ANNUAL
OPERATION & MAINTENANCE REPORT
October 1998 Through September 1999

N.W. MAUTHE
GROUNDWATER TREATMENT SYSTEM
Appleton, Wisconsin

Prepared For The
WISCONSIN DEPARTMENT OF NATURAL RESOURCES

MCO
Midwest Contract Operations, Inc.

January 7, 2000
Revised: May 5, 2000
MCO. No. M050-99746.16
JMS:smd

MCO

Midwest Contract Operations, Inc.

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May 5, 2000

Ms. Jennifer Huffman
Wisconsin Department Of Natural Resources
3369 West Brewster Street
Appleton, WI 54912-1602

Re: N.W. Mauthe Groundwater Treatment System
Appleton, Wisconsin
Annual Operation & Maintenance Report
MCO. No. M050-99746.16

Dear Ms. Huffman:

Enclosed, please find Midwest Contract Operations, Inc.'s "Annual Operation & Maintenance Report" for the N.W. Mauthe Groundwater Treatment System, 725 South Outagamie Street, Appleton, Wisconsin.

This report includes a site history, a summary of treatment system performance and monitoring, a summary of compliance sampling and reporting, operation and maintenance activities over the last year, and conclusions and recommendations for the site.

If you have any questions or require additional information, feel free to contact me.

Very truly yours,

MIDWEST CONTRACT OPERATIONS, INC.

John M. Stoeger
Project Manager

JMS:smd

Enclosure: "Annual Operation & Maintenance Report"

PROFESSIONAL QUALIFICATIONS STATEMENT

I, Thomas J. Kispert, hereby certify I am a Registered Professional Engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E-4, Wisconsin Administrative Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wisconsin Administrative Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements of chs. NR 700 to 726, Wisconsin Administrative Code."

Thomas J. Kispert, P.E., C.C.S. / P.E. No. E-26225
Senior Project Engineer

4-20-00
Date

WISCONSIN
THOMAS J. KISPERT
E-26225
NEENAH
WIS.
PROFESSIONAL ENGINEER

[Stamp]

"I, Stuart A. Boerst, hereby certify that I am a Hydrogeologist, as the term is defined in s.NR 712.03(1), Wisconsin Administrative Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements of chs. NR 700 to 726, Wisconsin Administrative Code."

Stuart A. Boerst, P.S., P.H.
Hydrogeologist

4/21/00
Date

WISCONSIN
STUART A.
BOERST
PS-9
NEENAH
WI
PROFESSIONAL SOIL SCIENTIST

4/21/00

WISCONSIN
STUART A.
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NEENAH
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PROFESSIONAL HYDROLOGIST

[Stamp] 4/21/00

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I. SITE BACKGROUND

The N.W. Mauthe site is a former electroplating facility, located at 725 South Outagamie Street, Appleton, Wisconsin (Refer to Figure #1, Site Location Map). The property was used for a chrome plating company, from 1960 until 1976. Electroplating of zinc, cadmium and, possibly, copper and silver was conducted from 1978 to 1987 in an adjacent building on the same property. After 1987, all plating operations ceased on the property.

Concerns over sub-surface discharges to the surrounding environment led the Wisconsin Department of Natural Resources (DNR) and United States Environmental Protection Agency (USEPA) to conduct a remedial investigation and clean up of the N.W. Mauthe site and surrounding properties.

The investigation determined the N.W. Mauthe site was contaminated with zinc, cadmium, chromium and cyanide. Additionally, several volatile organic compounds (VOC's) were also present.

Based upon the findings of the remedial investigation, the following actions were taken to remediate the N.W. Mauthe site and adjacent properties of the sub-surface contamination.

A. Demolition and removal of the buildings on the N.W. Mauthe property.

B. Excavation and off-site treatment of soils with a total chromium concentration of greater than 500 mg/kg.

C. Backfilling of the excavation with clean soils, capping the site with 2-feet of clay and topsoil, and the establishment of vegetative cover.

D. Installation of groundwater collection trenches and construction and operation of a groundwater treatment facility to contain and/or control groundwater contamination with ultimate compliance with groundwater Applicable or Relevant and Appropriate Requirements (ARAR's).

E. Improvement or installation of foundation drain systems and cleaning, painting or sealing of basement walls and floors, as needed, for homes or businesses in the area of the site, to prevent seepage of contaminated water into the buildings.

The groundwater collection trench system, the location of sump pump and drain connections, and the groundwater monitoring wells and piezometers associated with the site are shown in Figure #2.

Midwest Contract Operations, Inc. (MCO) began operating the groundwater treatment system in February 1997. CH_2M Hill, the site engineer and project manager for the U.S. EPA, retained responsibility for the overall site operations and the groundwater monitoring wells associated with the treatment system.

The objectives of the collection and treatment system are to reduce the contaminant concentrations in the groundwater to achieve federal drinking water standards and/or state groundwater quality standards, whichever are more stringent.

In October 1998, after the first year of operation and maintenance of the remediation system, the Wisconsin DNR assumed the responsibility from the U.S. EPA for all operation and maintenance of the site. MCO was retained by the Wisconsin DNR for the operation and maintenance of the entire groundwater treatment system, including the groundwater monitoring wells. As of September 1999, MCO has completed four rounds of groundwater sampling and is operating the batch treatment process, which is designed to remove chromium from the groundwater. A description of the batch process will be discussed later in this report.

II. BATCH TREATMENT PROCESS

A. Groundwater Treatment System

As part of the remediation phase at the N.W. Mauthe site, a groundwater collection system was installed on and adjacent to the N.W. Mauthe property. Approximately 1,000 lineal feet of coarse sand filled trenching was installed to draw groundwater from the contaminated areas to two collection sumps. From the collection sumps, groundwater is pumped to a 9,000 gallon holding tank, located within the treatment building.

Each batch of groundwater to be treated is pumped from the storage tank to the reaction tank. The batch process treatment system utilizes ferrous sulfate and caustic additions to treat the contaminated groundwater. Through chemical addition, mixing, aeration and settling, the chromium is removed from the groundwater. The fully automated process treats approximately 2,600 gallons per batch (based on physical tank measurements) and is capable of treating four batches per day.

Treated groundwater decants from the reaction tank to the City of Appleton sanitary sewer system. The chromium containing sludge settles to the bottom of the reaction tank. Excess sludge is pumped to a sludge storage tank, also located within the treatment building.

During each discharge, the effluent is tested for hexavalent chromium using a Hach Test kit. The pH is recorded off two meters, located in the reaction tank. The pH values from the two meters are recorded during discharge as the high and low pH values on a daily log sheet. The average of the two pH values is calculated. The effluent wastewater is tested quarterly for total chromium at a DNR approved environmental laboratory.

B. Permit Monitoring & Reporting

The discharge from the groundwater treatment system is tested for hexavalent chromium during each batch discharge using a Hach Hexavalent Chromium test kit. The effluent discharge is also tested quarterly at a DNR certified laboratory and annually for the parameters listed in Table #1. The effluent limits established by the City of Appleton Wastewater Treatment Plant are outlined in the City of Appleton Industrial User Permit, No. 97-21, and are included in Table #1. The reporting requirements for compliance with the City of Appleton Industrial User Permit and the Wisconsin DNR are summarized below.

1. Monthly Reporting

Monthly reports are submitted to the City of Appleton Wastewater Treatment plant. The reports include total flows for the month, individual batch flows, high, low and average pH of each batch and Hexavalent Chromium concentrations (as measured with a Hach test kit) of each batch. A summary of the batch discharges for this period are contained in Table #2. For the time period covered by this report, there were no exceedances of the effluence discharge limits.

Additionally, the Wisconsin DNR is provided with a monthly report summarizing operations at the site. The monthly reports include MCO's operating invoice for the month, a copy of the City of Appleton monthly report, a list of invoices paid during the month, and a copy of the facility log. Also included in this report is a narrative of any alarm call-outs or non-routine occurrences at the site.

2. Quarterly & Semi-Annual Reporting

Quarterly reports are submitted to the Wisconsin DNR and the City of Appleton covering the time periods of October through December, January through March, April through June, and July through September.

Semi-annual reporting consists of submittal of Wisconsin DNR Form 4400-194 with the March Quarterly Report and completion of a Semi-Annual Operation & Maintenance Report for the year ending September 30, 1999. The September report includes a summary of routine operation and maintenance activities at the site, the analytical results and reporting for the groundwater monitoring and treatment system effluent, the collection and treatment performance and effectiveness, an operation and maintenance cost summary, and recommendations.

The quarterly reports include site background, a description of the treatment process and analytical results, groundwater sampling procedures and results, a discussion of public contacts, applicable operation and maintenance activities, and MCO's conclusions and recommendations. A summary of the reported quarterly and annual discharge concentrations are shown in Table #3. The discharges for this period have consistently met the discharge limitations.

C. Compliance Sampling

Compliance sampling of the treatment system effluent is conducted twice per year by the City of Appleton. The samples were collected on March 18, 1999 and September 21, 1999. The effluent is analyzed for the parameters listed in Table #1, except of Hexavalent Chromium. MCO collects one compliance sample from the outfall during the first quarter of each year. The sample was collected on April 18, 1999. The MCO collected sample is analyzed for all of the parameters in Table #1.

A summary of the compliance sampling results from Outfall 001 are contained in Table #3. The laboratory analytical data was previously submitted in the quarterly DNR reports. During the period from October 1, 1998 through September 30, 1999, there were no exceedances of the City of Appleton Industrial User Discharge Permit.

D. Routine Operation & Maintenance Activities

Completed operations log sheets are kept on file at the groundwater treatment facility for all of the operation and maintenance activities listed below.

1. Daily Site Inspections

A daily inspection of the facility is required to check the nitrogen cylinder, which provides a blanket of nitrogen gas in the ferrous sulfate drum. The pressure at the nitrogen tank and the total flow from the flow totalizer are recorded daily and/or after each batch discharge. Additionally, a walk through of the building is conducted to check for any obvious equipment problems. The site activities are documented on daily log sheets and a daily checklist.

2. Weekly Operation & Maintenance Activities

The following activities are conducted on a weekly basis, normally on Wednesday of each week.

a. Test influent chromium concentration in storage tank, utilizing a Hach test kit. The Chromium concentration is entered into the programmable logic controller (PLC), which uses the figure to calculate the required ferrous sulfate additions per batch.

b. Record water levels in the two collection sumps.

c. Record pump operating pressure levels.

d. Record liquid levels in the storage tank and sludge storage tank. Record the sludge depth in the reaction tank and adjust if not within the minimum or maximum levels needed for desired coprecipitation.

e. Record weights of ferrous sulfate and caustic drums.

f. Calibrate or clean pH meters in the reaction tank. Meters are calibrated approximately once per month, depending upon the drift between the two probes. The system Operation & Maintenance Manual had required weekly calibration of the pH probes. Over the first year of system operation, MCO found that the pH meters remained in calibration and did not require re-calibration on a weekly basis. MCO consulted with the equipment manufacturer's Operation & Maintenance Manual, and determined a weekly probe cleaning and monthly calibration was recommended. Since October 1998, MCO has followed the manufacturer's recommended probe maintenance schedule.

The weekly checks are documented on log sheets, which are kept on file at the treatment facility.

3. Monthly Operation & Maintenance Activities

The following activities are performed each month, generally near the first of the month.

a. Top Mounted Mixers

The oil level in the mixers is checked and the seals are observed for obvious leaks. The motor bearings are greased monthly. Top mounted mixers are located in the storage tank, reaction tank and sludge storage tank.

b. Chemical Feed Pumps

The ferrous sulfate and caustic feed pumps are checked for proper operation. The feed lines and valves are checked for signs

of leakage. Upon installation of each new chemical drum, hot water is pumped through the chemical feed system to clean out the supply piping. This is performed approximately four times per year on each feed system. Due to the nature of groundwater flows, the lines are cleaned more during the spring and fall wet weather periods and not on a quarterly schedule, as specified in the Operation & Maintenance Manual. The spill containment sump below the drums is topped off with water to the level of the stand pipe.

c. Double Diaphragm Pumps

The most used double diaphragm pump is used for pumping water from the storage tank to the reaction tank. Additional pumps are used to pump sludge from the reaction tank to the sludge storage tank and from the sludge storage tank to the truck loading station. Each pump is operated as part of the monthly maintenance and checked for unusual noise and proper lubrication. The lubrication oil is filled and the water trap is drained, as needed.

d. Air Compressor

The compressor oil level is checked. The air filter is checked and changed, as needed. The compressor is run under full load and the on panel gauges are checked for proper operation. The oil filter is changed, as needed.

e. Unit Heaters

The unit heaters are checked during cold weather for proper operation, excessive noise and vibration. The heaters are shut-off in spring and turned on in the fall.

f. Air Conditioner

The facility heater / air conditioner is checked for proper operation and the air filter is cleaned, as-needed.

g. Water Heater

The water heater is checked for any visible leaks. The relief valve is tested for proper operation. Between 1 and 2-quarts of water are drained from the tank monthly.

h. Ceiling Fans

The ceiling fans are checked for excessive vibration or dirt build-up.

i. Safety Shower

The safety shower is tested monthly for proper operation.

4. Annual Operation & Maintenance Activities

The following activities are performed on an annual basis.

a. The unit heaters are cleaned and test fired. This will normally occur in September of the year. The Operation & Maintenance Plan for the facility calls for lubrication of the heater motors. The actual maintenance of the heaters deviates from the Operation & Maintenance Plan because the moving parts on the heaters have sealed bearings and do not require lubrication.

b. The submersible pumps in the two collection sumps and building sump are removed and the lubricating oil changed. The Operation & Maintenance Plan for the facility calls for replacement of the mechanical seal, oil filter, plug gasket and o-rings be replaced annually. A visual observation of the condition of the oil is done to verify the integrity of the pump seals. If no water is noted in the removed pump oil, the seals and o-rings are not changed. Beginning in the fall of 2000, MCO will replace the pump in Sump #2 with a spare pump, and replace the seals and o-rings in the removed pump. The pumps will be removed and refurbished every 2-years beginning with Sump #2 in 2000 (Sump #2 logs significantly more pump time than Sump #1) and Sump #1 in 2001. While this is a deviation from the Operation & Maintenance Plan, MCO is of the opinion that replacing the factory seals may cause more seal failures than returning the pumps for factory refurbished every 2-years. The oil in the two pumps was changed

on September 30, 1999. No water was noted in the waste oil from either pump.

c. The air compressor oil and filter are changed.

d. The ceiling fan blades are cleaned during the September operation and maintenance activities.

e. The Operation & Maintenance Manual requires the top mounted mixer gear oil be changed annually. MCO deviated from the plan by performing a monthly visual inspection of the oil for any obvious breakdown. The Wisconsin DNR case manager has required the oil be changed annually. This will be done immediately (May 2000), and is now scheduled to be done when the sump pump maintenance is performed each fall.

5. Periodic Operation & Maintenance Activities

The following activities are performed on an as-needed basis throughout the year.

a. Lawn mowing and snow removal is conducted as required.

b. The ferrous sulfate chemical feed pump calibration is verified prior to installation of a new 55-gallon drum. The sodium hydroxide pumping system is not calibrated because the pump is controlled by the reaction tank pH and not by volume.

c. The ferrous sulfate and caustic chemical feed lines are cleaned prior to installation of new 55-gallon drums. The cartridge valves are changed, as needed.

d. The water traps are emptied and oil reservoirs checked for the air pumps prior to each use.

e. Level sensing meters in the storage tank, reaction tank and sludge storage tank are compared with actual tank levels by visual observations.

f. The effluent flow meter operation is checked during each discharge. According to the factory representative, there are no

operator performed calibration functions for the flow meter, unless a hardware failure occurs.

E. Significant Operation & Maintenance Activities

The following significant operation and maintenance activities were performed between October 1, 1998 and September 30, 1999.

1. On November 2, 1998, a pH probe meter cord was replaced. Numerous alarms for pH deviations had been recorded and the cause of the alarms was found to be a short in the pH cable, which alarmed due to the vibration caused by passing coal trains.

2. On November 13, 1998, pH Probe #1 was rebuilt.

3. On December 16, 1998, the storage tank was emptied and several large stones were removed. The sludge and grit at the bottom of the tank was pumped to the sludge storage tank.

4. On January 5, 1999, a crack was noted in the air compressor oil filter. The filter was replaced and the compressor oil changed.

5. On January 6, 1999, the spare diaphragm pump was rebuilt and placed in storage for use as a backup pump.

6. On April 26, 1999, the cover to Collection Sump #1 was removed, straightened and reinforced. The cover had been damaged by snow piles placed over the sump cover by the Miller Electric plowing contractor. Crash posts were installed in front of the sump and signage placed to inform the plow operators not to place snow on the sump cover.

7. On September 14, 1999, flush mount monitoring well covers were removed and the threads re-tapped. This will provide a better seal during the winter months and make it easier to remove the bolts in the spring.

8. On September 30, 1999, the two collection sump pumps and the building sump pump were removed and the oil changed. The removed oil was checked for water, which would indicate a seal leak. No water was noted in any of the removed oil.

F. Emergency Operation Shut Downs

On July 17, 1999, the variable frequency drive (VFD) for the reaction tank mixer failed. A new VFD was purchased and air freighted to the site. The new VFD was installed on July 20, 1999. During the period that the VFD was out of service, batches were run manually utilizing the chemical addition rates and process times specified by the PLC. Mixing of the batches was conducted by manually increasing the air flow to the reaction tank during chemical addition. A safety factor of 1.5 was used for ferrous sulfate addition. The feed batch was tested prior to discharge using the Hach test kit. The Wisconsin DNR and the City of Appleton were informed of the mixer problems. No problems in the batch treatment process were noted.

III. GROUNDWATER SAMPLING

A. Groundwater Sampling Procedures

A total of 11 groundwater monitoring wells are associated with the groundwater treatment system and are sampled quarterly to determine the groundwater quality conditions at the site. Additionally, four piezometers were installed to measure the effectiveness of the groundwater collection trench system.

Groundwater levels are measured in the monitoring wells and the piezometers, relative to the north side of the top of the well casing. The latest round of groundwater monitoring well and piezometer groundwater readings and contours are shown in Figures #3 and #4. The groundwater elevation versus time graph is contained in Appendix C.

The 11 groundwater monitoring wells are sampled in March, June, September and December of each year. A dedicated 12-volt submersible pump is installed in each well. Water level measurements are collected from each monitoring well prior to sampling. Each well is slowly pumped dry and allowed to recharge for approximately 3-hours. The wells are then pumped dry again, allowed to recharge and then sampled. Two duplicate samples are also collected as a quality control measure. Purge water from the wells is collected and dumped into the collection sumps.

