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May 13, 2003

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: 2002 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 2002 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/28
Enc.

c.c.: Dave Erickson; City of Wausau
Wally Mattson; Marathon Electric
Jim Cherwinka: Wausau Chemical
Chuck Ahrens; CRA (w/o enc.)

# 2002 ANNUAL MONITORING REPORT

## WAUSAU WATER SUPPLY NPL SITE
## WAUSAU, WISCONSIN

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## WAUSAU WATER SUPPLY NPL SITE
## WAUSAU, WISCONSIN

**Prepared by:**
**Conestoga-Rovers & Associates**

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MAY 2003
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# 1.0 INTRODUCTION

Conestoga-Rovers and Associates (CRA) has prepared this 2002 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 2002. 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 $\mu$g/L
- Tetrachloroethylene (PCE) 5 $\mu$g/L
- cis-1,2-Dichloroethylene (DCE) 70 $\mu$g/L
- Vinyl chloride 2 $\mu$g/L

## 2.0 2002 MONITORING RESULTS

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 Monday, October 14, 2002. Water table contours based on these measurements are presented on Figure 2.1. The City was pumping CW3 and CW7 during the weekend before the water levels were measured. Field staff measured water levels on the East Bank on Monday morning while CW3 was still running. The City then switched over to pumping CW6 and CW11 at midday on Monday. The West Bank monitoring well water levels were then measured Monday afternoon while CW6 was operating.

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 15-16, 2002, 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. In addition, two well samples (C4S and W53A) were analyzed by EPA Method 8270 for bis(2-ethylhexyl)phthalate as required.

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 2002 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 2002 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 without any major incidents or shutdowns in 2002. A total of 450,267,000 gallons of water were extracted and treated during the year. The extraction well pumped at a flow rate of 864 gallons per minute averaged over the entire year. Table 3.1 summarizes EW1 operational data for 2002, including the number of gallons pumped and flow rate.

Because of declining pumping rates in 2000 and early 2001, EW1 underwent significant maintenance and repairs in 2001. An explanation of those repairs is discussed in the 2001 Annual Monitoring Report. Pumping rates had declined to between 700 and 800 gpm before the repairs.

It appears that the repairs completed in 2001 have improved the operation of EW1. The pumping rate was easily maintained above 800 gpm in 2002. The pumping rate only dropped below 800 gpm in October, and then only slightly (790 gallons per minute). The pumping rate was adjusted upwards in November, and the pump easily pumped at a rate greater than 800 gpm in November and December.

### 3.2 CITY PRODUCTION WELLS

The City of Wausau completed maintenance work on some of their production wells in 2002. Maintenance of CW6 consisted of cleaning the well screen, replacing the column, and repairing the pump. The periods of time CW6 was shut down were: April 1 to May 28 and July 17 to August 18.

Flow meters were replaced at CW7 and CW10 causing them to be shut down in July and April/May respectively. Production wells CW7 and CW10 are not part of the remediation system.

The City also installed a new production well, CW11, which began operation on January 10, 2002. CW11 is located approximately 1 block north of CW10 (See Figure 1.2). This new well is not part of the remediation system.

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.

The pumping rate of CW3 was declining at the end of 2002. A significant maintenance program is scheduled for CW3 during the first half of 2003.

## 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 USEPA and the WDNR 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. A November 13, 2002, letter from CRA documents a quarterly groundwater monitoring program. Monitoring wells WC3B and WC5A will be sampled in January, April, July, and October 2003 for Site Specific VOCs (Table 2.2).

## 3.4 MONITORING WELL MAINTENANCE

Only one monitoring well needed repairing in 2002. The flush-mount lid at W53 had broken in half and therefore was replaced. Because of the extensive monitoring well maintenance program completed in 2001, further repairs were not needed in 2002.

CRA recommends that the monitoring well top of casing elevations be resurveyed in 2003. The elevations of most of the wells were originally surveyed more than 10 years ago. There could have been some minor shifting of the wells since that time, especially considering some of the repairs that have been completed, that would affect the water level measurements.

## 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 2002. 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 2002 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 $\mu$g/L include R2D, R3D, R4D, EW1, W55, and CW6. Monitoring well C4S had a vinyl chloride concentration greater than the MCL of 2 $\mu$g/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 2002 that are comparable to the 2001 concentrations.

The one well with a significant decrease in CVOC concentration was R3D, where the CVOC concentration decreased from 1,500 $\mu$g/L to 1,200 $\mu$g/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 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 |

The 2001 Annual Monitoring Report discussed how this data supports the hypothesis that a slug of CVOCs, which began near the flow divide between EW1 and CW6 in the vicinity of R2D, is moving towards EW1.

The 2000 through 2002 data for R3D show a decrease in CVOC concentration from 1,800 µg/L to 1,200 µg/L. This data suggests that the center of this CVOC slug may have 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 (11 µg/L) was found at a higher concentration than TCE (2.4 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.

The semi-volatile bis(2-ethylhexyl)phthalate was not detected in either of the two wells (W53A and C4S) that were analyzed for bis(2-ethylhexyl)phthalate. Bis(2-ethylhexyl)phthalate was the only semivolatile organic compound retained when the Site monitoring plan was rewritten in 2000 (Groundwater Monitoring Plan) because it had been detected in these two wells. Monitoring since that time suggests that bis(2-ethylhexyl)phthalate is not a concern and future sampling for bis(2-ethylhexyl)phthalate is not necessary.

Bis(2-ethylhexyl)phthalate has not been detected at C4S since 1997. The history of bis(2-ethylhexyl)phthalate results in $\mu g/L$ at W53A is shown below:

| | |
|---|---|
| 2002 | <10 |
| 2001 | <10 |
| 2000 | 12 |
| 1999 | <10/29J |
| 1998 | <10 |
| 1997 | 3J |
| 1996 | 4J |
| 1995 | <10 |
| 1994 | <12 |
| 1993 | <10/<10 |

The only detections of bis(2-ethylhexyl)phthalate at W53A have been estimated (J) values, except for a value of 12 $\mu g/L$ in 2000, which was just slightly over the detection limit. The 1996 and 1997 values were below the laboratory reporting limit. The 1999 value was labeled as estimated because bis(2-ethylhexyl)phthalate was not detected in the duplicate sample. In addition, bis(2-ethylhexyl)phthalate was also detected in a laboratory method blank sample in 1999.

