Phase 8
Remedial Investigation Summary Report

Railroad Avenue Groundwater Contamination Site
West Des Moines, Iowa

January 14, 2005

Prepared for:
USEPA Region VII

Prepared by:
Black & Veatch Special Projects Corp.

USEPA Contract No.: 68-W5-0004
USEPA Work Assignment Number: 055-RICO-A713
BVSPC Project No.: 46124

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Black & Veatch Special Projects Corp.

USEPA Region VII
Railroad Avenue Site

BVSPC Project 46124
BVSPC File C.3
January 14, 2005

Mr. Bob Stewart
USEPA Region VII
Superfund-IANE
901 N. 5th Street
Kansas City, Kansas 66101

Subject: EPA Contract No. 68-W5-0004
W.A. 055-RICO-A713
Transmittal: *Phase 8 RI Summary Report Railroad Avenue Site*

Dear Mr. Stewart:

Please find enclosed three copies of the draft *Phase 8 RI Summary Report, Railroad Avenue Site, West Des Moines, Iowa, January 14, 2005.*

As requested, one copy has been forwarded to Mr. Bob Drustrup, IDNR/CSS.

If you have any questions please call me at (913)458-6583.

Sincerely,

BLACK & VEATCH SPECIAL PROJECTS CORP.

Gary L. Felkner
Site Manager

GLF
Enclosure

cc: Mr. Bob Drustrup, IDNR/CSS
File

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1.0 Introduction

The U.S. Environmental Protection Agency (EPA) has initiated remedial investigation (RI) efforts for the Railroad Avenue Groundwater Avenue site in West Des Moines, Iowa (CERCLIS ID No. IA0001610963). The RI process is the methodology that the Superfund program has established for investigating the risks posed by uncontrolled hazardous waste sites. The RI efforts were performed by Black & Veatch Special Projects Corp. (BVSPC) under EPA Work Assignment No. 055-RICO-A713. Documents detailing the scope and methodology for RI activities at the Railroad Avenue site consist of a Work Plan (WP) (BVSPC 2000), a Sampling and Analysis Plan (SAP) (BVSPC 2002a), a Quality Assurance Project Plan (QAPP) (BVSPC 2002b), QAPP Addendum (BVSPC April 2003a) and a Health and Safety Plan (HSP) (BVSPC 2004a).

This RI Summary Report describes the activities and results for the Phase 8 RI activities at the Railroad Avenue site. It discusses the following activities:

- Sampling and Analyses.
- Descriptions of the sampling methodologies for the various media.
- QA/QC Samples
- Analytical Results.
- Nature and Extent of Contaminants.
- Investigation Derived Waste (IDW) Management.

1.1 Site Location

The Railroad Avenue Groundwater Contamination site is in West Des Moines, Iowa, which is a suburb of Des Moines, Iowa, and is located in southwest Polk County in south-central Iowa. The western portion of the site is characterized by a softball field complex and light industrial and commercial use areas. Further to the east, the site is mostly commercial and residential areas including the Valley Junction shopping district that is located in the 100 to 300 block area along Fifth Street. The Valley Junction shopping area has been renovated with brick sidewalks and ornamental street fixtures. The eastern portion of the site is a residential area consisting primarily of single-family dwellings.

The Railroad Avenue site consists of the West Des Moines (WDM) water treatment plant well field, the area of observed groundwater contamination, and the potential source areas of the contamination. The WDM well field is the area that contains the 25 WDM municipal water supply wells (WDMW) that have historically supplied or currently supply water to the WDM water treatment plant (Figure 1-1). Currently, five municipal wells have been taken off-line as a result of the chlorinated volatile organic compound (VOC) contamination: WDMW-6, -7, -12, -13, and -21. Wells WDMW-2, -10, and -11 have been abandoned because of well production problems. All wells

are only used periodically depending on seasonal water demand.

1.2 Site History

The Railroad Avenue site was first identified in 1993 when a routine water distribution sample collected by the City of West Des Moines was found to contain cis-1,2-dichloroethene (cis-1,2-DCE) at 1.2 micrograms per liter (µg/L). Subsequent sampling of WDMW-13 detected cis-1,2-DCE at higher concentrations than in the water distribution sample. Benzene became a contaminant of concern in July 1994 when it was discovered in WDMW-12 at a concentration of 11 µg/L.

The contamination in the West Des Moines municipal wells was formally brought to the attention of the EPA after a site investigation was conducted by the Iowa Department of Natural Resources (IDNR) at the former Stearns Automotive site in 1996.

The EPA performed a Preliminary Assessment/Site Investigation (PA/SI) under the Superfund Technical Assessment and Response Team (START) program for the WDMW-13 site in October 1997 (E&E 1999). Results of the PA/SI identified groundwater contaminants at locations along Railroad Avenue between West Des Moines wells WDMW-12 and WDMW-13 and 10th Street. While contaminants were found in wells WDMW-6 and -7, a distinct groundwater contaminant plume near these two wells was not identified. Soil sampling conducted at five potential source areas could not determine a primary source area. Other source areas to the south of the investigated areas were proposed for further investigation.

An Expanded Site Inspection (ESI) was conducted by EPA in November and December 1999 (E&E 2000). During the ESI, groundwater and soil samples were collected from 56 direct-push sample locations, 11 monitoring wells, and 20 water supply wells. In addition, several water and sediment samples were collected from selected sanitary sewer lines and from lakes adjacent to the contaminant plumes. Samples were collected from areas to confirm the results of the PA/SI and to investigate additional areas. The samples were analyzed for VOCs, metals, and other parameters. Results from the ESI identified a groundwater contaminant plume along Railroad Avenue (the northern plume) and identified another plume near West Des Moines well WDMW-21 (the southern plume). Results indicated a need for further investigation east of the northern plume and south of the southern plume to further delineate the plume areas and to locate any other potential source areas.

In December 2000, IDNR performed groundwater sampling at three locations. Direct-push sampling techniques were used to collect groundwater samples at the water table and at equipment refusal at each of three locations. The samples confirmed results of the ESI.

Phase 1 RI efforts were performed by BVSPC under contract to EPA in April and May 2001 (BVSPC 2001). Phase 2 of the RI was performed in August 2001. Fifty-one primary groundwater samples were collected using direct-push sampling techniques from 27 sample locations. Groundwater samples were collected from 8 probe locations in the south area and from 19 probe

locations in the north area. Results confirmed the extent of the trichloroethene (TCE) plume in the south area and the extent of cis-1,2-DCE and vinyl chloride (VC) plumes in the north area. The results are discussed in the *Phase 1 and Phase 2 RI Summary Report* (BVSPC 2001). Results of the Phase 1 and Phase 2 RI indicated that the north area and south area plumes have separate source areas.

The North and South source areas and respective contaminant plumes were separated into two operable units (OUs): the North Area Plume (OU1) and the South Area Plume (OU2). The source area for the North Area Plume (OU1) has not been identified. The South Area Plume (OU2) is located northwest of wells WDMW-19, -20, and -21 where a release of TCE is reported to have occurred (E&E 2000).

Phase 3 RI efforts, which only focused on the North Area Plume, were performed by BVSPC under contract with the EPA from June to August 2002. Activities performed during the Phase 3 RI included installation and sampling of 12 monitoring wells, installation of 6 observation wells, sampling of 21 West Des Moines water wells, and performance of an aquifer pump test. The Phase 3 RI efforts are described in further detail in the *Phase 3 RI Summary Report* (BVSPC 2002c).

RI Phases 4, 5, 6, and 7, which also focused on the North Area Plume, were performed by BVSPC under contract with the EPA in November 2002 (BVSPC 2003c), May 2003 (BVSPC 2003d), November 2003 (BVSPC 2004b), and May 2004 (BVSPC 2004c), respectively. Activities performed during the Phase 4, 5, 6, and 7 RI efforts included collecting groundwater samples from monitoring wells and West Des Moines water wells; and collecting surface water samples,. The Phase 4 RI efforts are described in further detail in the *RI Report* (BVSPC 2003c), the Phase 5 RI efforts are described in further detail in the *Phase 5 RI Summary Report* (BVSPC 2003d), the Phase 6 RI efforts are described in further detail in the *Phase 6 RI Summary Report* (BVSPC 2004b), and the Phase 7 RI efforts are described in further detail in the *Phase 7 RI Summary Report* (BVSPC 2004c).

Remedial investigation and remediation of the South Area Plume is to be performed by the potentially responsible party (PRP) with the IDNR as the lead agency. The selected remedial alternative for the South Area Plume includes capture of contaminated groundwater using WDM water wells and treatment of the groundwater using upgraded aerators at the WDM water plant. These efforts also address the western portion of the North Area Plume. The North Area Plume was organized into two areas: the West Des Moines North Well Field Area (OU1A) and the Eastern Portion of the North Area Plume (OU1B). Contaminated groundwater in the western portion of the North Area Plume is captured using WDM wells and treated at the WDM water plant. The EPA completed a focused feasibility study (FS) addressing the WDM North Well Field Area (OU1A) in August 2003 (BVSPC 2003f). The capture zone of the WDM wells in the North Area Plume will be evaluated after the WDM wells are returned to service.

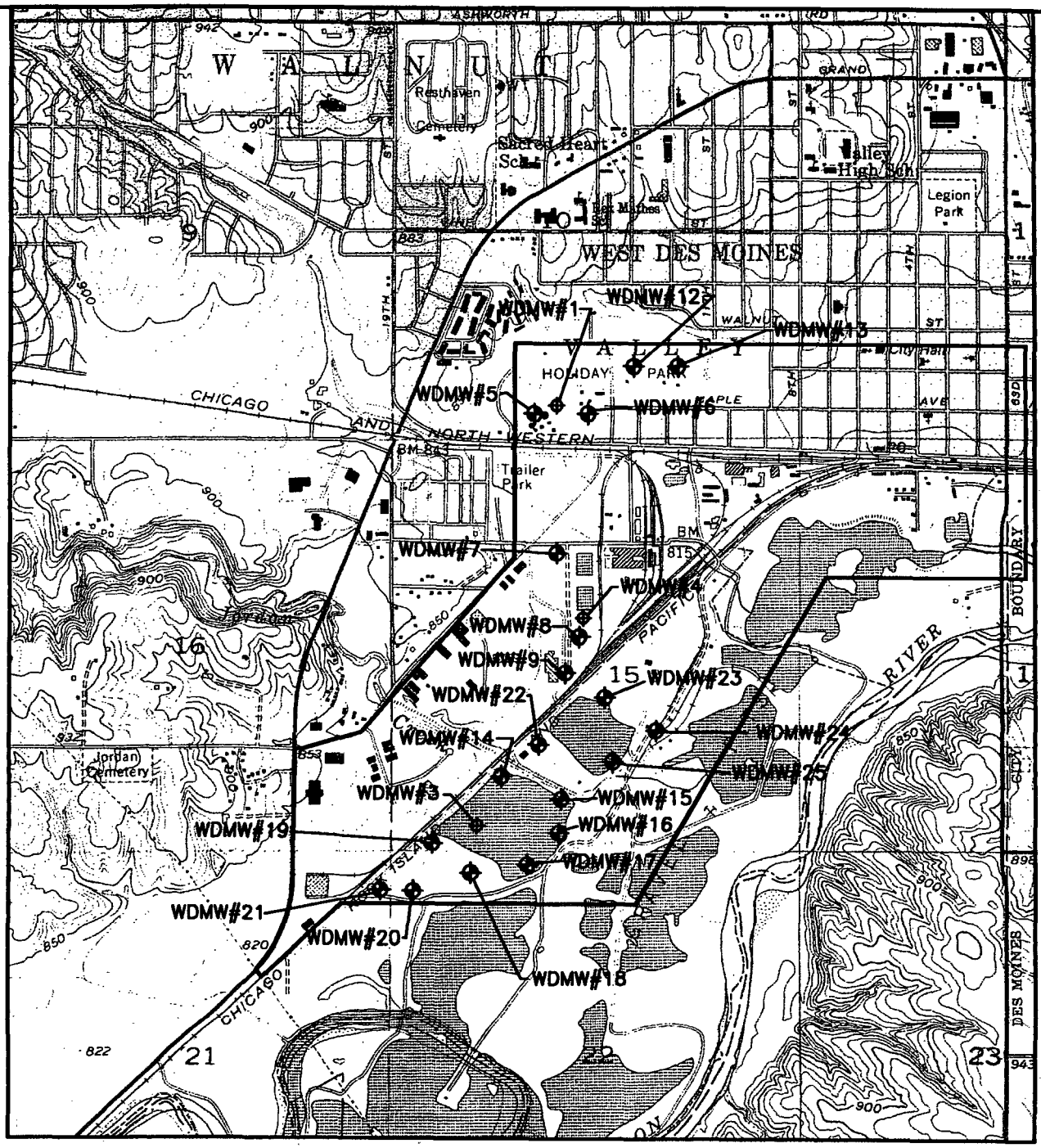

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FIGURE 1–1
SITE VICINITY MAP
RAILROAD AVENUE

REV
0

PLOTTER: HP 1055 PEN TABLE: r12-r14.ctb PLOT SCALE: 1=1 Orighal dwg size 8.5x 11 Revised By: new02908 ON May 06, 2003 @ 4:58pm
Drawing: Z:\48124\Phase 103\dwg\C0007517.DWG ACAD 15.05 Plot By: pro03298 May 28, 2003, 10:23am Attached Xref:

2.0 Investigation Objectives

The objective of the Phase 8 RI sampling effort was to continue the groundwater monitoring program to confirm the nature and extent of VOC contamination.