The sampling process utilizes a flow through cell to read the pH, temperature, conductivity, redox potential and dissolved oxygen in each well. The flow through cell consists of a 1-liter laboratory beaker placed over a 5-gallon bucket. Flow through the cell is maintained at approximately 250 ml/min. utilizing a resister to

control pump flow. The same approximate flow rate is maintained for purging and sampling. Groundwater samples are collected upon stabilization of the conductivity in each monitoring well or after each well has been pumped dry twice. The pH, conductivity, redox potential and dissolved oxygen readings for each monitoring well are recorded upon stabilization of the conductivity. The groundwater samples are then collected in the order of VOC vials first and metal samples second. The metal samples are not filtered. The laboratory containers supplied for metals analysis included NA0H and HN03 as preservatives. The collected samples are submitted to Northern Lake Service, Inc., Crandon, Wisconsin. The collected samples are analyzed for cyanide, selected metals and Volatile Organic Compounds (VOC's), as specified by the Wisconsin DNR. Alkalinity and ferrous iron testing was conducted using field Hach test kits.

B. Groundwater Sampling Results

The collected groundwater samples are analyzed for cyanide, selected metals and VOC's. Additionally, field analysis is conducted at each well for pH, temperature, conductivity, dissolved oxygen, Redox potential, alkalinity and ferrous iron. The field analysis sampling results will track the ability of the soil and groundwater to naturally bio-remediate the residual volatile organic compounds at the site.

The laboratory analytical results indicate that levels of total chromium exceed the DNR NR 140.10 Groundwater Enforcement Standard in monitoring well MW-107. MW-107 is the closest down-gradient well to the remediation building. Additionally, VOC compounds in MW-107 have been detected in excess of either the NR 149.21(9) maximum contaminant levels (MCL's) or the NR 140.10 Groundwater Enforcement Standards (ES). Exceedances of the MCL and ES for manganese have been found in all of the groundwater wells since sampling began in February 1997. These exceedances also appear in the background wells (W-2 & MW-108) which would indicate that the high levels of manganese in the groundwater occurs naturally.

A review of the laboratory analytical and groundwater flow data does not indicate any significant seasonal changes in the analytical results or groundwater flow direction. Overall, concentrations of organic and inorganic compounds appear to be decreasing.

The laboratory analytical results are contained in Tables #4 and #5. Graphs of the contaminant concentrations over time for the analyzed inorganic compounds are contained in Appendix A. Cyanide and mercury were not included on the graphs because there were no analytical detections for either compound above

the laboratory method detection limits. For graphing purposes, analytical results below the laboratory LOD were listed at half the analytical laboratory's method detection limit. A graph of the detected VOC compounds at MW-107 over time is contained in Appendix B. An Isoconcentration map for total chromium is shown in Figure #5.

The effectiveness of the existing groundwater treatment system towards meeting the clean-up goals in the groundwater will require analysis of data over an extended period of time to evaluate trends in metals and VOC reductions. Based upon the current analytical results, concentrations are generally stable, except in the source areas.

IV. GROUNDWATER COLLECTION SYSTEM

A. Collection Trenches

The groundwater collection system utilizes approximately 1,000 linear feet of coarse sand filled trenching, which was installed to draw groundwater from the contaminated areas to two collection sumps. Collection Sump #1, designated Manhole #1 on the site map and located at the southwest corner of the property, collects flows from below the Miller Electric parking lot and the south end of the Mauthe property.

Collection Sump #2, designated Manhole #2, on the site map and located along Outagamie Street south of the railroad tracks collects flows from the triangular area bounded by the railroad tracks, Outagamie Street and Second Street.

Piezometric groundwater levels in the area of the trenching indicate that the trenches are creating a capture zone, which directs groundwater to the collection trench system. Based upon the groundwater elevation data, the capture zone acts as containment for the existing contaminant plume.

Groundwater flows from the Mauthe site tend to flow southwest toward the collection trenches. Groundwater flow from the properties south of the railroad tracks flow in a northerly direction during periods of lower groundwater elevations and northeasterly in periods of higher groundwater elevations. In both cases, the flows are captured by the collection trench system. A summary of the historical groundwater elevations is shown in Table #6.

Foundation drains at 1410 and 1414 West Second Street and 801 South Outagamie Street are connected to the collection trench system. Additionally, the sump pump at 1428 West Second Street is connected to the system. During

the operation and maintenance period from October 1, 1998 through September 30, 1999, there were no reported problems with the foundation drains on any of the connected drain systems.

Homeowners were not notified of the July 17, 1999 plant shutdown because the system was switched to manual operation before water levels in either collection sump ever reached the elevations of any of the neighboring drain tile (assumed to be less than 10-feet below grade).

V. CONCLUSIONS & RECOMMENDATIONS

The latest round (September 13, 1999) of groundwater samples collected from the 11 monitoring wells, indicates residual chromium contamination above the DNR NR 140.10 ES exists in monitoring well MW-107. Additionally, two VOC compounds in excess of the NR 140.10 ES or the NR 149.21(9) maximum contaminant levels (MCL's) were detected in MW-107. High levels of manganese, noted historically in all wells, appears to occur naturally and may not be related to the past site uses.

A review of the groundwater flow patterns over the last year indicates the groundwater collection trench system is creating a capture zone that prevents the contamination plume from expanding and directs the groundwater to the trenching and, ultimately, the remediation system.

There have been no exceedances of the City of Appleton Industrial Discharge Permit for the treated effluent. The influent and effluent from the facility are sampled and analyzed to monitor the treatment process and confirm compliance with the discharge permit. The plant is operated and maintained to consistently meet the standards set by the City of Appleton POTW.

Data collected to date shows stable concentrations in the groundwater monitoring wells, with the exception of the two source area wells (MW-104 and MW-107). The effectiveness of the treatment system, in meeting the groundwater clean-up goals, will required additional data over time to evaluate the trends in organic and inorganic compound reductions.

Based upon the results of the September 13, 1999 groundwater sampling results and the batch treatment process analytical results, MCO recommends continued operation of the groundwater treatment system at the N.W. Mauthe groundwater remediation site.

MCO has included an operation and maintenance cost summary for the site in Appendix D. The Wisconsin DNR Operation & Maintenance Report Form 4400-194 is contained in Appendix E.

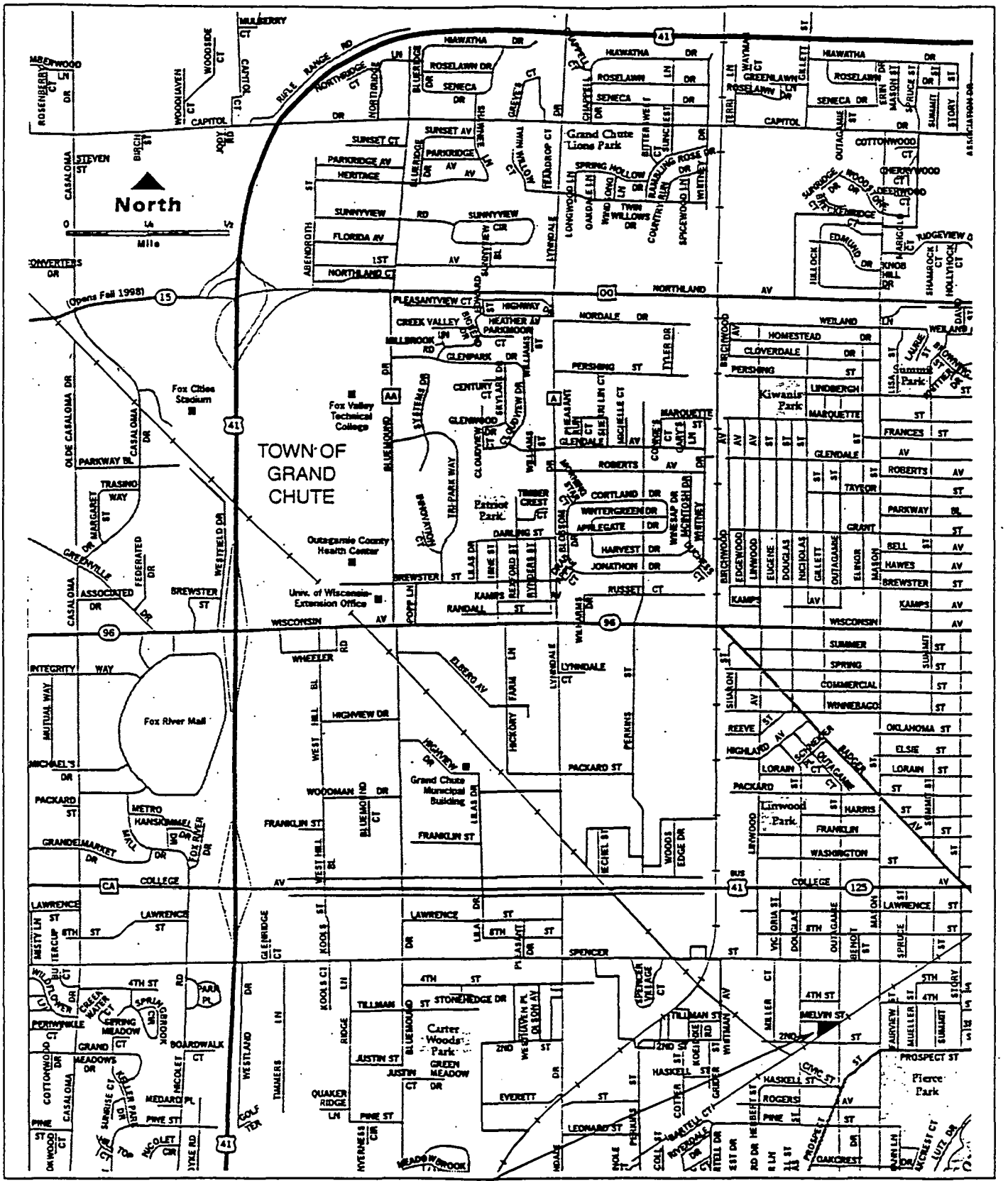

FIGURE 1

SITE LOCATION MAP

N.W. MAUTHE SUPERFUND SITE
APPLETON, WI

McM #M050-98808 July, 99

McMAHON
ASSOCIATES, INC.
ENGINEERS ▪ ARCHITECTS
SCIENTISTS ▪ SURVEYORS

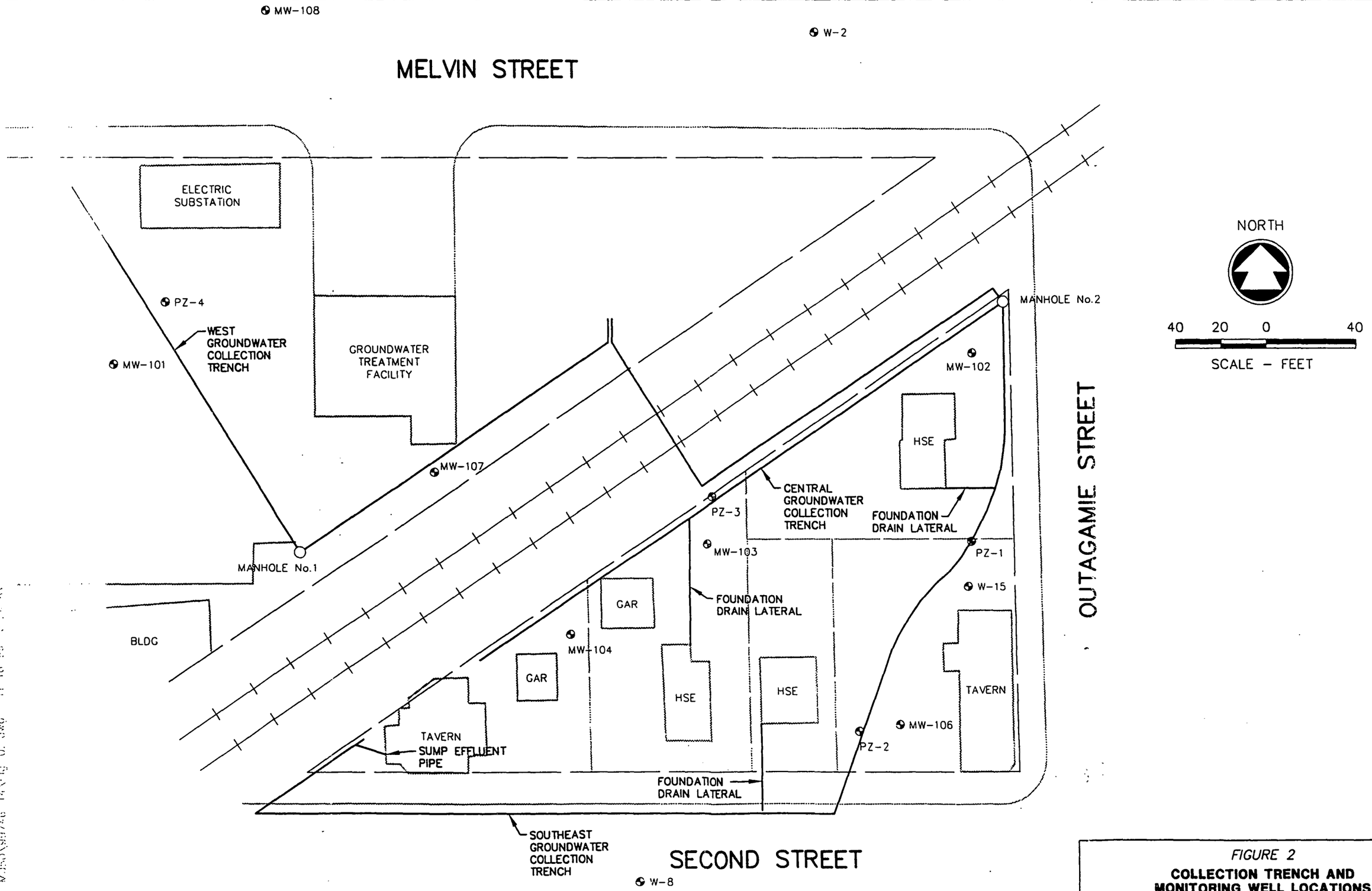

FIGURE 2

COLLECTION TRENCH AND MONITORING WELL LOCATIONS N.W. MAUTHE SUPERFUND SITE

APPLETON, WISCONSIN

McM# M050-99746.14 SEPTEMBER 13, 1999

MELVIN STREET

MW-108
799.93

W-2
798.88

ELECTRIC SUBSTATION

WEST GROUNDWATER COLLECTION TRENCH

PZ-4

MW-101
797.24

GROUNDWATER TREATMENT FACILITY

MW-107
797.46

MANHOLE No.1

MANHOLE No.2

MW-102
780.75

HSE

CENTRAL GROUNDWATER COLLECTION TRENCH

FOUNDATION DRAIN LATERAL

PZ-3

PZ-1

MW-103
793.95

W-15
795.91

BLDG

GAR

MW-104
797.00

GAR

FOUNDATION DRAIN LATERAL

HSE

HSE

TAVERN

PZ-2

MW-106
796.20

TAVERN SUMP EFFLUENT PIPE

FOUNDATION DRAIN LATERAL

SOUTHEAST GROUNDWATER COLLECTION TRENCH

SECOND STREET

W-8
796.65

MW-105
799.36

OUTAGAMIE STREET

798 796 794 792 790 788 786 784 782

NORTH

40 20 0 40

SCALE - FEET

W-8 798.88 MONITORING WELL & GROUNDWATER ELEVATION

GROUNDWATER FLOW DIRECTION

785 GROUNDWATER CONTOUR

FIGURE 3

GROUNDWATER MONITORING WELLS LOCATIONS & GROUNDWATER CONTOURS N.W. MAUTHE SUPERFUND SITE

APPLETON, WISCONSIN

McM# M050-99746.14 SEPTEMBER 13, 1999

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MW-108

W-2

MELVIN STREET

ELECTRIC SUBSTATION

WEST GROUNDWATER COLLECTION TRENCH

PZ-4
783.43

MW-101

782

GROUNDWATER TREATMENT FACILITY

MW-107

MANHOLE No.1

MANHOLE No.2

CENTRAL GROUNDWATER COLLECTION TRENCH

MW-102

HSE FOUNDATION DRAIN LATERAL

PZ-3
780.07

MW-103

782

784

786

PZ-1
785.92

W-15

BLDG

GAR

MW-104

FOUNDATION DRAIN LATERAL

GAR

HSE

HSE

788

TAVERN

MW-106

TAVERN SUMP EFFLUENT PIPE

PZ-2
788.92

FOUNDATION DRAIN LATERAL

SOUTHEAST GROUNDWATER COLLECTION TRENCH

SECOND STREET

W-8

MW-105

OUTAGAMIE STREET

NORTH

40 20 0 40

SCALE - FEET

PZ-1
800.81

PIEZOMETER & POTENTIOMETRIC SURFACE ELEVATION

POTENTIOMETRIC GRADIENT

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FIGURE 4

PIEZOMETER LOCATIONS AND PIEZOMETRIC CONTOURS N.W. MAUTHE SUPERFUND SITE

APPLETON, WISCONSIN

McM# M050-99746.14 SEPTEMBER 13, 1999

MW-108
4.5 ug/L

W-2
2.0 ug/L

MELVIN STREET

ELECTRIC SUBSTATION

WEST GROUNDWATER COLLECTION TRENCH

PZ-4

MW-101
2.9 ug/L

GROUNDWATER TREATMENT FACILITY

MANHOLE No.2

MW-102
4.0 ug/L

HSE

MW-107
4000 ug/L

CENTRAL GROUNDWATER COLLECTION TRENCH

PZ-3

FOUNDATION DRAIN LATERAL

MW-103
720 ug/L

PZ-1

MANHOLE No.1

W-15
5.3 ug/L

BLDG

GAR

MW-104
80 ug/L

FOUNDATION DRAIN LATERAL

GAR

HSE

HSE

TAVERN

TAVERN

SUMP EFFLUENT PIPE

MW-106
1.8 ug/L

PZ-2

FOUNDATION DRAIN LATERAL

SOUTHEAST GROUNDWATER COLLECTION TRENCH

SECOND STREET

W-8
1.9 ug/L

MW-105
.64* ug/L

OUTAGAMIE STREET

10
100
1000
10
10

NORTH

40 20 0 40

SCALE - FEET

10	ISOCONCENTRATION OF CHROMIUM (ESTIMATED)
<	LESS THAN THE DETECTION LIMIT
ug/L	MICROGRAM.LITER
MW-102	MONITORING WELL
*	ANOLYTE DETECTED IN THE AREA OF LESS CERTAIN QUANTITATION

FIGURE 5

ISOCONCENTRATION MAP
TOTAL CHROMIUM ug/L In Groundwater
N.W. MAUTHE SUPERFUND SITE

APPLETON, WISCONSIN
McM# M050-99746.14 SEPTEMBER 13, 1999

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Table #1

CITY OF APPLETON EFFLUENT COMPLIANCE LIMITS
Effluent Point 001
N.W. Mauthe Superfund Site - Appleton, Wisconsin
MCO No. M050-99746.16