## 4.2 EAST BANK

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 WC5A, had PCE concentrations that exceeded the MCL of 5 $\mu g/L$. In addition, WC3B and WW6 had vinyl chloride concentrations that exceeded the MCL of 2 $\mu g/L$.

The overall size of the East Bank plume continued to decrease in 2002 (see Figure 4.1). Total CVOC concentrations at wells within the plume also continued to decrease significantly. Most of the monitoring wells on the East Bank had lower total CVOC concentrations in 2002 than in 2001. Wells with significant decreases of CVOCs from 2001 to 2002 include:

| *Well* | *2001* | *2002* |
|---|---|---|
| E23A | 15.5 μg/L | 7.3 μg/L |
| E37A | 21.9 μg/L | 8.5 μg/L |
| E22A | 74 μg/L | 11.7 μg/L |
| WC5A | 27 μg/L | 11.4 μg/L |
| E24A | 10 μg/L | 2.8 μg/L |

Total CVOC concentrations increased at two wells in the East Bank plume. The concentration at WW6 doubled from 12.2 μg/L to 23.6 μg/L, which was probably caused by migration towards the production well CW3, since WW6 is near CW3. The concentration at WC3B increased from 2.8 μg/L to 32.7 μg/L, which may have been caused by a small slug of CVOCs at the outer edge of the plume.

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 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 and chloroform were detected in samples from most sampling events, but their concentrations were less than 1 μg/L.

Influent concentrations of TCE decreased from 15 μg/L in January to 13 μg/L in October. The effluent concentrations indicate that the EW1 treatment system removes approximately 50 percent 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 2002. Results of quarterly EW1 influent and effluent sampling are also reported quarterly for the purpose of the WPDES.