The scope of the Phase 8 RI field investigation activities included the following:

- Sample WDM water supply wells.
- Sample site monitoring wells.
- Collect surface water samples.
- Measure water levels in monitoring wells and the Gravel Pit Lake.

3.0 Investigation Activities

Field investigation activities conducted by BVSPC for the Phase 8 RI efforts are discussed in this section. Phase 8 RI efforts were performed November 1 through 4, 2004. The following subtasks are discussed:

- Sample Locations and Analyses.
- Sampling Procedures.
- Sample Numbering System.
- Documentation.
- Decontamination Procedures.

Previous investigation activities including monitoring and observation well installation, pump tests, and previous sampling efforts are described in detail in other RI reports previously referenced.

3.1 Sample Locations and Analyses

The scope of the Phase 8 RI included collecting and analyzing groundwater samples and surface water samples from the locations listed in Table 3-1. The locations of the West Des Moines water supply wells are shown on Figure 1-1 and locations of the monitoring wells and surface water samples are shown on Figure 3-1. Analytical parameters and analytical methods are summarized in Table 3-2. The total number of samples, including duplicates, blanks, and other quality control samples are summarized by sample media in Table 3-3. The EPA Region VII laboratory performed all analyses and data validation efforts.

3.2 Sampling Procedures

The following general procedures were practiced when sampling:

- A clean pair of new, disposable surgical gloves was worn each time a sample was collected.
- During the course of the field investigation, all samples were properly documented, as described in the QAPP. Documentation included completion of the chain of custody (COC) records, field logbook documentation, and sample labels for the sample containers.
- Samples were immediately sealed, kept out of the sun, and immediately cooled by being placed in a cooler with ice after collection.

3.2.1 Water Level Measurements

Water levels for the monitoring wells, North Retention Basin, and Gravel Pit Lake were measured on the same day. The water level, time of measurement, and date were recorded in the field logbook or field data sheet.

Water level measurements at wells were conducted as follows:

(1) Lower the probe of the water level indicator down the well until the meter indicator lights or sounds.

(2) Measure and record the water level to the nearest 0.01 foot from the top of the PVC riser pipe by reading the measurement directly from the water level meter cable. Also record the time and date of the measurement.

(3) Decontaminate the water level indicator by spraying the cable with distilled water and drying with paper towels as the cable is rewound onto the reel.

Additional water level measurements were also made at wells WDMW-13 and MW-7 to evaluate the extent of the capture zone of well WDMW-13. One 24-hour recording transducer was placed in each well WDMW-13 and MW-7. The recorders were started on November 4, 2004 and ran until December 3, 2004. Well WDMW-13 was pumped for only about 48 hours because of lack of water plant demand from November 3, 2004 to November 5, 2004. Evaluation of the drawdown data for well MW-7 showed no discernible drawdown. However, well WDMW-13 was not pumped at a duration expected to affect the water level at MW-7. Further evaluation of the capture zone of well WDMW-13 should include a constant pumping rate and install the observation recorder at well MW-3.

3.2.2 Groundwater Sampling

Groundwater samples were collected from monitoring wells and WDM water supply wells. All monitoring wells were sampled by purging methods; the WDM water supply wells were sampled using each well's dedicated sample port.

3.2.2.1 Monitoring Wells

The monitoring wells were purged and sampled using a 12-volt submersible pump. The temperature, pH, specific conductivity, dissolved oxygen (DO), oxidation/reduction potential (ORP) (Eh), and turbidity of the purge water was monitored during purging. Well purging data were recorded on well purging field sheets which are provided in Appendix A. Pumping continued until the field parameters stabilized. If the purging equipment had to be set down on the ground, it was placed on plastic sheeting or in new trash bags to prevent possible cross-contamination of the equipment.

3.2.2.2 Water Supply Well Purging and Sample Collection

The WDM water supply wells were sampled from each well's dedicated sample port except well WDMW-7 which was sampled with a low-flow submersible pump. The dedicated turbine pump from WDMW-7 has been removed.

Water quality parameters were measured at the sample port or pump discharge to evaluate well purging. Field parameters (temperature, pH, specific conductivity, Eh, DO, and turbidity) were periodically measured and recorded during the purging process. If the well was not currently running at the time of sample collection the purging process continued until the water quality parameters stabilized. After the field parameters stabilized, the sample jars were filled directly from the discharge port or pump.

3.2.3 Surface Water Sampling

Surface water samples were collected from three down gradient locations. As indicated on Figure 3-1 two samples (SW-1 and SW-2) were collected from the Gravel Pit Lake and one sample (SW-3) was collected from the Raccoon River. The samples were collected using a dipper on 10-foot extension pole. The dipper was submerged upside down, righted to allow filling, and then the sample was poured into the sample vials.

3.2.4 Equipment Rinsate Blanks

An equipment rinsate blank was prepared of the submersible pump used for sampling. The rinsate blank was used to measure the effectiveness of pump decontamination procedures. The rinsate blank was prepared in the following manner:

(1) Decontaminated the pump following the procedures described in Section 3.5.

(2) Pumped deionized water through the pump and collected directly into the sample containers.

(3) Analyzed the rinsate blank sample for VOCs.

The rinsate blank was identified with a unique sample identification number. The rinsate blank number and time and date of collection was documented in the field logbook, the sample field sheet, and on the chain-of-custody record.

3.2.5 Trip Blanks

Trip blanks of organic-reagent water were prepared by the EPA Region VII Laboratory. The trip blanks were kept with the VOC or methane/ethane/ethene samples from the time they left the site until the time they were received by the laboratory. The purpose of the trip blanks is to evaluate whether samples were contaminated during shipment. Trip blanks pertained to VOC and methane/ethane/ethene analysis only, and were identified with the sample identification code "FB".

3.2.6 *Duplicate Samples*

Duplicate samples were collected to assess laboratory quality assurance/quality control (QA/QC). The duplicate samples were collected in the field by alternately filling the appropriate sample containers for the primary and duplicate samples. The primary sample and the duplicate sample were placed in identical containers, preserved in the same manner, and submitted for the same analyses.

The duplicate groundwater samples were identified with the sample identification code "FD". The sample location, sample number, and date and time of collection were documented in the field logbook, the sample field sheet, and on the chain-of-custody record.

3.2.7 *Matrix Spike/Matrix Spike Duplicates (MS/MSD)*

MS/MSD samples were collected from the sample bottles to evaluate the effect of the sample matrix on the accuracy of the analysis. Additional volume for the MS/MSD samples was collected for one monitoring well sample.

3.3 Sample Numbering System

A sample numbering system was used to identify each sample submitted for chemical analysis. The purpose of the numbering system was to provide a tracking system for retrieval of information on each sample. The sample identification numbers were used on sample labels, field sheets, chain-of-custody records, and all other applicable documentation used during the sampling activity. Sample identification numbers were maintained in the field logbook. Each sample collected was assigned a unique sample number.

Sample identification numbers consisted of three components: analytical services request (ASR) number (EPA assigned), the unique sample identification number, and the sample qualifier (if applicable). The following is an example of a completely numbered trip blank, with each component identified:

2475-51-FB

where:

2475 = EPA ASR Number

51 = Unique Sample Identification Number

FB = Sample Qualifier (QC Code)

If the sample was a primary sample, MS or MSD sample, or an equipment rinsate blank no sample number qualifier was designated. The MS/MSD samples consisted of additional volume of a primary sample and were noted as a MS/MSD on the field sheet and chain-of-custody record. Field duplicate samples were assigned the same sample identification number as the primary sample, but

were qualified as FD. Trip blank samples were assigned their own unique identification number and were qualified with FB.

3.4 Documentation

3.4.1 Field Logbook

All information obtained during the sampling activities was recorded in bound logbooks with consecutively numbered pages. The logbooks were kept in the field team member's possession or in a secure place during the investigation. The logbooks are a part of the final project file. Copies of logbook entries for Phase 8 RI activities are included in Appendix B.

3.4.2 Sample Documentation

The following subsections describe the sample documentation and procedures used for completing sample documentation. The documentation was used for each environmental sample collected for chemical analysis.

3.4.2.1 Sample Labels

An adhesive sample label was placed on each sample container submitted for chemical analysis. The following information was included on each sample label:

- EPA Activity number.
- Sample number.
- Sample matrix.
- Analyses.
- Sample container and preservative
- Sample collection date and time.

Information known before field activities (i.e., activity number, sample number, etc.) was pre-printed on the sample labels. Duplicate sample labels were prepared because various aliquots of a sample were submitted in separate container for individual analyses.

3.4.2.2 EPA Region VII Field Sheet

EPA Region VII laboratory field sheets were used during sample collection in order to document sample collection time, location, and field observations. After completing the field sheet, a photocopy of the field sheet was made. The original was enclosed in a sealable bag and secured inside of the shipping container lid. The photocopy was retained for reference. Completed field sheets for the Phase 8 RI are presented in Appendix C.

3.4.2.3 Chain-of-Custody Record

A chain-of-custody record was completed for each sample shipment. Standard EPA Region VII laboratory chain-of-custody records were used. After completing the chain-of-custody-record, a photocopy of the chain-of-custody was made. Both copies of the original chain-of-custody record were then enclosed in a sealable plastic bag and secured to the inside of the shipping container lid. The photocopy was retained for reference. The chain-of-custody records for the Phase 8 RI efforts are presented in Appendix D.

Shipping containers were secured and custody seals placed across the container openings. As long as the chain-of-custody record was sealed inside the shipping container and the custody seals remained intact, commercial carriers were not required to sign the chain-of-custody record.

3.4.2.4 Custody Seals

Custody seals were used to ensure the integrity of the samples when they remained unattended or when they were relinquished to the delivery service for delivery to the laboratory. All samples were shipped in an insulated shipping container, and each shipping container was sealed with at least two custody seals. The seals were affixed to each shipping container so that it was necessary to break the seals to open the shipping container.

3.4.2.5 Airbill

An airbill was completed for each cooler shipment. Next morning overnight delivery was indicated on the airbill by the field personnel shipping the samples. Typically, more than one shipping container was forwarded to the same address under one airbill. When the shipping containers were relinquished to the delivery service, additional information was added to the airbill by an employee of the delivery service, and a copy of the airbill was received by the field personnel. Airbills for the sample shipments for the Phase 8 RI are presented in Appendix E.

3.5 Decontamination Procedures

Procedures for decontamination were implemented to avoid cross-contamination of groundwater samples and field equipment. Field equipment was decontaminated before initial use, between sample locations, and before leaving the site.

3.5.1 Initial Decontamination

Initial decontamination of the field equipment was performed. The initial decontamination included the following steps:

(1) Wash with potable water (using alconox if visibly contaminated).

(2) Rinse with distilled water.

(3) Air dry the equipment.

3.5.2 Intermediate Decontamination

Intermediate decontamination of the field equipment was required between wells. The intermediate decontamination procedures were the same as those in the initial decontamination.

3.5.3 Final Decontamination

Final decontamination of the field equipment was performed prior to demobilizing from the site. Final decontamination was required to prevent contaminants from being carried offsite. The intermediate decontamination procedures were the same as those in the initial decontamination.

