUPPLY NPL SITE

	Reference Elevation		*Water Level 10/7/2003*	*Water Table Elevation 10/7/2003*	
East Bank					
CW3	1202.15		51.00	1151.15	
E21	1197.51		12.13	1185.38	
E22	1195.47		10.70	1184.77	
E22A	1195.88		11.11	1184.77	
E23A	1197.61		13.32	1184.29	
E24	1210.01		24.48	1185.53	
E24A	1211.07		25.55	1185.52	
E26	1199.02		13.82	1185.20	
E26A	1199.13		13.91	1185.22	
E28A	1211.60		25.80	1185.80	
E37A	1197.84		13.26	1184.58	
FVD5	1198.89		14.00	1184.89	
GM6D	1198.57		15.31	1183.26	
W. HURD	1200.23		14.30	1185.93	
IWD	1192.10	(1)	5.60	1186.50	
MW10A	1210.67		24.85	1185.82	
MW10B	1210.37		24.57	1185.80	
WC3	1198.26		12.53	1185.73	
WC3B	1198.04		12.33	1185.71	
WC4	1196.74		10.91	1185.83	
WC4A	1196.57		10.70	1185.87	
WC5	1196.62		11.27	1185.35	
WC5A	1196.66		11.29	1185.37	
WC7	1196.77		10.73	1186.04	
WW4	1202.23		18.84	1183.39	
WW6	1200.53		17.05	1183.48	

Notes:
Elevations relative to National Geodetic Vertical Datum.
(1) All reference elevations based on 2003 survey data except IWD, which was last surveyed in 1993.

TABLE 2.1

GROUNDWATER ELEVATIONS
WAUSAU WATER SUPPLY NPL SITE

	Reference Elevation	*Water Level 10/7/2003*	*Water Table Elevation 10/7/2003*
West Bank			
EW1	NA	NA	NA
CW6	1220.33	47.00	1173.33
CW7	1224.14	38.00	1186.14
CW9	1226.16	36.00	1190.16
CW9 OBS	1224.24	NM	NA
CW10	1218.49	55.00	1163.49
CW11	1216.51	NA	NA
C2S	1219.05	35.12	1183.93
C3S	1220.58	34.78	1185.80
C4S	1216.70	30.45	1186.25
C4D	1216.16	29.93	1186.23
C6S	1221.58	34.98	1186.60
C7S	1220.87	36.33	1184.54
GM2S	1211.78	25.10	1186.68
GM4D	1216.35	30.75	1185.60
MW1A	1215.69	29.32	1186.37
MW3A	1223.13	36.84	1186.29
MW4A	1215.48	29.99	1185.49
MW4B	1215.10	29.59	1185.51
MW7	1218.53	34.96	1183.57
R1D	1222.24	36.55	1185.69
R2S	1209.70	23.28	1186.42
R2D	1209.42	23.50	1185.92
R3S	1215.17	29.13	1186.04
R3D	1215.42	29.87	1185.55
R4D	1218.90	40.41	1178.49
W50	1215.54	29.92	1185.62
W52	1219.16	34.17	1184.99
W52A	1218.95	33.66	1185.29
W53	1216.67	31.85	1184.82
W53A	1216.90	32.11	1184.79
W54	1216.19	31.64	1184.55
W55	1217.04	31.26	1185.78
W55A	1217.31	31.29	1186.02
W56	1200.01	14.10	1185.91
W57	1205.17	19.41	1185.76
WSWS	1193.04	5.92	1187.12
WSWD	1193.02	8.33	1184.69

Notes:
Elevations relative to National Geodetic Vertical Datum.
(1) All reference elevations based on 2003 survey data except IWD, which was last surveyed in 1993.

TABLE 2.2

SITE SPECIFIC VOC LIST
WAUSAU WATER SUPPLY NPL SITE

Acetone

Benzene

Carbon tetrachloride

Chloroform

1,1-Dichloroethene

cis-1,2-Dichloroethene

Ethylbenzene

Methylene chloride

Tetrachloroethene

Toluene

1,1,2-Trichloroethane

Trichloroethene

Vinyl chloride

Xylenes

TABLE 3.1

EXTRACTION WELL (EW1) PUMPING RATES
MARATHON ELECTRIC
WAUSAU WATER SUPPLY NPL SITE

Date	*Time*	*Elapsed Time (minutes)*	*Meter Reading*	*Total Flow (gallons)*	*Flow Rate[1] (gpm)*
12/30/02	9:30 AM		443,042,000		
02/03/03	10:00 AM	50,430	480,286,000	37,244,000	739
02/28/03	9:10 AM	35,950	510,975,000	30,689,000	854
04/03/03	8:00 AM	48,890	552,089,000	41,114,000	841
04/29/03	2:30 PM	37,830	583,680,000	31,591,000	835
06/05/03	12:30 PM	53,160	627,644,000	43,964,000	827
07/01/03	12:00 PM	37,410	not available	31,050,000	830 [2]
08/29/03	1:00 PM	85,020	650,446,000	68,016,000	800 [3]
10/07/03	10:00 AM	55,980	694,192,000	43,746,000	781
11/04/03	10:50 AM	40,370	725,352,000	31,160,000	772
12/02/03	10:15 AM	40,285	756,251,000	30,899,000	767
01/07/04	10:00 AM	51,825	795,796,000	39,545,000	763
2003 Total		537,150		**429,018,000**	**799**

Notes:

[1] The number of gallons pumped and the average flow rate shown are for the period preceeding the date.