	Aluminum (mg/l)	Arsenic (mg/l)	Cadmium (mg/l)	Chromium Total (mg/l)	Copper (mg/l)	Cyanide (mg/l)	Lead (mg/l)	Mercury (mg/l)	Nickel (mg/l)	Zinc (mg/l)	Hexavalent Chromium (mg/L)
Effluent Limits Permit #97-21	70	1.0	0.3	7.0	3.5	1.0	2.0	0.002	2.0	10.0	4.5

mg/l = milligram / liter
ug/l = microgram / liter

Table #2

BATCH DISCHARGES
October 1, 1998 Through September 30, 1999
N.W. Mauthe Superfund Site - Appleton, Wisconsin
MCO No. M050-99746.16

Month	Monthly (gallons)	Quarterly Flow (gallons)
October 1998	28,648	
November 1998	25,370	69,663
December 1998	15,645	
January 1999	22,084	
February 1999	62,860	128,946
March 1999	44,002	
April 1999	94,011	
May 1999	59,435	247,240
June 1999	93,794	
July 1999	106,344	
August 1999	66,009	197,301
September 1999	24,948	
TOTAL	**643,150**	

Table #3

LABORATORY ANALYTICAL RESULTS
Effluent Point 001
N.W. Mauthe Superfund Site - Appleton, Wisconsin
MCO No. M050-99746.16

Sample Name	Sample Date	Aluminum (mg/l)	Arsenic (mg/l)	Cadmium (mg/l)	Chromium Total (mg/l)	Copper (mg/l)	Cyanide (mg/l)	Lead (mg/l)	Mercury (mg/l)	Nickel (mg/l)	Zinc (mg/l)	Hexavalent Chromium (mg/L)
Outfall 001*	02/20/97	<.02	<.003	<.00050	0.04	<.01	<.00001	<.005	<.0002	<.005	0.0051	<.01
Outfall 001*	05/27/97	NA	NA	NA	0.26	NA	NA	NA	NA	NA	NA	NA
Outfall 001*	09/11/97	NA	NA	NA	0.557	NA	NA	NA	NA	NA	NA	NA
Outfall 001*	12/12/97	NA	NA	NA	0.279	NA	NA	NA	NA	NA	NA	NA
Outfall 001*	03/24/98	0.0152	<.002	<.00004	0.0637	<.0095	<.0017	<.0006	<.000015	<.0095	0.0046	0.1
Outfall 001**	04/29/98	<.011	<.002	<.005	0.22	<.05	0.002	<.1	<.0002	<.04	<.005	NA
Outfall 001*	06/10/98	NA	NA	NA	0.0784	NA	NA	NA	NA	NA	NA	NA
Outfall 001**	10/07/98	<.011	<.002	0.005	0.17	<.05	<.001	<.1	<.0002	<.04	0.025	NA
Outfall 001***	10/27/98	NA	NA	NA	0.094	NA	NA	NA	NA	NA	NA	NA
Outfall 001***	02/09/99	NA	NA	NA	0.16	NA	NA	NA	NA	NA	NA	NA
Outfall 001***	03/18/99	<.009	<.003	<.0031	NA	.00068****	<.000032	<.0024	<.00005	.00351****	<.012	<.0036
Outfall 001***	06/08/99	NA	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA
Outfall 001***	09/13/99	NA	NA	NA	0.17	NA	NA	NA	NA	NA	NA	NA
Outfall 001***	09/21/1999**	<.011	<.002	<.005	<.05	<.05	0.003	<.1	<.00015	<.04	0.008	NA
Effluent Limits Permit #97-21		70	1	0.3	7	3.5	1	2	0.002	2	10	4.5

mg/l = milligram / liter
ug/l = microgram / liter
N/A = not applicable
* = Sampled by CH2M Hill
** = Sampled by the City of Appleton
*** = Sampled by MCO
**** =Detect of Compound in Area of Less Certain Quantifiation.

Table #4

LABORATORY ANALYTICAL RESULTS / Selected Metals
N.W. Mauthe Superfund Site - Appleton, Wisconsin
MCO No. M050-99746.16

Well Name	Sample Date	Cadmium (ug/l)	Chromium (ug/l)	Copper (ug/l)	Cyanide (ug/l)	Manganese (ug/L)	Mercury (ug/l)	Zinc (ug/l)
W-2	02/20/97	NA	15	26	NA	460	NA	49
	05/27/97	0.43	8.5	<10	NA	170	<.2	30
	09/18/97	0.27	4.5**	9.5**	3**	116	<.03	16.9
	12/12/97	.13*	6.2	<9.7	<.8	133	.06*	20.4
	03/25/98	0.08	<3.9	<9.5	<1.7	83.8	.007*	18.6
	06/10/98	.31*	16.4	18.6**	<1.7	466	.027*	40.8
	10/27/98	.51*	3.60	4.7*	<.0032	69	<.05	170
	02/09/99	.46*	<.62	4.0	<.0032	240	<0.05	23
	06/08/99	<.31	<.62	1.8*	<.0032	290	<0.05	<12
	09/13/99	<.31	2.00	3.2	<.0032	240	<.05	<12
W-8	02/20/97	NA	17	22	NA	320	NA	34
	05/27/97	1.6	37	27	NA	670	<.2	54
	09/18/97	0.45	14.4	14.6**	1**	338	.11**	31.8
	12/12/97	0.5*	5.7	<9.7	<.8	147	.07*	17.1
	03/25/98	0.43	10.1	15**	<1.7	205	.007*	21
	06/10/98	0.54	9.9	12.6**	<1.7	264	.016*	21.6
	10/27/98	0.80	3.90	4.8*	<.0032	64	<.05	85
	02/09/99	<.31	<.62	<60	<.0032	850	<.05	12
	06/08/99	<.31	<.62	2.6	<.0032	50	<.05	<12
	09/13/99	<.31	1.90	2.7	<.0032	98	<.05	29
W-15	02/20/97	NA	32	52	NA	430	NA	88
	05/27/97	0.27	5.9	15	NA	97	<.2	39
	09/18/97	0.31	13.9	18.8**	<.78	325	<.03	35.5
	12/12/97	.12*	5.7	9.7**	<.8	80.9	.03*	18.5
	03/25/98	.04*	<3.9	<9.5	<1.7	85.7	.038*	13.7
	06/10/98	.11*	10	13.2**	<1.7	147	.016*	18.8
	10/27/98	.41*	6.80	7.40	<.0032	110	<.05	100
	02/09/99	<.31	<.62	<.60	<.0032	320	<.05	<12
	06/08/99	<.31	2.40	14.00	<.0032	130	<.05	66
	09/13/99	<.31	5.30	6.40	<.0032	130	<.05	16

Table #4

LABORATORY ANALYTICAL RESULTS / Selected Metals
N.W. Mauthe Superfund Site - Appleton, Wisconsin
MCO No. M050-99746.16

Well Name	Sample Date	Cadmium (ug/l)	Chromium (ug/l)	Copper (ug/l)	Cyanide (ug/l)	Manganese (ug/L)	Mercury (ug/l)	Zinc (ug/l)
MW-101	02/20/97	NA	36	41	NA	820	NA	49
	05/27/97	<.2	10	11	NA	170	<.03	18
	09/18/97	.06**	11.9	10.7**	1**	145	<.05	18.2
	12/12/97	.06*	12.8	<9.7	<.8	176	.05*	20.7
	03/25/98	.04*	20.9	21.6**	<1.7	239	.007*	32.7
	06/10/98	.27*	48.2	46.8	<1.7	604	.044*	75.9
	10/27/98	<.16	3.20	4.2*	<.0032	24	<.05	54
	02/09/99	<.31	<.62	<.60	<.0032	1,900	<.05	14
	06/08/99	<.31	1.80	8.2	<.0032	380	<.05	39
	09/13/99	<.31	2.90	5.1	<.0032	31	<.05	<12
MW-102	02/20/97	NA	26	38	NA	570	NA	34
	05/27/97	0.21	48	77	NA	920	<.2	73
	09/18/97	.08**	<3.92	6.9**	2**	302	<.03	8.7
	12/12/97	.04*	<3.9	<9.7	<.8	387	.04*	10.9
	03/25/98	.11*	<3.9	9.5**	<1.7	302	.007*	7.4*
	06/10/98	.04*	<3.9	<9.8	<1.7	318	.018*	9.5
	10/27/98	.27*	.98*	3.2*	<.0032	340	<.05	24
	02/09/99	<.31	.73*	<.60	<.0032	670	<.05	20
	06/08/99	<.31	1.2*	5.8	<.0032	140	<.05	36
	09/13/99	<.31	4.00	15.0	<.0032	160	<.05	73
MW-103	02/20/97	NA	1,300	47	NA	800	NA	27
	05/27/97	<.2	160.0	31	NA	900	<.2	29
	09/18/97	.06**	35.2	13.5**	3**	287	<.03	13.7
	12/12/97	.04*	16.3	<9.7	<.8	84.3	.09*	21.4
	03/25/98	.04*	15.5	<9.5	<1.7	83	.007*	7.5*
	06/10/98	.15*	57.6	27.5	<1.7	417	.02*	33.7
	10/27/98	<.16	6.30	2.3*	<.0032	27	<.05	30.0
	06/08/99	<.31	87.00	3.5	<.0032	810	<.05	30
	09/13/99	<.31	720.00	5.9	<.0032	83	<.05	15

Table #4

LABORATORY ANALYTICAL RESULTS / Selected Metals
N.W. Mauthe Superfund Site - Appleton, Wisconsin
MCO No. M050-99746.16

Well Name	Sample Date	Cadmium (ug/l)	Chromium (ug/l)	Copper (ug/l)	Cyanide (ug/l)	Manganese (ug/L)	Mercury (ug/l)	Zinc (ug/l)
MW-104	02/20/97	NA	5.9	15	NA	550	NA	6.9
	05/27/97	<.02	6.9	11	NA	470	<.2	5.2
	09/18/97	<.04	35.6	5**	3**	235	<.03	4.74
	12/12/97	.04*	61.8	9.8**	<.8	279	.05*	14
	03/25/98	.04*	66.8	<9.5	<1.7	73.6	.008*	7.4*
	06/10/98	.04*	219	<9.8	<1.7	107	.016*	12.8
	10/27/98	.29*	150.0	2.3*	<.0032	25	<.05	30
	02/09/99	<.31	94.00	1.4*	<.0032	1,000	<.05	<12
	06/08/99	1*	62.00	12.0	<.0032	620	<.05	17
	09/13/99	<.31	80.00	3.2	<.0032	9.2	<.05	<12
MW-105	02/20/97	NA	21	22	NA	1,100	NA	23
	05/27/97	<.2	5	<10	NA	120	<.2	12
	09/18/97	.14**	29.5	28.3	1**	532	<.03	46
	12/12/97	.36*	15.8	12.5**	<.8	297	.03*	27.1
	03/25/98	.04*	30.8	27.6	<1.7	518	.064*	44
	06/10/98	.048*	13.7	15.3**	<1.7	217	.016*	22.1
	10/27/98	.29*	8.80	8.20	<.0032	150	<.05	70
	02/09/99	<.31	1.3*	4.30	<.0032	2,000	<.05	19
	06/08/99	<.31	1*	18.00	<.0032	1,300	<.05	66
	09/13/99	<.31	.64*	24.00	<.0032	1,700	<.05	30
MW-106	02/20/97	NA	21	24	NA	320	NA	26
	05/27/97	<.02	40	35	NA	590	<.2	68
	09/18/97	.05**	5.5	6.2**	1**	56.9	<.03	35.6
	12/12/97	.04*	9.2	9.7**	<.08	155	.03*	18.4
	03/25/98	NA	13.40	14.4**	<1.7	150	.007*	18.5
	06/10/98	.04*	<3.9	10.2**	<1.7	10	.016*	10.9
	10/27/98	.27*	3.20	4.3*	<.0032	38	<.05	88
	02/09/99	<.31	<.62	1.1*	<.0032	760	<.05	22
	06/08/99	<.31	.79*	2.3	<.0032	900	<.05	<12
	09/13/99	<.31	1.80	4.7	<.0032	1,100	<.05	30

Table #4

LABORATORY ANALYTICAL RESULTS / Selected Metals
N.W. Mauthe Superfund Site - Appleton, Wisconsin
MCO No. M050-99746.16

Well Name	Sample Date	Cadmium (ug/l)	Chromium (ug/l)	Copper (ug/l)	Cyanide (ug/l)	Manganese (ug/L)	Mercury (ug/l)	Zinc (ug/l)
MW-107	02/20/97	NA	2,000	13	NA	190	NA	6.9
	05/27/97	<.2	3,600	<10	NA	91	<.2	10
	09/18/97	<.04	2,670	<8.1	1**	59.3	<.03	33.5
	12/12/97	.04*	2,310	<9.7	<.8	48.4	.1*	6.7
	03/25/98	.04*	11200*	12.1**	<1.7	68.2	.041*	9.3*
	06/10/98	.11*	6,240	13.8**	<1.7	161	.027*	17.3*
	10/27/98	<.16	7,100	1.2*	<.0032	28	<.05	94
	02/09/99	<.31	3,200	1.9*	<.0032	49	<.05	<12
	06/08/99	<.31	5,800	3.0	<.0032	25	<.05	<12
	09/13/99	<.31	4,000	1.9*	<.0032	18	<.05	<12
MW-108	02/20/97	NA	25	23	NA	490	NA	31
	05/27/97	<.2	11	13	NA	210	<.2	15
	09/18/97	.14**	27.4	22.4**	1**	462	<.03	36.6
	12/12/97	.04*	5.6	<9.7	<.8	74.8	.03*	27.9
	03/25/98	.04*	9.4	10.4**	<1.7	142	.007*	13.8
	06/10/98	.14*	28.4	25.5	<1.7	478	.021*	40.5
	10/27/98	.26*	8.90	7.40	<.0032	88	<0.5	44
	02/09/99	<.31	1.70	3.90	<.0032	560	<.05	30
	06/08/99	<.31	3.10	1.4*	<.0032	450	<.05	54
	09/13/99	<.31	4.50	5.30	<.0032	100	<.05	<12
Maximum Contaminant Level (MCL)		5	100	100	200	50	2	5,000
Enforcement Standard Chapter NR 140.10		5	100	1,300	200	50	2	5,000
Preventive Action Limit Chapter NR 140.10		0.5	10	130	40	25	0.2	2,500

Samples collected prior to 10/27/98 were collected by CH2M Hill.
* = Detection of compound in area of less certain quantification.
** = Compound was found in sample and blank.
N.D. = Not detected above the analytical laboratories method detection limit
N.A. = Not Analyzed
MW-104 = Was tested for Aluminum, Nickel, Arsenic & Lead. No quantifiable detections were noted for any of the analytes.
ug/l = Microgram/Liter
mg/l = Milligram / Liter
Indicates an exceedance of the NR 140 Groundwater Quality Enforcement Standard

Table #5

LABORATORY ANALYTICAL RESULTS
Volatile Organic Compounds (VOC's)
N.W. Mauthe Superfund Site - Appleton, Wisconsin
MCO No. M050-99746.164

Well Name	Sample Date	Benzene (ug/l)	Chloroform (ug/l)	1,1-Dichloroethane (ug/l)	1,1-Dichloroethene (ug/l)	cis-1,2,-Dichloroethene (ug/l)	Trans-1,2,-Dichloroethene (ug/l)	Ortho-Xylene (ug/l)	Toluene (ug/l)	1,1,1-Trichloroethane (ug/l)	1,1,2-Trichloroethane (ug/l)	Trichloroethene (ug/l)	Meta, para Xylene (ug/l)	Total Xylenes (ug/l)
W-2	02/20/97	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	05/27/97	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	09/18/97	<.5	<.6	<85	<.7	<7	<7	<124	<68	<40	<.5	<.5	<124	-
	12/12/97	<.5	<.6	<85	<.7	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	03/25/98	<.5	<.6	<85	<.7	<7	<7	<.4	<68	<40	<.5	<.5	.4**	-
	06/10/98	<.5	<.6	<85	<.7	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	10/27/98	<.24	<.23	<.27	<.28	<.27	<.26	<.17	<.21	<.26	<.23	<.29	<.36	-
	02/09/99	.15*	<.15	<.14	<.15	<.16	<.17	***	<.13	<.14	<.15	<.14	***	<.37
	06/08/99	<.13	<.15	<.14	<.15	<.16	<.17	***	<.13	<.14	<.15	<.14	***	<.37
	09/13/99	<.13	<.15	<.14	<.15	<.16	<.17	***	.13*	<.14	<.15	<.14	***	<37
W-8	02/20/97	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-
	05/27/97	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	09/18/97	<.5	<.6	<85	<40	<7	<7	<124	<68	<40	<.5	<.5	<124	-
	12/12/97	<.5	<.6	<85	<40	<7	<7	<.4	<68	<40	<.5	<.5	.4**	-
	03/25/98	<.5	<.6	<85	<40	<7	<7	<.3	<68	<40	<.5	<.5	.3**	-
	06/10/98	<.5	<.6	<85	<40	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	10/27/98	<.24	<.23	<.27	<.28	<.27	<.26	<.17	<.21	<.26	<.23	<.29	<.36	-
	02/09/99	.19*	<.15	<.15	<.15	<.16	<.17	***	.15*	<.14	<.15	<.15	***	<.37
	06/08/99	<.13	<.15	<.14	<.15	<.16	<.17	***	0.13	<.14	<.15	<.14	***	<.37
	09/13/99	<.13	<.15	<.14	<.15	<.16	<.17	***	<.13	<.14	<.15	<.14	***	<.37
W-15	02/20/97	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	05/27/97	<.5	0.22	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	09/18/97	<.5	<.6	<85	<.7	<7	<7	<124	<68	<40	<.5	<.5	<124	-
	12/12/97	<.5	<.6	<85	<.7	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	03/25/98	<.5	<.6	<85	<.7	<7	<7	<.4	<68	<40	<.5	<.5	.4**	-
	06/10/98	<.5	<.6	<85	<.7	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	10/27/98	<.24	<.23	<.27	<.28	<.27	<.26	<.17	<.21	<.26	<.23	<.29	<.36	-
	02/09/99	<.13	<.15	<.14	<.15	<.16	<.17	***	<.13	<.14	<.15	<.14	***	<.37
	06/08/99	.16*	<.15	<.14	<.15	<.16	<.17	***	<.13	<.14	<.15	<.14	***	<.37
	09/13/99	<.13	<.15	<.14	<.15	<.16	<.17	***	<.13	<.14	<.15	<.14	***	<.37

Table #5

LABORATORY ANALYTICAL RESULTS
Volatile Organic Compounds (VOC's)
N.W. Mauthe Superfund Site - Appleton, Wisconsin
MCO No. M050-99746.164