Table 3-1

Sample Location Summary
Railroad Avenue Groundwater Site
Phase 8 Remedial Investigation

Well Number	Screen Interval Depth	Diameter	Rationale
Monitoring wells:			
MW-1[1]	8-38 ft	4 inch	Plume characterization
MW-2	13-38 ft	4 inch	Plume characterization
MW-3[1]	9.5–39.5 ft	4 inch	Plume characterization
MW-4	9.5– 34.5 ft	4 inch	Plume characterization
MW-5	11–41 ft	4 inch	Plume characterization
MW-6	9.5-39.5 ft	4 inch	Plume characterization
MW-7	12.5–42.5 ft	4 inch	Plume characterization
MW-8	15–45 ft	4 inch	Plume characterization
MW-9	11.5–41.5 ft	4 inch	Plume characterization
MW-10[1]	14.5–44.5 ft	4 inch	Plume characterization
MW-11	11–51 ft	4 inch	Plume characterization
MW-12	12.5–52.5 ft	4 inch	Plume characterization

Note 1: Well caps at wells MW-1 and MW-3 were missing and MW-10 was buried under soil so the wells were not sampled.

West Des Moines water supply wells[2]:			
WDMW#1	2025-2460 ft	Unknown	Water Quality
WDMW#3	Approx. 2500 ft	Unknown	Water Quality
WDMW#4	Approx. 2500 ft	Unknown	Water Quality
WDMW#5[3]	28-40 ft	20 inches	Water Quality
WDMW#6	26-41 ft	20 inches	Water Quality
WDMW#7[4]	TD 47 ft	20 inches	Water Quality
WDMW#8	30-42 ft	24 inches	Water Quality
WDMW#9	40-50 ft	12 inches	Water Quality
WDMW#12	26-36 ft	20 inches	Water Quality
WDMW#13	26-36 ft	20 inches	Water Quality
WDMW#14	25-35 ft	20 inches	Water Quality
WDMW#15	24-34 ft	20 inches	Water Quality
WDMW#16[3]	22-32 ft	20 inches	Water Quality
WDMW#17	28-38 ft	20 inches	Water Quality
WDMW#18	31-41 ft	20 inches	Water Quality
WDMW#19	33-43 ft	20 inches	Water Quality
WDMW#20	26-36 ft	20 inches	Water Quality
WDMW#21	26-36 ft	20 inches	Water Quality
WDMW#22	32-38 ft	20 inches	Water Quality
WDMW#23	28-34 ft	20 inches	Water Quality
WDMW#24	25-31 ft	20 inches	Water Quality
WDMW#25	30-36 ft	20 inches	Water Quality

Surface Water Location ID	Rationale
SW-1	Plume characterization
SW-2	Plume characterization
SW-3	Plume characterization

Note 2: Wells WDMW#2, WDMW#10, and WDMW#11 have been abandoned by West Des Moines.
Note 3: Well WDMW#5 and WDMW-16 were temporarily down for maintenance and were not sampled.
Note 4: Well WDMW#7 was sampled using a low-flow submersible pump.

Table 3-2

Analytical Parameters and Methods
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 Remedial Investigation

Parameter	Method
Monitoring Wells	
Volatile Organic Compounds (VOCs)	EPA Region 7 RLAB Method 3230.13B
Total Iron (total Fe)	EPA Region 7 RLAB Method 3122.3A
Total Organic Carbon (TOC)	EPA SW846 Method 9060
Methane, Ethane, and Ethene	EPA Region 7 RLAB GC/FID
Chloride	EPA Region 7 RLAB Method 3135.11A
Nitrate as Nitrogen	EPA Region 7 RLAB Method 3133.2D
Sulfide	EPA Region 7 RLAB Method 3135.8C
Sulfate	EPA Region 7 RLAB Method 3135.3C
Specific Conductivity	Field Measurement (water quality meter)
Ferrous Iron (Fe +2)	Field Measurement (Hach Method)
pH	Field Measurement (water quality meter)
Temperature	Field Measurement (water quality meter)
Dissolved Oxygen (DO)	Field Measurement (water quality meter)
Oxidation/Reduction Potential (ORP)(Eh)	Field Measurement (water quality meter)
Turbidity	Field Measurement (water quality meter)
West Des Moines Water Supply Wells	
VOCs	EPA Region 7 RLAB Method 3230.13B
Specific Conductivity	Field Measurement (water quality meter)
pH	Field Measurement (water quality meter)
Temperature	Field Measurement (water quality meter)
Dissolved Oxygen	Field Measurement (water quality meter)
ORP (Eh)	Field Measurement (water quality meter)
Turbidity	Field Measurement (water quality meter)
Surface Water Samples	
VOCs	EPA Region 7 RLAB Method 3230.13B
Specific Conductivity	Field Measurement (water quality meter)
pH	Field Measurement (water quality meter)
Temperature	Field Measurement (water quality meter)
Dissolved Oxygen	Field Measurement (water quality meter)
ORP (Eh)	Field Measurement (water quality meter)
Turbidity	Field Measurement (water quality meter)
Note 1: VOC samples analyzed at low detection limit (LDL) concentration.	

Table 3-3
Sampling Summary
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 Remedial Investigation

Parameter	Number of Primary Samples	Number of Trip Blanks	Number of Duplicates	Number of Rinsates	Total Analyses
Water					
VOCs	32[2]	3	2	1	38
Total Iron	9	na	1	0	10
TOC	9	na	1	0	10
Methane/ Ethane/ and Ethene	9	1	1	0	11
Chloride	9	na	1	0	10
Nitrate as Nitrogen	9	na	1	0	10
Sulfide	9	na	1	0	10
Sulfate	9	na	1	0	10
Ferrous Iron (Field)	9	na	na	na	9
Field Parameters (water quality meter)	32[2]	na	na	na	32

Note 1: MS/MSD aliquot collected from primary sample volume.
Note 2: Includes 3 surface water samples, 9 monitoring well samples, and 20 WDM water well samples.
na: not applicable

Railroad Avenue Groundwater Contamination Site
West Des Moines, Iowa

N

200 0 200 400 600 800 Feet

LEGEND

- MW-5 — Monitoring Well with Identification
- OB-1 — Observation Well with Identification
- WDMW-13 — West Des Moines Water Supply Well with Identification
- SW-1 — Surface Water Sample Location

City Map Source: West Des Moines City Engineers Office, 1999.

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Figure 3-1
Monitoring Well and Surface Water Sample Locations

4.0 Investigation-Derived Waste

Investigation-derived wastes were minimal during the Phase 8 RI sampling effort.

4.1 Liquids

Purge water and decontamination fluids from monitoring wells were containerized and discharged to the sanitary sewer for treatment at the wastewater treatment plant. The fluids were discharged to the Publicly Owned Treatment Works (POTW) manhole at the City of West Des Moines Public Works maintenance garage at 506 South 16th Street, West Des Moines, Iowa.

Purge water from all WDM water supply wells was directed to the ground.

4.2 Personal Protective Equipment

Disposable personal protective equipment (PPE) and trash were collected in plastic bags and disposed of as solid waste.

4.3 Soil Cuttings

Soil cuttings were not generated during the Phase 8 RI sampling effort.

5.0 Phase 8 Remedial Investigation Results

This section summarizes data collected during the Phase 8 RI efforts performed November 1 through 5, 2004. Analysis of the groundwater and surface water samples was performed by the EPA Region VII Laboratory, Kansas City, Kansas. The EPA Region VII Laboratory also performed all data validation efforts for the sample groups. Complete results of the analyses and validation notation are provided in Appendix F.

5.1 Water Level and Hydrogeologic Data

Water level data for the monitoring wells and surface water sampling locations are presented on Table 5-1. The groundwater elevations were determined using location survey data and water level data. Depth to groundwater at the site on November 4, 2004 ranged from approximately 8 to 14 feet below ground surface (bgs). The approximate groundwater flow direction on November 4, 2004, represented by groundwater table elevation contours on Figure 5-1, indicates a south-southeast flow direction.

Plots of groundwater elevation data from other dates which are reported in previous RI summary reports indicate the groundwater flow direction across the site area is approximately to the east-southeast. The hydraulic gradient of the aquifer across the site area ranges from 0.00056 to 0.00100 and averages 0.00079 across the site on an annual basis. Pump test results indicate the hydraulic conductivity of the water table aquifer in the contaminated zone is approximately 193 feet per day. Assuming an effective porosity of 25 percent, the groundwater seepage velocity across the site is approximately 222 feet per year.

5.2 Analytical Data Usability

The main objective of the groundwater investigation is to collect environmental monitoring data of known, acceptable, and documentable quality. Data usability is established by evaluating QA procedures against established criteria and also by a QC evaluation. If QA/QC procedures are followed correctly, then an investigation will produce data that are of an acceptable level of confidence, scientifically valid, of known and documented quality, and legally defensible for the stated purpose.

5.2.1 Data Validation

Samples were shipped to the EPA Region VII laboratory in Kansas City, Kansas for analysis. The specified chemical analyses were performed, and results in the form of raw laboratory data were generated. A data quality assessment was then performed by the EPA Region 7 laboratory on the raw laboratory data in accordance with the EPA Region 7 Quality Manual. Results of the assessment

are presented in the Transmittal of Sample Analysis Results for the ASR data package (ASR number 2475). The transmittal letter, analytical data, and associated data validation results are included in Appendix F. Through the data validation process, the laboratory data were sometimes qualified using standard data validation protocol nomenclature.

The objective of the data validation was to review analytical laboratory procedures and QC results to evaluate whether the data met project data quality objectives (DQOs) established in the site specific QAPP (BVSPC 2002a, 2002b, and 2003a). DQOs were established to specify the quality of data and the methods to be used in the RI. DQOs were developed to ensure the following:

- Applicable or relevant and appropriate requirements (ARARs), risk-based criteria, and data needs for the risk assessment and engineering requirements are met.
- Groundwater samples are analyzed using well-defined and acceptable methods that will provide detection limits sufficiently below chemical-specific ARARs.
- The precision and accuracy of data are well defined and adequate to provide defensible data.
- Groundwater samples are collected using approved techniques and are representative of existing environmental conditions.

Four trip blanks, one for methane/ethane/ethene and three for VOCs, were submitted during the sampling event. All analytes were qualified as non-detect (U) or rejected (R) for these four samples indicating cross contamination of samples did not occur during shipment.

One equipment rinsate blank was submitted for VOC analysis during the sampling event. All VOC analytes were non-detect for this sample except for acetone and styrene. The analytes detected in the equipment rinsate blank were not detected in the primary samples therefore no qualifications of the data were necessary.

Two duplicate samples were collected during the sample event. Relative percent difference (RPD) validations between detected analytes in the primary and duplicate samples were calculated and are presented in Appendix F. The RPD calculations were within or close to the 20 percent variance range required in the QAPP. Further qualification of the data was determined not necessary.

5.2.2 Common Laboratory Contaminants

In addition to data validation and data evaluation, common laboratory contaminants were considered when determining data usability. Acetone, methylene chloride, 2-butanone, bromoform, and 2-hexanone are frequently present in the laboratory environment as the substances can be used as extraction solvents for certain analytical methods and as laboratory glassware cleaners. Phthalates are used as extraction solvents and are present in plastics.

The EPA Contract Laboratory Program National Functional Guidelines for Organic Data

Review lists the following substances as being commonly introduced by laboratory processes:

a) Common laboratory contaminants: CO_2, siloxanes, diethyl ether, hexane, certain freons (1,1,2-trichloro- 1,2,2-trifluoroethane or fluorotrichloromethane), and phthalates (bis(2-ethylhexyl)phthalate) at levels less than 100 ug/L or 4.0 mg/kg.

b) Solvent preservatives, such as cyclohexane which is a methylene chloride preservative. Related by-products include cyclohexanone, cyclohexenone, cyclohexanol, cyclohexenol, chlorocyclohexene, and chlorocyclohexanol.

c) Aldol reaction products of acetone include: 4-hydroxy-4-methyl-2-pentanone, 4-methyl-2-pentanone, and 5,5-dimethyl-2(5H)-furanone.

The substances listed above can unintentionally be introduced into samples during laboratory processing. For this reason, identification of these substances in samples collected from the site will not be considered representative of site conditions and will not be included in the analytical result summary tables unless they become consistently detected.

5.2.3 Data Evaluation

Results of the data validation and evaluation process identified estimated (J-coded) results. However, results of the data validation and evaluation process have determined the data are, except where noted, defensible, were collected in accordance with the site specific QAPP and SAP, and are usable for the intended purposes.

5.3 Geochemical and Biochemical Water Quality

Water quality parameters were analyzed or measured on water from the monitoring wells, WDM water supply wells, and surface water samples to evaluate the geochemical and biochemical quality of the groundwater and surface water. The geochemical and biochemical data will be used in the design of the groundwater treatment process. Results of the analyses are presented in Tables 5-2, 5-3, and 5-4.