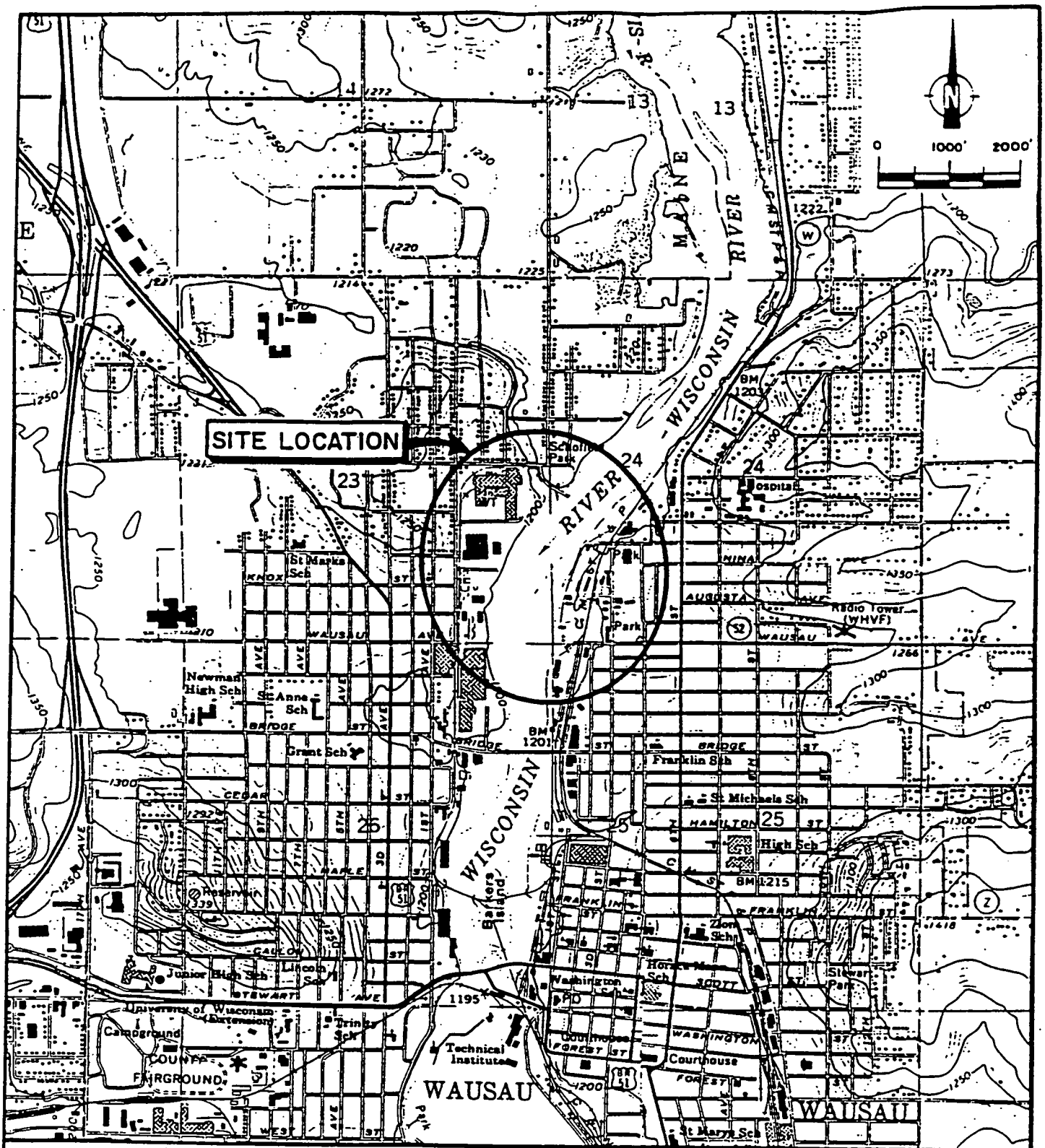
## 4.4 HYDRAULIC CAPTURE

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 continued to shrink and the concentrations within the plume decreased significantly.
- Permanent closure of the East Bank SVE system was evaluated and discussed during 2002. A letter report that recommends permanent closure of the East Bank SVE system was submitted to the USEPA and WDNR in March. In October, Wausau Chemical met with the USEPA and WDNR and agreed to quarterly groundwater monitoring. A November letter describes the proposed quarterly monitoring of WC3B and WC5A for 2003.
- 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 a total of 450,267,000 gallons of water in 2002 at a pumping rate of 864 gallons per minute averaged over the entire year. Because of the repairs completed in 2001, EW1 now operates more efficiently. There were no major shutdowns or repairs in 2002.
- The EW1 treatment system removed approximately 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 two months in April/May and one month in July/August when CW6 was shut down for maintenance. Maintenance consisted of cleaning the well screen, replacing the column, and repairing the pump. Major maintenance of CW3 is scheduled for 2003.
- The monitoring wells should be resurveyed for top of casing (TOC) elevations in 2003. Because of the length of time since the wells were originally surveyed and the repairs that have been completed in the past two years, minor elevation changes could have occurred.

- The Wausau PRP group recommends that chemical analysis for bis(2-ethylhexyl)phthalate be eliminated from the monitoring program. The history of bis(2-ethylhexyl)phthalate monitoring at C4S and W53A suggests that it is not a concern at the Site; therefore, further monitoring for bis(2-ethylhexyl)phthalate is not necessary.
- Otherwise, monitoring in 2003 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).




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

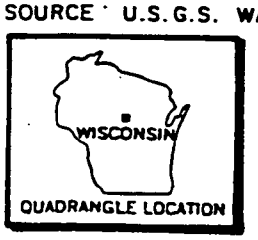
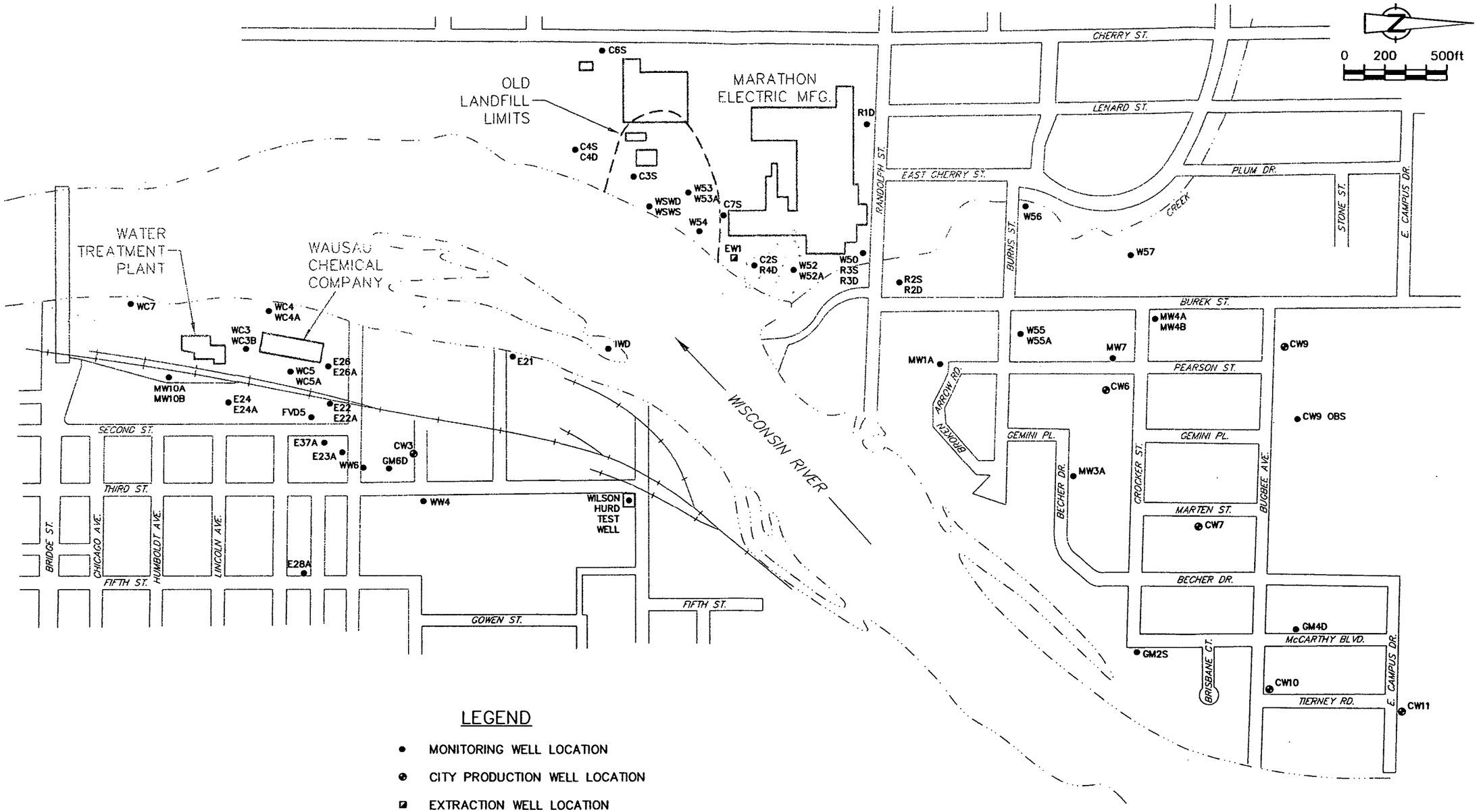