[2] The flow meter stopped working during June. Pump was shut down for 4 hours on June 24 to clean the flow meter. The number of gallons for June were estimated based on 830 gpm, the average flow for the preceeding two months.

[3] The flow meter was still not working properly in July and was removed on July 15 for repairs. Preventive maintenance was completed on the motor while the pump was shut down. Pump was shut down for 4 hours to complete these tasks. Pump was shut down for 1 hour on August 29 to reinstall the repaired flow meter. The number of gallons for July and August was estimated based on 800 gpm, the approximate flow rate when the meter was reinstalled.

TABLE 3.2

CITY WELL PUMPING DATA
WAUSAU WATER SUPPLY NPL SITE

Month	*Well No. 3*[3] *(gallons*[1]*/hours*[2]*)*	*Well No. 6 (gallons*[1]*/hours*[2]*)*	*Well No. 7 (gallons*[1]*/hours*[2]*)*	*Well No. 9*[4] *(gallons*[1]*/hours*[2]*)*	*Well No. 10 (gallons*[1]*/hours*[2]*)*	*Well No. 11 (gallons*[1]*/hours*[2]*)*
January	17.939/329.6	40.011/409.9	37.126/310.5	7.821/126.0	22.012/129.5	19.008/111.7
February	16.328/357.0	30.075/311.8	41.336/351.7	13.440/242.6	17.012/108.0	21.363/125.9
March	9.434/209.1	50.855/529.4	41.415/346.0	10.200/194.3	9.904/63.3	35.250/206.7
April	24.725/243.3	46.364/474.5	22.781/190.8	2.739/53.80	30.337/180.0	23.559/137.9
May	39.689/382.9	35.568/357.8	33.098/275.7	1.676/51.3	43.823/259.6	6.983/46.3
June	33.252/330.8	37.343/386.4	40.822/366.4	0.901/25.1	32.224/218.4	26.473/168.7
July	31.072/290.4	45.349/451.7	16.052/141.2	4.735/184.1	55.262/367.0	36.850/238.6
August	40.903/376.5	36.745/365.2	16.713/150.1	5.558/211.3	50.019/329.9	41.335/262.6
September	31.905/286.3	43.117/431.9	20.891/188.1	0/0	54.190/365.6	32.332/213.8
October	35.293/313.9	42.637/423.6	19.836/163.6	0/0	39.926/232.8	16.514/104.2
November	36.774/336.3	37.328/375.4	28.754/232.5	0/0	19.644/115.4	22.088/139.3
December	34.074/314.6	35.599/361.5	58.742/496.0	0/0	15.792/96.2	11.412/72.8

Notes:

[1] Gallons indicates millions of gallons pumped per month.

[2] Hours indicates total hours pumped per month.

[3] Well No. 3 was down from March 13 to April 10 to clean iron from the well screen.

[4] Well No. 9 has not been used since August due to iron bacteria clogging the screen.

TABLE 3.3

MONITORING WELL ELEVATION CHANGES
DECEMBER 2003
WAUSAU WATER SUPPLY NPL SITE

	New Elevation [1]	*Old Elevation*	*Change (ft)*
East Bank			
CW3	1202.15	1202.33	-0.18
E21	1197.51	1197.66	-0.15
E22	1195.47	1195.57	-0.1
E22A	1195.88	1195.98	-0.1
E23A	1197.61	1197.72	-0.11
E24	1210.01	1210.11	-0.1
E24A	1211.07	1211.17	-0.1
E26	1199.02	1199.11	-0.09
E26A	1199.13	1199.22	-0.09
E28A	1211.6	1211.73	-0.13
E37A	1197.84	1197.92	-0.08
FVD5	1198.89	1198.94	-0.05
GM6D	1198.57	1198.7	-0.13
W.HURD	1200.23	1199.78	0.45
IWD	NM	1192.1	
MW10A	1210.67	1210.77	-0.1
MW10B	1210.37	1210.48	-0.11
WC3	1198.26	1198.36	-0.1
WC3B	1198.04	1198.15	-0.11
WC4	1196.74	1196.82	-0.08
WC4A	1196.57	1196.65	-0.08
WC5	1196.62	1196.73	-0.11
WC5A	1196.66	1196.75	-0.09
WC7	1196.77	1197.02	-0.25
WW4	1202.23	1202.38	-0.15
WW6	1200.53	1200.64	-0.11
West Bank			
EW1	NM	NM	
CW6	1220.33	1220.5	-0.17
CW7	1224.14	1223.93	0.21
CW9	1226.16	1226.28	-0.12
CW9 OBS	1224.24	1224.29	-0.05
CW10	1218.49	1224.4	-5.91
CW11	1216.51	New Well	
C2S	1219.05	1219.12	-0.07
C3S	1220.58	1220.44	0.14
C4S	1216.7	1216.83	-0.13