5.4 Nature and Extent of Groundwater Contamination

The extent of contamination in groundwater at the North Area Plume Railroad Avenue site (OU1) was evaluated from samples collected on a semiannual basis from twelve monitoring wells since July 2002. The monitoring wells were sampled and analyzed for the presence of VOCs and water quality parameters. Results of the VOC analyses are summarized in Tables 5-5 and 5-6. The extent of the contaminants has been delineated. Interpolation of the plume locations indicate the source contaminants are tetrachloroethene (PCE) and TCE and the source area maybe located near the 700 block of Railroad Avenue. The duration and rate of contaminant release is unknown. However, the reduction of PCE and TCE to near non-detectable concentrations indicates that the

source material was released some time ago and that most source material has undergone dissolution and degradation processes. This indicates that source materials may no longer be significantly present at the North Area Plume Railroad Avenue site.

Analytes identified above the analytical detection limits are summarized in Table 5-5 for the monitoring wells and Table 5-6 for the WDM water wells. The majority of the analytical results for all wells were non-detect. Only the analytes identified at concentrations above the analytical detection limit are included in the tables. Also presented in Tables 5-5 and 5-6 are the maximum contaminant levels (MCLs) for the respective analytes identified above the respective analytical detection limits. As indicated, the contaminants of concern include TCE, PCE, cis-1,2-DCE, and VC. Complete results of the analyses for the Phase 8 RI are provided in Appendix F.

The concentrations of TCE, cis-1,2-DCE, and VC have been contoured on Figure 5-1 to illustrate the horizontal extent of contaminants in the aquifer. The extent of PCE was not contoured because it was only detected in wells MW-6 and MW-9, at 5.2 ug/L and 6.5 ug/L, respectively. Results indicate similar extent and concentration of the chemicals of concern to previous sampling efforts. Studies at other sites contaminated with chlorinated hydrocarbons indicate that 1 to 10 times the dissolved concentrations can be expected to be adsorbed to the aquifer matrix. Therefore, the site contaminants are most likely adsorbing to the aquifer matrix which will impede contaminant extraction. Significant amounts of chlorinated solvents can also result in accumulations of non-dissolved phase contaminants or dense non-aqueous phase liquid (DNAPL). Currently DNAPL has not been identified at the site.

Surface water samples from three down gradient locations (SW-1, SW-2, and SW-3) were also collected and analyzed for VOCs during the Phase 8 RI effort. Locations of the sample collection points are illustrated on Figure 5-1. Results of the analyses for the surface water samples were non-detect for all VOC parameters which indicate that VOCs are not accumulating in down gradient surface water bodies.

5.5 Fate and Transport of Contaminants of Concern

Site geochemical and biochemical data are presented in this section to evaluate natural attenuation of site contaminants. Natural attenuation can be a satisfactory remedial action if attenuation processes occur at rates to prevent completion of exposure pathways (USEPA 1996) (USEPA 1998) (USEPA 1999).

As indicated in the *RI Report* (BVSPC 2002b), the migration of contaminants in groundwater is complex and subject to several physical and chemical processes (USEPA 1998). Contaminant migration at the Railroad Avenue site is strongly affected by two primary site conditions: groundwater transport and biochemical processes.

In general terms, product phase contaminants initially leach vertically downward into

groundwater from contaminated subsurface soils at the source area where the contaminants were originally released. As the contaminants enter the groundwater, diffusion and advection processes control the migration of the contaminants. In groundwater, gravity causes contaminants in the product phase to continue to migrate downward while diffusion processes cause the contaminants to spread in all directions within similar aquifer matrices. The most dominant horizontal migration force is usually advective groundwater flow processes. Advective flow processes cause contaminants to migrate along with groundwater in the direction of groundwater flow. The groundwater flow direction and current extent of the contaminants of concern at the North Area Plume Railroad Avenue site are illustrated on Figure 5-1. The groundwater flow direction at the North Area Plume Railroad Avenue site is primarily to the east-southeast toward Gravel Pit Lake and the Raccoon River. The distribution of the contaminant plumes also shows evidence of an east-southeasterly groundwater flow trend. However, distribution of the contaminants indicates that the groundwater capture zone created from historical periodic pumping of WDM water wells WDMW-5, WDMW-6, WDMW-12, and WDMW-13 has caused contaminants to migrate west toward these water supply wells.

While advective flow processes cause contaminants to migrate along with groundwater in the direction of groundwater flow, biodegradation processes simultaneously degrade the site contaminants. Biochemical processes at sites include biodegradation which is where hydrocarbons are eventually reduced to more stable less toxic compounds. Studies show that chlorinated hydrocarbons such as PCE and TCE, and, to a lesser degree, cis-1,2-DCE, can degrade naturally via reductive dechlorination under anaerobic conditions. Biodegradation of PCE and TCE is occurring at the North Area Plume site as evidenced by the low concentrations of PCE and TCE and the relatively elevated concentrations of cis-1,2-DCE and VC which are degradation products of PCE and TCE (USEPA 1998). The extent of TCE, cis-1,2-DCE, and VC are illustrated on Figure 5-1. Figure 5-2 illustrates that the highest concentrations of the source contaminant TCE are located near the suspected release area, whereas down gradient of the source area, the concentrations of TCE are lower and the daughter contaminants (cis-1,2-DCE and VC) are higher.

Other indicators of biodegradation include evaluation of materials within the plumes which act as electron acceptors and electron donors in the reductive dechlorination process and the presence or absence of by-products of the process within the plumes.

The absence of electron acceptors indicates the occurrence of reductive dechlorination processes. The site geochemical data, presented in Table 5-2, show the absence of electron acceptors such as dissolved oxygen and nitrate within the plumes. However, sulfate, another less easily consumed electron acceptor, is also present indicating the aquifer is not at the optimal reducing condition for reduction of the cis-1,2-DCE plume. The presence of VC indicates that the cis-1,2-DCE plume is reducing, albeit at a slower rate than PCE and TCE.

The presence of electron donors, such as carbon sources, also supports the occurrence of reductive dechlorination processes. Natural organic carbon was encountered in borings drilled in the area which indicates the availability of a carbon source to support reductive dechlorination.

The presence of reductive dechlorination by-products also indicates the occurrence of reductive dechlorination processes. Site geochemical data, presented in Table 5-2, show the presence of reductive dechlorination by-products within the plumes including ferrous iron and methane.

The EPA has developed site screening criteria for identifying sites where reductive dechlorination is occurring (USEPA 1998). The site data from May and November 2004 was evaluated using the screening criteria. Results of the screening evaluation are presented in Appendix G and indicate adequate evidence for reductive dechlorination of PCE, TCE, and cis-1,2-DCE.

Site data indicate PCE, TCE, and cis-1,2-DCE may be biodegrading at an optimal rate and that expansion of these plumes may not occur. However, site data indicate that biodegradation of the VC plume may not be occurring. The aquifer is anaerobic which does not easily allow biodegradation of VC. The VC plume continues to expand toward the Gravel Pit Lake and Raccoon River; however, the VOC contaminants that eventually reach these surface water bodies appear to be attenuating through natural processes as indicated by the absence of VOCs above detection limits in the surface water samples.

The migration rates and paths for site contaminants were further evaluated by groundwater flow and contaminant transport computer models and are discussed in *Groundwater Model Technical Memorandum* (BVSPC 2003e). Results of the computer groundwater modeling show that the contaminant plumes will continue to be captured by wells in the WDM well field and will also eventually reach the Gravel Pit Lake and Raccoon River (BVSPC 2003a).

5.6 Conclusions and Recommendations

As discussed, contaminant migration is strongly affected by two primary site conditions including groundwater transport and biochemical processes. The contaminants appear to be migrating to the east-southeast, in response to groundwater flow toward Gravel Pit Lake and the Raccoon River. The contaminants appear to be attenuating through natural processes as indicated by nearly non-detectable concentrations of suspected source contaminants (i.e., PCE and TCE) coinciding with elevated concentrations of degradation by-products (i.e., cis-1,2-DCE and VC). The geochemical site data also indicates a favorable environment for reductive dechlorination.

Groundwater samples should continue to be collected from the WDM water supply wells and site monitoring wells on a semi-annual basis to monitor migration of contaminants in groundwater. The samples collected from the monitoring wells and WDM water supply wells should be analyzed for VOCs as discussed in the *QAPP* (QAPP 2002a), *QAPP Supplement No. 1* (BVSPC 2002b), and

QAPP Addendum (BVSPC 2003a). Three surface water samples should continue to be collected from Gravel Pit Lake and the Raccoon River and analyzed for VOCs as discussed in the *QAPP* (QAPP 2002a), *QAPP Supplement No. 1* (BVSPC 2002b), and *QAPP Addendum* (BVSPC 2003a) to evaluate the potential presence of site contaminants in the surface water bodies.

Table 5-1
Groundwater and Surface Water Elevation Data
November 4, 2004
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 Remedial Investigation

Well	Top of Casing Elevation (ft)	Depth to Water from Top of Casing (ft)	Groundwater Elevation (ft MSL)
MW-1	813.86	NA	NA
MW-2	812.31	7.90	804.41
MW-3	811.78	NA	NA
MW-4	811.84	10.76	801.08
MW-5	814.21	13.58	800.63
MW-6	810.18	10.58	799.60
MW-7	812.84	13.30	799.54
MW-8	812.07	12.64	799.43
MW-9	810.07	10.82	799.25
MW-10	810.35	NA	NA
MW-11	811.70	12.71	798.99
MW-12	811.73	12.88	798.85
OB-06	811.12	8.01	803.11
WDMW-13[1]	814.31	9.80	804.51

Surface Water Body	Survey Reference	Water Level Difference	Surface Water Elevation (ft MSL)
North Basin[2]	774.02	<27.00	DRY
Gravel Pit Lake (SW-1)[3]	801.27	1.10	800.17

Note 1: TOC survey reference adjusted to 814.31 for the well cap reference on Nov. 3, 2004
815.66 - 1.35 = 814.31 (see logbook No. 1)

Note 2: Water level read from surveyed staff.

Note 3: Water level measured down from surveyed northwest bolt on southeast side of spillway.

Table 5-2
Metals, Geochemical, and Biochemical Data Summary (Monitoring Wells)
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 RI

Monitoring Well	Analyte	Concentration						Units
		July 2002	Nov. 2002	May 2003	Nov. 2003	May 2004	Nov. 2004	
MW-01	Alkalinity, bicarbonate	398	424	NA	NA	NA	NA	mg/L
MW-02	Alkalinity, bicarbonate	352	370(376)	NA	NA	NA	NA	mg/L
MW-03	Alkalinity, bicarbonate	387	390	NA	NA	NA	NA	mg/L
MW-04	Alkalinity, bicarbonate	340	346	NA	NA	NA	NA	mg/L
MW-05	Alkalinity, bicarbonate	379	397	NA	NA	NA	NA	mg/L
MW-06	Alkalinity, bicarbonate	298	327	NA	NA	NA	NA	mg/L
MW-07	Alkalinity, bicarbonate	428(427)	383	NA	NA	NA	NA	mg/L
MW-08	Alkalinity, bicarbonate	460	525	NA	NA	NA	NA	mg/L
MW-09	Alkalinity, bicarbonate	300	324	NA	NA	NA	NA	mg/L
MW-10	Alkalinity, bicarbonate	342	320	NA	NA	NA	NA	mg/L
MW-11	Alkalinity, bicarbonate	329	425	NA	NA	NA	NA	mg/L
MW-12	Alkalinity, bicarbonate	343	346	NA	NA	NA	NA	mg/L
MW-01	Chemical Oxygen Demand	NA	NA	NA	10.4 U	20 U	NA	mg/L
MW-02	Chemical Oxygen Demand	NA	NA	10 U	10.4 U	20 U	NA	mg/L
MW-03	Chemical Oxygen Demand	NA	NA	NA	10.4(10.4) U	20 U	NA	mg/L
MW-04	Chemical Oxygen Demand	NA	NA	NA	10.4 U	20 U	NA	mg/L
MW-05	Chemical Oxygen Demand	NA	NA	NA	10.4 U	20 U	NA	mg/L
MW-06	Chemical Oxygen Demand	NA	NA	NA	10.4 U	20 U	NA	mg/L
MW-07	Chemical Oxygen Demand	NA	NA	NA	10.4 U	20(20) U	NA	mg/L
MW-08	Chemical Oxygen Demand	NA	NA	10 U	26	20 U	NA	mg/L
MW-09	Chemical Oxygen Demand	NA	NA	NA	11	20 U	NA	mg/L
MW-10	Chemical Oxygen Demand	NA	NA	10.7	16	20 U	NA	mg/L
MW-11	Chemical Oxygen Demand	NA	NA	85.1	10.4 U	20 U	NA	mg/L
MW-12	Chemical Oxygen Demand	NA	NA	NA	10.4 U	20 U	NA	mg/L
MW-01	Chloride	126	125	NA	NA	NA	NA	mg/L
MW-02	Chloride	96.9	94(93)	NA	NA	NA	96.6	mg/L
MW-03	Chloride	54.2	53.1	NA	NA	NA	NA	mg/L
MW-04	Chloride	134	131	NA	NA	NA	99.5(103)	mg/L
MW-05	Chloride	84.8	82.5	NA	NA	NA	39.7	mg/L
MW-06	Chloride	109	99.3	NA	NA	NA	95.9	mg/L