figure 1.1

SITE LOCATION
WAUSAU WATER SUPPLY NPL SITE
*Wausau, Wisconsin*

**CRA**

03978-00(021)GN-SP FEB 28/2003




LEGEND

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

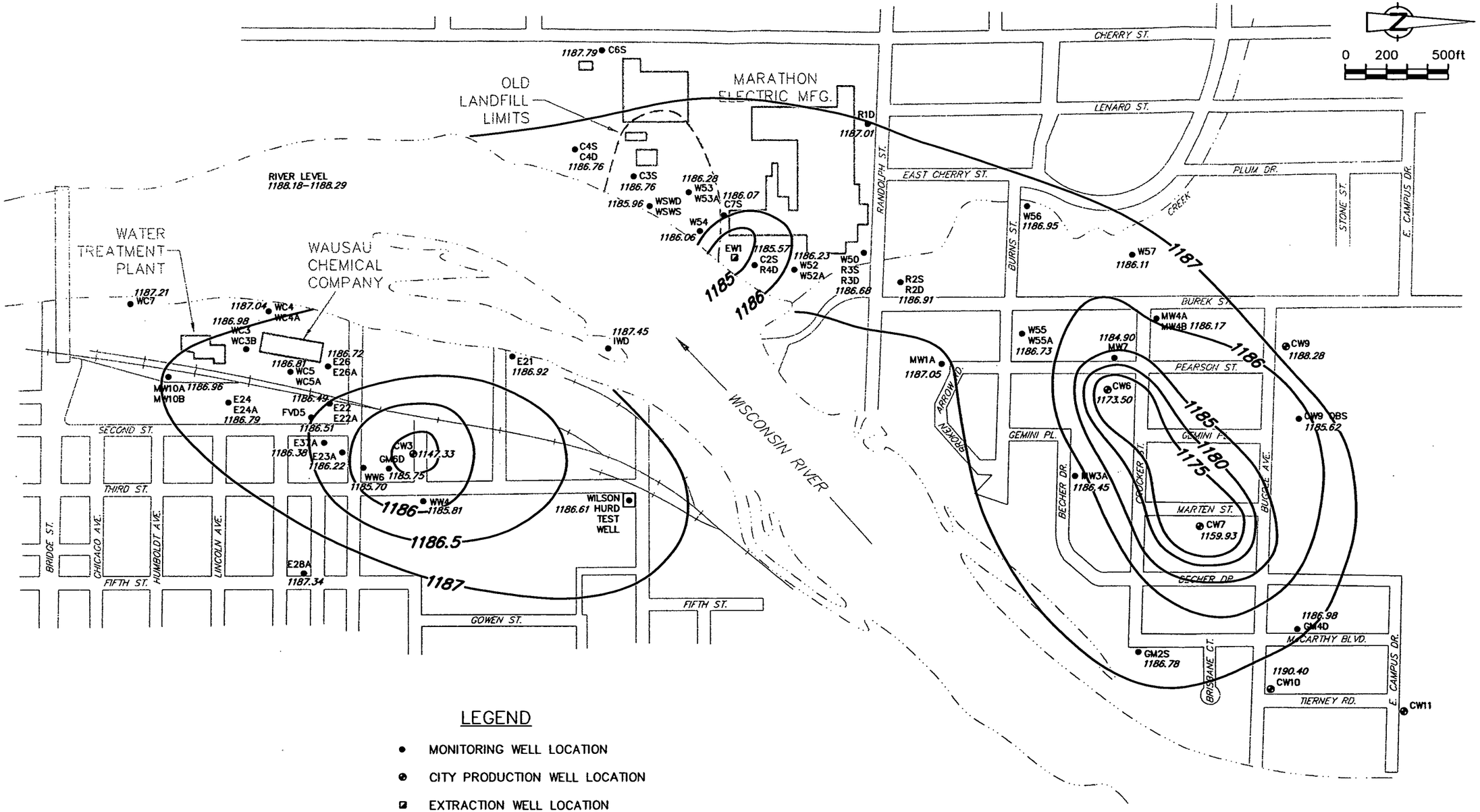
SOURCE: RMT INC. FIGURE 1, 5/14/87.

**CRA**

03978-00(021)GN-SP001 MAR 07/2003

figure 1.2

SITE PLAN
WAUSAU WATER SUPPLY NPL SITE
*Wausau, Wisconsin*




## LEGEND

- MONITORING WELL LOCATION
- CITY PRODUCTION WELL LOCATION
- EXTRACTION WELL LOCATION
- INDUSTRIAL WELL LOCATION
- *1186.27* GROUNDWATER ELEVATION IN FEET AMSL
- GROUNDWATER CONTOUR

