

**SECOND SEMI-ANNUAL 2002 REMEDIAL ACTION
NATIONAL ELECTRIC COIL SUPERFUND SITE
HARLAN COUNTY, KENTUCKY**

**Prepared for:
COOPER INDUSTRIES
HOUSTON, TEXAS**

February 24, 2003

CEC Project 200658

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February 24, 2003

Mr. Nelson Olavarria
Cooper Industries
P.O. Box 4446
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Dear Mr. Olavarria:

Subject: Second Semi-Annual 2002 Remedial Action Report
 National Electric Coil Superfund Site
 Harlan County, Kentucky
 CEC Project 200658.0002

Attached is the Second Semi-Annual 2002 Remedial Action Report for the National Electric Coil Site. Please feel free to call if you have any questions or comments.

Very truly yours,

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.

Lawrence A. Drane, III, P.G.
Project Manager

Enclosures

1.0 INTRODUCTION

1.1 SITE LOCATION

The National Electric Coil (NEC) facility is situated on approximately four acres of land and is located in Dayhoit, Harlan County, Kentucky, shown on Figure 1. The facility is bordered on the west by former U.S 119, on the east by the Cumberland River, on the north by an emergency utility substation, and on the south by a trailer park property. The facility is surrounded by a chain-link fence, and is occupied by a main plant building, several smaller storage buildings, and a boiler house, shown on Figure 2. Figure 3 shows the site vicinity, including the offsite properties and the location of the Cumberland River that flows generally east to west.

1.2 SITE HISTORY

The facility was originally opened in 1951 by the McGraw-Edison Company (McGraw-Edison) and operated as a rebuilding and remanufacturing facility for coal mining and related industrial equipment including electric motors, rewinding electric coils, manufacturing, general machine shop work, and mining equipment repair. McGraw-Edison owned and operated the facility until 1985 when Cooper Industries (Cooper) purchased McGraw-Edison as a wholly-owned subsidiary. McGraw-Edison continued to operate the NEC facility until August 1987. The Treen Land Company of Brookside, Kentucky purchased the NEC building and property in August of 1987 and the operations were reopened as the National Electric Service Company. The facility operates under the National Electric Services Management Group, owned by Charles Dozier, for electrical motor repair work and limited rebuilding of hydraulic systems for the coal industry.

1.3 SITE ENVIRONMENTAL ACTIONS

In October 1990, the United States Environmental Protection Agency (USEPA) issued a Unilateral Administrative Order (UAO) (USEPA Docket No. 90-57-C) requiring immediate actions designed to mitigate the release of hazardous substances from the site. Cooper subsequently contracted with Law Engineering & Environmental Services (Law) to develop and implement a Remedial Action Plan (RAP) in accordance with the USEPA's UAO. As part of the RAP, Law installed monitoring wells at the site to evaluate the magnitude and extent of the groundwater contamination.

The NEC site was proposed for inclusion on the National Priority List (NPL) on July 29, 1991 and the site was placed on the NPL on October 14, 1992. USEPA and Cooper entered into an Administrative Order by Consent for a Remedial Investigation/Feasibility Study (RI/FS) in May 1992. The USEPA issued a UAO on December 15, 1992, directing Cooper to perform the Interim Remedial Design/Interim Remedial Action (RA), described in the Record of Decision (ROD), concurrently with the RI/FS to capture groundwater containing chlorinated volatile organic compounds (VOCs).

The original remedial action involving the groundwater recovery and treatment system was initiated in July 1993 and consisted of an onsite Recovery Well CMW-5-11 located in the deeper bedrock aquifer zone (at an approximate depth of 120 feet), an equalization tank, an air stripping tower, and a 10,000 pound activated carbon unit to treat the air stripper off-gas.

An additional RA was implemented at the site to address impacted groundwater in accordance with the April 26, 1996 ROD and the May 20, 1996 UAO issued to Cooper by the USEPA. A RA Report (March 4, 1998) was submitted to document

the implementation and initial start-up activities associated with the RA system. The supplemental RA system consisted of the installation of additional groundwater recovery systems located in the shallow alluvial aquifer and the intermediate and deeper zones of the underlying bedrock aquifer, and the continued use of the treatment system to remove the VOCs from the extracted groundwater using air stripping technology. The air stripper off-gases are treated through a catalytic oxidation system (instead of the activated carbon unit) prior to being discharged into the atmosphere via a 60-foot tall air stack.

The final groundwater recovery system consisted of four recovery units: an interceptor trench located in the shallow alluvial aquifer (approximately 190 feet long and 24 feet deep); Recovery Well R-2 located in the intermediate bedrock aquifer zone (approximately 80 feet deep); Recovery Well CMW-5-2A located in the deeper bedrock aquifer zone (approximately 125 feet deep); and existing Recovery Well CMW-5-11 (approximately 120 feet deep) located in the deeper bedrock aquifer zone.

The final groundwater treatment system consisted of a 2,000-gallon double-walled equalization tank, the existing air stripper tower, and a catalytic oxidation system to treat the off-gases from the air stripping tower, in accordance with the EPA approved air emission performance standards. Treated water from the air stripper continues to be discharged to the Cumberland River in compliance with the requirements of a KPDES permit. The layout of the remediation system is shown on Figure 2.

The supplemental RA implementation activities were conducted between September 1997 and February 1998. The final groundwater recovery systems and the catalytic oxidation unit started up in February 1998.

1.4 CONTAMINANTS OF CONCERN

Historically, several VOCs have been detected in the groundwater samples collected from the site, however the contaminants with the highest concentrations detected include trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), vinyl chloride, and 1,1-DCE. The contaminants of concern and their respective maximum contaminant levels (MCLs) are listed below:

| Contaminant | MCL (ug/l) |
|----------------|------------|
| TCE | 5 |
| Cis-1,2-DCE | 70 |
| Trans-1,2-DCE | 100 |
| Vinyl Chloride | 2 |
| 1,1-DCE | 7 |

2.0 SEMI-ANNUAL ACTIVITIES

2.1 SYSTEM OPERATION AND MAINTENANCE

Civil & Environmental Consultants, Inc. (CEC) and Eastern Well and Pump conducted routine monthly monitoring of the groundwater remediation system. The operations and maintenance of the groundwater remediation system are performed by Eastern Well & Pump. Table 1 summarizes the maintenance conducted from July through December 2002. The system shut down once in August due to an electrical outage, but was returned to operation the same day. On December 20, 2002, the system was shut down for routine maintenance. During the shutdown, the media was removed from the air stripper tower and cleaned. The pumps, piping, and flow meters were checked and maintained, and Wells R-2, MW-11, and MW-5-2A were cleaned and sanitized. Minor problems with the pump in MW-5-2A and flow meters were corrected during this period. Overall, the system has operated satisfactorily through the reporting period.

2.2 INFLUENT AND EFFLUENT WATER SAMPLING

Operation of the remediation system is subject to federal and state requirements. The KYDEP Water Resources Branch, Division of Water, in a letter dated March 6, 1996, set forth the requirements for the NEC site for groundwater withdrawal and pumping from the three aquifer zones. The authorization letter permits total recovery rates to a maximum of 250 gpm (0.360 mgd) from all of the aquifer zones. The groundwater recovery system was pumped at a rate between 128 to 152 gpm, with an average flow rate of 141 gpm for the reporting period.

Monitoring of the treated groundwater discharge has continued during the operation of the Remedial Action (RA) to demonstrate continued compliance with

the KPDES requirements. A new KPDES permit (No. KY0093149) was approved by the KYDEP for the discharge of water from the treatment system effective from April 1, 2002 through July 31, 2003. The permit duration period is abbreviated to allow KYDEP to synchronize this facility with other permit grantees in the Cumberland River watershed. The permitted groundwater withdrawal rate of 250 gpm is unchanged; however, the daily maximum system discharge limits have been removed. Metals limits for the effluent have been removed and quarterly monitoring and reporting is required for total recoverable zinc and copper. All volatile organic compound (VOC) effluent limitations remain unchanged. A table of effluent limitations is presented in Table 2 and was in effect throughout this reporting period. A new KPDES permit application was submitted to the KYDEP in January 2003.

Effluent water samples were collected monthly during the reporting period to monitor the treatment efficiency of the air stripper. In addition, influent samples were collected during this period to monitor the effectiveness of the remediation system and to estimate the amount of contaminants removed. Samples were analyzed for VOCs by PACE using USEPA Method 8260.

2.3 INFLUENT AND EFFLUENT AIR EMISSION SAMPLING

The KYDEP has not established limits for air emissions from the treatment system and does not require an air permit. However, the USEPA has developed emission rates and ambient air performance standards for the RA system as follows:

| | |
|----------------|----------------|
| Cis-1,2-DCE | 5,850,000 ppbv |
| TCE | 19,600 ppbv |
| Vinyl Chloride | 837 ppbv |

Performance standards were established in the ROD, with limitations on the discharge of TCE, cis-1,2-DCE, and vinyl chloride. The point of compliance for the emission rate standards is the discharge end of the 60-foot tall air exhaust stack, after the catalytic oxidation unit.