Well Name	Sample Date	Benzene (ug/l)	Chloroform (ug/l)	1,1-Dichloroethane (ug/l)	1,1-Dichloroethene (ug/l)	cis-1,2,-Dichloroethene (ug/l)	Trans-1,2,-Dichloroethene (ug/l)	Ortho-Xylene (ug/l)	Toluene (ug/l)	1,1,1-Trichloroethane (ug/l)	1,1,2-Trichloroethane (ug/l)	Trichloroethene (ug/l)	Meta, para Xylene (ug/l)	Total Xylenes (ug/l)
MW-101	02/20/97	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	05/27/97	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	09/18/97	<.5	<.6	.491*	.353*	<7	<7	<124	<68	3.03	<.5	3.31	<124	-
	12/12/97	<.5	<.6	<85	<.7	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	03/25/98	<.5	<.6	<85	<.7	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	06/10/98	<.5	<.6	<85	<.7	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	10/27/98	<.24	<.23	<.27	<.28	<.27	<.26	<.17	<.21	<.26	<.23	<.29	<.36	-
	02/09/99	<.13	<.15	<.14	<.15	<.16	<.17	***	0.91	<.14	<.15	<.14	***	<.37
	06/08/99	<.13	<.15	<.14	<.15	<.16	<.17	***	<.13	<.14	<.15	<.14	***	<.37
	09/13/99	<.13	<.15	<.14	<.15	<.16	<.17	***	<.13	<.14	<.15	<.14	***	<.37
MW-102	02/20/97	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	05/27/97	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	09/18/97	<.5	<.6	<.85	<85	<7	<7	<124	<68	<40	<.5	<.5	<124	-
	12/12/97	<.5	<.6	<85	<85	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	03/25/98	<.5	<.6	<85	<85	<7	<7	<.4	<68	<40	<.5	<.5	.4*	-
	06/10/98	<.5	<.6	<85	<85	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	10/27/98	<.24	<.23	<.27	<.28	<.27	<.26	<.17	<.21	<.26	<.23	<.29	<.36	-
	02/09/99	<.13	<.15	<.14	<.15	<.16	<.17	***	0.65	<.14	<.15	<.14	***	<.37
	06/08/99	<.13	<.15	<.14	<.15	<.16	<.17	***	.21*	<.14	<.15	<.14	***	<.37
	09/13/99	<.13	<.15	<.14	<.15	<.16	<.17	***	<.13	<.14	<.15	<.14	***	<.37
MW-103	02/20/97	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	05/27/97	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	09/18/97	<.5	<.6	<85	<.7	<7	<7	<124	<68	<40	<.5	<.5	<124	-
	12/12/97	<.5	<.6	<85	<.7	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	03/25/98	<.5	<.6	<85	<.7	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	06/10/98	<.5	<.6	<85	<.7	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	10/27/98	<.24	<.23	<.27	<.28	<.27	<.26	<.17	<.21	<.26	<.23	<.29	<.36	-
	02/09/99	<.13	<.15	<.14	<.15	<.16	<.17	***	.15*	<.14	<.15	<.14	***	<.37
	06/08/99	<.13	<.15	<.14	<.15	<.16	<.17	***	<.13	<.14	<.15	<.14	***	<.37
	09/13/99	<.13	<.15	<.14	<.15	<.16	<.17	***	<.13	<.14	<.15	<.14	***	<.37

Table #5

LABORATORY ANALYTICAL RESULTS
Volatile Organic Compounds (VOC's)
N.W. Mauthe Superfund Site - Appleton, Wisconsin
MCO No. M050-99746.164

Well Name	Sample Date	Benzene (ug/l)	Chloroform (ug/l)	1,1-Dichloroethane (ug/l)	1,1-Dichloroethene (ug/l)	cis-1,2,-Dichloroethene (ug/l)	Trans-1,2,-Dichloroethene (ug/l)	Ortho-Xylene (ug/l)	Toluene (ug/l)	1,1,1-Trichloroethane (ug/l)	1,1,2-Trichloroethane (ug/l)	Trichloroethene (ug/l)	Meta, para Xylene (ug/l)	Total Xylenes (ug/l)
MW-104	02/20/97	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	05/27/97	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	09/18/97	<.5	<.6	<85	<.7	<7	<7	<124	<68	.324*	<.5	<.5	<124	-
	12/12/97	<.5	<.6	0.4	<.7	<7	<7	<120	<68	1*	<.5	0.9	<120	-
	03/25/98	<.5	<.6	<85	<.7	<7	<7	<120	<68	.8*	<.5	<.5	<120	-
	06/10/98	<.5	<.6	<85	<.7	<7	<7	<120	<68	2*	<.5	<.5	<120	-
	10/27/98	<.24	<.23	.35*	<.28	<.27	<.26	<.17	<.21	1.8	<.23	<.29	<.36	-
	02/09/99	<.13	<.15	.38*	<.15	<.16	<.17	***	.17*	1.5	<.15	<.14	***	<.37
	06/08/99	<.13	<.15	.34*	<.15	<.16	<.17	***	.14*	1.4	<.15	<.14	***	<.37
	09/13/99	<.13	<.15	.38*	<.15	<.16	<.17	***	.27*	1.6	<.15	<.14	***	<.37
MW-105	02/20/97	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	05/27/97	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	09/18/97	<.5	<.6	<85	<.7	<7	<7	<124	<68	<40	<.5	<.5	<124	-
	12/12/97	<.5	<.6	<85	<.7	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	03/25/98	<.5	<.6	<85	<.7	<7	<7	<.4	<68	<40	<.5	<.5	.4*	-
	06/10/98	<.5	<.6	<85	<.7	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	10/27/98	<.24	<.23	<.27	<.28	<.27	<.26	<.17	<.21	<.26	<.23	<.29	<.36	-
	02/09/99	.16*	<.15	<.14	<.15	<.16	<.17	***	.3*	<.14	<.15	<.14	***	<.37
	06/08/99	<.13	<.15	<.14	<.15	<.16	<.17	***	<.13*	<.14	<.15	<.14	***	<.37
	09/13/99	<.13	<.15	<.14	<.15	<.16	<.17	***	<.13	<.14	<.15	<.14	***	<.37
MW-106	02/20/97	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	05/27/97	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	09/18/97	<.5	<.6	<85	<.7	<7	<7	<124	<68	2.73*	<.5	<.5	<124	-
	12/12/97	<.5	<.6	<85	<.7	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	03/25/98	<.5	<.6	<85	<.7	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	06/10/98	<.5	<.6	<85	<.7	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	10/27/98	<.24	<.23	<.27	<.28	<.27	<.26	<.17	<.21	<.26	<.23	<.29	<.36	-
	02/09/99	.18*	<.15	<.14	<.15	<.16	<.17	***	<.17	<.14	<.15	<.14	***	<.37
	06/08/99	<.13	<.15	<.14	<.15	<.16	<.17	***	<.13	<.14	<.15	<.14	***	<.37
	09/13/99	<.13	<.15	<.14	<.15	<.16	<.17	***	<.13	<.14	<.15	<.14	***	<.37

Table #5

LABORATORY ANALYTICAL RESULTS
Volatile Organic Compounds (VOC's)
N.W. Mauthe Superfund Site - Appleton, Wisconsin
MCO No. M050-99746.164

Well Name	Sample Date	Benzene (ug/l)	Chloroform (ug/l)	1,1-Dichloroethane (ug/l)	1,1-Dichloroethene (ug/l)	cis-1,2,-Dichloroethene (ug/l)	Trans-1,2,-Dichloroethene (ug/l)	Ortho-Xylene (ug/l)	Toluene (ug/l)	1,1,1-Trichloroethane (ug/l)	1,1,2-Trichloroethane (ug/l)	Trichloroethene (ug/l)	Meta, para Xylene (ug/l)	Total Xylenes (ug/l)
MW-107	02/20/97	<.5	0.3	11	8.4	0.7	<.7	<.5	<.5	81	0.6	50	<.5	-
	05/27/97	0.09	1.10	36	40	3.1	<3.1	<.5	0.34	390	3.5	420	<.5	-
	09/18/97	<10	<12	47.6*	22.1	2.61*	<2.61	<2480	<68	265*	2.83	295	<2480	-
	12/12/97	<10	<12	56*	23	3*	<3	<2500	<68	280	3	290	<2500	-
	03/25/98	<25	<30	61*	69	5*	<5	<17	<68	720	5	620	17*	-
	06/10/98	<12	<15	59*	58	<3	<3	<3100	63*	340*	4*	390	<3100	-
	10/27/98	<.24	1.4	62	46*	3.6	.51*	<.17	<.21	550	4.9	640	<.36	-
	02/09/99	<3.2	<3.8	48	24	<4.0	<4.2	***	<3.2	220	<.38	250	***	<9.2
	06/08/99	<2.6	<3.0	42	20	<3.2	<3.4	***	<2.6	200	<3.0	310	***	<7.4
	09/13/99	<.26	<3.0	34	19	<.32	<3.4	***	<2.6	180	<.3.0	320	***	<.7.4
MW-108	02/20/97	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	05/27/97	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	-
	09/18/97	<.5	<.6	<85	<.7	<7	<7	<124	<68	<40	<.5	<.5	<124	-
	12/12/97	<.5	<.6	<85	<.7	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	03/25/98	<.5	<.6	<85	<.7	<7	<7	<120	<68	<40	<.5	<.5	<120	-
	06/10/98	<.5	<.6	<85	<.7	<7	<7	<120	<68	<44	<.5	<.5	<120	-
	10/27/98	<.24	<.23	<.22	<.28	<.27	<.26	<.17	<.21	<.26	<.23	<.29	<.36	-
	02/09/99	<.13	<.15	<.14	<.15	<.16	<.17	***	0.83	<.14	<.15	<.14	***	<.37
	06/08/99	<.13	<.15	<.14	<.15	<.16	<.17	***	.15*	<.14	<.15	<.14	***	<.37
	09/13/99	<.13	<.15	<.14	<.15	<.16	<.17	***	0.84	<.14	<.15	<.14	***	<.32
MCL NR 149.21 (9)		5.0	-	-	7.0	70	100	-	1,000	200	5.0	5.0	10,000	-
Enforcement Standards (ES		5	6	850	7	70	100	620**	343	200	5	5	620**	620
Preventive Action Plan (PA		0.5	0.6	85	0.7	7	20	124**	686	40	0.5	0.5	124**	124

EXPLANATION:

Results prior to 10/27/98 for cis-1,2,-Dichloroethene and Trans-1,2 Dichloroethene were listed as Total Dichloroethene and were placed in this table under the heading cis-1,2,-Dichloroethene.
Results prior to 10/27/98 for Ortho Xylene and Meta, para Xylene were listed as Total Xylenes and were placed in this table under the heading Meta, para Xylene.
* = Detection of compound in area of less certain quantification
** = Standard includes Ortho-, Meta, para-Xylenes
*** = As of 02/09/99 Xylene results are listed as "Total Xylenes".
ND = Not Detected
NA = Not Analyzed
MCL = Maximum Contaminant Levels
= Indicates an exceedance of the MCL 149.21(9) or ES 140.10

Table #6

GROUNDWATER ELEVATIONS
N.W. Mauthe Superfund Site - Appleton, Wisconsin
MCO No. M050-99746.16

Well Name	Date Measured	Depth To Water (feet)	Reference Elevation (To Top PVC) (feet)	Groundwater Elevation (feet)
W-2	02/01/97	-		798.66
	05/01/97	-		801.01
	09/01/97	-		800.28
	12/01/97	-	804.66	797.69
	03/01/98	-		802.08
	06/01/98	-		799.38
	10/27/98	5.85		798.81
	02/08/99	4.50		800.16
	06/08/99	3.31		801.35
	09/13/99	5.78		798.88
W8	02/01/97	-		797.22
	05/01/97	-		797.66
	09/01/97	-		798.01
	12/01/97	-	803.36	796.52
	03/01/98	-		798.16
	06/01/98	-		797.31
	10/27/98	6.41		796.95
	02/08/99	5.49		797.87
	06/08/99	4.38		798.98
	09/13/99	6.71		796.65
W-15	02/01/97	-		793.97
	05/01/97	-		796.92
	09/01/97	-		797.23
	12/01/97	-	803.76	795.52
	03/01/98	-		796.78
	06/01/98	-		796.32
	10/27/98	7.95		795.81
	02/08/99	9.19		794.57
	06/08/99	6.89		796.87
	09/13/99	7.85		795.91
MW-101	02/01/97	-		797.16
	05/01/97	-		799.99
	09/01/97	-		798.67
	12/01/97	-	807.59	798.21
	03/01/98	-		803.43
	06/01/98	-		800.48
	10/27/98	10.26		797.33
	02/08/99	11.91		795.68
	06/08/99	9.79		797.80
	09/13/99	10.35		797.24

Table #6

GROUNDWATER ELEVATIONS
N.W. Mauthe Superfund Site - Appleton, Wisconsin
MCO No. M050-99746.16

Well Name	Date Measured	Depth To Water (feet)	Reference Elevation (To Top PVC) (feet)	Groundwater Elevation (feet)
MW-102	02/01/97	-		780.72
	05/01/97	-		780.89
	09/01/97	-		780.79
	12/01/97	-	804.45	780.95
	03/01/98	-		780.47
	06/01/98	-		780.72
	10/27/98	24.11		780.34
	02/08/99	23.84		780.61
	06/08/99	23.59		780.86
	09/13/99	23.70		780.75
MW-103	02/01/97	-		795.29
	05/01/97	-		791.83
	09/01/97	-		789.60
	12/01/97	-	803.74	787.78
	03/01/98	-		791.03
	06/01/98	-		789.13
	10/27/98	11.96		791.78
	02/08/99	10.24		793.50
	06/08/99	8.69		795.05
	09/13/99	9.79		793.95
MW-104	02/01/97	-		792.94
	05/01/97	-		789.91
	09/01/97	-		798.59
	12/01/97	-	807.28	795.70
	03/01/98	-		799.46
	06/01/98	-		796.60
	10/27/98	10.51		796.77
	02/08/99	9.04		798.24
	06/08/99	7.49		799.79
	09/13/99	10.28		797.00
MW-105	02/01/97	-		793.74
	05/01/97	-		800.60
	09/01/97	-		800.37
	12/01/97	-	803.96	799.03
	03/01/98	-		800.08
	06/01/98	-		800.50
	10/27/98	5.41		798.55
	02/08/99	6.46		797.50
	06/08/99	3.04		800.92
	09/13/99	4.60		799.36

Table #6

GROUNDWATER ELEVATIONS
N.W. Mauthe Superfund Site - Appleton, Wisconsin
MCO No. M050-99746.16

Well Name	Date Measured	Depth To Water (feet)	Reference Elevation (To Top PVC) (feet)	Groundwater Elevation (feet)
MW-106	02/01/97	-		794.75
	05/01/97	-		797.23
	09/01/97	-		796.91
	12/01/97	-	804.08	795.48
	03/01/98	-		797.37
	06/01/98	-		796.76
	10/27/98	8.12		795.96
	02/08/99	9.75		794.33
	06/08/99	6.72		797.36
	09/13/99	7.88		796.20
MW-107	02/01/97	-		788.23
	05/01/97	-		796.60
	09/01/97	-		797.64
	12/01/97	-	809.01	796.49
	03/01/98	-		796.68
	06/01/98	-		796.31
	10/27/98	10.71		798.30
	02/08/99	11.11		797.90
	06/08/99	11.04		797.97
	09/13/99	11.55		797.46
MW-108	02/01/97	-		798.36
	05/01/97	-		793.32
	09/01/97	-		790.53
	12/01/97	-	806.61	788.65
	03/01/98	-		795.59
	06/01/98	-		789.30
	10/27/98	6.98		799.63
	02/08/99	6.72		799.89
	06/08/99	5.80		800.81
	09/13/99	6.68		799.93
PZ-01	10/27/98	17.43	804.17	786.74
	02/08/99	18.24		785.93
	06/08/99	18.22		785.95
	09/13/99	18.25		785.92
PZ-02	10/27/98	14.66	803.64	788.98
	02/08/99	14.70		788.94
	06/08/99	14.70		788.94
	09/13/99	14.74		788.90