Table 5-2 (Continued)
Metals, Geochemical, and Biochemical Data Summary (Monitoring Wells)
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 RI

Monitoring Well	Analyte	Concentration						Units
		July 2002	Nov. 2002	May 2003	Nov. 2003	May 2004	Nov. 2004	
MW-07	Chloride	32(32)	55.4	NA	NA	NA	90.6	mg/L
MW-08	Chloride	58.7	60.6	NA	NA	NA	44.9	mg/L
MW-09	Chloride	94.7	103	NA	NA	NA	104	mg/L
MW-10	Chloride	142	154	NA	NA	NA	NA	mg/L
MW-11	Chloride	44.1	53.1	NA	NA	NA	75.7	mg/L
MW-12	Chloride	72	88.5	NA	NA	NA	94.0	mg/L
MW-01	Conductivity	1390	1182	NA	1602	1681	NA	umhos/cm
MW-02	Conductivity	930	1009	1155	1300	1313	1134	umhos/cm
MW-03	Conductivity	1057	1257	NA	1174	1292	NA	umhos/cm
MW-04	Conductivity	1130	1124	NA	1276	1398	1030	umhos/cm
MW-05	Conductivity	1043	1148	NA	1515	1381	1169	umhos/cm
MW-06	Conductivity	NA	1425	NA	1447	1436	1284	umhos/cm
MW-07	Conductivity	1045	1269	NA	1497	1673	1156	umhos/cm
MW-08	Conductivity	1100	1189	1404	1608	1466	1270	umhos/cm
MW-09	Conductivity	1220	1265	NA	1335	1392	1075	umhos/cm
MW-10	Conductivity	1183	1472	1395	1395	1531	NA	umhos/cm
MW-11	Conductivity	640	996	961	1054	1110	997	umhos/cm
MW-12	Conductivity	1158	1477	NA	1461	1318	1250	umhos/cm
MW-01	Dissolved Organic Carbon	1.5	1 U	NA	NA	NA	NA	mg/L
MW-02	Dissolved Organic Carbon	1.1	1(1) U	NA	NA	NA	NA	mg/L
MW-03	Dissolved Organic Carbon	1.6	1.4	NA	NA	NA	NA	mg/L
MW-04	Dissolved Organic Carbon	1 U	1 U	NA	NA	NA	NA	mg/L
MW-05	Dissolved Organic Carbon	1.4	1 U	NA	NA	NA	NA	mg/L
MW-06	Dissolved Organic Carbon	2.3	2	NA	NA	NA	NA	mg/L
MW-07	Dissolved Organic Carbon	1(1) U	1.5	NA	NA	NA	NA	mg/L
MW-08	Dissolved Organic Carbon	2.1	2.3	NA	NA	NA	NA	mg/L
MW-09	Dissolved Organic Carbon	1 U	1 U	NA	NA	NA	NA	mg/L
MW-10	Dissolved Organic Carbon	1.5	1.5	NA	NA	NA	NA	mg/L
MW-11	Dissolved Organic Carbon	1.9	2.8	NA	NA	NA	NA	mg/L
MW-12	Dissolved Organic Carbon	1 U	1.1	NA	NA	NA	NA	mg/L

Table 5-2 (Continued)
Metals, Geochemical, and Biochemical Data Summary (Monitoring Wells)
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 RI

Monitoring Well	Analyte	Concentration						Units
		July 2002	Nov. 2002	May 2003	Nov. 2003	May 2004	Nov. 2004	
MW-01	Dissolved Oxygen	5.45	0.2	NA	0.6	0.1	NA	mg/L
MW-02	Dissolved Oxygen	0.4	0.1	1.7	0.4	0.1	0.5	mg/L
MW-03	Dissolved Oxygen	0.1	0.1	NA	0.4	0.1	NA	mg/L
MW-04	Dissolved Oxygen	NA	0.1	NA	0.5	0.1	0.5	mg/L
MW-05	Dissolved Oxygen	0.1	0.1	NA	0.4	0.1	0.3	mg/L
MW-06	Dissolved Oxygen	NA	0.1	NA	0.5	0.1	0.8	mg/L
MW-07	Dissolved Oxygen	0.4	0.1	NA	0.4	0.1	0.4	mg/L
MW-08	Dissolved Oxygen	0.1	0.1	3.4	0.4	0.1	0.1	mg/L
MW-09	Dissolved Oxygen	NA	0.1	NA	0.5	0.1	0.5	mg/L
MW-10	Dissolved Oxygen	0.2	0.1	0.3	0.4	0.1	NA	mg/L
MW-11	Dissolved Oxygen	0.1	0.1	1.2	0.5	0.3	0.5	mg/L
MW-12	Dissolved Oxygen	2.2	0.1	NA	0.5	0.1	0.6	mg/L
MW-01	Eh	-16	180 R	NA	122	54	NA	mv
MW-02	Eh	-18	121 R	-30	-33	-0.6	-74	mv
MW-03	Eh	-108	28 R	NA	-64	-76	NA	mv
MW-04	Eh	NA	255 R	NA	31	21	-13	mv
MW-05	Eh	-54	157 R	NA	-64	-35	5	mv
MW-06	Eh	NA	160 R	NA	-5	60	-9	mv
MW-07	Eh	-38	122 R	NA	-54	153	73	mv
MW-08	Eh	-60	157 R	-60	-71	-18	6	mv
MW-09	Eh	NA	161 R	NA	-35	75	-51	mv
MW-10	Eh	-97	180 R	-33	27	23	NA	mv
MW-11	Eh	-135	63 R	-117	-60	-85	-98	mv
MW-12	Eh	-61	128 R	NA	-19	-35	-63	mv
MW-01	Ethane	NA	NA	NA	2 U	2 U	NA	ug/L
MW-02	Ethane	NA	NA	NA	2 U	2 U	2 U	ug/L
MW-03	Ethane	NA	NA	NA	2 (2) U	2 U	NA	ug/L
MW-04	Ethane	NA	NA	NA	2 U	2 U	2 (2) U	ug/L
MW-05	Ethane	NA	NA	NA	2 U	2 U	2 U	ug/L
MW-06	Ethane	NA	NA	NA	2 U	2 U	2 U	ug/L

Table 5-2 (Continued)
Metals, Geochemical, and Biochemical Data Summary (Monitoring Wells)
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 RI

Monitoring Well	Analyte	Concentration						Units
		July 2002	Nov. 2002	May 2003	Nov. 2003	May 2004	Nov. 2004	
MW-07	Ethane	NA	NA	NA	2 U	2 (2) U	2 U	ug/L
MW-08	Ethane	NA	NA	NA	2	2 U	4	ug/L
MW-09	Ethane	NA	NA	NA	2 U	2 U	2 U	ug/L
MW-10	Ethane	NA	NA	NA	2 U	2 U	NA	ug/L
MW-11	Ethane	NA	NA	NA	2 U	2 U	2 U	ug/L
MW-12	Ethane	NA	NA	NA	2 U	2 U	2 U	ug/L
MW-01	Ethene	NA	NA	NA	3 U	3 U	NA	ug/L
MW-02	Ethene	NA	NA	NA	3 U	3 U	3 U	ug/L
MW-03	Ethene	NA	NA	NA	3 (3) U	3 U	NA	ug/L
MW-04	Ethene	NA	NA	NA	3 U	3 U	3 (3) U	ug/L
MW-05	Ethene	NA	NA	NA	3 U	3 U	3 U	ug/L
MW-06	Ethene	NA	NA	NA	3 U	3 U	3 U	ug/L
MW-07	Ethene	NA	NA	NA	3 U	3 (3) U	3 U	ug/L
MW-08	Ethene	NA	NA	NA	3 U	3 U	3 U	ug/L
MW-09	Ethene	NA	NA	NA	3 U	3 U	3 U	ug/L
MW-10	Ethene	NA	NA	NA	3 U	3 U	NA	ug/L
MW-11	Ethene	NA	NA	NA	3 U	3 U	3 U	ug/L
MW-12	Ethene	NA	NA	NA	3 U	3 U	3 U	ug/L
MW-01	Iron (total)	1460	966	NA	858	972	NA	ug/L
MW-02	Iron (total)	1370	2280(2130)	1680	1080	3230	3700	ug/L
MW-03	Iron (total)	8290	8510	NA	8900(9050)	9010	NA	ug/L
MW-04	Iron (total)	549	376	NA	1780	2330	1920(1960)	ug/L
MW-05	Iron (total)	1400	3230	NA	4050	4240	3370	ug/L
MW-06	Iron (total)	2240	1330	NA	4460	666	984	ug/L
MW-07	Iron (total)	5840(6070)	1610	NA	4320	453(892)	637	ug/L
MW-08	Iron (total)	2030	6650	4010	5630	3470	4370	ug/L
MW-09	Iron (total)	674	3900	NA	6370	424	2130	ug/L
MW-10	Iron (total)	3170	816	1790	1180	2130	NA	ug/L
MW-11	Iron (total)	2890	3930	4140	4450	4660	4720	ug/L
MW-12	Iron (total)	4220	5470	NA	6230	4730	4620	ug/L

Table 5-2 (Continued)
Metals, Geochemical, and Biochemical Data Summary (Monitoring Wells)
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 RI

Monitoring Well	Analyte	Concentration						Units
		July 2002	Nov. 2002	May 2003	Nov. 2003	May 2004	Nov. 2004	
MW-01	Iron (+2)	NA	1.6	NA	0.5	1.0	NA	mg/L
MW-02	Iron (+2)	NA	2.4	2200	1.1	2.8	3.2	mg/L
MW-03	Iron (+2)	NA	2.7	NA	3.8	4.5	NA	mg/L
MW-04	Iron (+2)	NA	0.8	NA	2.1	2.2	2.4	mg/L
MW-05	Iron (+2)	NA	3.3	NA	3.4	3.2	3.7	mg/L
MW-06	Iron (+2)	NA	1.4	NA	3.1	0.4	1.1	mg/L
MW-07	Iron (+2)	NA	1.7	NA	3.6	0.0	0.8	mg/L
MW-08	Iron (+2)	NA	1.9	2600	3.4	3.2	3.8	mg/L
MW-09	Iron (+2)	NA	7.5	NA	3.2	0.8	2.5	mg/L
MW-10	Iron (+2)	NA	1.3	1600	1.6	1.2	NA	mg/L
MW-11	Iron (+2)	NA	2.4	4400	3.3	3.2	4.4	mg/L
MW-12	Iron (+2)	NA	5.0	NA	3.5	2.8	3.4	mg/L
MW-01	Methane	NA	NA	NA	1 U	1	NA	ug/L
MW-02	Methane	NA	NA	NA	4	4	5	ug/L
MW-03	Methane	NA	NA	NA	3 (4)	4	NA	ug/L
MW-04	Methane	NA	NA	NA	1 U	1	1 (1) U	ug/L
MW-05	Methane	NA	NA	NA	2	14	7	ug/L
MW-06	Methane	NA	NA	NA	2	1 U	1 U	ug/L
MW-07	Methane	NA	NA	NA	15	1 (1)	3	ug/L
MW-08	Methane	NA	NA	NA	190 J	110 J	210	ug/L
MW-09	Methane	NA	NA	NA	1 U	1 U	1 U	ug/L
MW-10	Methane	NA	NA	NA	39	7	NA	ug/L
MW-11	Methane	NA	NA	NA	6	1 U	1 U	ug/L
MW-12	Methane	NA	NA	NA	38	10	2	ug/L
MW-01	Nitrate as Nitrogen	1.16	1.86	NA	0.03 U	1.10	NA	mg/L
MW-02	Nitrate as Nitrogen	0.31	0.18(0.14)	NA	0.28	0.03	0.25	mg/L
MW-03	Nitrate as Nitrogen	0.03 U	0.03 U	NA	0.03(0.3) U	0.03 U	NA	mg/L
MW-04	Nitrate as Nitrogen	0.03 U	0.03 U	NA	0.03 U	0.03 U	0.03(0.03) U	mg/L
MW-05	Nitrate as Nitrogen	0.1	0.03 U	NA	0.03 U	0.03 U	0.03 U	mg/L
MW-06	Nitrate as Nitrogen	0.03 U	0.34	NA	0.03 U	0.07	0.26	mg/L