The air emissions exiting the air exhaust stack were monitored continuously during the initial start up of the RA off-gas system to demonstrate compliance of the catalytic oxidation (cat-ox) treatment system with the USEPA emission rate performance standards. Monitoring of the air exhaust emissions exiting the stack has continued on a monthly basis during the operation of the RA to demonstrate continued compliance with USEPA's air emission performance standards. The off-gas catalytic oxidation system started operation in 1998 when the additional RA work was implemented.

Influent air samples are collected each quarter and were collected in September and December, 2002. Air samples were collected using Summa canisters with flow-control valves and analyzed by Severn Trent in Houston, Texas, for VOCs using USEPA Method TO-14.

2.4 GROUNDWATER SAMPLING

Cooper conducts routine groundwater monitoring on a semi-annual basis. The purpose is to evaluate the concentrations of VOCs in groundwater with respect to time, and to measure the effectiveness of the groundwater recovery and treatment system. The groundwater monitoring system for the NEC site is summarized in Table 3.

The second semi-annual 2002 sampling event was conducted on September 25 and 26, 2002 by CEC. Activities included water level measurement in 23 monitoring

wells, as well as an onsite interceptor trench sump, and the collection of 12 groundwater samples. Groundwater monitoring well locations are shown on Figure 4. During the monitoring event, the pump at CMW-85 was inoperable and a sample could not be obtained. Furthermore, a new owner had moved into the property. Representatives from Eastern Well & Pump will be fixing the pump so that it can be sampled in 2003.

Conventional groundwater sampling procedures and protocols were used in conducting the monitoring. Groundwater levels were measured within each monitoring well to determine the groundwater elevations for the development of groundwater elevation contour maps, and to identify groundwater flow directions.

Prior to sampling each monitoring well, a minimum of three well volumes of water were removed from the wells (unless the wells are recovery wells used for pumping groundwater), and disposed through the facility treatment system. Samples for laboratory analysis were collected in laboratory-prepared VOA vials containing an appropriate amount of preservative. Vials were filled without headspace or air bubbles. Samples were packaged in shuttles containing ice packs for shipment to the analytical laboratory. Chain-of-custody protocol was adhered to during all phases of sample collection, transportation and delivery to the laboratory. Pace Analytical of Export, Pennsylvania, provided the sample bottles with preservatives and analyzed the groundwater samples.

During the sampling event, four QA samples were collected. QA samples included an equipment blank and a duplicate sample from CMW-7 (labeled as "Duplicate") and a field blank. A trip blank was prepared by the analytical laboratory prior to shipping the sample bottles; however, the bottles were damaged during the sampling event and therefore no trip blank was analyzed for this sampling event. The equipment blank was collected by pouring deionized water over sampling

equipment after it had been decontaminated, and was collected to evaluate the effectiveness of the decontamination procedures. The duplicate sample was collected to evaluate laboratory analytical procedures. The field blank was collected to evaluate the ambient air conditions at the time of sampling.

3.0 FINDINGS

3.1 SYSTEM PERFORMANCE

The recovery system treated and discharged over 37 million gallons of water during this reporting period (Table 4 and Appendix A). The average flow rates for the recovery system during the reporting period were approximately:

| | |
|---|------------------|
| Shallow aquifer (interceptor trench) | 1.2 gpm |
| Intermediate bedrock aquifer (R-2) | 17.9 gpm |
| Deep bedrock aquifer (CMW-5-2A, CMW-5-11) | <u>121.6</u> gpm |
| Total average flow rate | 140.7 gpm |

These flows were determined by totalizing flow meters at the treatment plant. Based on these measurements, the average total pumping rate of the system was approximately 141 gpm, which is below the KPDES permit limit of 250 gpm.

Table 1 summarizes the system maintenance activities during this six-month period.

3.1.1 Influent Concentrations

Table 4 summarizes the analyses of untreated influent water for the first half of 2002. Influent samples were collected in August, September, and December 2002. Concentrations presented for July, October, and November 2002 were estimates for calculation purposes based on actual data from the nearest previous month. The analytical results are presented in Appendix B. The cis-1,2-DCE ranged from 430 ppb in the August sample to 310 ppb in December. TCE values fluctuated from 22

ug/l in August to 60 ug/l in December. Vinyl chloride concentrations fluctuated from 29 ug/l in August to 39 ug/l in December (Figure 9).

Contaminant concentration levels in the air stripper influent water through time are summarized on Figure 5. From July 1993 until the final RA system was started in February 1998, the influent concentration showed a decreasing trend through time. The influent concentrations rose significantly once the new RA system was activated in February 1998. However, since that time, the concentrations are again showing a decreasing trend through time.

3.1.2 Effluent Quality

System effluent water concentrations for the reporting period are also summarized in Table 4. All measurements of cis-1,2-DCE, TCE, and vinyl chloride complied with the KPDES permit effluent limits for the daily maximum. Furthermore, monthly average concentrations complied with the monthly average limit specified in the permit. The average removal efficiency for the air stripper was 91.1% (Table 4) from July through December 2002.

3.1.3 Contaminant Removal

Table 4 indicates that approximately 120 pounds of VOCs were removed from the groundwater system during the second half of 2002. This total includes approximately 100 pounds of cis-1,2-DCE, 10 pounds of TCE, and 10 pounds of vinyl chloride. Since January 1997, approximately 2,265 pounds of VOCs have been removed (Appendix A) from the groundwater. Since the start-up of the system in July 1993, approximately 3,915 pounds of VOCs have been removed from the aquifer.

3.1.4 Off-Gas Treatment

Table 5 summarizes analyses of the air stripper exhaust gas (cat-ox influent) and the cat-ox air stack effluent for the reporting period. The analytical report is presented in Appendix B. Concentrations in both the influent and stack effluent samples were well below the standards established by EPA in the ROD. The updated summary of historic cat-ox influent concentrations is presented in Table C-1 (Appendix C). Revised graphs presenting the cat-ox influent concentrations for cis-1,2-DCE (Figure D-1), TCE (Figure D-2) and VC (Figure D-3) are presented in Appendix D. As shown on the tables and graphs, the influent concentrations of these VOCs have consistently been significantly below the effluent standards established by EPA.

For this reporting period, Cooper used the maximum cat-ox system influent concentration for each compound analyzed during the second half of 2002 in determining the percentage of air emission with respect to the standard. For cis-1,2-DCE, TCE, and vinyl chloride, the maximum concentrations were measured in December 2002. The 2,990 ppbv value for cis-1,2-DCE equates to 0.05 percent of the 5,850,000 ppbv standard. The 188 ppbv value for TCE represents 0.96 percent of the 19,600 ppbv standard and the 417 ppbv value for vinyl chloride equates to 49.8 percent of the 837 ppbv standard.

3.1.5 State Regulatory Review

The Commonwealth of Kentucky repealed its toxic substances emission standards on January 19, 1999 and adopted the federal hazardous air pollutant regulations. However, 401 KAR 63:021 Section 1 states, "A source in existence on the effective date of this administrative regulation which was issued a permit pursuant to 401 KAR 50:035 with conditions based on this administrative regulation or 401 KAR

63:022 shall continue to comply with all conditions based on this administrative regulation or 401 KAR 63:022 unless it can demonstrate that a condition is no longer necessary to protect human health and the environment."

Although Cooper was not issued a permit for operating the air stripper as part of the remedial action for this Superfund site, Kentucky's air toxic regulations were considered ARARs. To demonstrate compliance with these former regulations, a table has been prepared utilizing the maximum concentrations of target compounds measured during the year from the air stripper exhaust gas. These concentrations and volumes of chemicals were compared to Kentucky's Threshold Ambient Limits (TALs) and Significant Emission Levels without adjustment for the height of emissions release, which is a stack 60 feet tall. The maximum air stripper emission concentrations were less than Kentucky's TALs by 16 and 78 percent and less than the Significant Emission Levels by 70 and 92 percent for cis-1,2-dichloroethene and trichloroethene, respectively. Even under these extremely conservative computations, the emission levels are substantially below the regulated levels contained in Kentucky's former air toxic regulations and would only emit 584 pounds per year of total VOCs, including vinyl chloride (49 pounds per month, or less than 1.6 pounds per day), Kentucky's total allowable VOC emissions would be 10 tons per year, 20,000 pounds per year, 1,667 pounds per month or approximately 55 pounds per day. This further substantiates the fact that the cat-ox unit is not required to meet the Kentucky air emission standards.

The Kentucky Administrative Code (401 KAR 52:070) establishes criteria for registration of designated air contamination sources. These regulations apply to sources that emit or have the potential to emit (PTE) 2-tons per year or more but less than 10 tons per year of a HAP.

Additionally, the Kentucky Division for Air Quality establishes criteria for designation of insignificant activities as the potential to emit 1,000 pounds of combined HAPs per year, or 5 tons per year of any nonhazardous regulated air pollutant.

Based on the data provided in Appendices (B, C and D) and the analyses of off-gas VOC discharge from the air stripper, the emissions of HAPs and total VOCs are below the criteria for registration as a designated source.

3.2 GROUNDWATER FLOW

Groundwater level measurements were obtained from 23 monitoring wells, plus the onsite interceptor trench sump, during this semi-annual monitoring event (Table 6).

The groundwater elevations were used to generate groundwater contour maps of the shallow, intermediate and deep aquifers. Groundwater flow in the shallow aquifer shows the effects of the recovery trench (Figure 6) with the trench capturing groundwater in the central portion of the facility.