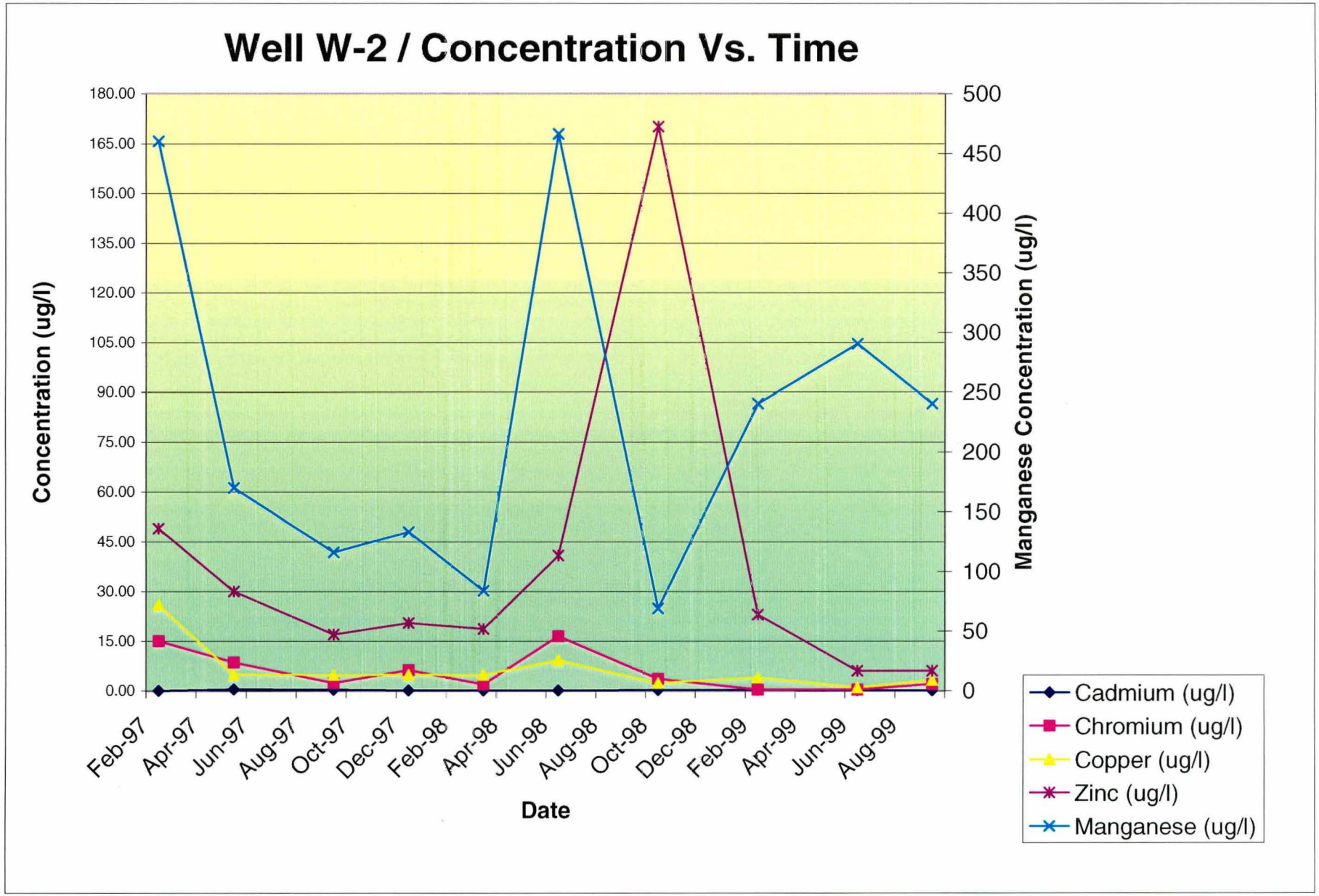
Table #6

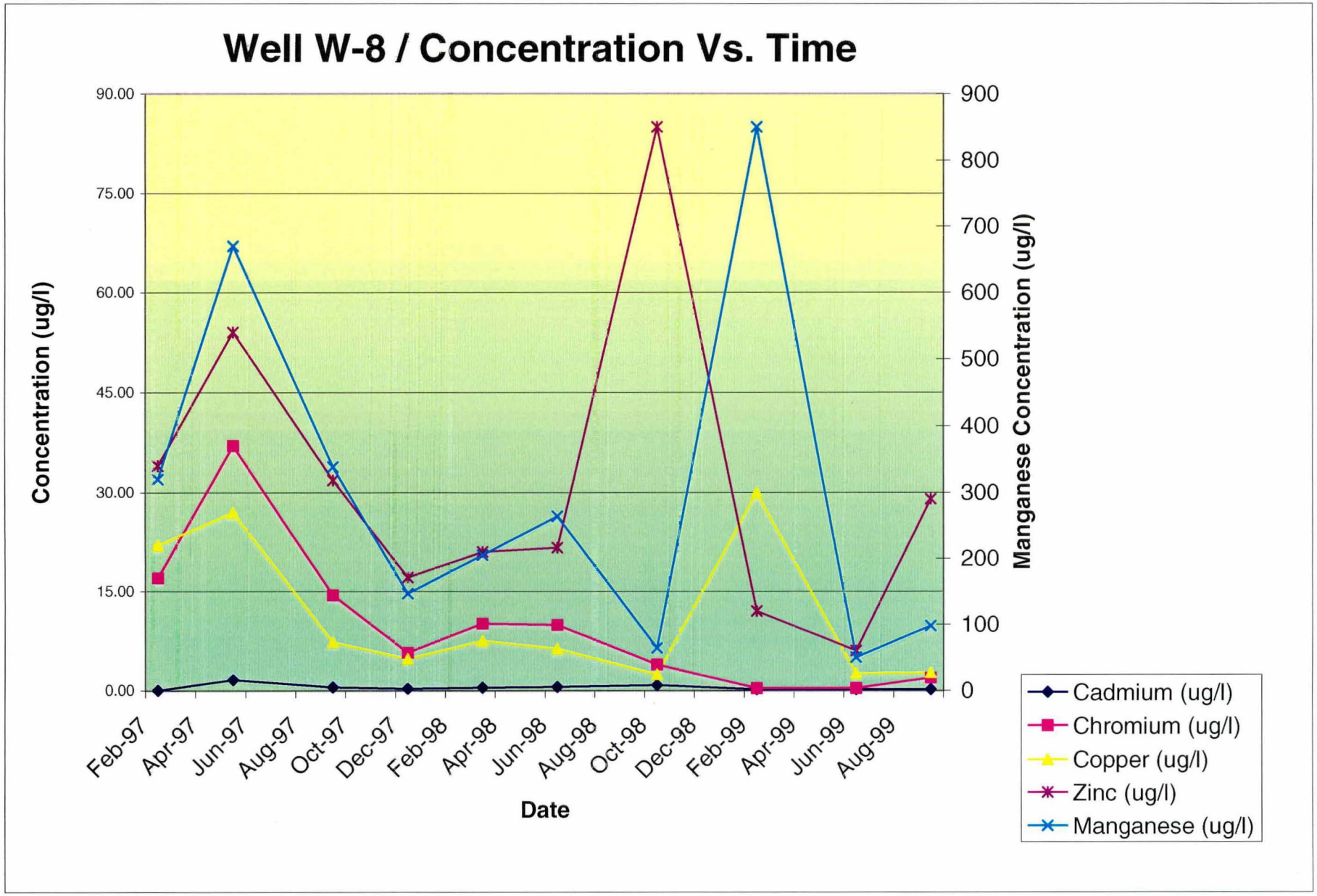
GROUNDWATER ELEVATIONS
N.W. Mauthe Superfund Site - Appleton, Wisconsin
MCO No. M050-99746.16

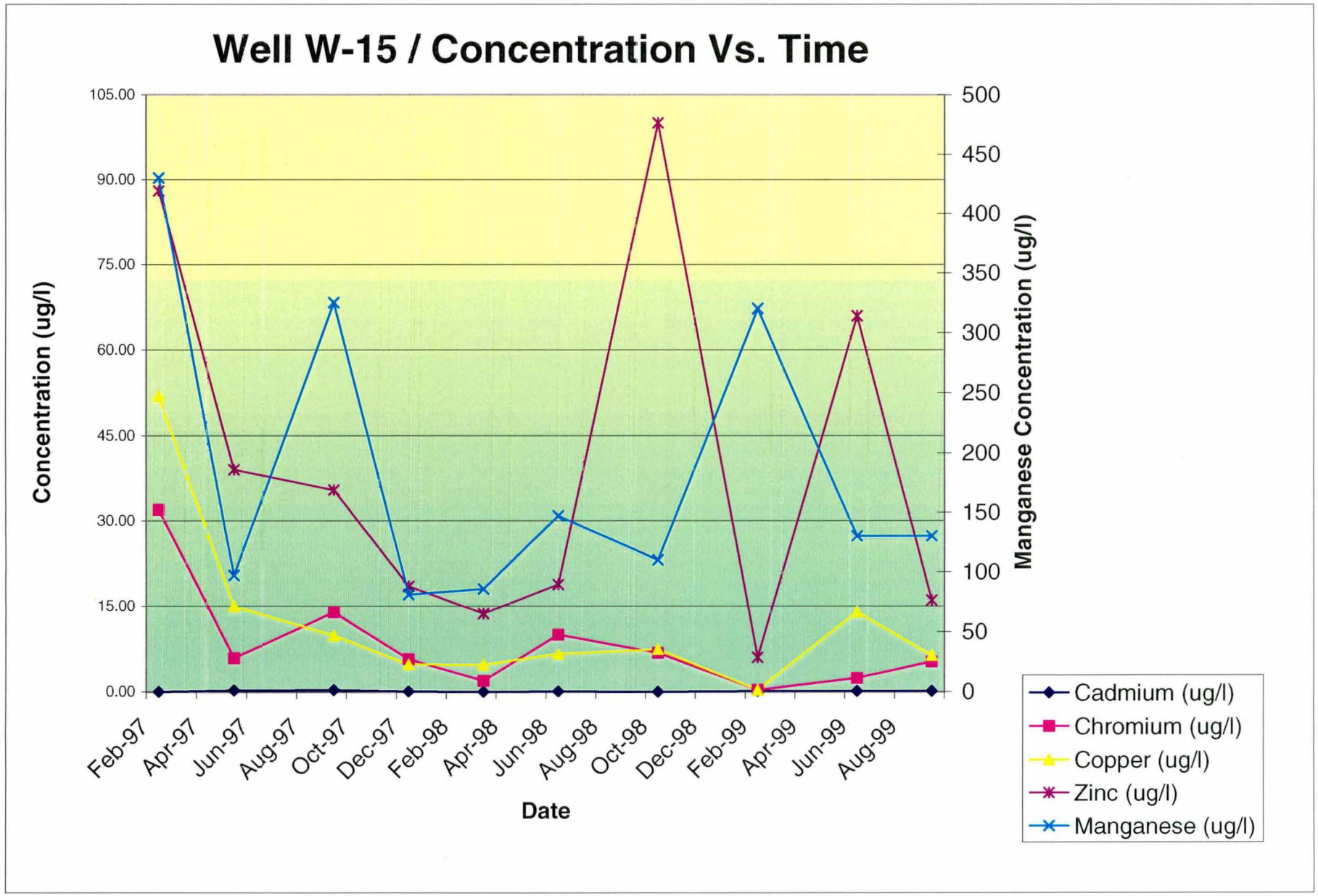
Well Name	Date Measured	Depth To Water (feet)	Reference Elevation (To Top PVC) (feet)	Groundwater Elevation (feet)
PZ-03	10/27/98	22.71	803.62	780.91
	02/08/99	23.74		779.88
	06/08/99	23.74		779.88
	09/13/99	23.55		780.07
PZ-04	10/27/98	15.18	807.30	792.12
	02/08/99	23.61		783.69
	06/08/99	21.69		785.61
	09/13/99	23.87		783.43

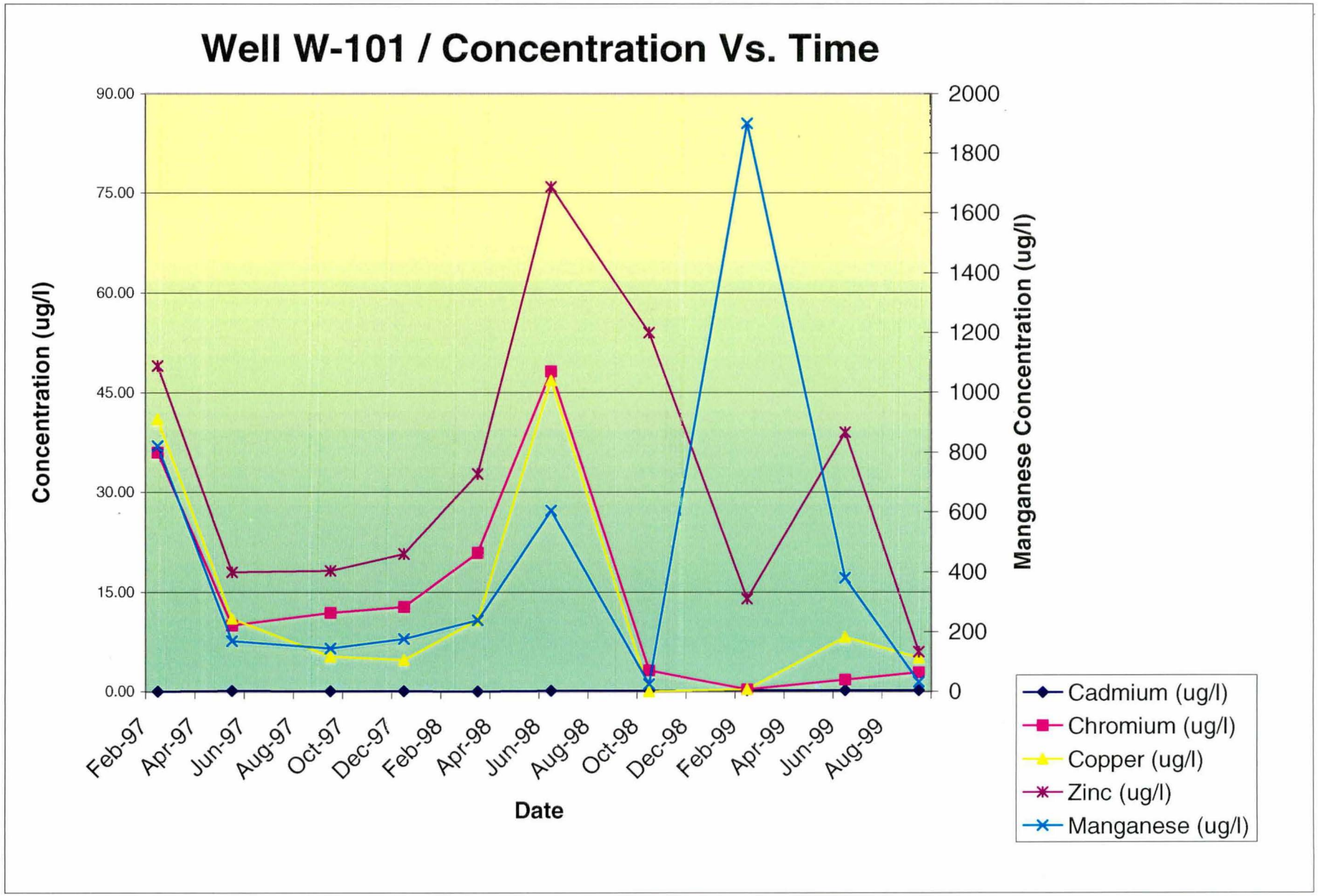
APPENDIX A

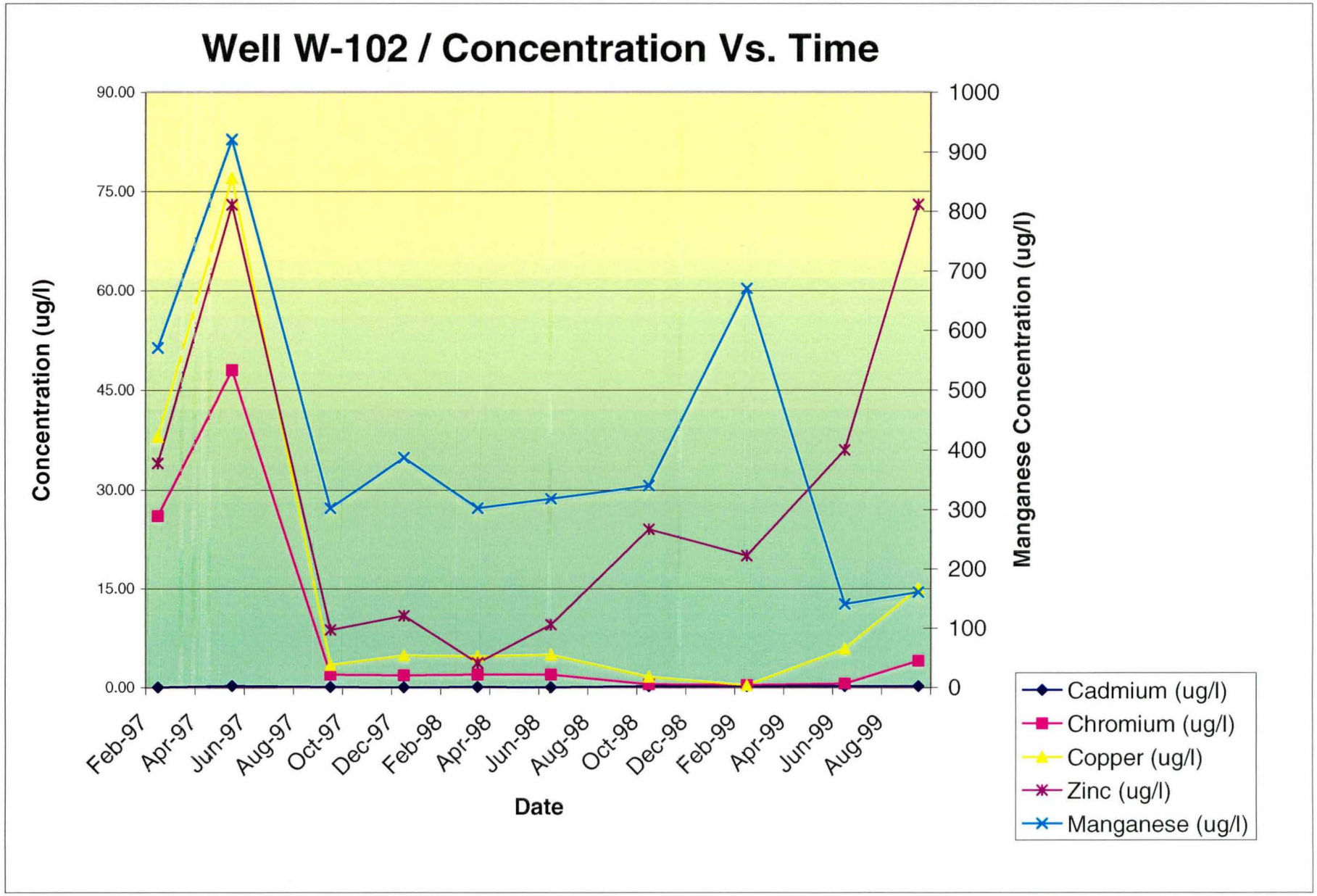
Concentration Versus Time Graphs
Inorganic Compounds / All Wells