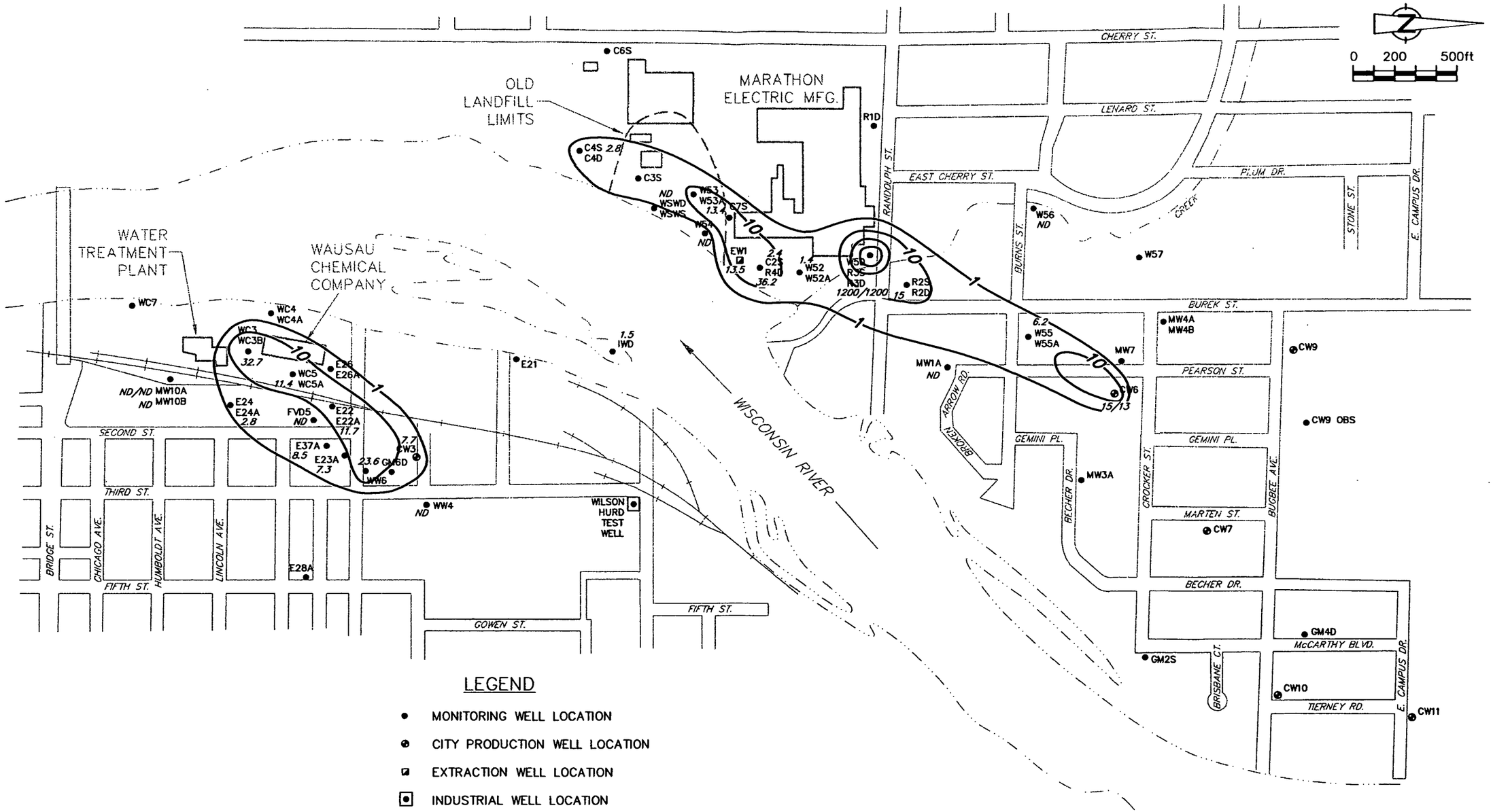
SOURCE: RMT INC. FIGURE 1, 5/14/87.

**CRA**

03978–00(021)GN–SP002 MAR 07/2003

figure 2.1

WATER TABLE CONTOURS (10/14/02)
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(021)GN-SP003 MAR 07/2003

figure 4.1

TOTAL CHLORINATED VOCs IN GROUNDWATER (OCTOBER 2002)
WAUSAU WATER SUPPLY NPL SITE
*Wausau, Wisconsin*

**TABLE 2.1**

**GROUNDWATER ELEVATIONS**
**WAUSAU WATER SUPPLY NPL SITE**

| *Location* | *Top of Casing Elevation (Ft. AMSL)* | *October 14, 2002* |
|---|---|---|
| *East Bank* | | |
| CW3 | 1202.33 | 1147.33 |
| E21 | 1197.66 | 1186.92 |
| E22 | 1195.57 | 1186.49 |
| E22A | 1195.98 | 1186.50 |
| E23A | 1197.72 | 1186.22 |
| E24 | 1210.11 | 1186.82 |
| E24A | 1211.17 | 1186.79 |
| E26 | 1199.11 | 1186.72 |
| E26A | 1199.22 | 1186.74 |
| E28A | 1211.73 | 1187.34 |
| E37A | 1197.92 | 1186.38 |
| FVD5 | 1198.94 | 1186.51 |
| GM6D | 1198.70 | 1185.75 |
| W. HURD | 1199.78 | 1186.61 |
| IWD | 1192.10 | 1187.45 |
| MW10A | 1210.77 | 1186.96 |
| MW10B | 1210.48 | 1186.92 |
| WC3 | 1198.36 | 1186.98 |
| WC3B | 1198.15 | 1186.97 |
| WC4 | 1196.82 | 1187.04 |
| WC4A | 1196.65 | 1187.05 |
| WC5 | 1196.73 | 1186.81 |
| WC5A | 1196.75 | 1186.78 |
| WC7 | 1197.02 | 1187.21 |
| WW4 | 1202.38 | 1185.81 |
| WW6 | 1200.64 | 1185.70 |
| River[(1)] | | 1188.18-1188.29 |

**TABLE 2.1**

**GROUNDWATER ELEVATIONS**
**WAUSAU WATER SUPPLY NPL SITE**

| *Location* | *Top of Casing Elevation (Ft. AMSL)* | *October 14, 2002* |
|---|---|---|
| *West Bank* | | |
| EW1 | N/A | N/A |
| CW6 | 1220.50 | 1173.50 |
| CW7 | 1223.93 | 1159.93 |
| CW9 | 1226.28 | 1188.28 |
| CW9 OBS | 1224.29 | 1185.62 |
| CW10 | 1224.40 | 1190.40 |
| C2S | 1219.12 | 1185.57 |
| C3S | 1220.44 | 1186.76 |
| C4S | 1216.83 | 1187.88 |
| C4D | 1216.23 | 1186.76 |
| C6S | 1221.71 | 1187.79 |
| C7S | 1220.98 | 1186.07 |
| GM2S | 1211.78 | 1186.78 |
| GM4D | 1216.38 | 1186.98 |
| MW1A | 1215.83 | 1187.05 |
| MW3A | 1223.29 | 1186.45 |
| MW4A | 1215.26 | 1185.38 |
| MW4B | 1215.64 | 1186.17 |
| MW7 | 1218.67 | 1184.90 |
| R1D | 1222.36 | 1187.01 |
| R2S | 1209.84 | 1187.55 |
| R2D | 1209.56 | 1186.91 |
| R3S | 1215.30 | 1187.40 |
| R3D | 1215.53 | 1186.68 |
| R4D | 1218.97 | 1181.53 |
| W50 | 1215.66 | 1186.86 |
| W52 | 1219.17 | 1186.23 |
| W52A | 1219.06 | 1186.78 |
| W53 | 1216.80 | 1186.28 |
| W53A | 1217.02 | 1186.22 |
| W54 | 1216.31 | 1186.06 |