Data for the intermediate aquifer during this reporting period are presented on Figure 7. Dashed contours are included where groundwater elevations are inferred based on historic data from previous pumping tests that have demonstrated that a capture zone has been developed around intermediate pumping well R-2. During the monitoring event, the groundwater elevation in R-2 was found to be elevated above the level recorded on September 9, 2002 presented in the first semi-annual report. The elevated reading was due to iron bacteria build-up in the well that caused the electronic meter to record an erroneous reading. The iron bacteria was removed and the well was cleaned and sanitized in December by Eastern Well & Pump. Based on the flow meter readings, this well pumped continually during the

period. The apparent false elevation reading for this well was not used in the generation of the contour map. The map was developed based on the historic configuration at R-2 and the elevation measured at CMW-12. The groundwater elevation at R-2 will be verified during the first semi-annual 2003 groundwater monitoring event.

Data for the deep aquifer (Figure 8) indicates the presence of an elongated cone of depression surrounding the deep pumping wells, CMW-5-2A and CMW-5-11, and extending toward offsite wells CMW-12A on the DOT property and beyond well CWM-85 located across the river. This flow pattern indicates effective capture of contaminants in the deeper zone.

3.3 ONSITE GROUNDWATER QUALITY

The analytical results for the monitoring and extraction wells, and trench samples are summarized on Table 7 and Figure 9. The complete analytical report is presented in Appendix E. Samples were collected from the interceptor trench sump discharge from the shallow aquifer, recovery well R-2 in the intermediate aquifer, and two recovery wells (CMW-5-11 and CMW-5-2A) in the deeper aquifer. TCE, cis-1,2-DCE, and vinyl chloride were detected at concentrations above their MCLs in deep monitoring well CMW-5-2 and recovery well CMW-5-2A. Cis-1,2-DCE and vinyl chloride were detected at concentrations above their MCLs in recovery well CMW-5-11. The intermediate recovery well R-2 contained TCE, cis-1,2-DCE, and vinyl chloride above their respective MCLs. Benzene was also detected in well R-2 at the detection limit of 5 ppb. The trench contained only TCE above the MCL.

Consistent with previous sampling data, the presence of cis-1,2-DCE and vinyl chloride indicate the presence of natural biodegradation processes occurring in the

aquifers. Furthermore, dechlorination of TCE is very evident with depth in the aquifer, based on Table 7 and Figure 9.

3.4 OFF-SITE GROUNDWATER QUALITY

The second semi-annual groundwater sampling results are summarized in Table 7 and Figure 9. Complete analytical results are presented in Appendix B. Offsite wells sampled during the reporting period were CMW-6, CMW-7, CMW-9, CMW-12, CMW-12-16, and CMW-13. Due to pump problems and new owners, Well CMW-85 was not sampled during this monitoring event. The access issues with the new homeowner and well pump repair will be addressed prior to the next sampling event in 2003.

Concentrations of constituents in excess of the MCLs were detected in only two out of six offsite wells: CMW-7 and CMW-12. Cis-1,2 DCE and vinyl chloride were detected in wells CMW-7 and CMW-12 above their MCLs. The detected values were within historic ranges (Appendix C).

3.5 TIME TRENDS

Water quality data for wells CMW-5-2, CMW-5-11, CMW-7, and CMW-12 were reviewed for trends (Figures 10 through 13). The historic analytical database for the site is presented in Appendix F. The concentration levels are consistent with the historic data over the past few years.

The cumulative VOC mass recovered by the groundwater recovery/treatment system is shown on Figure 15. The continuous increasing trend clearly demonstrates the effectiveness of the system in removing VOCs.

3.6 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Analytical results for quality assurance samples are presented in Table 8. Acetone was detected in equipment and field blank samples but not in any of the groundwater samples. 2-Butanone was detected in the field blank sample. Acetone and 2-Butanone have not historically been associated with the site, and the detections do not appear to be representative of the actual site conditions. The trip blank sample was broken during the sampling event and, therefore, was not analyzed.

The results for CMW-7 and the duplicate sample are within acceptable QA/QC limits.

4.0 SUMMARY

4.1 TREATMENT SYSTEM

The groundwater treatment system continues to be effective at removing VOCs from the groundwater extracted from the shallow, intermediate, and deep aquifer recovery systems. Approximately 37 million gallons of impacted groundwater were removed during this period, at an average combined flow of 141 gpm. A total of approximately 120 pounds of VOCs were removed from the shallow, intermediate and deep aquifer zones during the period. The final RA system was started in July 1993 and updated from September 1997 through in February 1998. Since startup of the system in July 1993, approximately 3,916 pounds of VOCs have been removed from the aquifer.

During the six month reporting period, the air stripper system operated at approximately 91% removal efficiency. The analytical results of effluent water samples collected from air stripper Outfall 001 were well within the KPDES compliance limits.

The off-gases from the air stripper were treated through a catalytic oxidation system. The catalytic oxidation system removed approximately 99.7% of the influent gases of concern (cis-1,2-DCE, TCE, and vinyl chloride) during the six month time period. Influent, as well as effluent, air emission analytical results were significantly less than the required EPA and KYDEP air emission standards for each VOC compound of concern.

4.2 GROUNDWATER FLOW

The groundwater contour maps generated for the shallow, intermediate, and deep aquifers indicate that the recovery system is effectively capturing and remediating the contaminated groundwater. During the sampling event, the groundwater elevation in R-2 was slightly elevated, possibly due to iron filings and bacteria fouling the instrumentation. This well was immediately treated with bleach and maintenance was performed on the pump by Eastern Well & Pump. CEC believes that this well is still adequately capturing contaminated water from the site. In the shallow aquifer, the groundwater appears to be captured by the trench system. Historic data combined with data collected on September 7, 2002 demonstrate capture in the intermediate aquifer. The capture zone developed in the deep zone extends beyond the leading edge of the plume in this zone beyond the Cumberland River toward well 85, nearly 2,000 feet from the site. This finding indicates that the system is not only controlling the plume's movement, but is also retracting and remediating the remaining groundwater contamination.

4.3 ANALYTICAL RESULTS

Samples collected from the groundwater recovery extraction points (Trench, R-2, CMW-5-2A and CMW-11) and in the influent water to the air stripper detected the presence of elevated concentrations of cis-1,2-DCE, TCE, and vinyl chloride which demonstrates effective recovery of the VOC plume. The VOC concentration levels in the recovery and monitoring wells have continued to decrease since the final upgraded system started up in February 1998, based on the time trend analysis figures. However, the cumulative mass of VOCs removed is still increasing (Figure 15). The presence of the degradation products of TCE (cis-1,2-DCE and vinyl chloride) indicates that biodegradation is occurring in the aquifers with depth and is actively supporting natural attenuation of the plume.

The groundwater results from the offsite wells in the deep aquifer indicate that off-site migration of contaminants is being controlled and mitigated by the remediation system. For example, the only off-site wells exhibiting constituent concentrations in excess of the MCLs were wells CMW-7 and CMW-12, which are located close to the site.

4.4 QA/QC

The QA/QC samples collected during this sampling event were generally within acceptable limits. The duplicate sample collected from Well CMW-7 contained contaminant concentrations within $\pm 15.9\%$ of the original sample. The field and equipment blank samples were free of VOCs of concern, except for acetone and 2-Butanone, which are believed to be laboratory artifacts and have not been detected as contaminants of concern at this site.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The groundwater recovery system continues to effectively remove contaminants from the impacted shallow, intermediate, and deep aquifers. The system also appears to be controlling the offsite migration of the contaminants and retracting the contaminant VOC plume. Water-quality data also shows that natural attenuation is occurring in the aquifers.

The continued operation of the groundwater remediation treatment system along with the monthly monitoring and maintenance of the remediation system will continue to remediate the aquifers. Cooper continues to examine the current operation and its effectiveness in removing VOCs from the aquifers. Based on the continued success and the consistent upward trend of cumulative VOCs removed (Figure 15), Cooper does not propose any changes to the current extraction system. When a leveling off of cumulative VOCs removal is noted, Cooper will further evaluate other alternative on/off pumping schedules in an effort to continue favorable contaminant removal rates.

Influent air samples to the cat-ox unit collected from the final RA system since May 1998 have continued to be significantly below the USEPA and KYDEP air emission limits. This represents 14 consecutive quarters of influent air data. Therefore, Cooper requests approval from EPA and the KYDEP to shutdown the cat-ox unit.

Based on the consistency of the data, and groundwater monitoring data available since 1993, we recommend that the groundwater sampling program be reduced to annual monitoring, with a corresponding report to be submitted annually to the KYDEP and EPA. In addition, Cooper requests that air emission samples be collected quarterly instead of monthly due to the consistency of the analytical results.