Table 5-2 (Continued)
Metals, Geochemical, and Biochemical Data Summary (Monitoring Wells)
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 RI

Monitoring Well	Analyte	Concentration						Units
		July 2002	Nov. 2002	May 2003	Nov. 2003	May 2004	Nov. 2004	
MW-07	Nitrate as Nitrogen	0.03(0.03) U	0.39	NA	0.03 U	0.63(0.64)	0.52	mg/L
MW-08	Nitrate as Nitrogen	0.1	0.21	NA	0.03 U	0.03 U	0.03 U	mg/L
MW-09	Nitrate as Nitrogen	0.05	0.03 U	NA	0.05	0.59	0.03 U	mg/L
MW-10	Nitrate as Nitrogen	0.03 U	0.03 U	NA	0.03 U	0.03 U	NA	mg/L
MW-11	Nitrate as Nitrogen	0.03 U	0.03 U	NA	0.03 U	0.03 U	0.03 U	mg/L
MW-12	Nitrate as Nitrogen	0.03 U	0.03 U	NA	0.03 U	0.03 U	0.03 U	mg/L
MW-01	pH	7.23	6.9	NA	6.7	7.0	NA	SU
MW-02	pH	6.8	7	7	7.1	7.0	6.9	SU
MW-03	pH	6.9	7.1	NA	6.9	7.1	NA	SU
MW-04	pH	NA	6.8	NA	6.5	6.9	6.8	SU
MW-05	pH	6.8	6.9	NA	7	6.9	6.9	SU
MW-06	pH	NA	6.9	NA	6.7	7.0	6.8	SU
MW-07	pH	6.9	6.9	NA	6.9	6.9	6.8	SU
MW-08	pH	6.8	6.9	6.9	7	7.0	6.9	SU
MW-09	pH	NA	7	NA	6.7	7.0	6.9	SU
MW-10	pH	7	7	7.0	6.8	7.0	NA	SU
MW-11	pH	7.1	7.2	7.2	6.8	7.2	7.1	SU
MW-12	pH	7	6.9	NA	6.7	7.0	6.9	SU
MW-01	Sulfate	229	210	NA	236	202	NA	mg/L
MW-02	Sulfate	164	213(206)	NA	163	178	291	mg/L
MW-03	Sulfate	300	296	NA	221(221)	211	NA	mg/L
MW-04	Sulfate	200	205	NA	203	205	243(236)	mg/L
MW-05	Sulfate	224	280	NA	279	244	206	mg/L
MW-06	Sulfate	308	335	NA	342	253	387	mg/L
MW-07	Sulfate	332(335)	312	NA	339	224(233)	245	mg/L
MW-08	Sulfate	260	248	NA	239	280	389	mg/L
MW-09	Sulfate	212	273	NA	236	256	230	mg/L
MW-10	Sulfate	247	260	NA	230	232	NA	mg/L
MW-11	Sulfate	46.5	42.5	NA	72.5	63.4	54.5	mg/L
MW-12	Sulfate	358	358	NA	322	288	311	mg/L

Table 5-2 (Continued)
Metals, Geochemical, and Biochemical Data Summary (Monitoring Wells)
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 RI

Monitoring Well	Analyte	Concentration						Units
		July 2002	Nov. 2002	May 2003	Nov. 2003	May 2004	Nov. 2004	
MW-01	Sulfide	NA	NA	NA	NA	NA	NA	mg/L
MW-02	Sulfide	NA	NA	NA	NA	NA	0.033	mg/L
MW-03	Sulfide	NA	NA	NA	NA	NA	NA	mg/L
MW-04	Sulfide	NA	NA	NA	NA	NA	0.075(0.079)	mg/L
MW-05	Sulfide	NA	NA	NA	NA	NA	0.010 U	mg/L
MW-06	Sulfide	NA	NA	NA	NA	NA	0.010 U	mg/L
MW-07	Sulfide	NA	NA	NA	NA	NA	0.010 U	mg/L
MW-08	Sulfide	NA	NA	NA	NA	NA	0.105	mg/L
MW-09	Sulfide	NA	NA	NA	NA	NA	1.64	mg/L
MW-10	Sulfide	NA	NA	NA	NA	NA	NA	mg/L
MW-11	Sulfide	NA	NA	NA	NA	NA	0.035	mg/L
MW-12	Sulfide	NA	NA	NA	NA	NA	0.010 U	mg/L
MW-01	Temperature	NA	15	NA	14.8	13.4	NA	Deg C
MW-02	Temperature	13	14.3	13.5	13.6	13.0	14.3	Deg C
MW-03	Temperature	14.4	14.3	NA	14	14.2	NA	Deg C
MW-04	Temperature	14.8	15.4	NA	14.7	11.7	14.7	Deg C
MW-05	Temperature	13.5	14	NA	13.5	13.6	13.4	Deg C
MW-06	Temperature	NA	15.8	NA	15.2	14.8	15.7	Deg C
MW-07	Temperature	15	15.8	NA	15	14.8	16.3	Deg C
MW-08	Temperature	13.8	13.7	13.9	13.5	13.8	13.4	Deg C
MW-09	Temperature	15.5	14.2	NA	14.1	14.1	14.0	Deg C
MW-10	Temperature	15.1	14.3	14.6	14.2	14.3	NA	Deg C
MW-11	Temperature	12.8	12.2	12.6	12.1	12.7	12.4	Deg C
MW-12	Temperature	14.5	13.4	NA	13.5	13.7	13.4	Deg C
MW-01	Total Organic Carbon	1 U	1 U	NA	NA	NA	NA	mg/L
MW-02	Total Organic Carbon	7.4	1(1) U	NA	NA	NA	1 U	mg/L
MW-03	Total Organic Carbon	1.2	1.3	NA	NA	NA	NA	mg/L
MW-04	Total Organic Carbon	1.3	1 U	NA	NA	NA	1.1(1.0 U)	mg/L
MW-05	Total Organic Carbon	1.2	1 U	NA	NA	NA	1.7	mg/L
MW-06	Total Organic Carbon	1.5	1 U	NA	NA	NA	1 U	mg/L

Table 5-2 (Continued)
Metals, Geochemical, and Biochemical Data Summary (Monitoring Wells)
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 RI

Monitoring Well	Analyte	Concentration						Units
		July 2002	Nov. 2002	May 2003	Nov. 2003	May 2004	Nov. 2004	
MW-07	Total Organic Carbon	7.1(7.2)	1 U	NA	NA	NA	1 U	mg/L
MW-08	Total Organic Carbon	1.8	1.9	NA	NA	NA	1.7	mg/L
MW-09	Total Organic Carbon	1 U	1.8	NA	NA	NA	1 U	mg/L
MW-10	Total Organic Carbon	1.9	5.1	NA	NA	NA	NA	mg/L
MW-11	Total Organic Carbon	2.7	3	NA	NA	NA	2.7	mg/L
MW-12	Total Organic Carbon	1 U	1 U	NA	NA	NA	1 U	mg/L
MW-01	Turbidity	5.9	0	NA	0	2.1	NA	NTU
MW-02	Turbidity	2.4	0	0	0	4.1	0.2	NTU
MW-03	Turbidity	9.1	0	NA	1.3	8.5	NA	NTU
MW-04	Turbidity	NA	0	NA	0	3.5	-1.7	NTU
MW-05	Turbidity	2	0.1	NA	0.1	4.7	5.5	NTU
MW-06	Turbidity	NA	0	NA	0.4	5.0	-0.8	NTU
MW-07	Turbidity	5.1	0	NA	0.8	2.6	3.7	NTU
MW-08	Turbidity	2.8	0	0	1.4	5.0	7.0	NTU
MW-09	Turbidity	NA	5.2	NA	5	33	3.5	NTU
MW-10	Turbidity	3.7	0	2.4	0	14.3	NA	NTU
MW-11	Turbidity	1.8	0	0.8	0	3.9	4.2	NTU
MW-12	Turbidity	1.5	0	NA	0	4.5	-0.6	NTU

NA = Not Available
mg/L = milligrams per liter
ug/L = micrograms per liter
U = Not detected at or above the reportable level shown.
J = The associated numerical value is an estimated quantity.
umhos/cm = micromhos per centimeter
mv = millivolt
SU = standard units (pH)
deg C = degrees Celsius
NTU = Nephelometric turbidity units
R = rejected

Table 5-3
Geochemical Data Summary (WDM Water Wells)
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 Remedial Investigation

West Des Moines Water Well	Analyte	Concentration					Units
		July 2002	Nov 2002	May 2003	Nov 2003	Nov 2004	
WDMW-01	Conductivity	1756	NA	1670	1892	1693	umhos/cm
WDMW-03	Conductivity	1751	NA	1722	1784	1769	umhos/cm
WDMW-04	Conductivity	NA	1459	1744	1910	1744	umhos/cm
WDMW-05	Conductivity	965	1020	1328	1261	NA	umhos/cm
WDMW-06	Conductivity	2019	2214	2580	2862	2285	umhos/cm
WDMW-07	Conductivity	1307	1382	1610	1558	1636	umhos/cm
WDMW-08	Conductivity	1067	1217	1469	1554	1740	umhos/cm
WDMW-09	Conductivity	1004	528	1316	1258	1240	umhos/cm
WDMW-12	Conductivity	972	1054	1282	1402	1299	umhos/cm
WDMW-13	Conductivity	912	1007	1134	1261	1189	umhos/cm
WDMW-14	Conductivity	658	778	840	900	856	umhos/cm
WDMW-15	Conductivity	546	746	958	829	797	umhos/cm
WDMW-16	Conductivity	805	785	1055	NA	NA	umhos/cm
WMDW-17	Conductivity	374	399	367	466	627	umhos/cm
WDMW-18	Conductivity	477	544	678	694	582	umhos/cm
WDMW-19	Conductivity	822	872	979	980	994	umhos/cm
WDMW-20	Conductivity	308	346	421	563	422	umhos/cm
WDMW-21	Conductivity	292	346	396	381	474	umhos/cm
WDMW-22	Conductivity	663	152127 R	990	946	1003	umhos/cm
WDMW-23	Conductivity	1069	1481	1297	1369	1550	umhos/cm
WDMW-24	Conductivity	869	1018	1040	1210	1078	umhos/cm
WDMW-25	Conductivity	620	152437 R	848	884	811	umhos/cm
WDMW-01	Dissolved Oxygen	2.4	NA	6.8	7.4	7.7	mg/L
WDMW-03	Dissolved Oxygen	2.0	NA	7.8	12.6	7.9	mg/L
WDMW-04	Dissolved Oxygen	NA	4.9	6.9	8.6	7.7	mg/L
WDMW-05	Dissolved Oxygen	5.0	4.3	6.3	7.0	NA	mg/L
WDMW-06	Dissolved Oxygen	2.8	3.8	7.9	7.5	8.8	mg/L
WDMW-07	Dissolved Oxygen	3.9	4.1	7.7	6.0	6.2	mg/L
WDMW-08	Dissolved Oxygen	5.3	6.3	9.6	6.9	7.6	mg/L
WDMW-09	Dissolved Oxygen	3.9	7.8	7.0	8.7	12.9	mg/L
WDMW-12	Dissolved Oxygen	3.9	5.2	7.3	6.5	5.0	mg/L
WDMW-13	Dissolved Oxygen	2.7	6.8	8.5	7.3	6.6	mg/L
WDMW-14	Dissolved Oxygen	4.8	5.3	8.8	8.1	6.8	mg/L
WDMW-15	Dissolved Oxygen	5.3	5.5	9.5	8.5	3.8	mg/L
WDMW-16	Dissolved Oxygen	4.2	4.5	7.9	NA	NA	mg/L
WMDW-17	Dissolved Oxygen	2.6	3.4	8.6	7.7	3.7	mg/L
WDMW-18	Dissolved Oxygen	3.6	4.2	7.6	7.6	8.4	mg/L
WDMW-19	Dissolved Oxygen	4.9	4.9	7.0	9.8	5.8	mg/L
WDMW-20	Dissolved Oxygen	3.6	4.2	6.0	5.6	7.7	mg/L
WDMW-21	Dissolved Oxygen	3.1	3.9	8.5	9.1	6.4	mg/L
WDMW-22	Dissolved Oxygen	4.5	2.0	5.7	7.7	6.9	mg/L
WDMW-23	Dissolved Oxygen	5.4	3.5	5.3	7.6	8.9	mg/L
WDMW-24	Dissolved Oxygen	4.7	6.7	6.0	8.6	7.9	mg/L
WDMW-25	Dissolved Oxygen	3.9	1.6	6.4	7.0	8.3	mg/L