TABLE 3.3

MONITORING WELL ELEVATION CHANGES
DECEMBER 2003
WAUSAU WATER SUPPLY NPL SITE

	New Elevation [1]	*Old Elevation*	*Change (ft)*
West Bank (cont'd)			
C4D	1216.16	1216.23	-0.07
C6S	1221.58	1221.71	-0.13
C7S	1220.87	1220.98	-0.11
GM2S	1211.78	1211.78	0
GM4D	1216.35	1216.38	-0.03
MW1A	1215.69	1215.83	-0.14
MW3A	1223.13	1223.29	-0.16
MW4A	1215.48	1215.26	0.22
MW4B	1215.1	1215.64	-0.54
MW7	1218.53	1218.67	-0.14
R1D	1222.24	1222.36	-0.12
R2S	1209.7	1209.84	-0.14
R2D	1209.42	1209.56	-0.14
R3S	1215.17	1215.3	-0.13
R3D	1215.42	1215.53	-0.11
R4D	1218.9	1218.97	-0.07
W50	1215.54	1215.66	-0.12
W52	1219.16	1219.17	-0.01
W52A	1218.95	1219.06	-0.11
W53	1216.67	1216.8	-0.13
W53A	1216.9	1217.02	-0.12
W54	1216.19	1216.31	-0.12
W55	1217.04	1217.17	-0.13
W55A	1217.31	1217.45	-0.14
W56	1200.01	1200.13	-0.12
W57	1205.17	1205.31	-0.14
WSWS	1193.04	1192.83	0.21
WSWD	1193.02	1192.98	0.04

Notes:

Elevations relative to National Geodetic Vertical Datum.

[1] Monitoring well top of casing surveyed by City of Wausau in December 2003.

NM - Not measured.

TABLE 4.1

MONITORING WELL ANALYTICAL RESULTS (µg/l)
WAUSAU WATER SUPPLY NPL SITE

LOCATION	DATE		Acetone	Benzene	Ethylbenzene	Toluene	Xylenes (total)	Carbon tetrachloride	Chloroform	1,1-Dichloroethene	Methylene chloride	1,1,2-Trichloroethane	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Vinyl chloride	Total CVOCs
East Bank																	
CW3	10/8/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2.1	4.8	0.76	< 1	7.7
E22A	16/6/03		1.2 J	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	6.1	0.57 J	2.7	1.2	10
E23A	10/6/03		5.7 J	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	15	0.94 J	0.63	0.38 J	15.6
E24A	10/6/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.2	< 1	< 0.5	< 1	1.2
E37A	10/6/03		1.2 J	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2.7	0.51 J	0.71	0.5 J	3.4
FVD5	10/6/03		< 170	120	340	34	1700	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 8.3	< 17	ND
IWD	10/8/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	5.6	< 0.5	< 1	5.6
MW10A	10/6/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 1	ND
MW10A	10/6/03	D	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 1	ND
MW10B	10/6/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.17 J	< 1	< 0.5	< 1	ND
WC3B	1/13/03		< 140	< 14	< 14	< 14	< 14	< 14	< 14	5 J	< 14	< 14	60	420	76	< 14	556
WC3B	4/11/03		< 20	< 2	< 2	< 2	< 2	< 2	< 2	1.8 J	< 2	< 2	56	53	18	< 2	127
WC3B	4/11/03	D	< 20	< 2	< 2	< 2	< 2	< 2	< 2	2.1	< 2	< 2	60	54	17	0.96 J	133.1
WC3B	7/2/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.2	3.1	7.5	3.3	15.1
WC3B	10/7/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.76 J	0.97 J	3.1	0.96 J	3.1
WC5A	1/13/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	14	1.4	1.1	< 1	16.5
WC5A	4/11/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	6	1.1	2.6	< 1	9.7
WC5A	7/2/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	6.8	0.77 J	0.83	< 1	7.6
WC5A	10/7/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	3.7	1	0.85	< 1	5.6
WW4	10/6/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 1	ND
WW6	10/6/03		0.83 J	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.3	0.55 J	3.5	5.8	10.6

TABLE 4.1

MONITORING WELL ANALYTICAL RESULTS (µg/l)
WAUSAU WATER SUPPLY NPL SITE

LOCATION	DATE		Acetone	Benzene	Ethylbenzene	Toluene	Xylenes (total)	Carbon tetrachloride	Chloroform	1,1-Dichloroethene	Methylene chloride	1,1,2-Trichloroethane	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Vinyl chloride	Total CVOCs
West Bank																	
C2S	10/7/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.4	< 0.5	< 1	1.4
C4S	10/8/03		< 10	1.4	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	1.8	1.8
CW6	10/8/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	9.4	< 0.5	< 1	9.4
MW1A	10/7/03		0.78 J	< 1	< 1	0.38 J	0.66 J	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 1	ND
R2D	10/7/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	10	0.38 J	< 1	10
R3D	10/7/03		< 330	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	980 ✓	10 J	< 33	980
R4D	10/8/03		< 29 U	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	37	1.5	< 2.9	38.5
R4D	10/8/03	D	< 29	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	36	1.4	< 2.9	37.4
R4D	10/8/03	DR	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	45 J	1.6	< 1	1.6
R4D	10/8/03	R	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	45 J	1.8	< 1	1.8
W52	10/7/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.2	< 0.5	< 1	1.2
W53A	10/8/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	13	12	< 1	25
W54	10/8/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 1	ND
W55	10/7/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	6.9 J	0.25 J	< 1	6.9
W55	10/7/03	D	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	9.9 J	0.3 J	< 1	9.9
W56	10/7/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.29 J	< 0.5	< 1	ND
WSWD	10/8/03		< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.64 J	< 0.5	< 1	ND

Notes:
D - Duplicate Sample
DR - Duplicate of re-analysis
R - Re-analysis
U - Estimated detection limit.
J - Estimated value, value is below the reporting limit.
Total CVOCs - Total chlorinated VOCs (does not include estimated values).