FIGURES

TABLES

Figure 10
CMW-5-2, VOC Concentrations Versus Time
 National Electric Coil Facility
 Harlan, Kentucky

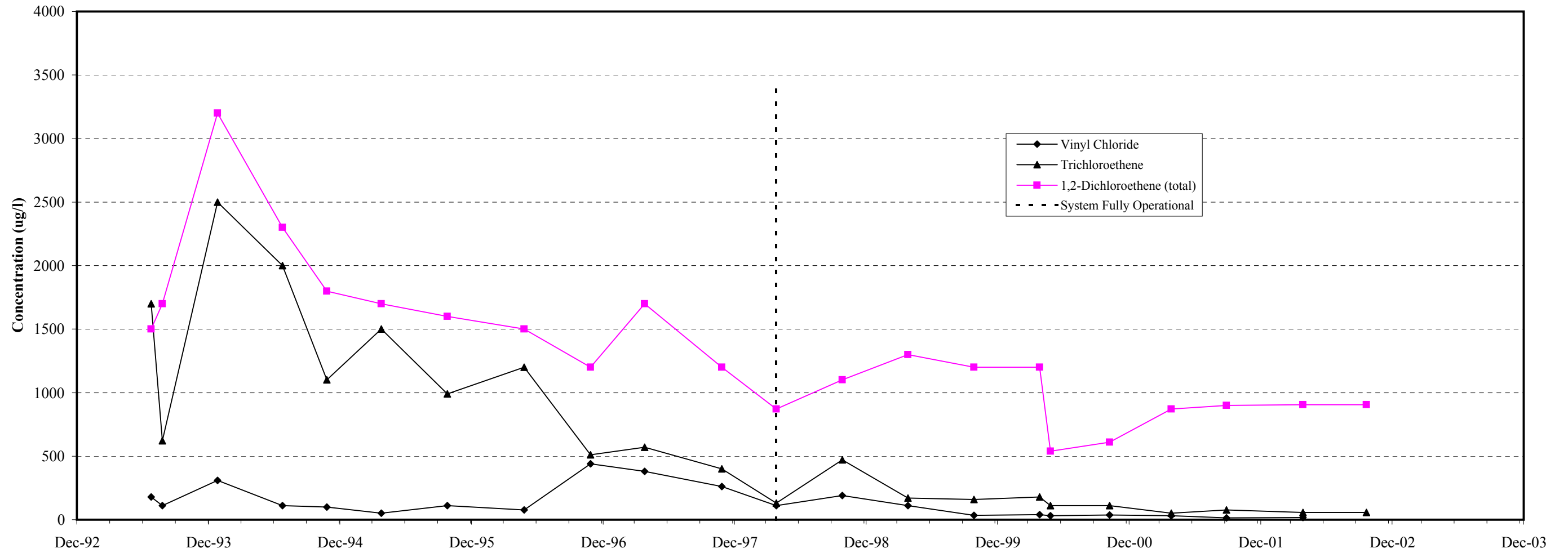


Figure 11
CMW-5-11, VOC Concentrations Versus Time
 National Electric Coil Facility
 Harlan, Kentucky

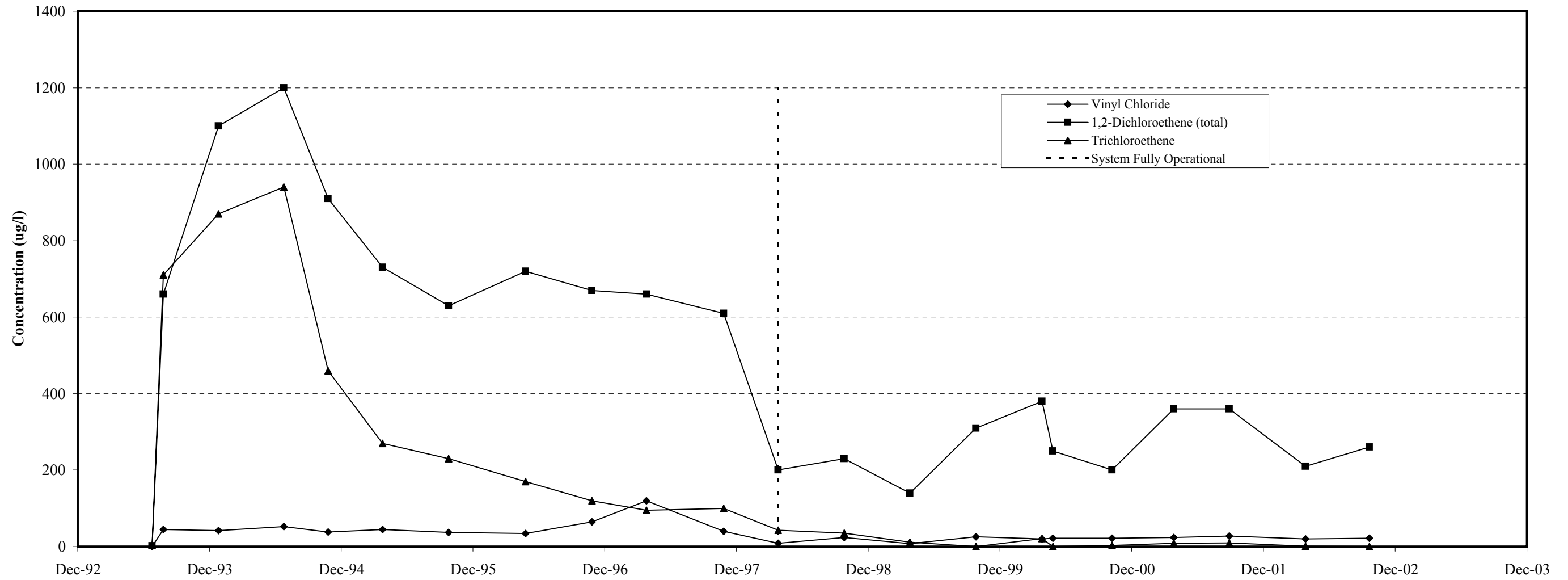


Figure 12
CMW-7, VOC Concentrations Versus Time
National Electric Coil Facility
Harlan, Kentucky

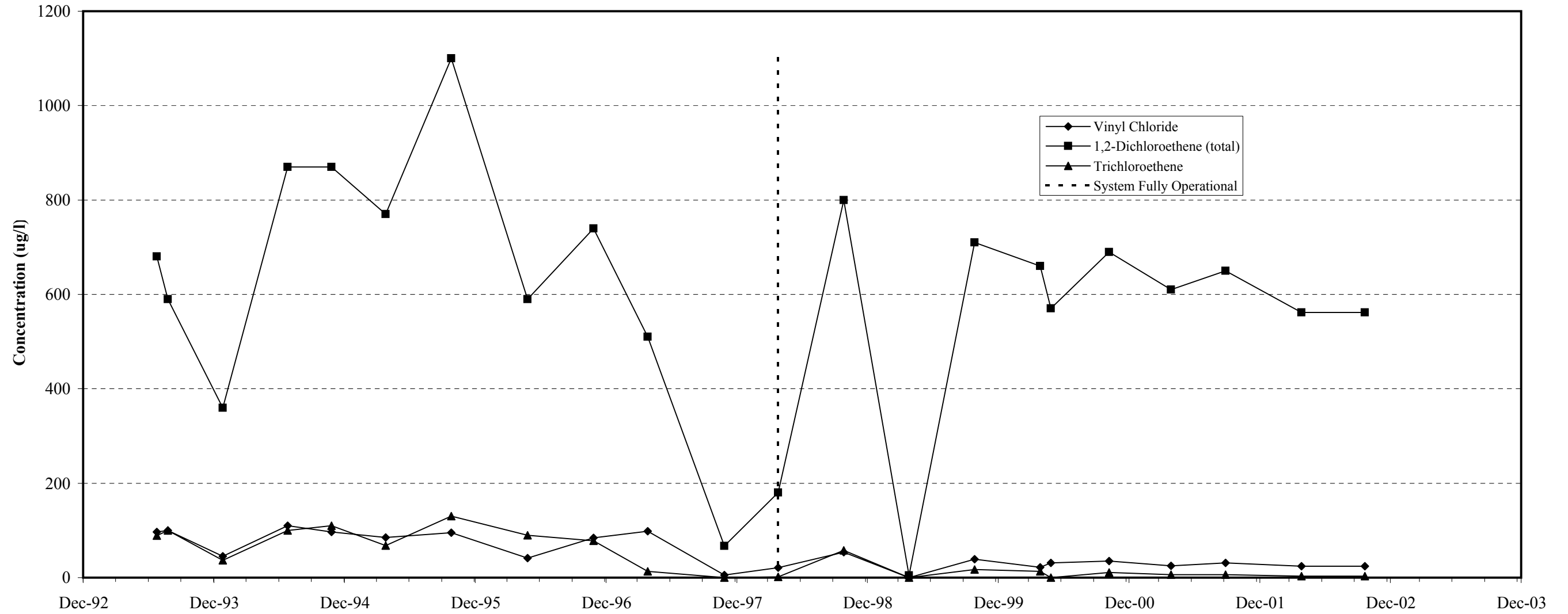


Figure 13
CMW-12, VOC Concentrations Versus Time
National Electric Coil Facility
Harlan, Kentucky