## TABLE 2.1

## GROUNDWATER ELEVATIONS
## WAUSAU WATER SUPPLY NPL SITE

| *Location* | *Top of Casing Elevation (Ft. AMSL)* | *October 14, 2002* |
|---|---|---|
| W55 | 1217.17 | 1186.56 |
| W55A | 1217.45 | 1186.73 |
| W56 | 1200.13 | 1186.95 |
| W57 | 1205.31 | 1186.11 |
| WSWS | 1192.83 | 1187.43 |
| WSWD | 1192.98 | 1185.96 |

Note:
(1) Wisconsin River elevations obtained from Wisconsin Valley Improvement. River elevation measured upstream of the Bridge Street Dam in the vicinity of the water treatment plant and Wausau Chemical.

## 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

Note:

This list of analytes applies to samples collected after May 2000.

## 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)* |
|---|---|---|---|---|---|
| 01/02/02 | 9:10 AM | | 992,775,000 | | |
| 02/05/02 | 9:35 AM | 48,985 | 40,286,000 | 47,511,000 | 970 |
| 02/28/02 | 1:00 PM | 33,325 | 73,868,000 | 33,582,000 | 1008 |
| 04/02/02 | 10:00 AM | 47,340 | 113,559,000 | 39,691,000 | 838 |
| 05/02/02 | 1:10 PM | 43,390 | 149,845,000 | 36,286,000 | 836 |
| 05/30/02 | 1:30 PM | 40,340 | 185,351,000 | 35,506,000 | 880 |
| 07/01/02 | 10:00 AM | 45,870 | 225,676,000 | 40,325,000 | 879 |
| 08/08/02 | 9:00 AM | 54,660 | 270,945,000 | 45,269,000 | 828 |
| 09/03/02 | 8:15 AM | 37,395 | 301,837,000 | 30,892,000 | 826 |
| 10/02/02 | 10:00 AM | 41,865 | 337,468,000 | 35,631,000 | 851 |
| 10/31/02 | 12:30 PM | 41,910 | 370,589,000 | 33,121,000 | 790 |
| 11/27/02 | 12:45 PM | 38,895 | 404,685,000 | 34,096,000 | 877 |
| 12/30/02 | 9:30 AM | 47,325 | 443,042,000 | 38,357,000 | 811 |
| **2002 Total** | | 521,300 | | **450,267,000** | **864** |

Notes:

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

## TABLE 3.2

## CITY WELL PUMPING DATA
## WAUSAU WATER SUPPLY NPL SITE

| *Month* | *Well No. 3 (gallons[1]/hours[2])* | *Well No. 6[3] (gallons[1]/hours[2])* | *Well No. 7[4] (gallons[1]/hours[2])* | *Well No. 9 (gallons[1]/hours[2])* | *Well No. 10[5] (gallons[1]/hours[2])* | *Well No. 11 (gallons[1]/hours[2])* |
|---|---|---|---|---|---|---|
| January | 20.303/283.0 | 36.178/452.7 | 23.697/218.9 | 7.348/110.8 | 59.834/290.8 | 19.888/104.1 |
| February | 20.437/283.0 | 29.751/378.2 | 31.107/285.3 | 8.095/121.1 | 33.182/174.9 | 26.642/137.1 |
| March | 27.390/382.7 | 28.322/358.1 | 41.482/377.4 | 12.253/177.9 | 22.267/114.5 | 27.619/141.9 |
| April | 50.780/718.6 | 0/0 | 50.370/459.8 | 20.360/304.2 | 0/0 | 32.589/176.3 |
| May | 45.622/653.4 | 8.343/89.0 | 18.241/162.7 | 4.868/70.5 | 0/0 | 70.215/391.5 |
| June | 19.436/283.4 | 40.028/433.6 | 26.871/226.8 | 8.236/138.9 | 32.203/191.6 | 28.689/167.6 |
| July | 33.578/501.8 | 22.011/240.5 | 0/0 | 19.880/301.7 | 46.995/307.2 | 61.455/367.5 |
| August | 37.120/547.4 | 18.813/192.8 | 21.374/181.6 | 12.535/185.3 | 39.605/232.6 | 40.516/232.3 |
| September | 22.690/339.2 | 36.661/378.4 | 35.383/307.3 | 14.599/236.9 | 32.673/196.3 | 19.538/113.8 |
| October | 20.839/315.4 | 39.035/425.7 | 34.049/287.6 | 7.477/112.8 | 20.617/120.3 | 25.621/163.6 |
| November | 21.519/336.7 | 37.097/381.0 | 35.060/291.2 | 4.173/56.3 | 16.738/96.3 | 19.783/113.0 |
| December | 19.540/312.8 | 41.188/428.3 | 33.075/273.0 | 6.288/95.9 | 24.301/141.5 | 16.369/93.8 |

Notes:

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

[2] Hours indicates total hours pumped per month.

[3] Well No.6 was down for maintenance from April 1 to May 28 and July 17 to August 18.

[4] Well No. 7 was down for maintenance in July.

[5] Well No. 10 was down for maintenance in April and May.