TABLE 4.2

EW1 ANALYTICAL RESULTS (µg/l)
WAUSAU WATER SUPPLY NPL SITE

LOCATION	DATE	Acetone	Benzene	Ethylbenzene	Toluene	Xylenes (total)	Carbon tetrachloride	Chloroform	1,1-Dichloroethene	Methylene chloride	1,1,2-Trichloroethane	Tetrachloroethene	Trichloroethene (5|6)	cis-1,2-Dichloroethene	Vinyl chloride
Effluent	1/3/03	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	6.4	< 0.5	< 1
Effluent	4/3/03	< 10 U	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	5.3	< 0.5	< 1
Effluent	7/2/03	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	5.9	< 0.5	< 1
Effluent	10/7/03	< 10 U	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	4.4	0.36 J	< 1
Influent	1/3/03	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	14	0.54	< 1
Influent	4/3/03	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	12	0.49 J	< 1
Influent	7/2/03	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	13	0.53	< 1
Influent	10/7/03	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	10	0.57	< 1

Notes:

U - Estimated detection limit.

J - Estimated value, value is below the reporting limit.

APPENDIX A

2003 DATA QUALITY VALIDATION MEMORANDUMS

CONESTOGA-ROVERS & ASSOCIATES

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MEMORANDUM

TO: Jason Twaddle

REF. NO.: 3978-10

FROM: Ruth Mickle

DATE: February 18, 2003

C.C.: Analytical Data File

RE: **Data Quality Assessment and Validation**
January 3, 2003, Sampling Event
Wausau Superfund Site - Wausau, Wisconsin (COC 168837)

The following details a data quality assessment and validation for water samples collected on January 3, 2003, at the Wausau Superfund Site in Wausau, Wisconsin. The samples identified as W030102MT-426 and W030102MT-427 were analyzed for volatile organic compounds (VOC)[1]. The analyses were performed by Severn Trent Laboratories (STL) in North Canton, Ohio. The quality assurance criteria were established in the Quality Assurance Project Plan (QAPP)[2].

HOLDING TIME PERIOD & SAMPLE PRESERVATION

The holding time period for the VOC analysis is 14 days from sample collection to analysis. On the basis of sample collection dates on the chain-of-custody form and the analytical report provided by STL, the analyses were completed within the specified holding time period. The samples were properly preserved to a pH less than 2.

METHOD BLANK SAMPLE

Contamination of the samples contributed by laboratory conditions or procedures was monitored by the concurrent preparation and analysis of method blank samples. One method blank yielded a methylene chloride (0.4 µg/l) detection. However, since the associated sample data were nondetect for this parameter, no data qualification was required. The remaining method blank results were free of target analytes.

---

1 VOC Method 8260B was derived from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW 846, Third Edition, November 1986 and updates.

2 Application of relevant quality assurance criteria was consistent with "National Functional Guidelines for Organic Data Review", October 1999.

SURROGATE COMPOUND PERCENT RECOVERIES (SURROGATE RECOVERIES)

Individual sample performance for VOC analyses was monitored by surrogate recoveries. The surrogate recoveries were within acceptance criteria, indicating that individual sample performance was adequate.

LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE (LCS/LCSD)

Overall performance for the analyses was monitored by means of a LCS/LCSD. LCS/LCSD results were within acceptance criteria.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) RESULTS

To assess the long-term accuracy and precision of the analytical method on various matrices, matrix spike percent recoveries and relative percent difference (RPD) of the spike recoveries were determined for the analyses. Since the MS/MSD spike samples were non-project samples, no evaluation of project samples was made based on matrix spike results.

FIELD QUALITY ASSURANCE/ QUALITY CONTROL (QA/QC) SAMPLES

The field QA/QC associated with the sampling event consisted of one trip blank sample.

To evaluate the possibility of contamination arising from sample transport, the environment, and/or shipping, a trip blank sample was submitted to the laboratory for VOC analysis. The trip blank yielded methylene chloride (7.4 μg/l) and acetone (3.5 μg/l) detections. However, since the associated sample data were nondetect for these parameters, no data qualification was required.

OVERALL ASSESSMENT

The data were found to exhibit acceptable levels of accuracy and precision pertaining to the above criteria, and may be used without qualification.

RLM/jla/48

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MEMORANDUM

TO: Jason Twaddle

REF. NO.: 3978-20

FROM: Ruth Mickle

DATE: February 18, 2003

C.C.: Analytical Data File

RE: **Data Quality Assessment and Validation**
January 13, 2003, Sampling Event
Wausau Superfund Site - Wausau, Wisconsin (COC 4129)

The following details a data quality assessment and validation for water samples collected January 13, 2003, at the Wausau Superfund Site in Wausau, Wisconsin. The samples identified as W-030113-DN-01 and W-030113-DN-02 were analyzed for Site list volatile organic compounds (VOC)[1]. The analyses were performed by Severn Trent Laboratories (STL) in North Canton, Ohio. The quality assurance criteria were established in the Quality Assurance Project Plan (QAPP)[2].

HOLDING TIME PERIOD & SAMPLE PRESERVATION

The holding time period for the VOC analysis is 14 days from sample collection to analysis. On the basis of sample collection dates on the chain-of-custody form and the analytical report provided by STL, the analyses were completed within the specified holding time period. The samples were properly preserved to a pH less than 2.

METHOD BLANK SAMPLES

Contamination of the samples contributed by laboratory conditions or procedures was monitored by the concurrent preparation and analysis of method blank samples. One method blank yielded a methylene chloride (0.37 μg/l) detection. However, since the associated sample data were nondetect for this parameter, no data qualification was required. The remaining method blank results were free of target analytes.