Table 5-3 (Continued)
Geochemical Data Summary (WDM Water Wells)
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 Remedial Investigation

West Des Moines Water Well	Analyte	Concentration					Units
		July 2002	Nov 2002	May 2003	Nov 2003	Nov 2004	
WDMW-01	Eh	-90	NA	-50	-82	-65	mv
WDMW-03	Eh	-75	NA	-24	-97	-77	mv
WDMW-04	Eh	NA	99 R	-56	-55	11	mv
WDMW-05	Eh	25	252 R	81	16	NA	mv
WDMW-06	Eh	-35	141 R	42	-4	-23	mv
WDMW-07	Eh	-70	52 R	-6	-24	-44	mv
WDMW-08	Eh	-62	161 R	2	-34	-80	mv
WDMW-09	Eh	-8	201 R	27	2	-22	mv
WDMW-12	Eh	-61	41 R	-14	-58	-58	mv
WDMW-13	Eh	-78	30 R	-62	-78	-20	mv
WDMW-14	Eh	43	263 R	34	24	-37	mv
WDMW-15	Eh	63	212 R	84	89	216	mv
WDMW-16	Eh	-9	4 R	9	NA	NA	mv
WMDW-17	Eh	-13	86 R	8	-20	6	mv
WDMW-18	Eh	13	50 R	44	25	12	mv
WDMW-19	Eh	64	110 R	74	44	15	mv
WDMW-20	Eh	-5	50 R	49	9	-7	mv
WDMW-21	Eh	-69	65 R	-17	-126	-50	mv
WDMW-22	Eh	72	236 R	76	38	30	mv
WDMW-23	Eh	33	164 R	58	20	17	mv
WDMW-24	Eh	26	134 R	66	8	7	mv
WDMW-25	Eh	-8	88 R	40	-3	4	mv
WDMW-01	pH	7.4	NA	7.5	7.5	7.4	SU
WDMW-03	pH	7.3	NA	7.6	7.7	7.5	SU
WDMW-04	pH	NA	7.8	7.5	7.7	7.4	SU
WDMW-05	pH	7.1	7.0	7.3	7.1	NA	SU
WDMW-06	pH	6.8	7.0	6.8	6.9	6.9	SU
WDMW-07	pH	7.1	7.0	7.1	7.1	6.9	SU
WDMW-08	pH	7.0	6.8	6.9	7.0	7.4	SU
WDMW-09	pH	7.0	6.8	7.0	7.1	6.3	SU
WDMW-12	pH	7.0	7.2	6.9	7.0	6.9	SU
WDMW-13	pH	6.8	7.0	6.9	7.1	6.7	SU
WDMW-14	pH	7.3	7.2	7.3	7.5	7.4	SU
WDMW-15	pH	7.1	7.5	7.2	7.3	7.2	SU
WDMW-16	pH	6.8	6.9	7.0	NA	NA	SU
WMDW-17	pH	7.2	7.5	7.5	7.5	7.0	SU
WDMW-18	pH	6.9	7.3	7.1	7.2	7.3	SU
WDMW-19	pH	7.0	7.2	7.1	7.2	7.1	SU
WDMW-20	pH	7.4	7.7	7.5	7.5	7.4	SU
WDMW-21	pH	7.5	7.6	7.6	7.7	7.4	SU
WDMW-22	pH	7.3	7.2	7.3	7.3	7.3	SU
WDMW-23	pH	7.0	7.1	7.0	7.1	7.0	SU
WDMW-24	pH	7.0	7.1	7.0	7.2	7.2	SU
WDMW-25	pH	7.3	7.4	7.2	7.2	7.4	SU

Table 5-3 (Continued)
Geochemical Data Summary (WDM Water Wells)
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 Remedial Investigation

West Des Moines Water Well	Analyte	Concentration					Units
		July 2002	Nov 2002	May 2003	Nov 2003	Nov 2004	
WDMW-01	Temperature	26	NA	25	21	25	Deg C
WDMW-03	Temperature	25	NA	25	23	25	Deg C
WDMW-04	Temperature	NA	24	25	22	25	Deg C
WDMW-05	Temperature	15	14	17	15	NA	Deg C
WDMW-06	Temperature	14	14	14	13	14	Deg C
WDMW-07	Temperature	15	14	13	12	13	Deg C
WDMW-08	Temperature	13	12	13	11	23	Deg C
WDMW-09	Temperature	17	13	14	13	14	Deg C
WDMW-12	Temperature	14	13	13	12	13	Deg C
WDMW-13	Temperature	14	13	13	12	13	Deg C
WDMW-14	Temperature	13	13	12	13	13	Deg C
WDMW-15	Temperature	11	14	12	14	15	Deg C
WDMW-16	Temperature	14	14	13	NA	NA	Deg C
WMDW-17	Temperature	16	15	18	13	15	Deg C
WDMW-18	Temperature	15	14	14	13	14	Deg C
WDMW-19	Temperature	15	14	14	13	14	Deg C
WDMW-20	Temperature	13	16	13	16	16	Deg C
WDMW-21	Temperature	13	18	13	13	14	Deg C
WDMW-22	Temperature	12	15	11	14	14	Deg C
WDMW-23	Temperature	13	13	12	12	14	Deg C
WDMW-24	Temperature	14	13	12	13	14	Deg C
WDMW-25	Temperature	16	15	11	15	16	Deg C
WDMW-01	Turbidity	0	NA	0	2	10	NTU
WDMW-03	Turbidity	0	NA	0	1	3	NTU
WDMW-04	Turbidity	NA	-1	0	0	4	NTU
WDMW-05	Turbidity	1	-3	2	0	NA	NTU
WDMW-06	Turbidity	6	9	10	3	7	NTU
WDMW-07	Turbidity	5	-2	0	1	1	NTU
WDMW-08	Turbidity	4	-3	0	1	7	NTU
WDMW-09	Turbidity	2	-3	0	1	5	NTU
WDMW-12	Turbidity	3	-2	5	0	1	NTU
WDMW-13	Turbidity	23	-1	0	0	1	NTU
WDMW-14	Turbidity	2	-3	0	5	0	NTU
WDMW-15	Turbidity	1	-4	3	2	-6	NTU
WDMW-16	Turbidity	2	5	0	NA	NA	NTU
WMDW-17	Turbidity	0	-4	0	1	-4	NTU
WDMW-18	Turbidity	2	-3	0	1	0	NTU
WDMW-19	Turbidity	1	-2	0	2	1	NTU
WDMW-20	Turbidity	0	-4	0	0	0	NTU
WDMW-21	Turbidity	2	73	0	92	1	NTU
WDMW-22	Turbidity	2	-4	0	0	0	NTU
WDMW-23	Turbidity	0	-4	0	0	2	NTU
WDMW-24	Turbidity	1	-5	1	0	1	NTU
WDMW-25	Turbidity	3	0	1	0	7	NTU

Table 5-3 (Continued)
Geochemical Data Summary (WDM Water Wells)
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 Remedial Investigation

West Des Moines Water Well	Analyte	Concentration					Units
		July 2002	Nov 2002	May 2003	Nov 2003	Nov 2004	

NA = Not Available
mg/L = milligrams per liter
ug/L = micrograms per liter
U = Not detected at or above the reportable level shown.
J = The associated numerical value is an estimated quantity.
umhos/cm = micromhos per centimeter
mv = millivolt
SU = standard units (pH)
deg C = degrees Celsius
NTU = Nephelometric turbidity units
R = Probable instrument failure, result rejected

Table 5-4
Geochemical Data Summary (Surface Water Samples)
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 Remedial Investigation

Sample Location	Analyte	Value					Units
		Nov 2002	May 2003	Nov 2003	May 2004	Nov 2004	
SW-01	Conductivity	351	487	338	586	424	umhos/cm
SW-02	Conductivity	338	455	331	574	408	umhos/cm
SW-03	Conductivity	NA	NA	NA	728	558	umhos/cm
SW-01	Dissolved Oxygen	13	4.3	13.6	10.8	10.7	mg/L
SW-02	Dissolved Oxygen	13.6	18.5	12.7	13.8	9.7	mg/L
SW-03	Dissolved Oxygen	NA	NA	NA	10.6	8	mg/L
SW-01	Eh	300	82	80	72	-82	mV
SW-02	Eh	297	21.4	93	132	-44	mV
SW-03	Eh	NA	NA	NA	214	125	mV
SW-01	pH	8.8	7.4	8.5	8.8	8.4	SU
SW-02	pH	9	9.2	8.5	9.4	8.3	SU
SW-03	pH	NA	NA	NA	8.6	8.2	SU
SW-01	Temperature	4.7	20.2	8.7	18.9	11	Deg C
SW-02	Temperature	5.2	20.4	7.8	16.9	11	Deg C
SW-03	Temperature	NA	NA	NA	15	13	Deg C
SW-01	Turbidity	1000	54.4	1140	55	21	NTU
SW-02	Turbidity	1043	1705	31	513	26	NTU
SW-03	Turbidity	NA	NA	NA	1290	30	NTU

umhos/cm = micromhos per centimeter
mg/L = milligrams per liter
SU = standard units (pH)
deg C = degrees Celsius
NTU = Nephelometric turbidity units

Table 5-5
VOC Data Summary (Monitoring Wells)
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 RI

Monitoring Well	Analyte	MCL* (ug/L)	Concentration						Units
			July 2002	Nov. 2002	May 2003	Nov. 2003	May 2004	Nov. 2004	
MW-01	PCE	5	0.5 U	0.5 U	0.5 U	1 U	0.5 U	NA	ug/L
MW-02	PCE		0.5 U	0.5(0.5) U	0.5 U	1 U	0.5 U	0.5 U	ug/L
MW-03	PCE		0.5 U	0.5 U	0.5 U	1.0(1.0) U	0.5 U	NA	ug/L
MW-04	PCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 (0.5) U	ug/L
MW-05	PCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	ug/L
MW-06	PCE		5	12	4.3	1.6	6.7	5.2	ug/L
MW-07	PCE		0.5(0.5) U	0.5 U	0.5 U	1 U	0.5(0.5) U	0.5 U	ug/L
MW-08	PCE		0.5 U	0.5 U	0.5(0.5) U	1 U	10 U	0.5 U	ug/L
MW-09	PCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	6.5	ug/L
MW-10	PCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	NA	ug/L
MW-11	PCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	ug/L
MW-12	PCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	ug/L
MW-01	TCE	5	0.96	1.5	1.4	1 U	0.90	NA	ug/L
MW-02	TCE		0.5 U	1.3(1.2)	0.83	1.1	0.93	0.5 U	ug/L
MW-03	TCE		0.5 U	0.51	0.5 U	1.0(1.0) U	0.50	NA	ug/L
MW-04	TCE		0.5 U	0.5 U	0.5 U	1 U	0.50 U	0.5 (0.5) U	ug/L
MW-05	TCE		5.7	6.6	2.1	7.3	5.6	6.1	ug/L
MW-06	TCE		2.5	4.7	2.6	1 U	5.5	2.5	ug/L
MW-07	TCE		0.5(0.5) U	0.5 U	0.5 U	1 U	0.5(0.5) U	0.5 U	ug/L
MW-08	TCE		2.8	2.7	0.5 (0.5) U	1.7	10 U	0.98	ug/L
MW-09	TCE		0.5 U	0.5 U	0.5 U	1 U	0.50 U	3.3	ug/L
MW-10	TCE		0.5 U	1.1	1.1	1 U	0.89	NA	ug/L
MW-11	TCE		0.5 U	0.5 U	0.5 U	1 U	0.50 U	0.5 U	ug/L
MW-12	TCE		0.5 U	0.5 U	0.5 U	1 U	0.50 U	0.5 U	ug/L

Table 5-5 (Continued)
VOC Data Summary (Monitoring Wells)
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 RI