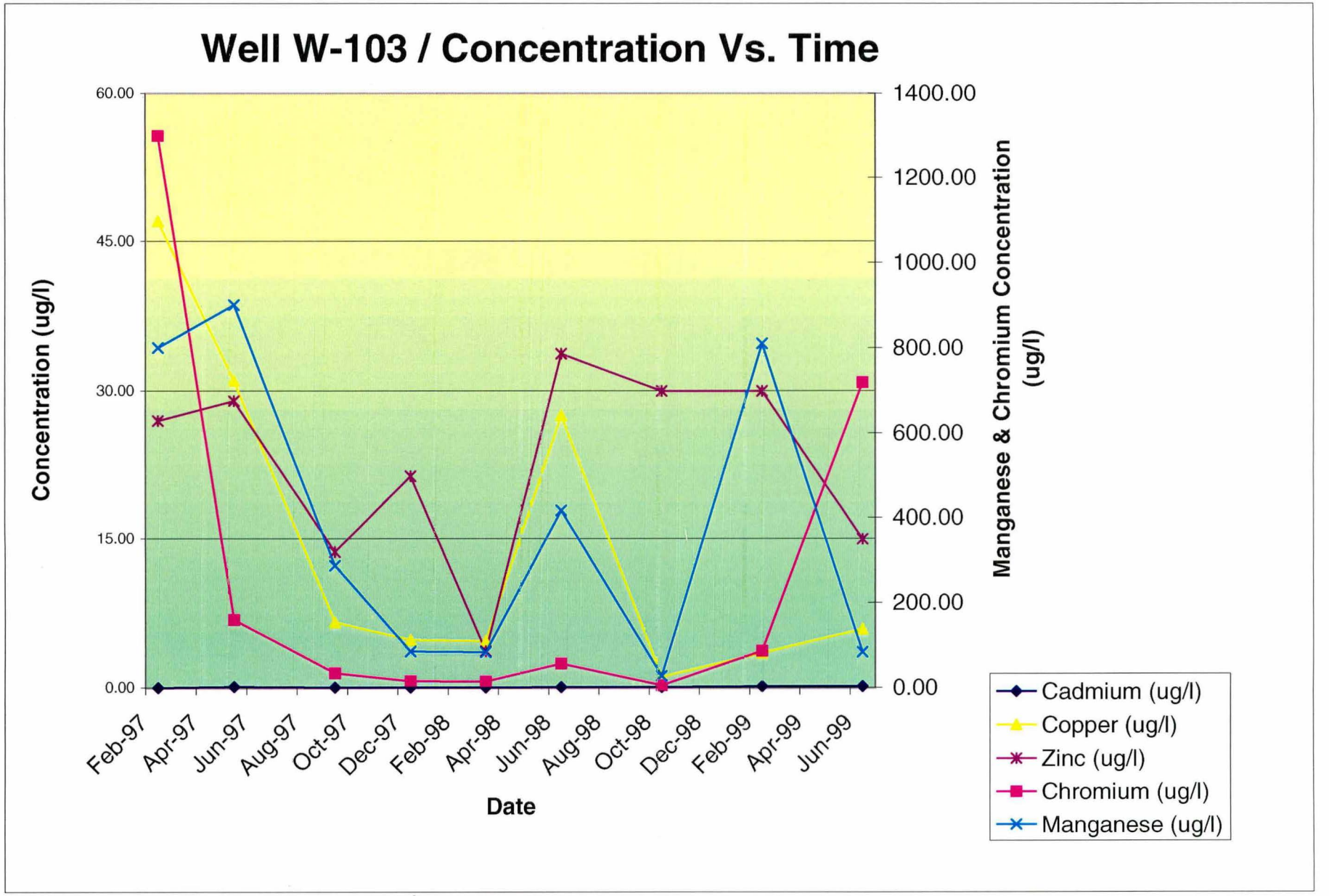

Well W-2 / Concentration Vs. Time
Concentration (ug/l)
Manganese Concentration (ug/l)
Date
180.00
165.00
150.00
135.00
120.00
105.00
90.00
75.00
60.00
45.00
30.00
15.00
0.00
500
450
400
350
300
250
200
150
100
50
0
Feb-97
Apr-97
Jun-97
Aug-97
Oct-97
Dec-97
Feb-98
Apr-98
Jun-98
Aug-98
Oct-98
Dec-98
Feb-99
Apr-99
Jun-99
Aug-99
Cadmium (ug/l)
Chromium (ug/l)
Copper (ug/l)
Zinc (ug/l)
Manganese (ug/l)

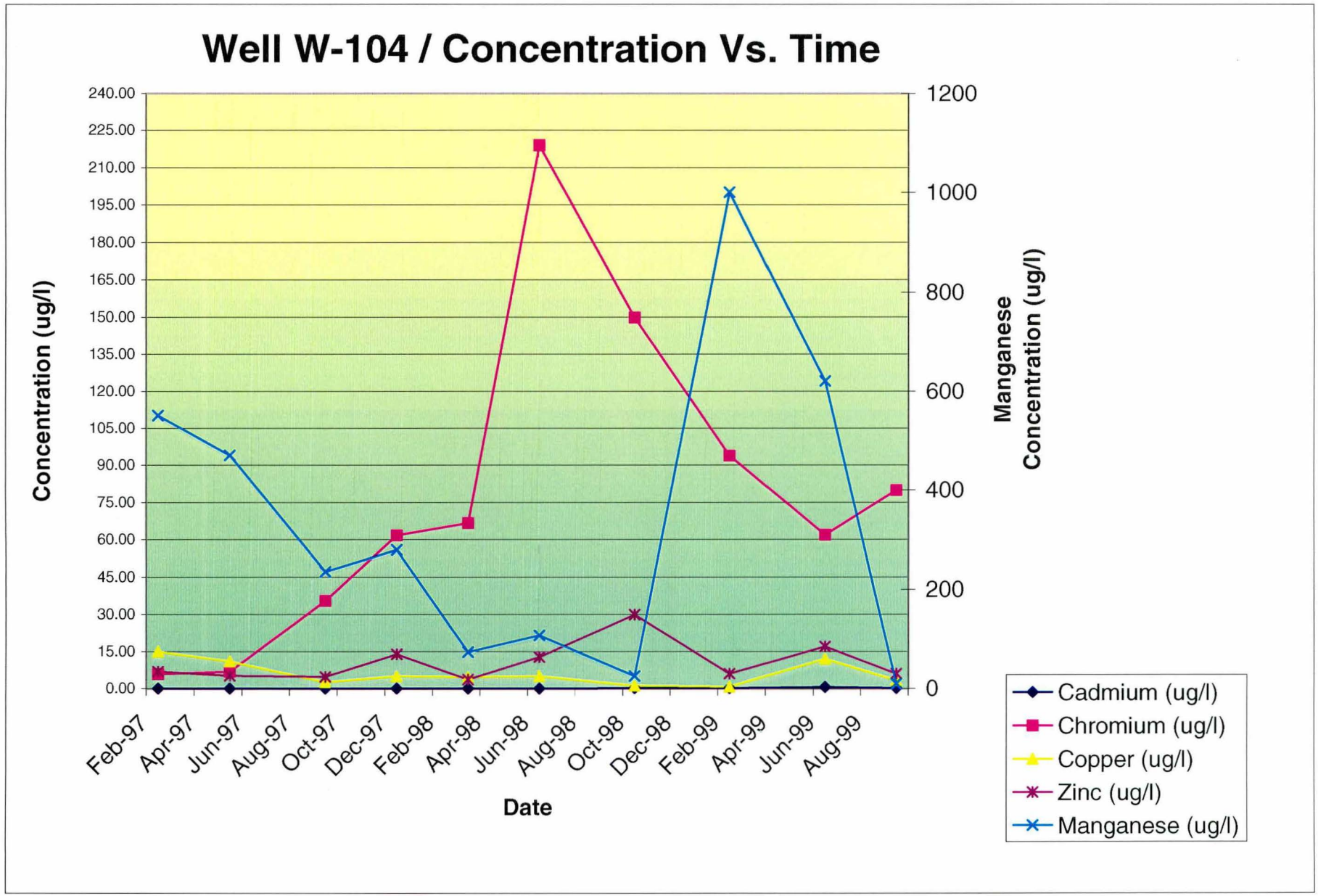

Well W-8 / Concentration Vs. Time
Concentration (ug/l)
Manganese Concentration (ug/l)
Date
90.00
75.00
60.00
45.00
30.00
15.00
0.00
900
800
700
600
500
400
300
200
100
0
Feb-97
Apr-97
Jun-97
Aug-97
Oct-97
Dec-97
Feb-98
Apr-98
Jun-98
Aug-98
Oct-98
Dec-98
Feb-99
Apr-99
Jun-99
Aug-99
Cadmium (ug/l)
Chromium (ug/l)
Copper (ug/l)
Zinc (ug/l)
Manganese (ug/l)

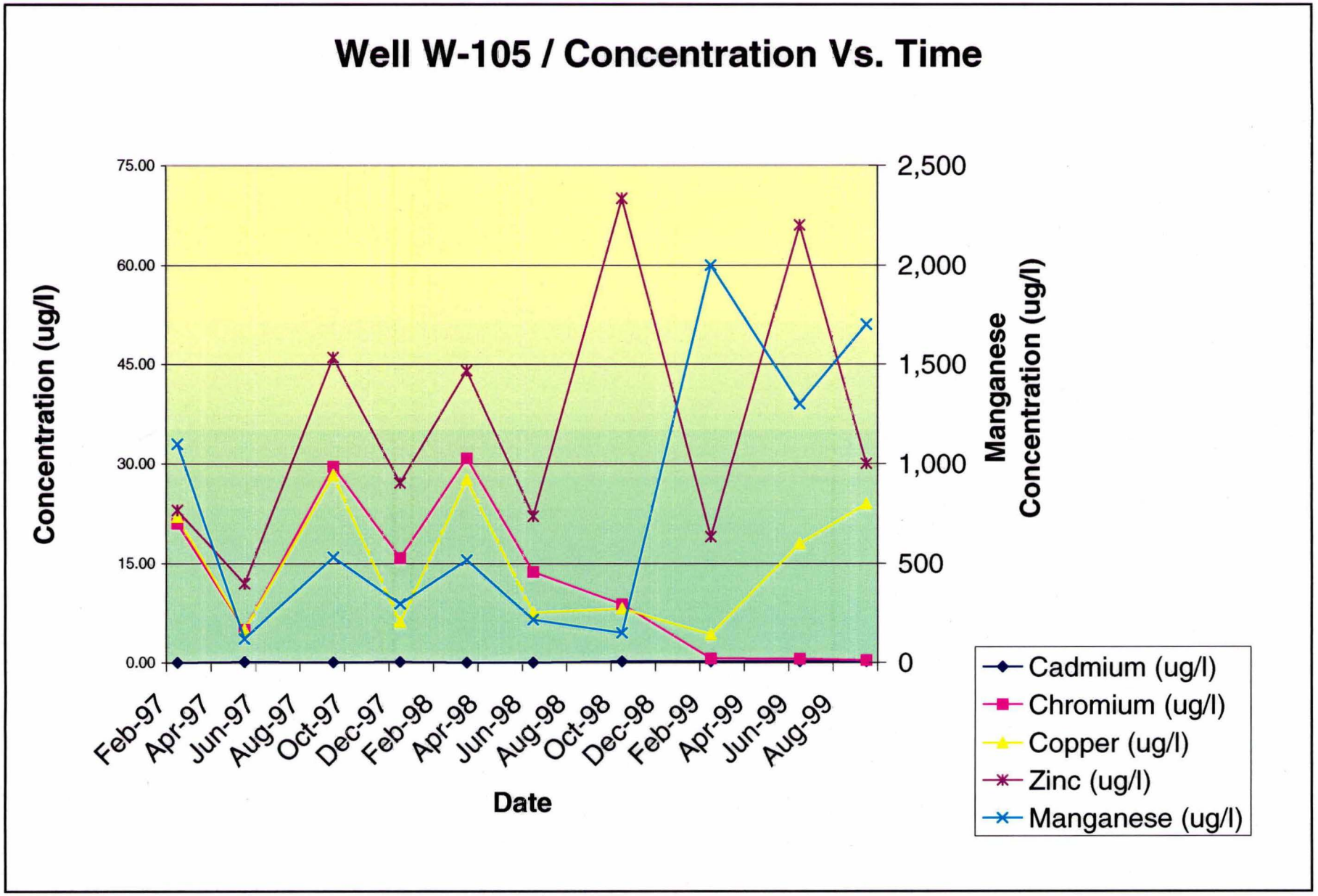

Well W-15 / Concentration Vs. Time
Concentration (ug/l)
Manganese Concentration (ug/l)
105.00
90.00
75.00
60.00
45.00
30.00
15.00
0.00
500
450
400
350
300
250
200
150
100
50
0
Feb-97
Apr-97
Jun-97
Aug-97
Oct-97
Dec-97
Feb-98
Apr-98
Jun-98
Aug-98
Oct-98
Dec-98
Feb-99
Apr-99
Jun-99
Aug-99
Date
Cadmium (ug/l)
Chromium (ug/l)
Copper (ug/l)
Zinc (ug/l)
Manganese (ug/l)

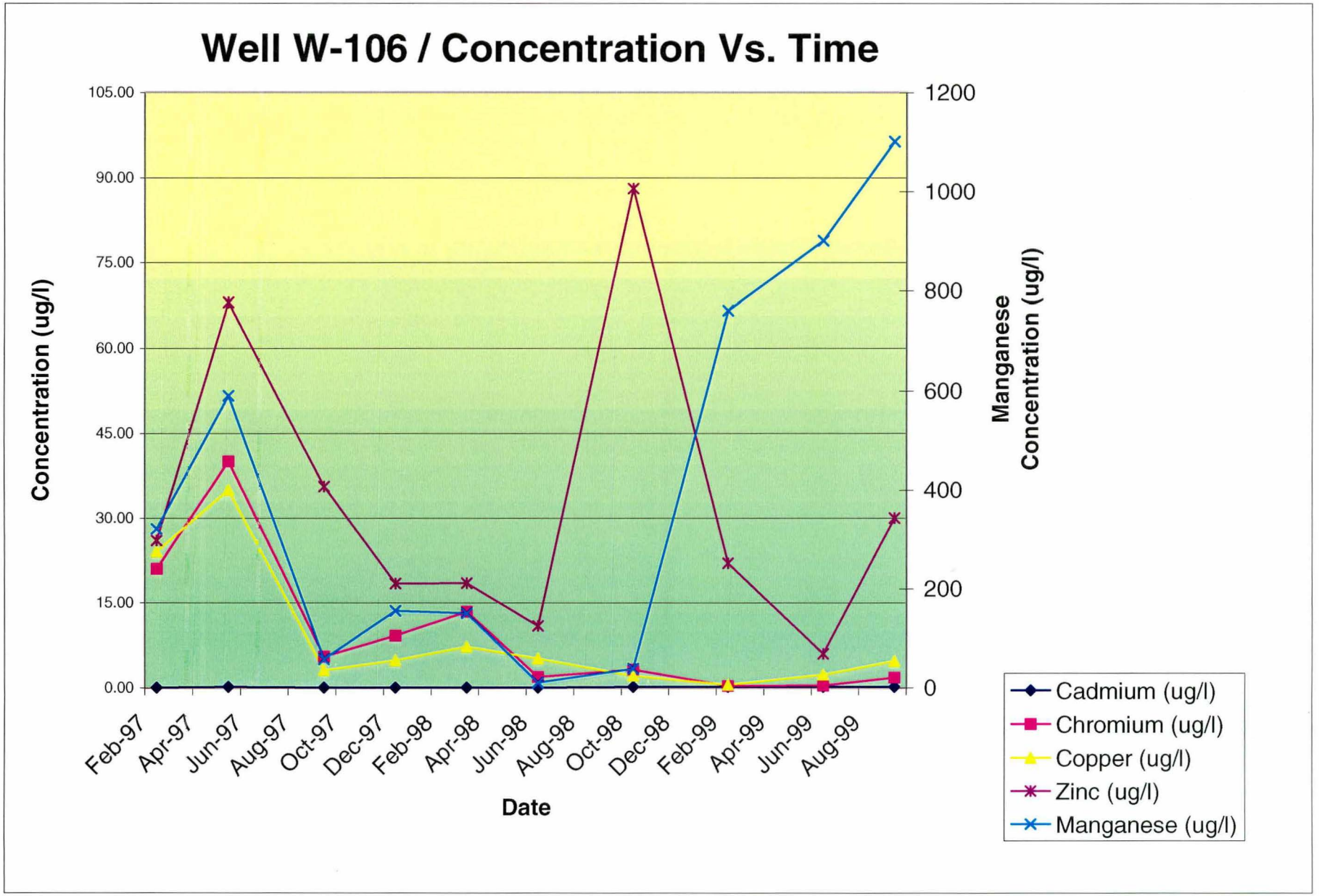

Well W-101 / Concentration Vs. Time
Concentration (ug/l)
Manganese Concentration (ug/l)
90.00
75.00
60.00
45.00
30.00
15.00
0.00
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Feb-97
Apr-97
Jun-97
Aug-97
Oct-97
Dec-97
Feb-98
Apr-98
Jun-98
Aug-98
Oct-98
Dec-98
Feb-99
Apr-99
Jun-99
Aug-99
Date
Cadmium (ug/l)
Chromium (ug/l)
Copper (ug/l)
Zinc (ug/l)
Manganese (ug/l)

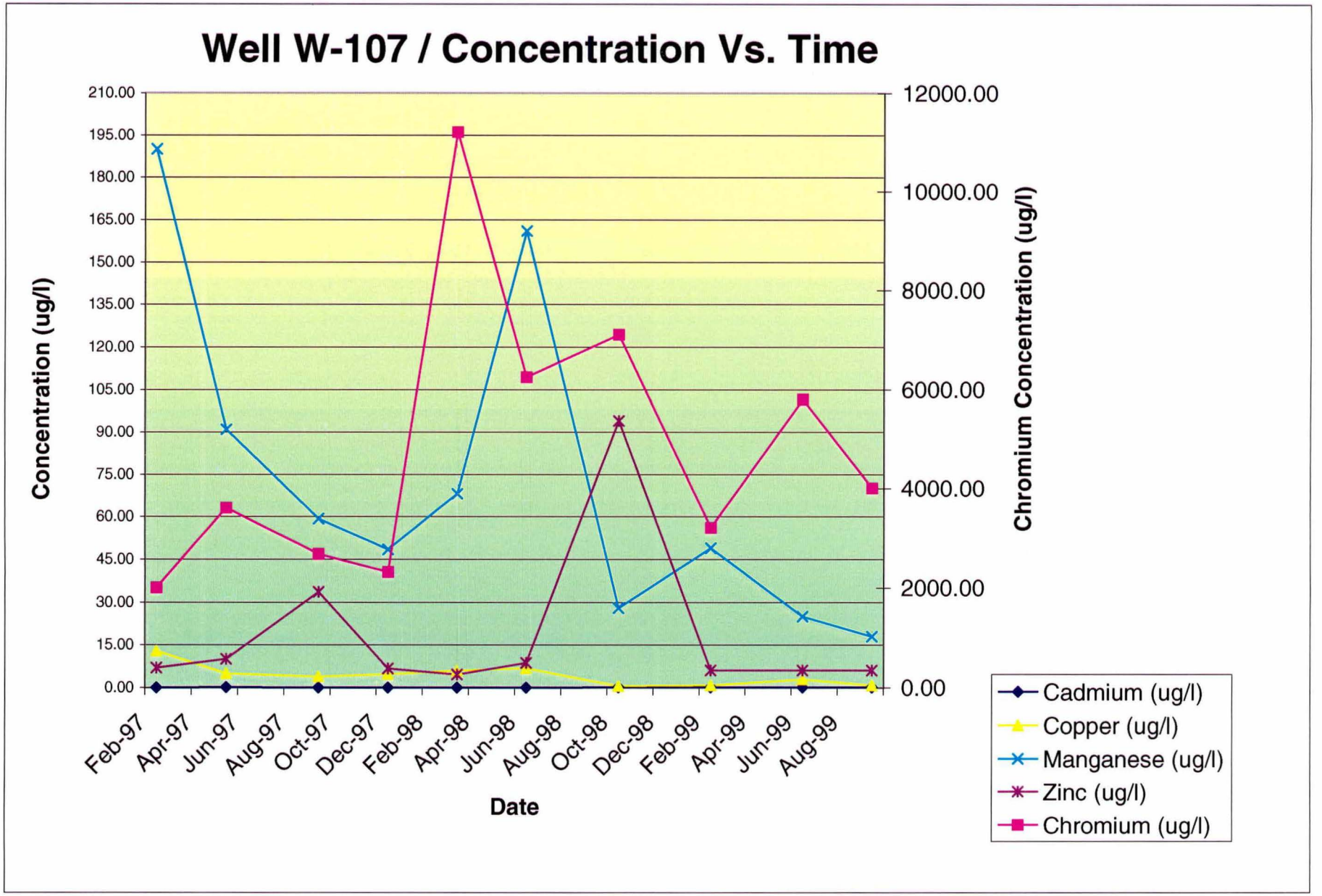

Well W-102 / Concentration Vs. Time
Concentration (ug/l)
Manganese Concentration (ug/l)
Date
90.00
75.00
60.00
45.00
30.00
15.00
0.00
1000
900
800
700
600
500
400
300
200
100
0
Feb-97
Apr-97
Jun-97
Aug-97
Oct-97
Dec-97
Feb-98
Apr-98
Jun-98
Aug-98
Oct-98
Dec-98
Feb-99
Apr-99
Jun-99
Aug-99
Cadmium (ug/l)
Chromium (ug/l)
Copper (ug/l)
Zinc (ug/l)
Manganese (ug/l)