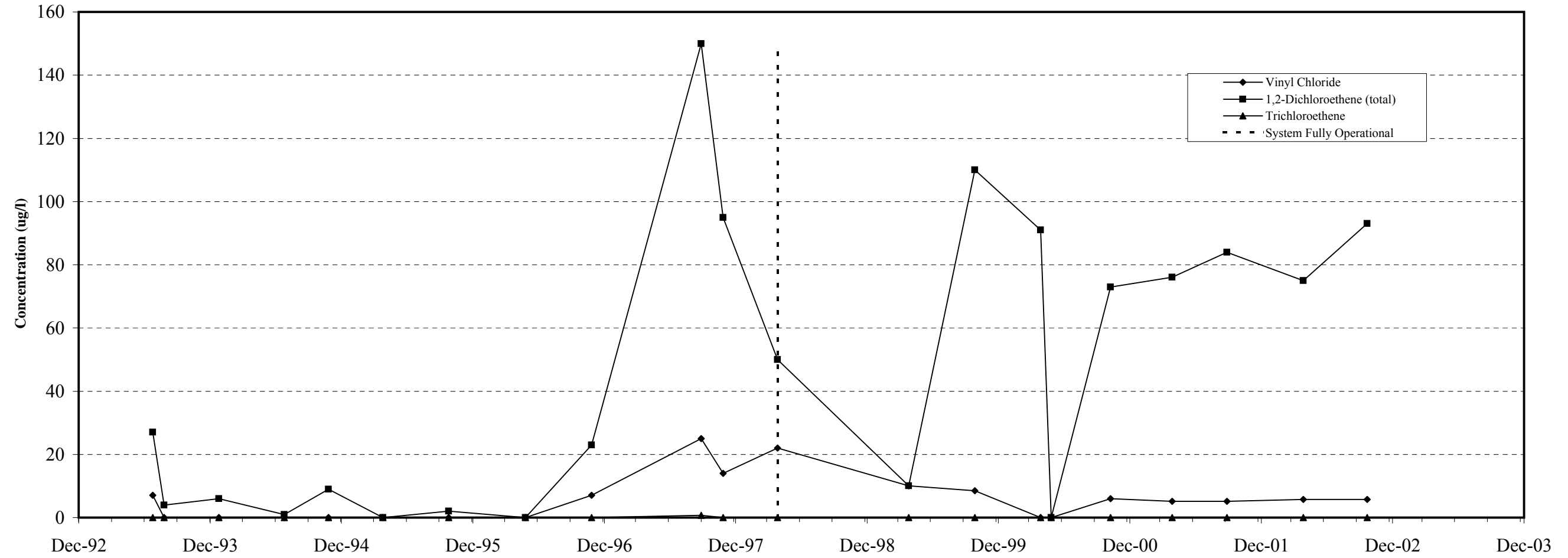
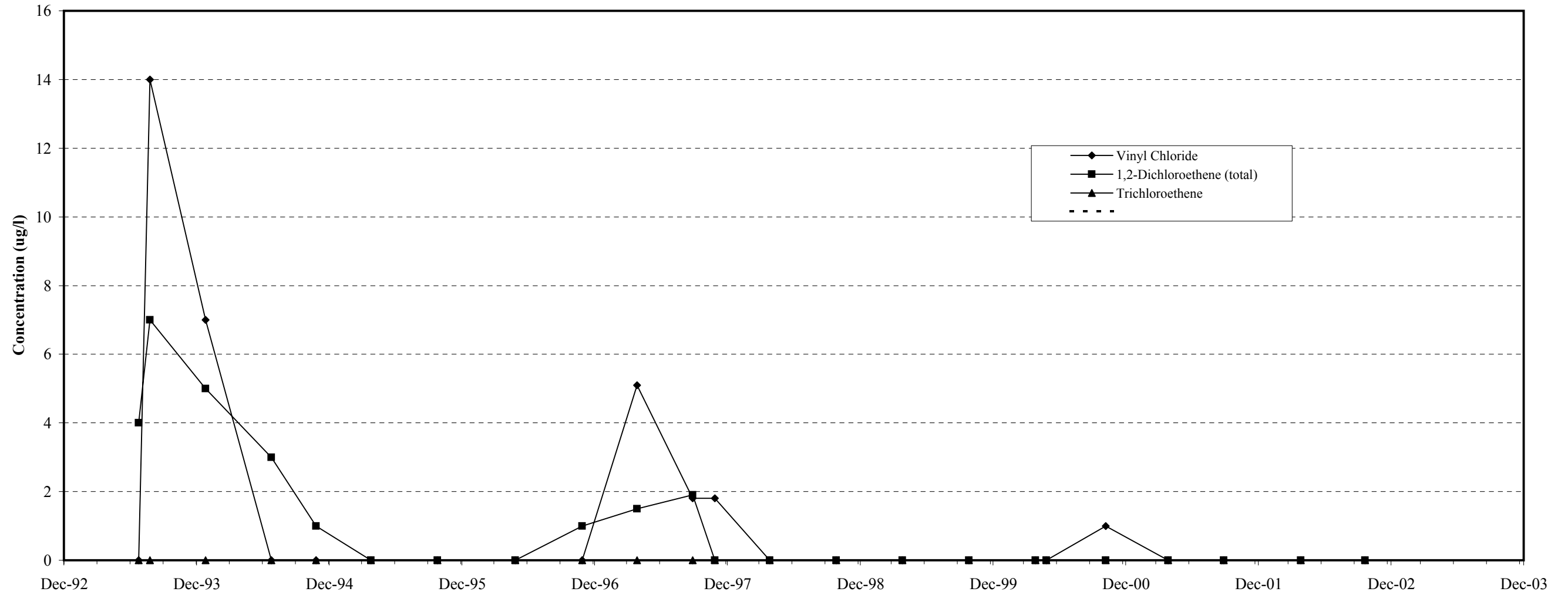


Figure 14
CMW-85, VOC Concentrations Versus Time
National Electric Coil Facility
Harlan, Kentucky



APPENDIX A
RECOVERY DATA SUMMARIES

APPENDIX B
AIR ANALYSES

APPENDIX C

HISTORIC CAT-OX INFLUENT AIR ANALYTICAL RESULTS

APPENDIX D

CAT-OX INFLUENT AIR CONCENTRATIONS THROUGH TIME

APPENDIX E

**SECOND SEMI-ANNUAL 2002
LABORATORY REPORT**

APPENDIX F

HISTORIC GROUNDWATER ANALYTICAL RESULTS

Trench

| Analytes VOLATILE ORGANICS (ug/l) | Federal MCL | Mar-98 | Mar-99 | Apr-00 | May-00 | Oct-00 | Apr-01 | Sep-01 | Apr-02 | Sep-02 |
|--|----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Vinyl Chloride | 2 | | | | | U | U | U | U | U |
| Acetone | -- | | | | | U | U | U | 3.J | U |
| Carbon Disulfide | -- | | | | | U | U | U | U | U |
| 1,1-Dichloroethene | 7 | | | | | U | U | U | U | U |
| 1,1-Dichloroethane | -- | | | | | U | U | U | U | U |
| 1,2-Dichloroethene (total) | 70 | NA | 78 | 6.6 | 62 | 76 | 13 | 78 | 55 | 69 |
| Chloroform | -- | | | | | U | U | U | U | U |
| Trichloroethene | 5 | 2280 | 2700 | 270 | 1800 | 2300 | 410 | 910 | 1700 | 1300D |
| Benzene | 5 | | | | | U | U | U | U | U |
| Tetrachloroethene | 5 | | | | | U | U | U | 3.J | U |
| 1,1,2,2-Tetrachloroethane | -- | | | | | U | U | U | U | U |
| Toluene | 1000 | | | | | U | U | U | U | U |
| Chlorobenzene | -- | | | | | U | U | U | U | U |
| Ethylbenzene | 700 | | | | | U | U | U | U | U |
| Styrene | 100 | | | | | U | U | U | U | U |
| Xylene (total) | 10000 | | | | | U | U | U | U | U |

Notes:

- J - Estimated value: less than the CRQL
- U - Constituent analyzed for and not detected
- NA - Well was not completed at the time of the July sampling event
- NS - Well not sampled
- D - Reported value was determined after dilution
- B - Constituent detected in associated blank and is a suspected laboratory contaminant
- MCL - Maximum contaminant level

R-2

| Analytes VOLATILE ORGANICS (ug/l) | Federal MCL | Mar-98 | Mar-99 | Apr-00 | May-00 | Oct-00 | Apr-01 | Sep-01 | Apr-02 | Sep-02 |
|--|----------------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| Vinyl Chloride | 2 | 54 | 49 | NS | NS | 43 | 34 | 38 | 33 | 35 |
| Acetone | -- | | | | | U | U | U | 4.1J | 4.1J |
| Carbon Disulfide | -- | | | | | U | U | U | U | U |
| 1,1-Dichloroethene | 7 | | | | | U | U | 2.8 | 3.9 | 3 |
| 1,1-Dichloroethane | -- | | | | | U | U | U | U | U |
| 1,2-Dichloroethene (total) | 70 | 1455 | 2100 | NS | NS | 1400 | 1307 | 1407 | 1307 | 1206.4D |
| Chloroform | -- | | | | | U | U | U | U | U |
| Trichloroethene | 5 | 1460 | 1500 | NS | NS | 600 | 210 | 170 | 200 | 130 |
| Benzene | 5 | | | | | U | U | 5.4 | 5.3 | 5 |
| Tetrachloroethene | 5 | | | | | U | U | U | U | U |
| 1,1,2,2-Tetrachloroethane | -- | | | | | U | U | U | U | U |
| Toluene | 1000 | | | | | U | U | U | U | U |
| Chlorobenzene | -- | | | | | U | U | U | U | U |
| Ethylbenzene | 700 | | | | | U | U | U | U | U |
| Styrene | 100 | | | | | U | U | U | U | U |
| Xylene (total) | 10000 | | | | | U | U | U | U | U |