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1 VOC Method 8260B was derived from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW 846, Third Edition, November 1986 and updates.

2 Application of relevant quality assurance criteria was consistent with "National Functional Guidelines for Organic Data Review", October 1999.

SURROGATE COMPOUND PERCENT RECOVERIES (SURROGATE RECOVERIES)

Individual sample performance for the analyses was monitored by surrogate recoveries. The surrogate recoveries were within acceptance criteria, indicating that individual sample performance was adequate.

LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE (LCS/LCSD)

Overall performance for the analyses was monitored by means of a LCS/LCSD. The percent recoveries were within acceptance criteria.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) RESULTS

To assess the long-term accuracy and precision of the analytical method on various matrices, matrix spike percent recoveries and relative percent difference (RPD) of the spike recoveries were determined for the analyses. Since the MS/MSD spike samples were non-project samples, no evaluation of project samples was made based on matrix spike results.

FIELD QUALITY ASSURANCE/ QUALITY CONTROL (QA/QC) SAMPLES

The field QA/QC associated with the sampling event consisted of one trip blank sample.

To evaluate the possibility of contamination arising from sample transport, the environment, and/or shipping, a trip blank sample was submitted to the laboratory for VOC analysis. The trip blank yielded a methylene chloride (0.39 μg/l) detection. However, since the associated sample data were nondetect for this parameter, no data qualification was required.

OVERALL ASSESSMENT

The data were found to exhibit acceptable levels of accuracy and precision pertaining to the above criteria, and may be used without qualification.

RLM/jla/49

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MEMORANDUM

TO: Jason Twaddle

REF. NO.: 3978-10

FROM: Ruth Mickle

DATE: May 13, 2003

C.C.: Analytical Data File

RE: **Data Quality Assessment and Validation**
April 3, 2003 Sampling Event
Wausau Superfund Site - Wausau, Wisconsin (COC 164557)

The following details a data quality assessment and validation for water samples collected on April 3, 2003, at the Wausau Superfund Site in Wausau, Wisconsin. The samples identified as W030403MT-428 and W030403MT-429 were analyzed for volatile organic compounds (VOCs)[1]. The analyses were performed by Severn Trent Laboratories (STL) in North Canton, Ohio. The quality assurance criteria were established in the Quality Assurance Project Plan (QAPP)[2].

HOLDING TIME PERIOD & SAMPLE PRESERVATION

The holding time period for the VOC analysis is 14 days from sample collection to analysis. On the basis of sample collection dates on the chain-of-custody form and the analytical report provided by STL, the analyses were completed within the specified holding time period. The samples were properly preserved to a pH less than 2.

METHOD BLANK SAMPLE

Contamination of the samples contributed by laboratory conditions or procedures was monitored by the concurrent preparation and analysis of a method blank sample. The method blank yielded a methylene chloride (0.70 µg/l) detection. However, since the associated investigative sample data were nondetect for this parameter, no data qualification was required. The remaining method blank results were free of target analytes.

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1 VOC Method 8260B was derived from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW 846, Third Edition, November 1986 and updates.

2 Application of relevant quality assurance criteria was consistent with "National Functional Guidelines for Organic Data Review", October 1999.

SURROGATE COMPOUND PERCENT RECOVERIES (SURROGATE RECOVERIES)

Individual sample performance for VOC analyses was monitored by surrogate recoveries. The surrogate recoveries were within acceptance criteria, indicating that individual sample performance was adequate.

LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE (LCS/LCSD)

Overall performance for the analyses was monitored by means of a LCS/LCSD. LCS/LCSD results were within acceptance criteria.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) RESULTS

To assess the long-term accuracy and precision of the analytical method on various matrices, matrix spike percent recoveries and relative percent difference (RPD) of the spike recoveries were determined for the analyses. Since the MS/MSD spike samples were non-project samples, no evaluation of project samples was made based on matrix spike results.

FIELD QUALITY ASSURANCE/ QUALITY CONTROL (QA/QC) SAMPLES

The field QA/QC associated with the sampling event consisted of one trip blank sample.

To evaluate the possibility of contamination arising from sample transport, the environment, and/or shipping, a trip blank sample was submitted to the laboratory for VOC analysis. The trip blank yielded methylene chloride (0.51 μg/l) and acetone (1.9 μg/l) detections. Since the associated sample data were nondetect for methylene chloride, no methylene chloride data qualification was required. The acetone detection for sample W030403MT-429 should be qualified as nondetect (10U) based on the trip blank results.

OVERALL ASSESSMENT

The data were found to exhibit acceptable levels of accuracy and precision pertaining to the above criteria, and may be used with the qualification noted.

RLM/jla/50

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MEMORANDUM

TO: Jason Twaddle

REF. NO.: 3978-20

FROM: Ruth Mickle

DATE: May 13, 2003

C.C.: Analytical Data File

RE: **Data Quality Assessment and Validation**
April 11, 2003 Sampling Event
Wausau Superfund Site - Wausau, Wisconsin (COC 4177)

The following details a data quality assessment and validation for water samples collected April 11, 2003, at the Wausau Superfund Site in Wausau, Wisconsin. The samples identified as W-030411-DN-01, W-030411-DN-02, W-030411-DN-03, and W-030411-DN-04 were analyzed for the Site list of volatile organic compounds (VOCs)[1]. The analyses were performed by Severn Trent Laboratories (STL) in North Canton, Ohio. The quality assurance criteria were established in the Quality Assurance Project Plan (QAPP)[2].