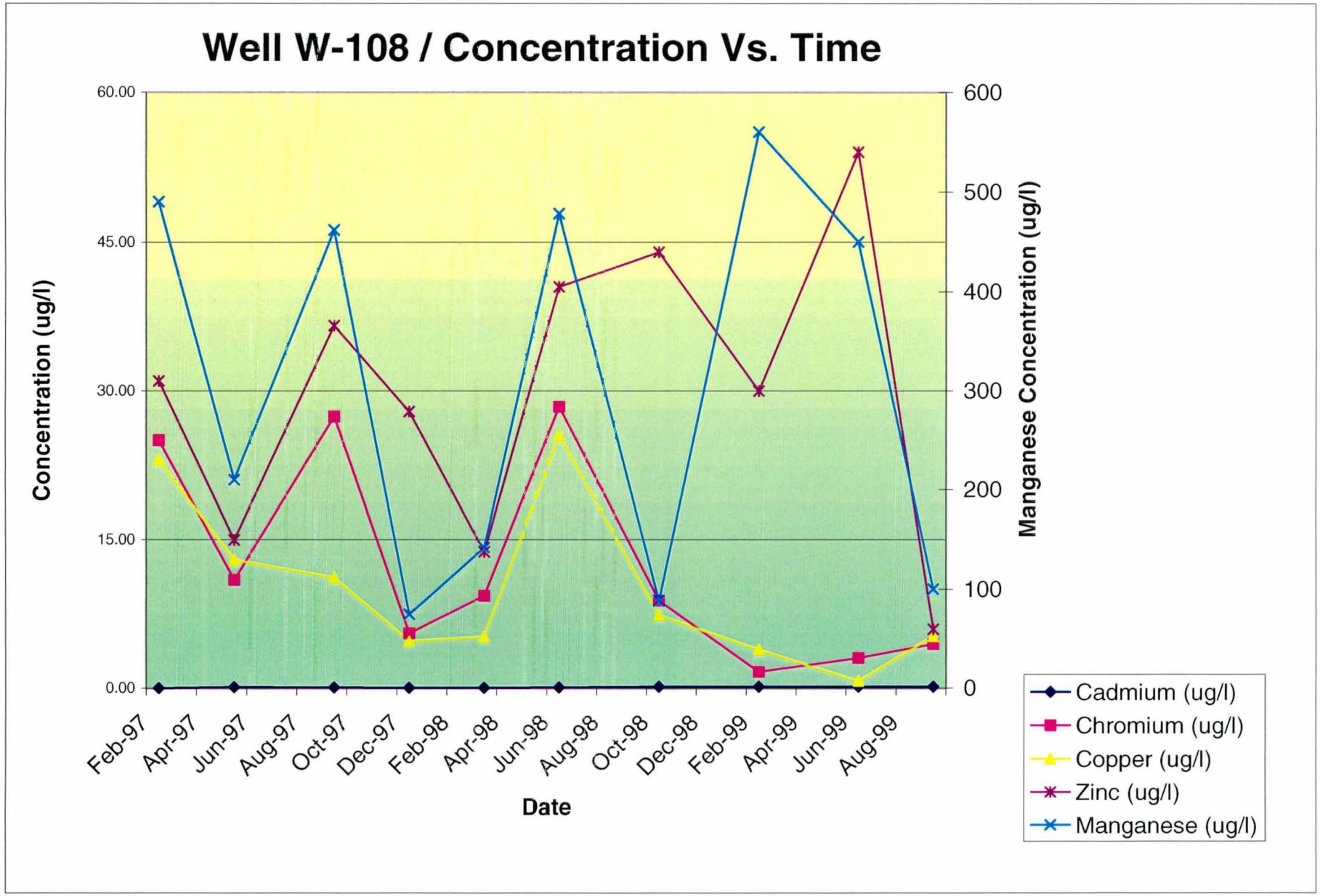

Well W-103 / Concentration Vs. Time
Concentration (ug/l)
60.00
45.00
30.00
15.00
0.00
1400.00
1200.00
1000.00
800.00
600.00
400.00
200.00
0.00
Manganese & Chromium Concentration (ug/l)
Feb-97
Apr-97
Jun-97
Aug-97
Oct-97
Dec-97
Feb-98
Apr-98
Jun-98
Aug-98
Oct-98
Dec-98
Feb-99
Apr-99
Jun-99
Date
Cadmium (ug/l)
Copper (ug/l)
Zinc (ug/l)
Chromium (ug/l)
Manganese (ug/l)


Well W-104 / Concentration Vs. Time
Concentration (ug/l)
240.00
225.00
210.00
195.00
180.00
165.00
150.00
135.00
120.00
105.00
90.00
75.00
60.00
45.00
30.00
15.00
0.00
1200
1000
800
600
400
200
0
Manganese Concentration (ug/l)
Feb-97
Apr-97
Jun-97
Aug-97
Oct-97
Dec-97
Feb-98
Apr-98
Jun-98
Aug-98
Oct-98
Dec-98
Feb-99
Apr-99
Jun-99
Aug-99
Date
Cadmium (ug/l)
Chromium (ug/l)
Copper (ug/l)
Zinc (ug/l)
Manganese (ug/l)


Well W-105 / Concentration Vs. Time
Concentration (ug/l)
75.00
60.00
45.00
30.00
15.00
0.00
2,500
2,000
1,500
1,000
500
0
Manganese Concentration (ug/l)
Feb-97
Apr-97
Jun-97
Aug-97
Oct-97
Dec-97
Feb-98
Apr-98
Jun-98
Aug-98
Oct-98
Dec-98
Feb-99
Apr-99
Jun-99
Aug-99
Date
Cadmium (ug/l)
Chromium (ug/l)
Copper (ug/l)
Zinc (ug/l)
Manganese (ug/l)

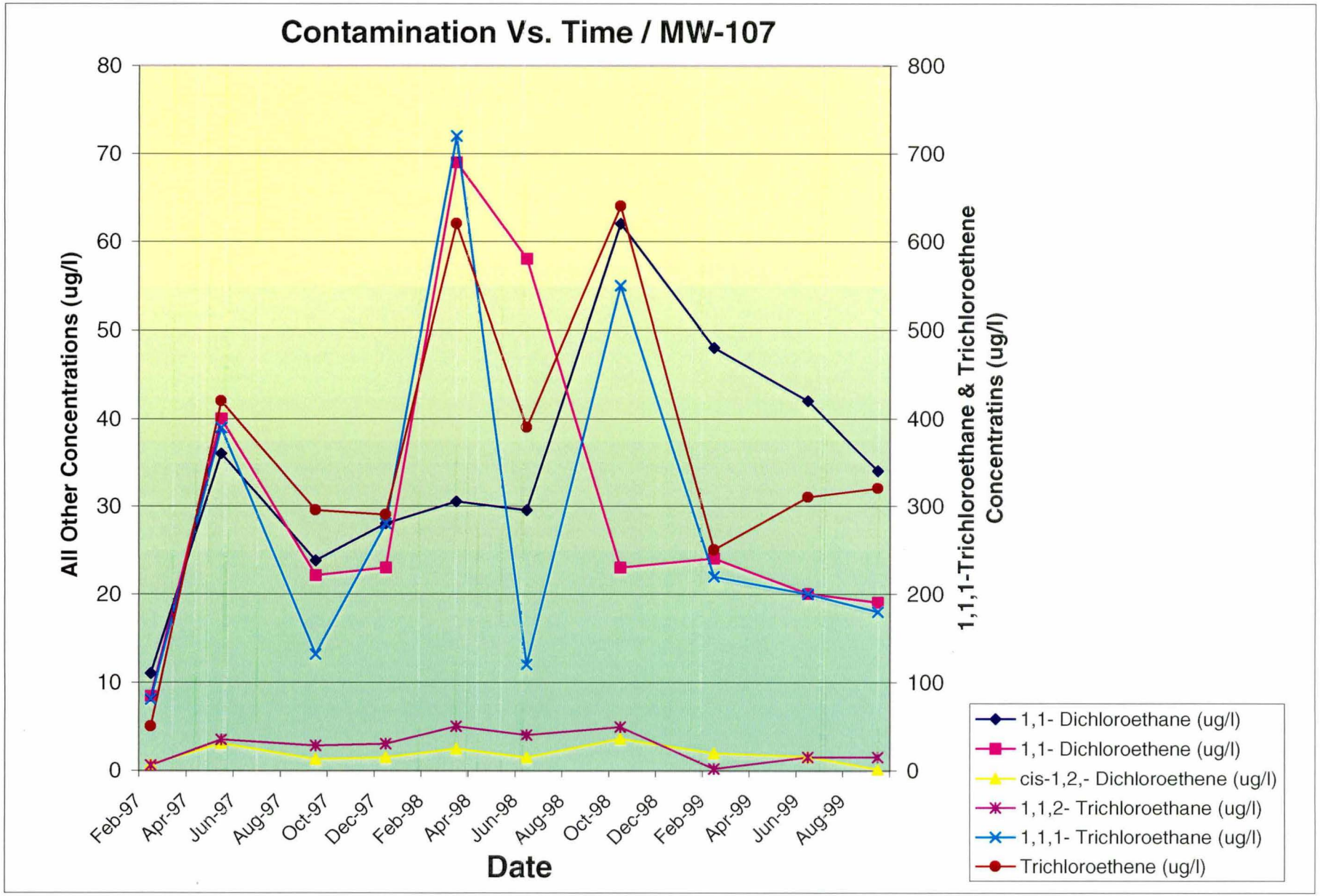

Well W-106 / Concentration Vs. Time
Concentration (ug/l)
105.00
90.00
75.00
60.00
45.00
30.00
15.00
0.00
Manganese Concentration (ug/l)
1200
1000
800
600
400
200
0
Feb-97
Apr-97
Jun-97
Aug-97
Oct-97
Dec-97
Feb-98
Apr-98
Jun-98
Aug-98
Oct-98
Dec-98
Feb-99
Apr-99
Jun-99
Aug-99
Date
Cadmium (ug/l)
Chromium (ug/l)
Copper (ug/l)
Zinc (ug/l)
Manganese (ug/l)


Well W-107 / Concentration Vs. Time
Concentration (ug/l)
Chromium Concentration (ug/l)
210.00
195.00
180.00
165.00
150.00
135.00
120.00
105.00
90.00
75.00
60.00
45.00
30.00
15.00
0.00
12000.00
10000.00
8000.00
6000.00
4000.00
2000.00
0.00
Feb-97
Apr-97
Jun-97
Aug-97
Oct-97
Dec-97
Feb-98
Apr-98
Jun-98
Aug-98
Oct-98
Dec-98
Feb-99
Apr-99
Jun-99
Aug-99
Date
Cadmium (ug/l)
Copper (ug/l)
Manganese (ug/l)
Zinc (ug/l)
Chromium (ug/l)


Well W-108 / Concentration Vs. Time
Concentration (ug/l)
Manganese Concentration (ug/l)
60.00
45.00
30.00
15.00
0.00
600
500
400
300
200
100
0
Feb-97
Apr-97
Jun-97
Aug-97
Oct-97
Dec-97
Feb-98
Apr-98
Jun-98
Aug-98
Oct-98
Dec-98
Feb-99
Apr-99
Jun-99
Aug-99
Date
Cadmium (ug/l)
Chromium (ug/l)
Copper (ug/l)
Zinc (ug/l)
Manganese (ug/l)

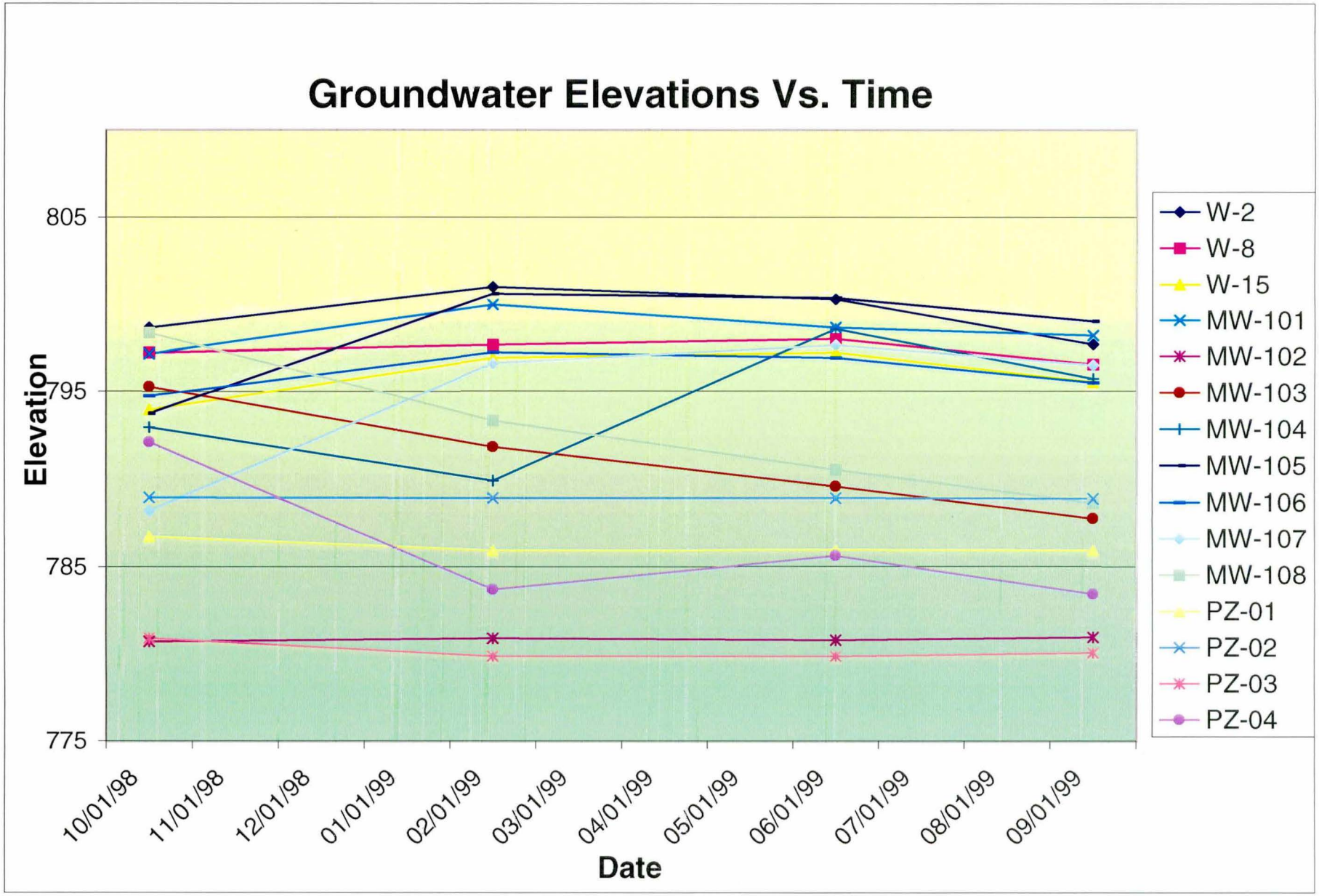
APPENDIX B

Contaminant Versus Time Graph
Detected VOC Compounds At MW-107 Graphs


Contamination Vs. Time / MW-107
All Other Concentrations (ug/l)
1,1,1-Trichloroethane & Trichloroethene Concentratins (ug/l)
Date
80
70
60
50
40
30
20
10
0
800
700
600
500
400
300
200
100
0
Feb-97
Apr-97
Jun-97
Aug-97
Oct-97
Dec-97
Feb-98
Apr-98
Jun-98
Aug-98
Oct-98
Dec-98
Feb-99
Apr-99
Jun-99
Aug-99
1,1- Dichloroethane (ug/l)
1,1- Dichloroethene (ug/l)
cis-1,2,- Dichloroethene (ug/l)
1,1,2- Trichloroethane (ug/l)
1,1,1- Trichloroethane (ug/l)
Trichloroethene (ug/l)

APPENDIX C

Groundwater Elevations Versus Time
All Wells


Groundwater Elevations Vs. Time
Elevation
805
795
785
775
10/01/98
11/01/98
12/01/98
01/01/99
02/01/99
03/01/99
04/01/99
05/01/99
06/01/99
07/01/99
08/01/99
09/01/99
Date
W-2
W-8
W-15
MW-101
MW-102
MW-103
MW-104
MW-105
MW-106
MW-107
MW-108
PZ-01
PZ-02
PZ-03
PZ-04

APPENDIX D

Operation & Maintenance Cost Summary

APPENDIX D

Summary Of Operation & Maintenance Costs

N.W. Mauthe Superfund Site - Appleton, Wisconsin

MCO. No. M050-99746.16

O&M Cost Category	Oct. 98	Nov. 98	Dec. 98	Jan. 99	Feb. 99	Mar. 99	Apr. 99	May-99	June-99	July-99	Aug. 99	Sept. 99	Totals
LABOR COSTS													
Routine Labor (Including Alarms, Groundwater Sampling)	3,556.00	5,782.00	5,960.00	2,299.00	4,385.00	4,550.00	3,154.00	2,873.00	3,163.00	3,194.00	3,351.00	6,499.00	48,766.00
Building & Equipment Maintenance	466.00	288.00	969.00	732.00	483.00	244.00	683.00	740.00	2,224.00	237.00	1,843.00	240.00	9,149.00
Labor - Subtotal	4,022.00	6,070.00	6,929.00	3,031.00	4,868.00	4,794.00	3,837.00	3,613.00	5,387.00	3,431.00	5,194.00	6,739.00	57,915.00
ANALYTICAL SERVICES													
City Monitoring (Semi-Annual) - System Outfall							323.40				323.40		646.80
Quarterly Monitoring - System Outfall & Groundwater Wells		2,380.95			2,380.95			157.30		2,371.20			7,290.40
Analytical - Subtotal	0.00	2,380.95	0.00	0.00	2,380.95	0.00	323.40	157.30	0.00	2,371.20	323.40	0.00	7,937.20
CHEMICALS													
Nitrogen Cylinder Rental & Gas	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	54.30	167.60
Sodium Hydroxide (55-Gal. Drums)						174.76			174.76			174.76	524.28
Ferrous Sulfate (55-Gal. Drums)						305.80			305.80			305.80	917.40
Chemicals - Subtotal	10.30	10.30	10.30	10.30	10.30	490.86	10.30	10.30	490.86	10.30	10.30	534.86	1,609.28
UTILITY SERVICES													
Electrical & Natural Gas	610.50	203.50	203.50	203.50	203.50	203.50	203.50	348.00	382.80	332.20	332.20	261.68	3,488.38
Telephone	26.84	34.44	25.82	26.96	26.75	29.47	26.27	28.77	28.64	30.46	35.28	27.54	347.24
Utilities - Subtotal	637.34	237.94	229.32	230.46	230.25	232.97	229.77	376.77	411.44	362.66	367.48	289.22	3,835.62
CITY WATER & SEWER FEES													
Water Charge, Sewer Charge, Storm Water Charge					69.96			68.28				78.07	216.31
Sewer Volume Charge					232.11				679.87			850.03	1,762.01
Subtotal - City Fees	0.00	0.00	0.00	0.00	302.07	0.00	0.00	68.28	679.87	0.00	0.00	928.10	1,978.32
MISCELLANEOUS	21.85					114.98			156.80				293.63
TOTAL O&M COSTS	**4,691.49**	**8,699.19**	**7,168.62**	**3,271.76**	**7,791.57**	**5,632.81**	**4,400.47**	**4,225.65**	**7,125.97**	**6,175.16**	**5,895.18**	**8,491.18**	**73,569.05**
ADMINISTRATIVE COSTS ALLOWANCE (Monthly & Semi-Annual Reporting, Data Management & Recordkeeping)	730.00	730.00	730.00	730.00	730.00	730.00	730.00	730.00	730.00	730.00	730.00	730.00	8,760.00
TOTAL O&M INCLUDING ADMINISTRATION	**5,421.49**	**9,429.19**	**7,898.62**	**4,001.76**	**8,521.57**	**6,362.81**	**5,130.47**	**4,955.65**	**7,855.97**	**6,905.16**	**6,625.18**	**9,221.18**	**82,329.05**

NOTES: 1) Nitrogen costs include cylinder rented and estimated gas costs. September 1999 costs represent year lease of cylinder.
2) Administrative costs are based upon the total budgeted costs divided by 12-months.