Notes:

J - Estimated value: less than the CRQL

U - Constituent analyzed for and not detected

NA - Well was not completed at the time of the July sampling event

NS - Well not sampled

D - Reported value was determined after dilution

B - Constituent detected in associated blank and is a suspected laboratory contaminant

MCL - Maximum contaminant level

| Well Number 5-2 | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| Analytes | Federal MCL | Jul-93 | Aug-93 | Jan-94 | Jul-94 | Nov-94 | Apr-95 | Oct-95 | May-96 | Nov-96 | Apr-97 | Nov-97 | Apr-98 | Oct-98 | Apr-99 | Oct-99 | Apr-00 | May-00 | Oct-00 | Apr-01 | Sep-01 | Apr-02 | Sep-02 |
| VOLATILE ORGANICS (ug/l) | | | | | | | | | | | | | | | | | | | | | | | |
| Vinyl Chloride | 2 | 180 | 110 | 310 | 110 | 100 | 51 | 110 | 77 | 440 | 380 | 260 | 110 | 190 | 110 | 33 | 41 | 31 | 37 | 32 | 15 | 16 | 22 |
| Acetone | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | 3.4J | U |
| Carbon Disulfide | -- | U | 7 | U | U | U | U | U | U | U | U | 12 | U | U | U | U | U | U | U | U | U | U | U |
| 1,1-Dichloroethene | 7 | 3 J | 3 J | U | 3 J | 0.7 J | U | 3 J | U | 4 J | U | 2.6 J | 2.7 J | 3.6 J | 3.0J | U | U | U | 2 | 2 | U | 1.9J | 2.6J |
| 1,1-Dichloroethane | -- | 1J | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,2-Dichloroethene (total) | 70 | 1500 D | 1700 D | 3200 D | 2300 D | 1800 D | 1700 D | 1600 D | 1500 D | 1200 | 1700 | 1200 | 870 D | 1100 D | 1300 | 1200 | 1200 | 540 | 610 | 870 | 899 | 905 | 1105.6D |
| Chloroform | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | 25 | 8.2 |
| Trichloroethene | 5 | 1700 D | 620 D | 2500 D | 2000 D | 1100 D | 1500 D | 990 E | 1200 D | 510 | 570 | 400 | 130 | 470 D | 170 | 160 | 180 | 110 | 110 | 51 | 76 | 57 | 40 |
| Benzene | 5 | 0.7 J | U | 0.3 J | 2 J | U | U | 1 J | U | 2 J | 2.5 J | 1.2 J | 1.1 J | U | U | U | U | U | U | U | U | U | U |
| Tetrachloroethene | 5 | 2 J | U | 6 | 3 J | 2 J | 2 J | U | U | 0.6 J | U | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,1,2,2-Tetrachloroethane | -- | U | U | U | U | U | U | 2 J | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Toluene | 1000 | 1 J | 1 J | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Chlorobenzene | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Ethylbenzene | 700 | U | U | U | U | U | U | U | U | 0.2 J | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Styrene | 100 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Xylene (total) | 10000 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |

Notes:

J - Estimated value: less than the CRQL

U - Constituent analyzed for and not detected

NA - Well was not completed at the time of the July sampling event

NS - Well not sampled

D - Reported value was determined after dilution

B - Constituent detected in associated blank and is a suspected laboratory contaminant

MCL - Maximum contaminant level

| Well Number 5-2A | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Analytes | Federal MCL | Jul-93 | Aug-93 | Jan-94 | Jul-94 | Nov-94 | Apr-95 | Oct-95 | May-96 | Nov-96 | Apr-97 | Nov-97 | Apr-98 | Oct-98 | Apr-99 | Oct-99 | Apr-00 | May-00 | Oct-00 | Apr-01 | Sep-01 | Apr-02 | Sep-02 |
| VOLATILE ORGANICS (ug/l) | | | | | | | | | | | | | | | | | | | | | | | |
| Vinyl Chloride | 2 | 180 | 110 | 310 | 110 | 100 | 51 | 110 | 77 | 440 | 380 | 260 | 110 | 190 | 110 | 33 | 41 | 31 | 22 | 23 | 31 | 25 | 25 |
| Acetone | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | 3.6J | 3.6J |
| Carbon Disulfide | -- | U | 7 | U | U | U | U | U | U | U | U | 12 | U | U | U | U | U | U | U | U | U | U | U |
| 1,1-Dichloroethene | 7 | 3 J | 3 J | U | 3 J | 0.7 J | U | 3 J | U | 4 J | U | 2.6 J | 2.7 J | 3.6 J | 3.0J | U | U | U | 2 | 2 | 2.1 | 1.9J | 1.6J |
| 1,1-Dichloroethane | -- | 1J | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,2-Dichloroethene (total) | 70 | 1500 D | 1700 D | 3200 D | 2300 D | 1800 D | 1700 D | 1600 D | 1500 D | 1200 | 1700 | 1200 | 870 D | 1100 D | 1300 | 1200 | 1200 | 540 | 870 | 770 | 950 | 640 | 703.4D |
| Chloroform | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Trichloroethene | 5 | 1700 D | 620 D | 2500 D | 2000 D | 1100 D | 1500 D | 990 E | 1200 D | 510 | 570 | 400 | 130 | 470 D | 170 | 160 | 180 | 110 | 67 | 110 | 150 | 39 | 85 |
| Benzene | 5 | 0.7 J | U | 0.3 J | 2 J | U | U | 1 J | U | 2 J | 2.5 J | 1.2 J | 1.1 J | U | U | U | U | U | U | U | U | U | U |
| Tetrachloroethene | 5 | 2 J | U | 6 | 3 J | 2 J | 2 J | U | U | 0.6 J | U | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,1,2,2-Tetrachloroethane | -- | U | U | U | U | U | U | 2 J | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Toluene | 1000 | 1 J | 1 J | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Chlorobenzene | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Ethylbenzene | 700 | U | U | U | U | U | U | U | U | 0.2 J | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Styrene | 100 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Xylene (total) | 10000 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |

Notes:

J - Estimated value: less than the CRQL

U - Constituent analyzed for and not detected

NA - Well was not completed at the time of the July sampling event

NS - Well not sampled

D - Reported value was determined after dilution

B - Constituent detected in associated blank and is a suspected laboratory contaminant

MCL - Maximum contaminant level

| Well Number 5-10 | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Analytes | Federal MCL | Jul-93 | Aug-93 | Jan-94 | Jul-94 | Nov-94 | Apr-95 | Oct-95 | May-96 | Nov-96 | Apr-97 | Sep-97 | Nov-97 | Apr-98 | Oct-98 | Apr-99 | Oct-99 | Apr-00 | May-00 | Oct-00 | Apr-01 | Sep-01 | Apr-02 | Sep-02 |
| VOLATILE ORGANICS (ug/l) | | | | | | | | | | | | | | | | | | | | | | | | |
| Vinyl Chloride | 2 | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | NS | 1 | 1 | U | U | U |
| Acetone | -- | U | U | U | U | U | U | U | U | U | 1.1 | NS | U | U | U | U | U | U | NS | U | U | U | 4.2J | U |
| Carbon Disulfide | -- | U | 0.9 J | U | U | U | U | 1 J | U | U | 4.5 | NS | 2.2 J | U | 2.3 J | 2.3 J | 2.3 J | U | NS | U | U | U | U | U |
| 1,1-Dichloroethene | 7 | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | NS | U | U | U | U | U |
| 1,1-Dichloroethane | -- | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | NS | U | U | U | U | U |
| 1,2-Dichloroethene (total) | 70 | U | U | U | U | U | U | U | U | 0.7 J | U | NS | U | 3.8 J | U | U | U | U | NS | 12 | 12 | 9.3 | 7.7 | 11 |
| Chloroform | -- | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | NS | U | U | U | U | U |
| Trichloroethene | 5 | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | NS | U | U | U | U | U |
| Benzene | 5 | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | NS | U | U | U | U | U |
| Tetrachloroethene | 5 | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | NS | U | U | U | U | U |
| 1,1,2,2-Tetrachloroethane | -- | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | NS | U | U | U | 1.1J | U |
| Toluene | 1000 | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | NS | U | U | U | U | U |
| Chlorobenzene | -- | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | NS | U | U | U | U | U |
| Ethylbenzene | 700 | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | NS | U | U | U | U | U |
| Styrene | 100 | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | NS | U | U | U | U | U |
| Xylene (total) | 10000 | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | 8.8 B | U | NS | U | U | U | U | U |

Notes:

J - Estimated value: less than the CRQL

U - Constituent analyzed for and not detected

NA - Well was not completed at the time of the July sampling event

NS - Well not sampled

D - Reported value was determined after dilution

B - Constituent detected in associated blank and is a suspected laboratory contaminant