HOLDING TIME PERIOD AND SAMPLE PRESERVATION

The holding time period for VOC analysis is 14 days from sample collection to analysis. On the basis of sample collection dates on the chain-of-custody form and the analytical report provided by STL, the analyses were completed within the specified holding time period. The samples were properly preserved to a pH less than 2.

METHOD BLANK SAMPLES

Contamination of the samples contributed by laboratory conditions or procedures was monitored by the concurrent preparation and analysis of method blank samples. The method blank was free of target analytes.

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1 VOC Method 8260B was derived from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW 846, Third Edition, November 1986 and updates.

2 Application of relevant quality assurance criteria was consistent with "National Functional Guidelines for Organic Data Review", October 1999.

SURROGATE COMPOUND PERCENT RECOVERIES (SURROGATE RECOVERIES)

Individual sample performance for the analyses was monitored by surrogate recoveries. The surrogate recoveries were within acceptance criteria, indicating that individual sample performance was adequate.

LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE (LCS/LCSD)

Overall performance for the analyses was monitored by means of a LCS/LCSD. The percent recoveries were within acceptance criteria.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) RESULTS

To assess the long-term accuracy and precision of the analytical method on various matrices, matrix spike percent recoveries and relative percent difference (RPD) of the spike recoveries were determined for the analyses. Since the MS/MSD spike samples were non-project samples, no evaluation of project samples was made based on matrix spike results.

FIELD QUALITY ASSURANCE/ QUALITY CONTROL (QA/QC) SAMPLES

The field QA/QC associated with the sampling event consisted of one field blank sample and one field duplicate set.

As a check for cleanliness of sampling equipment and conditions at the site, a field blank was collected as an authentic sample for labeling and submission to the lab. The field blank sample was identified as W-030411-DN-04. The field blank sample was free of target analytes.

Overall precision for the sampling event was monitored using field duplicate samples: W-030411-DN-01/W-030411-DN-02. The RPD values for positive parameter results were found to be acceptable, indicating an adequate level of precision was achieved.

OVERALL ASSESSMENT

The data were found to exhibit acceptable levels of accuracy and precision pertaining to the above criteria, and may be used without qualification.

RLM/jla/51

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MEMORANDUM

TO: Jason Twaddle

REF. NO.: 3978-10

FROM: Grant Anderson GRA

DATE: October 13, 2003

C.C.: Analytical Data File

RE: **Data Quality Assessment and Validation**
July 2, 2003 Sampling Event
Wausau Superfund Site - Wausau, Wisconsin (COC 161993)

The following details a data quality assessment and validation for water samples collected on July 2, 2003, at the Wausau Superfund Site in Wausau, Wisconsin. The samples identified as W030702MT-430 (INF) and W030702MT-431 (EFF) were analyzed for volatile organic compounds (VOCs)[1]. The analyses were performed by Severn Trent Laboratories (STL) in North Canton, Ohio. The quality assurance criteria were established in the Quality Assurance Project Plan (QAPP)[2].

HOLDING TIME PERIOD & SAMPLE PRESERVATION

The holding time period for the VOC analysis is 14 days from sample collection to analysis. On the basis of sample collection dates on the chain-of-custody form and the analytical report provided by STL, the analyses were completed within the specified holding time period. The samples were properly preserved to a pH less than 2.

METHOD BLANK SAMPLE

Contamination of the samples contributed by laboratory conditions or procedures was monitored by the concurrent preparation and analysis of a method blank sample. The method blank yielded a methylene chloride (0.38 μg/l) detection. However, since the associated investigative sample data were nondetect for this parameter, no data qualification was required. The remaining method blank results were free of target analytes.

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1 VOC Method 8260B was derived from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW 846, Third Edition, November 1986 and updates.

2 Application of relevant quality assurance criteria was consistent with "National Functional Guidelines for Organic Data Review", October 1999.

SURROGATE COMPOUND PERCENT RECOVERIES (SURROGATE RECOVERIES)

Individual sample performance for VOC analyses was monitored by surrogate recoveries. The surrogate recoveries were within acceptance criteria, indicating that individual sample performance was adequate.

LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE (LCS/LCSD)

Overall performance for the analyses was monitored by means of a LCS/LCSD. LCS/LCSD results were within acceptance criteria.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) RESULTS

To assess the long-term accuracy and precision of the analytical method on various matrices, matrix spike percent recoveries and relative percent difference (RPD) of the spike recoveries were determined for the analyses. Since the MS/MSD spike samples were non-project samples, no evaluation of project samples was made based on matrix spike results.

FIELD QUALITY ASSURANCE/ QUALITY CONTROL (QA/QC) SAMPLES

The field QA/QC associated with the sampling event consisted of one trip blank sample.

To evaluate the possibility of contamination arising from sample transport, the environment, and/or shipping, a trip blank sample was submitted to the laboratory for VOC analysis. The trip blank yielded methylene chloride (0.83 μg/l) and acetone (3.4 μg/l) detections. Since the associated sample data were nondetect for methylene chloride and acetone, no qualification of data was necessary based on trip blank results.

OVERALL ASSESSMENT

The data were found to exhibit acceptable levels of accuracy and precision pertaining to the above criteria, and may be used without qualification.