TABLE 4.1

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

| LOCATION | DATE | | bis(2-Ethylhexyl) phthalate | 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 | 10/14/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 3.4 | 1.9 | 2.4 | 0.56 J | 7.7 |
| E22A | 10/15/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 11 | < 1 | 0.72 | < 1 | 11.72 |
| E23A | 10/15/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 4.3 | 0.8 J | 1.8 | 1.2 | 7.3 |
| E24A | 10/15/02 | | | < 10 U | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 2.8 | < 1 | < 0.5 | < 1 | 2.8 |
| E37A | 10/15/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 4 | 0.7 J | 4.5 | 0.45 J | 8.5 |
| FVD5 | 10/15/02 | | | < 170 | 65 | 200 | 27 | 900 | < 17 | < 17 | < 17 | < 17 | < 17 | < 17 | < 17 | < 8.3 | < 17 | ND |
| IWD | 10/16/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 1.5 | 0.37 J | < 1 | 1.5 |
| MW10A | 10/15/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 0.5 | < 1 | ND |
| MW10A | 10/15/02 | D | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 0.5 | < 1 | ND |
| MW10B | 10/15/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 0.5 | < 1 | ND |
| WC3B | 10/15/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 1.1 | < 1 | < 1 | 1.1 | 4 | 22 | 4.5 | 32.7 |
| WC5A | 10/15/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 9.6 | 1.1 | 0.69 | < 1 | 11.39 |
| WW4 | 10/15/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | 0.46 J | < 1 | < 1 | < 1 | < 1 | < 1 | < 0.5 | < 1 | ND |
| WW6 | 10/15/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 1 | 0.56 J | 9.6 | 13 | 23.6 |
| *West Bank* | | | | | | | | | | | | | | | | | | |
| C2S | 10/16/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 2.4 | < 0.5 | < 1 | 2.4 |
| C4S | 10/16/02 | | < 10 | < 10 | 0.76 J | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 0.5 | 2.8 | 2.8 |
| CW6 | 10/16/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 15 | < 0.5 | < 1 | 15 |
| CW6 | 10/16/02 | D | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 13 | < 0.5 | < 1 | 13 |
| MW1A | 10/15/02 | | | < 10 | < 1 | < 1 | 0.71 J | 1.2 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 0.5 | < 1 | ND |
| R2D | 10/16/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 15 | 0.36 J | < 1 | 15 |
| R3D | 10/15/02 | | | < 500 | < 50 | < 50 | < 50 | < 50 | < 50 | < 50 | < 50 | < 50 | < 50 | < 50 | 1200 | < 25 | < 50 | 1200 |
| R3D | 10/15/02 | D | | < 500 | < 50 | < 50 | < 50 | < 50 | < 50 | < 50 | < 50 | < 50 | < 50 | < 50 | 1200 | < 25 | < 50 | 1200 |
| R4D | 10/16/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 35 | 1.2 | < 1 | 36.2 |
| W52 | 10/16/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 1.4 | < 0.5 | < 1 | 1.4 |
| W53A | 10/16/02 | | < 10 | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 2.4 | 11 | < 1 | 13.4 |
| W54 | 10/16/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 0.5 | < 1 | ND |
| W55 | 10/15/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 6.2 | < 0.5 | < 1 | 6.2 |
| W56 | 10/15/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 0.5 | < 1 | ND |
| WSWD | 10/16/02 | | | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 0.87 J | < 0.5 | < 1 | ND |

Notes:
D - Duplicate Sample
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 | cis-1,2-Dichloroethen | Vinyl chloride |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Effluent | 1/3/02 | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | 0.62 J | < 1 | < 1 | < 1 | < 1 | 7.3 | 0.35 J | < 1 |
| Effluent | 4/2/02 | < 10 U | < 1 | < 1 | < 1 | < 1 | < 1 | 0.4 J | < 1 | < 1 | < 1 | < 1 | 6.7 | 0.3 J | < 1 |
| Effluent | 7/1/02 | < 10 U | < 1 | < 1 | < 1 | < 1 | < 1 | 0.38 J | < 1 | < 1 | < 1 | < 1 | 7.1 | 0.31 J | < 1 |
| Effluent | 10/2/02 | < 10 | < 1 UJ | < 1 UJ | < 1 UJ | < 1 UJ | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 5.9 | < 0.5 | < 1 |
| | | | | | | | | | | | | | | | |
| Influent | 1/3/02 | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | 0.51 J | < 1 | < 1 | < 1 | < 1 | 15 | 0.66 | < 1 |
| Influent | 4/2/02 | < 10 | < 1 | < 1 | < 1 | < 1 | < 1 | 0.39 J | < 1 | < 1 | < 1 | < 1 | 16 | 0.56 | < 1 |
| Influent | 7/1/02 | < 10 U | < 1 | < 1 | < 1 | < 1 | < 1 | 0.4 J | < 1 | < 1 | < 1 | < 1 | 15 | 0.51 | < 1 |
| Influent | 10/2/02 | < 10 | < 1 UJ | < 1 UJ | < 1 UJ | < 1 UJ | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 13 | 0.51 | < 1 |

Notes:

U - Estimated detection limit.

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

UJ - Estimated detection limit.

# APPENDIX A

# 2002 DATA QUALITY VALIDATION MEMORANDUMS

CONESTOGA-ROVERS & ASSOCIATES

1801 Old Highway 8 NW, Suite #114
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# MEMORANDUM

TO: Jason Twaddle

REF. NO.: 3978-10

FROM: Ruth Mickle

DATE: March 4, 2002

C.C.: Analytical Data File

RE: **Data Quality Assessment and Validation**
**January 3, 2002, Sampling Event**
**Wausau Superfund Site - Wausau, Wisconsin (COC 72120)**

The following details a data quality assessment and validation for water samples collected on January 3, 2002, at the Wausau Superfund Site in Wausau, Wisconsin. The samples identified as W020103MT-418 and W020103MT-419 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

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.

## 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 sample yielded a methylene chloride detection. Since the associated sample data were reportedly non-detect for methylene chloride, no data qualification was required based on method blank results.

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 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. The benzene spike recoveries were reported below the lower control limit. However, since the spike samples were non-project samples, no data qualification was required 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 sample was identified on the chain-of custody form as a "tap blank". However, clarification with the sampler revealed that the blank was actually a trip blank. The trip blank sample was free of target analytes.