MCL - Maximum contaminant level

| Well Number 5-11 | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Analytes | Federal MCL | Feb-98 | Feb-98 | Jul-93 | Aug-93 | Jan-94 | Jul-94 | Nov-94 | Apr-95 | Oct-95 | May-96 | Nov-96 | Apr-97 | Nov-97 | Apr-98 | Oct-98 | Apr-99 | Oct-99 | Apr-00 | May-00 | Oct-00 | Apr-01 | Sep-01 | Apr-02 | Sep-02 |
| VOLATILE ORGANICS (ug/l) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Vinyl Chloride | 2 | | | U | 45 | 42 | 52 | 38 | 45 | 37 | 34 | 65 | 120 | 40 | 8.4 | 24 | 8 | 26 | 20 | 22 | 22 | 24 | 28 | 20 | 22 |
| Acetone | -- | | | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | 4 | 4 | U | 3.5J | 3J |
| Carbon Disulfide | -- | | | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,1-Dichloroethene | 7 | | | U | U | U | 2J | U | U | U | U | 2J | 1.8J | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,1-Dichloroethane | -- | | | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,2-Dichloroethene (total) | 70 | | | 2J | 660D | 1100D | 1200D | 910D | 730D | 630D | 720D | 670 | 660 | 610 | 200D | 230D | 140 | 310 | 380 | 250 | 200 | 360 | 360 | 210 | 260D |
| Chloroform | -- | | | U | U | U | U | U | U | U | U | U | U | U | U | 14 | U | U | U | U | U | U | U | U | U |
| Trichloroethene | 5 | | | 3J | 710D | 870D | 940D | 460D | 270D | 230D | 170 | 120 | 95 | 100 | 43 | 35 | 11 | U | 21 | U | 3 | 8.9 | 9.1 | 1.3J | U |
| Benzene | 5 | | | U | U | U | U | U | U | U | U | 0.9J | 1J | U | U | U | U | U | U | U | U | U | U | U | U |
| Tetrachloroethene | 5 | | | U | 2J | 1J | 1J | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,1,2,2-Tetrachloroethane | -- | | | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Toluene | 1000 | | | 3J | U | U | U | U | 2J | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Chlorobenzene | -- | | | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Ethylbenzene | 700 | | | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Styrene | 100 | | | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Xylene (total) | 10000 | | | U | U | U | U | U | U | U | U | U | U | U | U | U | U | 6.5 | U | U | U | U | U | U | U |

System 0 1400

Notes:

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- U - Constituent analyzed for and not detected
- NA - Well was not completed at the time of the July sampling event
- NS - Well not sampled
- D - Reported value was determined after dilution
- B - Constituent detected in associated blank and is a suspected laboratory contaminant
- MCL - Maximum contaminant level

| Well Number CMW-6 | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Analytes | Federal MCL | Jul-93 | Aug-93 | Jan-94 | Jul-94 | Nov-94 | Apr-95 | Oct-95 | May-96 | Nov-96 | Apr-97 | Sep-97 | Nov-97 | Apr-98 | Oct-98 | Apr-99 | Oct-99 | Apr-00 | May-00 | Oct-00 | Apr-01 | Sep-01 | Apr-02 | Sep-02 |
| VOLATILE ORGANICS (ug/l) | | | | | | | | | | | | | | | | | | | | | | | | |
| Vinyl Chloride | 2 | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | U | U | U | U | U | U |
| Acetone | -- | 19 | U | U | U | U | U | U | U | U | 16 | NS | U | U | U | U | U | 140 | U | U | U | U | 4.1J | U |
| Carbon Disulfide | -- | U | U | U | 6 | U | U | 8 | U | 18 | 26 | NS | 47 | 2.3 J | 1.4 J | U | U | U | U | U | U | U | U | U |
| 1,1-Dichloroethene | 7 | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,1-Dichloroethane | -- | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,2-Dichloroethene (total) | 70 | U | 4 J | U | U | 1 J | U | U | U | 1 J | U | NS | 2.1 J | U | 1.2 J | U | U | U | U | U | U | U | U | U |
| Chloroform | -- | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | U | U | U | U | U | U |
| Trichloroethene | 5 | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | U | U | U | U | U | U |
| Benzene | 5 | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | U | U | U | U | U | U |
| Tetrachloroethene | 5 | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,1,2,2-Tetrachloroethane | -- | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | U | U | U | U | U | U |
| Toluene | 1000 | U | U | U | U | U | U | U | 72 | U | U | NS | U | U | U | U | U | U | U | U | U | U | U | U |
| Chlorobenzene | -- | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | U | U | U | U | U | U |
| Ethylbenzene | 700 | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | U | U | U | U | U | U |
| Styrene | 100 | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | U | U | U | U | U | U | U | U |
| Xylene (total) | 10000 | U | U | U | U | U | U | U | U | U | U | NS | U | U | U | U | 6.5 | U | U | U | U | U | U | U |

Notes:

J - Estimated value: less than the CRQL

U - Constituent analyzed for and not detected

NA - Well was not completed at the time of the July sampling event

NS - Well not sampled

D - Reported value was determined after dilution

B - Constituent detected in associated blank and is a suspected laboratory contaminant

MCL - Maximum contaminant level

| Well Number CMW-7 | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Analytes | Federal MCL | Jul-93 | Aug-93 | Jan-94 | Jul-94 | Nov-94 | Apr-95 | Oct-95 | May-96 | Nov-96 | Apr-97 | Nov-97 | Apr-98 | Oct-98 | Apr-99 | Oct-99 | Apr-00 | May-00 | Oct-00 | Apr-01 | Sep-01 | Apr-02 | Sep-02 |
| VOLATILE ORGANICS (ug/l) | | | | | | | | | | | | | | | | | | | | | | | |
| Vinyl Chloride | 2 | 97 | 100 | 45 | 110 | 97 | 85 | 95 | 41 | 84 | 98 | 5.1 J | 21 | 54 | U | 39 | 22 | 31 | 35 | 25 | 31 | 24 | 23 |
| Acetone | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | 3.8J | 3.8J |
| Carbon Disulfide | -- | U | U | U | U | U | U | U | U | 6 J | 1.5 J | 2.2 J | U | 10 | U | U | U | U | U | U | U | U | U |
| 1,1-Dichloroethene | 7 | 1 J | U | U | U | U | U | U | U | 2 J | U | U | U | U | U | U | U | U | 1 | U | U | 1.3J | 1.2J |
| 1,1-Dichloroethane | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,2-Dichloroethene (total) | 70 | 680 D | 590 D | 360 | 870 D | 870 D | 770 | 1100 D | 590 D | 740 | 510 | 67 | 180 | 800 D | 5 | 710 | 660 | 570 | 690 | 610 | 650 | 562 | 610D |
| Chloroform | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Trichloroethene | 5 | 89 | 100 | 37 | 100 | 110 | 68 | 130 | 90 | 78 | 13 | U | 1.8 J | 58 | U | 17 | 13 | U | 11 | 6.5 | 6.6 | 3.1J | U |
| Benzene | 5 | U | U | U | 1 J | U | 1 J | 2 J | U | 3 J | 1.7 J | U | U | 2.1 J | U | U | U | U | 2 | U | U | 1.6J | U |
| Tetrachloroethene | 5 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,1,2,2-Tetrachloroethane | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Toluene | 1000 | U | U | U | U | U | U | U | U | 0.1 J | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Chlorobenzene | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Ethylbenzene | 700 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Styrene | 100 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Xylene (total) | 10000 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |

Notes:

J - Estimated value: less than the CRQL

U - Constituent analyzed for and not detected

NA - Well was not completed at the time of the July sampling event

NS - Well not sampled

D - Reported value was determined after dilution

B - Constituent detected in associated blank and is a suspected laboratory contaminant

MCL - Maximum contaminant level

| Well Number CMW-9 | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Analytes | Federal MCL | Jul-93 | Aug-93 | Jan-94 | Jul-94 | Nov-94 | Apr-95 | Oct-95 | May-96 | Nov-96 | Apr-97 | Sep-97 | Nov-97 | Apr-98 | Oct-98 | Apr-99 | Oct-99 | Apr-00 | May-00 | Oct-00 | Apr-01 | Sep-01 | Apr-02 | Sep-02 |
| Vinyl Chloride | 2 | U | U | U | U | U | U | U | U | U | 5.4 | 1.2 J | U | U | U | 17 | U | U | U | 2 | U | U | 2.2 | 1.7J |
| Acetone | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | 4.7J | U |
| Carbon Disulfide | -- | U | 1 J | U | U | U | U | U | U | 1 J | U | 0.8 J | 9.3 J | U | U | U | U | U | U | U | U | U | U | U |
| 1,1-Dichloroethene | 7 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,1-Dichloroethane | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,2-Dichloroethene (total) | 70 | U | U | U | 4 J | 3 J | 4 J | 4 J | U | 5 J | 8 J | 6.7 J | 8.6 J | 6.9 | 1.9 J | 260 | U | U | U | 13 | 14 | 14 | 14 | 15 |
| Chloroform | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Trichloroethene | 5 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | 3.0J | U | U | U | U | U | U | U | U |
| Benzene | 5 | U | 0.9 J | U | U | U | U | U | U | U | 0.7 J | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Tetrachloroethene | 5 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,1,2,2-Tetrachloroethane | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Toluene | 1000 | U | U | U | U | U | U | U | U | 0.2 J | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Chlorobenzene | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Ethylbenzene | 700 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Styrene | 100 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Xylene (total) | 10000 | U | U | U | U | U | U | U | U | 0.5 J | 0.6 J | U | U | U | U | U | U | U | U | U | U | U | U | U |

Notes:

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NA - Well was not completed at the time of the July sampling event

NS - Well not sampled

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B - Constituent detected in associated blank and is a suspected laboratory contaminant