GDA/jla/54

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MEMORANDUM

TO: Jason Twaddle

REF. NO.: 3978-20

FROM: Ruth Mickle

DATE: August 18, 2003

C.C.: Analytical Data File

RE: **Data Quality Assessment and Validation**
July 2, 2003, Sampling Event
Wausau Superfund Site - Wausau, Wisconsin (COC 4199)

The following details a data quality assessment and validation for water samples collected July 2, 2003, at the Wausau Superfund Site in Wausau, Wisconsin. The samples identified as W-030702-DN-01 and W-030702-DN-02 were analyzed for the Site list of volatile organic compounds (VOCs)[1]. The analyses were performed by Severn Trent Laboratories (STL) in North Canton, Ohio. The quality assurance criteria were established in the Quality Assurance Project Plan (QAPP)[2].

HOLDING TIME PERIOD & SAMPLE PRESERVATION

The holding time period for VOC analysis is 14 days from sample collection to analysis. On the basis of sample collection dates on the chain-of-custody form and the analytical report provided by STL, the analyses were completed within the specified holding time period. The samples were properly preserved to a pH less than 2.

METHOD BLANK SAMPLES

Contamination of the samples contributed by laboratory conditions or procedures was monitored by the concurrent preparation and analysis of a method blank sample. The method blank yielded a methylene chloride (0.32 μg/L) detection. Since the associated sample data were nondetect for methylene chloride, no methylene chloride data qualification was required.

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1 VOC Method 8260B was derived from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW 846, Third Edition, November 1986 and updates.

2 Application of relevant quality assurance criteria was consistent with "National Functional Guidelines for Organic Data Review", October 1999.

SURROGATE COMPOUND PERCENT
RECOVERIES (SURROGATE RECOVERIES)

Individual sample performance for the analyses was monitored by surrogate recoveries. The surrogate recoveries were within acceptance criteria, indicating that individual sample performance was adequate.

LABORATORY CONTROL SAMPLE/
LABORATORY CONTROL SAMPLE DUPLICATE (LCS/LCSD)

Overall performance for the analyses was monitored by means of a LCS/LCSD. The percent recoveries were within acceptance criteria.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE
(MS/MSD) RESULTS

To assess the long-term accuracy and precision of the analytical method on various matrices, matrix spike percent recoveries and relative percent difference (RPD) of the spike recoveries were determined for the analyses. The MS/MSD spike results were within acceptance criteria.

FIELD QUALITY ASSURANCE/
QUALITY CONTROL (QA/QC) SAMPLE

The field QA/QC associated with the sampling event consisted of one trip blank sample.

To evaluate the possibility of contamination arising from sample transport, the environment, and/or shipping, a trip blank sample was submitted to the laboratory for VOC analysis. The trip blank yielded a methylene chloride (0.64 μg/L) detection. Since the associated sample data were nondetect for methylene chloride, no methylene chloride data qualification was required.

OVERALL ASSESSMENT

The data were found to exhibit acceptable levels of accuracy and precision pertaining to the above criteria, and may be used without qualification.

RLM/jla/52

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MEMORANDUM

TO: Jason Twaddle

REF. NO.: 3978-10

FROM: Ruth Mickle

DATE: November 3, 2003

C.C.: Analytical Data File

RE: **Data Quality Assessment and Validation**
October 7, 2003 Sampling Event
Wausau Superfund Site - Wausau, Wisconsin (COC 133163)

The following details a data quality assessment and validation for water samples collected on October 7, 2003, at the Wausau Superfund Site in Wausau, Wisconsin. The samples identified as W031007MT-432 and W031007MT-433 were analyzed for volatile organic compounds (VOCs).[1] The analyses were performed by Severn Trent Laboratories (STL) in North Canton, Ohio. The quality assurance criteria were established in the Quality Assurance Project Plan (QAPP).[2]

HOLDING TIME PERIOD & SAMPLE PRESERVATION

The holding time period for the VOC analysis is 14 days from sample collection to analysis. On the basis of sample collection dates on the chain-of-custody form and the analytical report provided by STL, the analyses were completed within the specified holding time period. The samples were properly preserved to a pH less than 2.

METHOD BLANK SAMPLE

Contamination of the samples contributed by laboratory conditions or procedures was monitored by the concurrent preparation and analysis of a method blank sample. The method blank results were free of target analytes.

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1 VOC Method 8260B was derived from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW 846, Third Edition, November 1986 and updates.

2 Application of relevant quality assurance criteria was consistent with "National Functional Guidelines for Organic Data Review", October 1999.

SURROGATE COMPOUND PERCENT RECOVERIES (SURROGATE RECOVERIES)

Individual sample performance for VOC analyses was monitored by surrogate recoveries. The surrogate recoveries were within acceptance criteria, indicating that individual sample performance was adequate.

LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE (LCS/LCSD)

Overall performance for the analyses was monitored by means of a LCS/LCSD. LCS/LCSD results were within acceptance criteria.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) RESULTS

To assess the long-term accuracy and precision of the analytical method on various matrices, matrix spike percent recoveries and relative percent difference (RPD) of the spike recoveries were determined for the analyses. Since the MS/MSD spike samples were non-project samples, no evaluation of project samples was made based on matrix spike results.

FIELD QUALITY ASSURANCE/ QUALITY CONTROL (QA/QC) SAMPLES

The field QA/QC associated with the sampling event consisted of one trip blank sample.

To evaluate the possibility of contamination arising from sample transport, the environment, and/or shipping, a trip blank sample was submitted to the laboratory for VOC analysis. The trip blank yielded an acetone (2.9 μg/L) detection. The acetone detection (0.78 μg/L) for sample W031007MT-4232 should be qualified as nondetect (10U) based on the trip blank results.