APPENDIX E

Operation & Maintenance Report / Form 4400-194

OPERATION, MAINTENANCE, MONITORING AND OPTIMIZATION REPORTING OF SOIL AND GROUNDWATER REMEDIATION SYSTEMS

PURPOSE AND APPLICABILITY OF THIS FORM: Completion of this form is required under s. NR 724.13(e), Wis. Adm. Code. Use of this form is mandatory. Failure to submit this form as require is a violation of s. NR 724.13, Wis. Adm. Code, and is subject to the penalties in s. 144.99, Wis. Stats. This form must be submitted every six months for active soil and groundwater remediation projects and every twelve months for passive (natural attenuation) remediation projects that are regulated under the NR 700 series of Wis. Adm. Code. Specifically, for sites meeting any of the following criteria:

- Soil or groundwater remediation projects that report progress in accordance with s. NR 700.11(1), Wis. Adm. Code.
- Soil or groundwater remediation projects that report progress in accordance with s. NR 724.13(3), Wis. Adm. Code. (Note: s. NR 724.13(3) requires progress reports for operation and maintenance of active systems to be submitted every three months however the Department considers submittal of this form every six months to satisfy the requirements of the rules, unless otherwise directed by the Department on a site specific basis.)
- Soil or groundwater remediation projects that report progress in accordance with s. NR 724.17(3), Wis. Adm. Code. (Note: s. NR 724.17(3) requires progress reports every time that samples are collected however the Department considers submittal of this form every twelve months to satisfy the requirements of the rules for monitoring natural attenuation, unless otherwise directed by the Department on a site specific basis.)

Submittal of this form is not a substitute for reporting required by Department programs such as Wastewater or Air Management. Personally identifiable information on this form is not intended to be used for any other purpose than tracking progress of the remediation by the Bureau for Remediation and Redevelopment.

Please refer to the instructions that are attached to the back of these forms starting on page INS-1. In all cases, when asked to "explain," those explanations are to be included on separate sheets of paper. Explanations must include a title that refers to the page and item number, for example: Page GI-2, C.1.a.

A. GENERAL INFORMATION:

1. Site name: NW Mantle Superfund Site
2. Reporting period from: October 1, 1998 To: September 30, 1999 Days in period: 365
3. Regulatory agency (enter DNR, DCOM, DATCP and/or other): WDNR U.S. EPA
4. DNR issued site number: BRRTS ID # 02-45-000127
5. State reimbursement fund claim number and fund name (if not applicable, enter NA): NA
6. Site location:
   a. DNR region and county: Northeast Region Outagamie County
   b. Street address and municipality: 725 South Outagamie Street Appleton
   c. Township, range, section and quarter quarter section: NE 1/4 of NW 1/4 of Section 34 Township 21 North, Range 17 East
7. Responsible party:
   a. Name: Carol Mantle (WDNR contact Jennifer Huffman)
   b. Mailing address: WDNR 3369 West Brewster Street
      Appleton, WI 54914-1607
   c. Phone number: 920-832-1803
8. Consultant:
   a. Company name: McMahon Associates, Inc
   b. Mailing address: P.O. Box 1025, 1445 McMahon Drive
      Neenah, WI 54957-1025
   c. Phone number: 920-751-4200
9. Contaminants: Chromium, VOC's
10. Soil types (USCS or USDA): Clay / Silty Clay
11. Hydraulic conductivity (cm/sec): 1×10^{-7} (estimated) 12. Average linear velocity of groundwater (ft/yr): 10.34

GENERAL SITE INFORMATION, CONTINUED

SITE NAME AND REPORTING PERIOD:

Site name: N.W. Mauth Superfund Site

Reporting period from: October 1, 1998 To: September 30, 1999 Days in period: 365

A. GENERAL INFORMATION (CONTINUED):

13. If soil is treated ex situ, is the treatment location off site? (Y/(N)) If yes, give location:

    a. DNR region and county: _____

    b. Township, range, section and quarter quarter section: _____

B. REMEDIATION METHOD: Only submit pages that apply to an individual site. Check all that apply:

- [X] Groundwater extraction (submit a completed page GW-1).
- [ ] Free product recovery (submit a completed page GW-1).
- [ ] In situ air sparging (submit a completed page GW-2).
- [ ] Groundwater natural attenuation (submit a completed page GW-3).
- [X] Other groundwater remediation method (submit a completed page GW-4).
- [ ] Soil venting (including soil vapor extraction and bioventing, submit a completed page IS-1).
- [ ] Soil natural attenuation (submit a completed page IS-2).
- [ ] Other in situ soil remediation method (submit a completed page IS-3).
- [ ] Biopiles (submit a completed page ES-1).
- [ ] Landspreading/thinspreading of petroleum contaminated soil (submit a completed page ES-2).
- [ ] Other ex situ soil remediation method (submit a completed page ES-3).

C. GENERAL EFFECTIVENESS EVALUATION FOR ALL ACTIVE SYSTEMS: If the remediation is active (not natural attenuation), complete this subsection.

1. Is the system operating at design rates and specifications? (Y/(N)): _____
   If the answer is no, explain whether or not modifications are necessary to achieve the goal that was previously established in design.
2. Are modifications to the system warranted to improve effectiveness? (Y/(N)) If yes, explain: _____
3. Is natural attenuation an effective low cost option at this time? (Y/(N)): _____
4. Is closure sampling warranted at this time? (Y/(N)): _____
5. Are there any modifications that can be made to the remediation to improve cost effectiveness? ((Y)/N) If yes, explain: _____

D. ECONOMIC AND COST DATA TO DATE:

1. Total investigation costs ($): NA
2. Implementation costs (design, capital and installation costs, excluding investigation costs) ($): NA
3. Total costs during the previous reporting period ($): NA
4. Total costs during this reporting period ($): $80,189
5. Total anticipated costs for the next reporting period ($): $81,793
6. Are any unusual or one-time costs listed in the reporting periods covered by D.3., D.4. or D.5. above? ((Y)/N) If yes explain: _____
7. If close out is anticipated within 12 months, estimated costs for project closeout ($): NO

State of Wisconsin
Department of
Natural Resources

OPERATION, MAINTENANCE, MONITORING AND OPTIMIZATION REPORTING OF SOIL AND GROUNDWATER REMEDIATION SYSTEMS

Form 4400-194
7-96
Page GW-1

GROUNDWATER PUMP AND TREAT SYSTEMS AND FREE PRODUCT RECOVERY SYSTEMS

SITE NAME AND REPORTING PERIOD:

Site name: N.W. Mauthe Superfund Site

Reporting period from: October 1, 1996 To: September 30, 1997 Days in period: 365

Date that the system was first started up: January 14, 1997

A. GROUNDWATER EXTRACTION SYSTEM OPERATION:

1. Total number of groundwater extraction wells or trenches available and the number in use during period: 2/2
2. Number of days of operation (only list the number of days the system actually operated, if unknown explain): 365
3. System utilization in percent (days of operation divided by reporting time period multiplied by 100). If < 80%, explain: 100
4. Quantity of groundwater extracted during this time period (gallons): 643,150
5. Average groundwater extraction rate (gpm): 1.22 gpm
6. Quantity of dissolved phase contaminants removed during this time period in pounds: 7.15

B. FREE PRODUCT RECOVERY SYSTEM OPERATION:

1. Is free product (nonaqueous phase liquid) being recovered at this site? (Y/N) If yes, list method:
2. Quantity of free product extracted during this time period (gallons, enter none if none): None
3. Average free product extraction rate (gpd): NA

C. SYSTEM EFFECTIVENESS EVALUATION:

1. Is a contaminated groundwater plume fully contained in the capture zone? (Y/N) If no, explain:
2. If free product is present, is the free product fully contained in capture zone? (Y/N) If no, explain: NA
3. If free product is present in any wells at the site, but free product was not recovered during reporting period, explain.
4. If free product is not present, determine the single contaminant that requires the greatest percent reduction to achieve ch. NR 140 ES and PAL. Perform this calculation for all contaminants that were present at the site that have ch. NR 140 standards. Use the highest contaminant concentration measured in any sampling points during reporting period. If free product is present, write "FREE PRODUCT" in C.4.a.
   a. Contaminant: Chromium 4000 ug/L
   b. Percent reduction necessary to reach ch. NR 140 ES and PAL: ES. 97.5 % PAL. 99.8 %
   c. Maximum contaminant concentration level in any monitoring well of that contaminant (µg/L): 4000 ug/L MW-107
   d. Maximum contaminant concentration level in any extraction well of that contaminant (µg/L): NA
   e. If the maximum concentration in a monitoring well is more that one order of magnitude above the concentration measured in an extraction well, explain why the extracted groundwater contamination levels are significantly less than the levels at other locations within the aquifer.

D. ADDITIONAL ATTACHMENTS: Attach the following to this form:

- Most recent report to the DNR Wastewater Program, if applicable.
- Groundwater contour map with capture zone indicated.
- Groundwater contaminant distribution map (may be combined with contour map).
- Graph of cumulative contaminant removal, if both free product recovery and ground water extraction are used, provide separate graphs.
- Time versus groundwater contaminant concentration graphs for the contaminant listed in C.4.a. (above), as follows:
  - — Graph of contaminant concentrations versus time for each extraction well in use during the period.
  - — Graph of contaminant concentrations versus time for the monitoring well with the greatest level of contamination.
- Groundwater contaminant chemistry table.
- Groundwater elevations table.
- System operational data table.

GENERAL SITE INFORMATION, CONTINUED

SITE NAME AND REPORTING PERIOD:

Site name: N. W. Mauthe Superfund Site

Reporting period from: October 1, 1998 To: September 30, 1999 Days in period: 365

E. NAME(S), SIGNATURE(S) AND DATE OF PERSON(S) SUBMITTING FORM: Legibly print name, date and sign. Only persons qualified to submit reports under ch. NR 712 Wis. Adm. Code are to sign this form.

Registered Professional Engineers:

I (print name) THOMAS J. KISPERT, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

Signature, title, P.E. number and date: [signature] SR. PROJECT ENGINEER, E-26225 4-20-00

Hydrogeologists:

I (print name) [signature], hereby certify that I am a hydrogeologist as that term is defined in s. NR 712.03(1), Wis. Adm. Code, and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

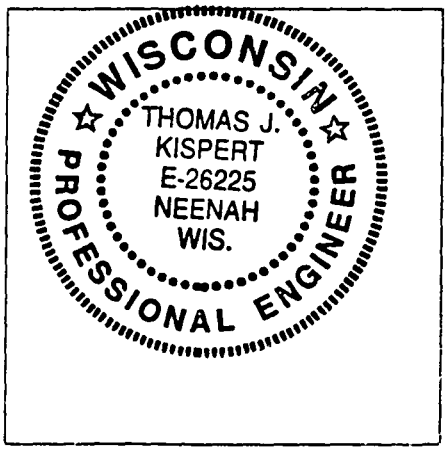
Signature, title and date: [signature], P.S., P.H., 4/21/00

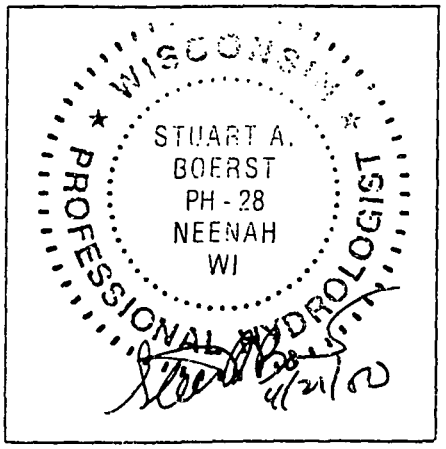
Scientists:

I (print name) _____, hereby certify that I am a scientist as that term is defined in s. NR 712.03(3), Wis. Adm. Code, and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

Signature, title and date: _____

Professional Seal(s), if applicable:





OTHER GROUNDWATER REMEDIATION METHODS

SITE NAME AND REPORTING PERIOD:

Site name: N.W Mantk Superfund Site

Reporting period from: October 1, 1998 To: September 30, 1999 Days in period: 365

Date that the system was first started up: January 14, 1997

A. EFFECTIVENESS EVALUATION:

1. If free product is not present, determine the single contaminant that requires the greatest percent reduction to achieve ch. NR 140 ES and PAL. Perform this calculation for all contaminants that were present at the site that have ch. NR 140 standards. Use the highest contaminant concentration measured in any sampling points during reporting period. If free product is present, write "FREE PRODUCT" in A.1.a.

   a. Contaminant: Chromium

   b. Percent reduction necessary: ES. 97.5% PAL 99.8%

   c. Maximum contaminant concentration level in any monitoring well (µg/L): 4000 ug/L MW-107

2. Is the size of the plume increasing, stabilized, or decreasing: Stabilized

3. Describe the method used to remediate groundwater at the site.

   See Section II A of Enclosed report.

4. List any additional information required by the DNR for this method for this site:

B. ADDITIONAL ATTACHMENTS: Attach the following to this form:

- Groundwater contour map.
- Groundwater contaminant distribution map (may be combined with contour map).
- When contaminants are aerobically biodegradable, attach a dissolved oxygen in groundwater map (dissolved oxygen may be combined with the contaminant data on a single map).
- Graph of contaminant concentrations versus time for the contaminant listed in A.1.a. (above) for the monitoring point with the greatest level of contamination.
- Groundwater contaminant chemistry table.
- Groundwater elevations table.
- Any other attachments required by the DNR for this remediation method.

SOIL VENTING (INCLUDING BOTH SOIL VAPOR EXTRACTION AND BIOVENTING)

SITE NAME AND REPORTING PERIOD:

Site name: _____

Reporting period from: _____ To: _____ Days in period: _____

Date that the system was first started up: _____

A. SOIL VENTING SYSTEM OPERATION:

1. Number of air extraction wells available and number of wells actually in use during the period: _____
2. Number of days of operation (only list the number of days the system actually operated, if unknown explain): _____
3. System utilization in percent (days of operation divided by reporting time period multiplied by 100). If less than 80%, explain: _____
4. Average depth to groundwater: _____

B. EFFECTIVENESS EVALUATION:

1. Average contaminant removal rate for the entire system (pounds per day): _____
2. Average contaminant removal rate per well (pounds per day): _____
3. If the average contaminant removal rate is less than one pound per day for the entire system, or if the average contaminant removal rate per well is less than one tenth of a pound per day, evaluate the following:

   a. If contaminants are aerobically biodegradable and confirmation borings have not been drilled in the past year:

      i. Oxygen levels in extracted air (percent): _____

      ii. Methane levels in extracted air (ppm_v) If over 10 ppm_v, explain: _____

      iii. If methane is not present above 10 ppm_v and if oxygen is greater than 20 percent in extracted air, you should either:
      - Drill confirmation borings during the next reporting period, if the entire site should be considered for closure.
      - Or, perform an in situ respirometry test in a zone of high contamination. Do not perform the test in an air extraction well, use a gas probe or water table well. If a zero order rate of decay based on oxygen depletion is less than 2 mg/kg per day, then you should drill confirmation borings, if the entire site should be considered for closure. If the rate of decay is between 2 and 10 mg/kg, operate for one more reporting period before evaluating further. If the zero order rate of decay is greater than 10 mg/kg total hydrocarbons, continue operating the system in a manner than maximizes aerobic biodegradation.

   b. If contaminants are not aerobically biodegradable and confirmation borings have not been recently drilled during the past year, you should drill confirmation borings during the next reporting period if the entire site should be considered for closure.

   c. If soil borings were drilled during the past year and soil contamination remains above acceptable levels, explain if the system effectiveness can be increased and/or if other options need to be considered to achieve cleanup criteria.

C. ADDITIONAL ATTACHMENTS: Attach the following to this form:

- Well and soil sample location map indicating all air extraction wells. If forced air injection wells are also in use, identify those wells.
- If water table monitoring wells are present at the site, a map of well locations.
- Time versus vapor phase contaminant concentration graph.
- Time versus cumulative contaminant removal graph.
- Groundwater elevations table, if water table wells are present at the site; also list screen lengths and elevations.
- Table of soil contaminant chemistry data.
- Soil gas data, if gas probes are used to monitor subsurface conditions in locations other than where air is extracted.
- System operational data table.