MCL - Maximum contaminant level

| Well Number CMW-12 | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----|
| Analytes | Federal MCL | Jul-93 | Aug-93 | Jan-94 | Jul-94 | Nov-94 | Apr-95 | Oct-95 | May-96 | Nov-96 | Sep-97 | Nov-97 | Apr-98 | Apr-99 | Oct-99 | Apr-00 | May-00 | Oct-00 | Apr-01 | Sep-01 | Apr-02 | Sep-02 | |
| VOLATILE ORGANICS (ug/l) | | | | | | | | | | | | | | | | | | | | | | | |
| Vinyl Chloride | 2 | 7 | U | U | U | U | U | U | U | U | 7 | 25 | 14 | 22 | 10 | 8.5 | U | U | 6 | 5.2 | 5.2 | 5.7 | 5.7 |
| Acetone | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Carbon Disulfide | -- | U | 1 J | U | 1 J | U | U | U | U | U | 0.78 J | 2.9 J | U | U | U | U | U | U | U | U | U | U | U |
| 1,1-Dichloroethene | 7 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,1-Dichloroethane | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,2-Dichloroethene (total) | 70 | 27 | 4 J | 6 | 1 J | 9 | U | 2 J | U | 23 | 150 | 95 | 50 | 10 | 110 | 91 | U | 73 | 76 | 84 | 75 | 93 | |
| Chloroform | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Trichloroethene | 5 | U | U | U | U | U | U | U | U | U | 0.7 J | U | U | U | U | U | U | U | U | U | U | U | U |
| Benzene | 5 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Tetrachloroethene | 5 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| 1,1,2,2-Tetrachloroethane | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Toluene | 1000 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Chlorobenzene | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Ethylbenzene | 700 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Styrene | 100 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |
| Xylene (total) | 10000 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U |

Notes:

J - Estimated value: less than the CRQL

U - Constituent analyzed for and not detected

NA - Well was not completed at the time of the July sampling event

NS - Well not sampled

D - Reported value was determined after dilution

B - Constituent detected in associated blank and is a suspected laboratory contaminant

MCL - Maximum contaminant level

| Well Number CMW-12-16 | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Analytes | Federal MCL | Jul-93 | Aug-93 | Jan-94 | Jul-94 | Nov-94 | Apr-95 | Oct-95 | May-96 | Nov-96 | Apr-97 | Sep-97 | Nov-97 | Apr-98 | Oct-98 | Apr-99 | Oct-99 | Apr-00 | May-00 | Oct-00 | Apr-01 | Sep-01 | Apr-02 | Sep-02 |
| VOLATILE ORGANICS (ug/l) | | | | | | | | | | | | | | | | | | | | | | | | |
| Vinyl Chloride | 2 | U | U | U | U | U | U | U | U | 18 | NS | NS | 1.7 J | 1 J | NS | NS | U | U | U | 2 | U | U | 1.3J | 1.2J |
| Acetone | -- | 31 | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | NS | U | U | U | U | U | U | U | U |
| Carbon Disulfide | -- | U | U | U | U | U | U | U | U | U | NS | NS | 1.5 J | U | NS | NS | U | U | U | U | U | U | U | U |
| 1,1-Dichloroethene | 7 | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | NS | U | U | U | U | U | U | U | U |
| 1,1-Dichloroethane | -- | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | NS | U | U | U | U | U | U | U | U |
| 1,2-Dichloroethene (total) | 70 | U | U | U | U | U | U | U | U | 4 J | NS | NS | U | U | NS | NS | U | U | U | U | U | U | U | U |
| Chloroform | -- | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | NS | U | U | U | U | U | U | U | U |
| Trichloroethene | 5 | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | NS | U | U | U | U | U | U | U | U |
| Benzene | 5 | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | NS | U | U | U | U | U | U | U | U |
| Tetrachloroethene | 5 | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | NS | U | U | U | U | U | U | U | U |
| 1,1,2,2-Tetrachloroethane | -- | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | NS | U | U | U | U | U | U | U | U |
| Toluene | 1000 | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | NS | U | U | U | U | U | U | U | U |
| Chlorobenzene | -- | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | NS | U | U | U | U | U | U | U | U |
| Ethylbenzene | 700 | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | NS | U | U | U | U | U | U | U | U |
| Styrene | 100 | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | NS | U | U | U | U | U | U | U | U |
| Xylene (total) | 10000 | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | NS | U | U | U | U | U | U | U | U |

Notes:

J - Estimated value: less than the CRQL

U - Constituent analyzed for and not detected

NA - Well was not completed at the time of the July sampling event

NS - Well not sampled

D - Reported value was determined after dilution

B - Constituent detected in associated blank and is a suspected laboratory contaminant

MCL - Maximum contaminant level

| Well Number CMW-13 | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---|
| Analytes | Federal MCL | Jul-93 | Aug-93 | Jan-94 | Jul-94 | Nov-94 | Apr-95 | Oct-95 | May-96 | Nov-96 | Apr-97 | Sep-97 | Nov-97 | Apr-98 | Oct-98 | Apr-99 | Oct-99 | Apr-00 | May-00 | Oct-00 | Sep-01 | Apr-02 | Sep-02 | |
| Vinyl Chloride | 2 | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | U | U | U | U | U | U | U | U | U |
| Acetone | -- | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | 3.0J | U | U | U | U | 2 | U | 1.2J | U |
| Carbon Disulfide | -- | U | 0.7 J | U | 5 J | U | U | U | U | 0.9 J | NS | NS | 3.5 J | 5 J | NS | U | U | U | U | U | U | U | U | U |
| 1,1-Dichloroethene | 7 | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | U | U | U | U | U | U | U | U | U |
| 1,1-Dichloroethane | -- | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | U | U | U | U | U | U | U | U | U |
| 1,2-Dichloroethene (total) | 70 | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | U | U | U | U | U | U | U | U | U |
| Chloroform | -- | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | U | U | U | U | U | U | U | U | U |
| Trichloroethene | 5 | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | U | U | U | U | U | U | U | U | U |
| Benzene | 5 | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | 2.0J | U | U | U | U | U | U | U | U |
| Tetrachloroethene | 5 | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | U | U | U | U | U | U | U | U | U |
| 1,1,2,2-Tetrachloroethane | -- | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | U | U | U | U | U | U | U | U | U |
| Toluene | 1000 | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | 2.0J | U | U | U | U | 2 | U | U | U |
| Chlorobenzene | -- | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | U | U | U | U | U | U | U | U | U |
| Ethylbenzene | 700 | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | U | U | U | U | U | U | U | U | U |
| Styrene | 100 | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | U | U | U | U | U | U | U | U | U |
| Xylene (total) | 10000 | U | U | U | U | U | U | U | U | U | NS | NS | U | U | NS | U | U | U | U | U | U | U | U | U |

Notes:

J - Estimated value: less than the CRQL

U - Constituent analyzed for and not detected

NA - Well was not completed at the time of the July sampling event

NS - Well not sampled

D - Reported value was determined after dilution

B - Constituent detected in associated blank and is a suspected laboratory contaminant

MCL - Maximum contaminant level

| Well Number MW-85 | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----|
| Analytes | Federal | Jul-93 | Aug-93 | Jan-94 | Jul-94 | Nov-94 | Apr-95 | Oct-95 | May-96 | Nov-96 | Apr-97 | Sep-97 | Nov-97 | Apr-98 | Oct-98 | Apr-99 | Oct-99 | Apr-00 | May-00 | Oct-00 | Apr-01 | Sep-01 | Apr-02 | Sep-02 | |
| VOLATILE ORGANICS (ug/l) | MCL | | | | | | | | | | | | | | | | | | | | | | | | |
| Vinyl Chloride | 2 | U | 14 | 7 | U | U | U | U | U | U | 5.1 | 1.8 J | 1.8 J | U | U | U | U | U | U | 1 | U | U | U | NS | |
| Acetone | -- | 770 D | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | 1 | U | U | U | NS |
| Carbon Disulfide | -- | U | U | 9 | U | U | U | U | U | 3 J | U | 6.5 J | 8.2 J | U | U | U | U | U | U | U | U | U | U | NS | |
| 1,1-Dichloroethene | 7 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | NS | |
| 1,1-Dichloroethane | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | NS | |
| 1,2-Dichloroethene (total) | 70 | 4 J | 7 | 5 | 3 J | 1 J | U | U | U | 1 J | 1.5 J | 1.9 J | U | U | U | U | U | U | U | U | U | U | U | NS | |
| Chloroform | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | NS | |
| Trichloroethene | 5 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | NS | |
| Benzene | 5 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | NS | |
| Tetrachloroethene | 5 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | NS | |
| 1,1,2,2-Tetrachloroethane | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | NS | |
| Toluene | 1000 | U | U | U | U | U | U | U | U | 0.2 J | U | U | U | U | U | U | U | U | U | U | U | U | U | NS | |
| Chlorobenzene | -- | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | NS | |
| Ethylbenzene | 700 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | NS | |
| Styrene | 100 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | NS | |
| Xylene (total) | 10000 | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | U | NS | |

Notes:

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U - Constituent analyzed for and not detected

NA - Well was not completed at the time of the July sampling event

NS - Well not sampled

D - Reported value was determined after dilution

B - Constituent detected in associated blank and is a suspected laboratory contaminant

MCL - Maximum contaminant level