OVERALL ASSESSMENT

The data were found to exhibit acceptable levels of accuracy and precision pertaining to the above criteria, and may be used with the qualification noted.

RLM/jla/55

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MEMORANDUM

TO: Jason Twaddle

REF. NO.: 3978

FROM: Ruth Mickle

DATE: November 4, 2003

C.C.: Analytical Data File

RE: **Data Quality Assessment and Validation**
October 6 through 8, 2003 Sampling Event
Wausau Superfund Site - Wausau, Wisconsin (COC 4300, 4301)

The following details a data quality assessment and validation for water samples collected October 6 through 8, 2003, at the Wausau Superfund Site in Wausau, Wisconsin. The samples identified in Table 1 were analyzed for Site list volatile organic compounds (VOCs).[1] The analyses were performed by Severn Trent Laboratories (STL) in North Canton, Ohio. The quality assurance criteria were established in the Quality Assurance Project Plan (QAPP).[2]

HOLDING TIME PERIODS

The holding time period for VOC analyses is 14 days from sample collection to analysis.

On the basis of sample collection dates on the chain-of-custody forms and the analytical reports provided by STL, the analyses were completed within the specified holding time periods.

METHOD BLANK SAMPLES

Contamination of the samples contributed by laboratory conditions or procedures was monitored by the concurrent preparation and analysis of a method blank sample. One VOC method blank sample (batch 3293337) yielded an acetone detection (0.99 $\mu g/L$). The associated acetone data for sample W-031008-DN-31 (batch 3293337) should be qualified as nondetect (29U).

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1 VOC Method 8260B was derived from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW 846, 3rd edition, November 1986 and updates.

2 Application of relevant quality assurance criteria was consistent with "National Functional Guidelines for Organic Data Review", October 1999.

SURROGATE COMPOUND PERCENT RECOVERIES (SURROGATE RECOVERIES)

Individual sample performance for the analyses was monitored by surrogate recoveries. The surrogate recoveries were within acceptance criteria, indicating that individual sample performance was adequate.

LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE (LCS/LCSD)

Overall performance for the analyses was monitored by means of a LCS/LCSD. The percent recoveries were within acceptance criteria.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) RESULTS

To assess the long-term accuracy and precision of the analytical method on various matrices, matrix spike percent recoveries and relative percent difference (RPD) of the spike recoveries were determined for the analyses. The percent recovery and RPD data for project samples were within acceptance criteria.

CALIBRATION RANGE EXCEEDANCE

Samples W-031008-DN-31 and W-031008-DN-32 were reanalyzed due to higher concentrations of trichloroethene that exceeded the calibration range. Both original and reanalysis data were reported for both samples. The original trichloroethene data (batch 3290312) for samples W-031008-DN-31 and W-031008-DN-32 should be qualified as estimated (J).

FIELD QUALITY ASSURANCE/ QUALITY CONTROL (QA/QC) SAMPLES

The field QA/QC associated with the sampling event consisted of one trip blank sample, three rinsate blanks, and three field duplicate sets.

To evaluate the possibility of contamination arising from sample transport, the environment, and/or shipping, one trip blank sample was submitted to the laboratory for VOC analysis. The trip blank sample was free of target analytes.

As a check for cleanliness of sampling equipment, rinsate blanks were collected as authentic samples for labeling and submission to the lab. The rinsate samples were identified as W-031006-DN-05, W-031007-DN-20, and W-031008-DN-30. Two rinsate blank samples (W-031006-DN-05 and W-031007-DN-20) yielded detections of acetone and toluene. However, since the associated sample data were reported as nondetect for acetone and toluene, no data qualification was required. The third rinsate blank (W-031008-DN-30) was free of target analytes.

Overall precision for the sampling event was monitored using field duplicate samples: W-031006-DN-01/W-031006-DN-02, W-031007-DN-15/W-031007-DN-16, and W-031008-DN-31/W-031008-DN-32. The relative percent difference (RPD) values for positive parameter results were generally found to be acceptable (RPD values less than or equal to 25), indicating an adequate level of precision was achieved. Duplicate samples W-031007-DN-15 and W-031007-DN-16 yielded noncomparable trichloroethene results (RPD=36). Because of this, trichloroethene data for samples W-031007-DN-15 and W-031007-DN-16 should be qualified as estimated (J).

OVERALL ASSESSMENT

The data were found to exhibit acceptable levels of accuracy and precision pertaining to the above criteria, and may be used with the qualifications noted.

RLM/jla/56
Enc.

TABLE 1

SAMPLE IDENTIFICATION NUMBERS
WAUSAU SUPERFUND SITE
OCTOBER 6-8, 2003 SAMPLING EVENT

W-031006-DN-01	W-031007-DN-17
W-031006-DN-02	W-031007-DN-18
W-031006-DN-03	W-031007-DN-19
W-031006-DN-04	W-031007-DN-20
W-031006-DN-05	W-031007-DN-21
W-031006-DN-06	W-031007-DN-22
W-031006-DN-07	W-031008-DN-23
W-031006-DN-08	W-031008-DN-24
W-031006-DN-09	W-031008-DN-25
W-031006-DN-10	W-031008-DN-26
W-031006-DN-11	W-031008-DN-27
W-031007-DN-12	W-031008-DN-28
W-031007-DN-13	W-031008-DN-29
W-031007-DN-14	W-031008-DN-30
W-031007-DN-15	W-031008-DN-31
W-031007-DN-16	W-031008-DN-32