## 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/42

CONESTOGA-ROVERS & ASSOCIATES

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# MEMORANDUM

TO: Jason Twaddle

REF. NO.: 3978-10

FROM: Ruth Mickle

DATE: May 2, 2002

C.C.: Analytical Data File

RE: **Data Quality Assessment and Validation**
**April 2, 2002, Sampling Event**
**Wausau Superfund Site - Wausau, Wisconsin (COC 28629)**

The following details a data quality assessment and validation for water samples collected on April 2, 2002, at the Wausau Superfund Site in Wausau, Wisconsin. The samples identified as W020402MT-420 and W020402MT-421 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

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.

## 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 sample yielded a acetone detection (0.91 µg/l). The associated acetone detection for sample W020402MT-421 should be qualified as non-detect (10U).

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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 sample was identified on the chain-of custody form as a "tap blank". However, clarification with the sampler revealed that the blank was actually a trip blank. The trip blank sample was free of target analytes.

## 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/43

CONESTOGA-ROVERS & ASSOCIATES

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# MEMORANDUM

TO: Jason Twaddle

REF. NO.: 3978-10

FROM: Grant Anderson

DATE: August 8, 2002

C.C.: Analytical Data File

RE: **Data Quality Assessment and Validation**
**July 1, 2002, Sampling Event**
**Wausau Superfund Site - Wausau, Wisconsin (COC 124037)**

The following details a data quality assessment and validation for water samples collected on July 1, 2002, at the Wausau Superfund Site in Wausau, Wisconsin. The samples identified as W020701MT-422 and W020701MT-423 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

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.

## 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 sample yielded a acetone detection (1.4 $\mu g/L$). The associated acetone results for samples W020701MT-422 and W020701MT-423 should be qualified as non-detect (10U).

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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 sample was reported to be free of target analytes, indicating that cross-contamination was unlikely.

## 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 above.

GDA/jla/44

CONESTOGA-ROVERS & ASSOCIATES

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# MEMORANDUM

TO: Jason Twaddle

REF. NO.: 3978-10

FROM: Ruth Mickle

DATE: October 31, 2002

C.C.: Analytical Data File

RE: **Data Quality Assessment and Validation**
**Otober 2, 2002, Sampling Event**
**Wausau Superfund Site - Wausau, Wisconsin (COC 56667)**

The following details a data quality assessment and validation for water samples collected on October 2, 2002, at the Wausau Superfund Site in Wausau, Wisconsin. The samples identified as W021002MT-424 and W021002MT-425 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 should also be preserved to a pH less than 2. Both samples were found to have pH values greater than 2. As a result, aromatic VOC data (benzene, toluene, xylenes, and ethylbenzene) for samples W021002MT-424 and W021002MT-425 should be qualified as estimated (UJ) for negative parameter results.

## 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 sample 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 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. The 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 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 with the qualifications noted.

RLM/jla/46

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# MEMORANDUM

TO: Jason Twaddle

REF. NO.: 3978

FROM: Ruth Mickle

DATE: January 13, 2003

C.C.: Analytical Data File

RE: **Data Quality Assessment and Validation**
**October 14-16, 2002, Sampling Event**
**Wausau Superfund Site - Wausau, Wisconsin (COC 4049, 4050)**

The following details a data quality assessment and validation for water samples collected October 14-16, 2002, at the Wausau Superfund Site located in Wausau, Wisconsin. The samples identified in Table 1 were analyzed for Site list volatile organic compounds (VOC). In addition, samples W-021016-DN-28, W-021016-DN-29, and W-021016-DN-30 were analyzed for Site list semi-volatile organic compounds (SVOC)[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 periods for the analyses are as follows:

VOC - 14 days from sample collection to analysis; and

SVOC - 7 days from sample collection to extraction; 40 days from extraction 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 method blank samples. One VOC method blank sample yielded an acetone detection. There were no associated acetone results from investigative samples that required qualification.

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1 VOC Method 8260B and SVOC method 8270C were 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 percent recovery and RPD data were within acceptance criteria.

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

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

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 sample yielded an acetone detection (4.2 $\mu$g/l). The associated sample data for samples W-021015-DN-03 and W-021015-DN-06 should be qualified as nondetect (10U).

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-021015-DN-03 and W-021016-DN-30. The rinsate blank samples yielded detections of several target analytes. However, since the associated sample data were previously qualified or reported as nondetect for a given parameter, no data qualification was required.

As a check on ambient conditions at the site, one field blank was collected as authentic samples for labeling and submission to the lab. The field blank sample was identified as W-021016-DN-26. The field blank sample yielded detections of benzene (0.45 $\mu$g/l) and toluene (1.2 $\mu$g/l). However, since the associated sample data were reported as nondetect for a given parameter, no data qualification was required.

Overall precision for the sampling event was monitored using field duplicate samples: W-021015-DN-04/W-021015-DN-05, W-021015-DN-18/W-021015-DN-19,

W-021016-DN-31/W-021016-DN-32. The relative percent difference (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 with the qualifications noted.

RLM/jla/47
Enc.

## TABLE 1

## SAMPLE IDENTIFICATION NUMBERS
## WAUSAU SUPERFUND SITE
## OCTOBER 14-16, 2002 SAMPLING EVENT

| | |
|---|---|
| W-021014-DN-01 | W-021015-DN-17 |
| W-021015-DN-02 | W-021015-DN-18 |
| W-021015-DN-03 | W-021015-DN-19 |
| W-021015-DN-04 | W-021016-DN-20 |
| W-021015-DN-05 | W-021016-DN-21 |
| W-021015-DN-06 | W-021016-DN-22 |
| W-021015-DN-07 | W-021016-DN-23 |
| W-021015-DN-08 | W-021016-DN-24 |
| W-021015-DN-09 | W-021016-DN-25 |
| W-021015-DN-10 | W-021016-DN-26 |
| W-021015-DN-11 | W-021016-DN-27 |
| W-021015-DN-12 | W-021016-DN-28 |
| W-021015-DN-13 | W-021016-DN-29 |
| W-021015-DN-14 | W-021016-DN-30 |
| W-021015-DN-15 | W-021016-DN-31 |
| W-021015-DN-16 | W-021016-DN-32 |