Monitoring Well	Analyte	MCL* (ug/L)	Concentration						Units
			July 2002	Nov. 2002	May 2003	Nov. 2003	May 2004	Nov. 2004	
MW-01	cis-1,2-DCE	70	15	10	19	12	24	NA	ug/L
MW-02	cis-1,2-DCE		110	270(240)	140	150	220	0.5 U	ug/L
MW-03	cis-1,2-DCE		200	220	180	210(220)	190	NA	ug/L
MW-04	cis-1,2-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 (0.5) U	ug/L
MW-05	cis-1,2-DCE		14	11	13	16	19	14	ug/L
MW-06	cis-1,2-DCE		7.3	12	18	11	9.1	4.8	ug/L
MW-07	cis-1,2-DCE		490(500)	410	830	820	110(130)	170	ug/L
MW-08	cis-1,2-DCE		370	420	220(250)	280	370	290	ug/L
MW-09	cis-1,2-DCE		0.5 U	0.57	0.5 U	1 U	0.5 U	6.6	ug/L
MW-10	cis-1,2-DCE		4.8	4	3.6	4.4	4.6	NA	ug/L
MW-11	cis-1,2-DCE		5.2	6	4.4	5.7	6.6	3.6	ug/L
MW-12	cis-1,2-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	ug/L
MW-01	VC	2	0.5 U	0.5 U	0.5 U	2 U	0.5 U	NA	ug/L
MW-02	VC		0.5 U	0.5(0.5) U	0.83	2 U	0.5 U	1.7	ug/L
MW-03	VC		0.51	0.5 U	0.55	2.0(2.0) U	0.5 U	NA	ug/L
MW-04	VC		0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 (0.5) U	ug/L
MW-05	VC		0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	ug/L
MW-06	VC		0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	ug/L
MW-07	VC		12(11)	17	34	15 J	2.4(2.0)	2.8	ug/L
MW-08	VC		29	110	110(120)	92 J	57	37	ug/L
MW-09	VC		0.5 U	0.5 U	0.5 U	2 U	0.5 U	0.5 U	ug/L
MW-10	VC		17	8.1	4.3	12 J	7.5	NA	ug/L
MW-11	VC		2.7	11	21	12 J	13	5.8	ug/L
MW-12	VC		2.3	6.7	12	12 J	1.2	0.66	ug/L

Table 5-5 (Continued)
VOC Data Summary (Monitoring Wells)
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 RI

Monitoring Well	Analyte	MCL* (ug/L)	Concentration						Units
			July 2002	Nov. 2002	May 2003	Nov. 2003	May 2004	Nov. 2004	
MW-01	1,1-DCE	7	0.5 U	0.5 U	0.5 U	1 U	0.5 U	NA	ug/L
MW-02	1,1-DCE		0.5 U	0.5(0.5) U	0.6	1 U	0.69	0.5 U	ug/L
MW-03	1,1-DCE		0.6	0.5 U	0.7	1.0(1.0) U	0.69	NA	ug/L
MW-04	1,1-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 (0.5) U	ug/L
MW-05	1,1-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	ug/L
MW-06	1,1-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	ug/L
MW-07	1,1-DCE		1.6(1.6)	0.5 U	2.5	1.3	0.5(0.5) U	0.5 U	ug/L
MW-08	1,1-DCE		1.2	1.0	0.9(0.9)	1 U	10 U	0.5 U	ug/L
MW-09	1,1-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 UJ	ug/L
MW-10	1,1-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	NA	ug/L
MW-11	1,1-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	ug/L
MW-12	1,1-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 UJ	ug/L
MW-01	MTBE	None	1	1.1	0.5 U	-	0.67	NA	ug/L
MW-02	MTBE		0.5 U	1.1(0.9)	0.5 U	-	0.75	2.6	ug/L
MW-03	MTBE		0.99	1.2	0.5 U	-	0.88	NA	ug/L
MW-04	MTBE		0.5 U	0.5 U	0.5 U	-	0.5 U	0.5 (0.5) U	ug/L
MW-05	MTBE		12	11	1.1	-	13	8.9	ug/L
MW-06	MTBE		0.5 U	0.5 U	0.5 U	-	0.5 U	0.5 U	ug/L
MW-07	MTBE		1.5(1.5)	1.5	0.5 U	-	0.5(0.5) U	0.5 U	ug/L
MW-08	MTBE		1.9	2.3	0.5(0.5) U	-	10 U	1.1	ug/L
MW-09	MTBE		2.2	7.6	0.5 U	-	1.9	0.5 UJ	ug/L
MW-10	MTBE		3.2	6.3	0.5 U	-	3.0	NA	ug/L
MW-11	MTBE		0.5 U	0.5 U	0.5 U	-	0.5 U	0.5 U	ug/L
MW-12	MTBE		3.2	4.1	0.5 U	-	4.1	1.7 J	ug/L

Table 5-5 (Continued)
VOC Data Summary (Monitoring Wells)
Railroad Avenue Groundwater Site
West Des Moines, Iowa
Phase 8 RI

Monitoring Well	Analyte	MCL* (ug/L)	Concentration						Units
			July 2002	Nov. 2002	May 2003	Nov. 2003	May 2004	Nov. 2004	
MW-01	trans-1,2-DCE	100	0.5 U	0.5 U	1.1	1 U	0.63	NA	ug/L
MW-02	trans-1,2-DCE		0.5 U	2.1(1.7)	1.3	1.3	2.1	0.5 U	ug/L
MW-03	trans-1,2-DCE		1.3	1.3	1.3	1.1(1.1)	1.3	NA	ug/L
MW-04	trans-1,2-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 (0.5) U	ug/L
MW-05	trans-1,2-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	ug/L
MW-06	trans-1,2-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	ug/L
MW-07	trans-1,2-DCE		4.7(4.5)	3.2	4.2	3	1.2(1.1)	1	ug/L
MW-08	trans-1,2-DCE		3.1	3.9	1.9(1.9)	2	10 U	1.6	ug/L
MW-09	trans-1,2-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	ug/L
MW-10	trans-1,2-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	NA	ug/L
MW-11	trans-1,2-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	ug/L
MW-12	trans-1,2-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	ug/L

* Maximum contaminant levels established under 40 CFR 141

ug/L = micrograms per liter

U = Not detected at or above the reportable level shown.

J = The associated numerical value is an estimated quantity.

Other VOCs detected infrequently at low concentrations include 2-butanone at 0.76 ug/L in well MW-7 in July 2002, toluene at 0.76 ug/L in well MW-1 in July 2002, and 1,2-dibromo-3-chloropropane at 1.4 ug/L in well MW-8 in July 2002.

Shaded results indicate where contaminant was detected above respective MCL.

Table 5-6
VOC Data Summary (Water Supply Wells)
Railroad Avenue Groundwater Site
Phase 8 Remedial Investigation

Well	Analyte	MCL* (ug/L)	Concentration					Units
			July 2002	Nov. 2002	May 2003	Nov. 2003	Nov. 2004	
WDMW-01	TCE		0.5 U	NA	0.5 U	1 U	0.5 U	ug/L
WDMW-03	TCE		0.5 U	NA	0.5 U	1 U	0.5 U	ug/L
WDMW-04	TCE		NA	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-05	TCE		0.5 U	0.5 U	0.5 U	1 U	NA	ug/L
WDMW-06	TCE		0.5 U	0.5 U	0.5 U	1 U	0.5(0.5) U	ug/L
WDMW-07	TCE		0.5(0.5) U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-08	TCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-09	TCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-12	TCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-13	TCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-14	TCE	5	0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-15	TCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-16	TCE		0.5 U	0.5 U	0.5 U	1 U	NA	ug/L
WMDW-17	TCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-18	TCE		0.5 U	0.5 U	0.5 U	1(1) U	0.5 U	ug/L
WDMW-19	TCE		1	1.4	1.5	1.4	0.95	ug/L
WDMW-20	TCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-21	TCE		1.4	1.9	1.8(1.8)	2.4	0.5 U	ug/L
WDMW-22	TCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-23	TCE		0.5 U	0.5(0.5) U	0.5 U	1 U	0.5 U	ug/L
WDMW-24	TCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-25	TCE		0.5(0.5) U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-01	cis-1,2-DCE		0.5 U	NA	0.5 U	1 U	0.5 U	ug/L
WDMW-03	cis-1,2-DCE		0.5 U	NA	0.5 U	1 U	0.5 U	ug/L
WDMW-04	cis-1,2-DCE		NA	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-05	cis-1,2-DCE		3	2.8	1.3	2	NA	ug/L
WDMW-06	cis-1,2-DCE		4.5	6	5.8	3.8	1.9(2.4)	ug/L
WDMW-07	cis-1,2-DCE		0.5(0.5) U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-08	cis-1,2-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-09	cis-1,2-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-12	cis-1,2-DCE		2.2	2.3	3.1	1.8	2.1	ug/L
WDMW-13	cis-1,2-DCE		0.54	1.5	0.54	1 U	0.5 U	ug/L
WDMW-14	cis-1,2-DCE	5	0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-15	cis-1,2-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-16	cis-1,2-DCE		0.5 U	0.5 U	0.5 U	1 U	NA	ug/L
WMDW-17	cis-1,2-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-18	cis-1,2-DCE		0.5 U	0.5 U	0.5 U	1(1) U	0.5 U	ug/L
WDMW-19	cis-1,2-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-20	cis-1,2-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-21	cis-1,2-DCE		0.96	0.66	1.7(1.7)	3.1	2.6	ug/L
WDMW-22	cis-1,2-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-23	cis-1,2-DCE		0.5 U	0.5(0.5) U	0.5 U	1 U	0.5 U	ug/L
WDMW-24	cis-1,2-DCE		0.5 U	0.5 U	0.5 U	1 U	0.5 U	ug/L
WDMW-25	cis-1,2-DCE		0.5(0.5) U	0.5 U	0.5 U	1 U	0.5 U	ug/L

Table 5-6 (Continued)
VOC Data Summary (Water Supply Wells)
Railroad Avenue Groundwater Site
Phase 8 Remedial Investigation

Well	Analyte	MCL* (ug/L)	Concentration					Units
			July 2002	Nov. 2002	May 2003	Nov. 2003	Nov. 2004	
WDMW-01	VC	2	0.5 U	NA	0.5 U	2 U	0.5 U	ug/L
WDMW-03	VC		0.5 U	NA	0.5 U	2 U	0.5 U	ug/L
WDMW-04	VC		NA	0.5 U	NA	2 U	0.5 U	ug/L
WDMW-05	VC		0.5 U	0.5 U	0.5 U	2 U	NA	ug/L
WDMW-06	VC		0.5 U	0.5 U	0.5 U	2 U	0.5 U	ug/L
WDMW-07	VC		0.5(0.5) U	0.5 U	0.5 U	2 U	0.5 U	ug/L
WDMW-08	VC		0.5 U	0.5 U	0.5 U	2 U	0.5 U	ug/L
WDMW-09	VC		0.5 U	0.5 U	0.5 U	2 U	0.5 U	ug/L
WDMW-12	VC		0.5 U	0.5 U	0.5 U	2 U	0.5 U	ug/L
WDMW-13	VC		0.5 U	0.5 U	0.5 U	2 U	0.5 U	ug/L
WDMW-14	VC		0.5 U	0.5 U	0.5 U	2 U	0.5 U	ug/L
WDMW-15	VC		0.5 U	0.5 U	0.5 U	2 U	0.5 U	ug/L
WDMW-16	VC		0.5 U	0.5 U	0.5 U	NA	NA	ug/L
WMDW-17	VC		0.5 U	0.5 U	0.5 U	2 U	0.5 U	ug/L
WDMW-18	VC		0.5 U	0.5 U	0.5 U	2(2) U	0.5 U	ug/L
WDMW-19	VC		0.5 U	0.5 U	0.5 U	2 U	0.5 U	ug/L
WDMW-20	VC		0.5 U	0.5 U	0.5 U	2 U	0.5 U	ug/L
WDMW-21	VC		0.5 U	0.5 U	0.5(0.5) U	2 U	5.1	ug/L
WDMW-22	VC		0.5 U	0.5 U	0.5 U	2 U	0.5 U	ug/L
WDMW-23	VC		0.5 U	0.5(0.5) U	0.5 U	2 U	0.5 U	ug/L
WDMW-24	VC		0.5 U	0.5 U	0.5 U	2 U	0.5 U	ug/L
WDMW-25	VC		0.5(0.5) U	0.5 U	0.5 U	2 U	0.5 U	ug/L

* MCLs established under 40 CFR 141
ug/L = micrograms per liter
U = Not detected at or above the reportable level shown.
J = The associated numerical value is an estimated quantity.

Other VOCs detected infrequently at low concentrations include xylene (total) at 3.7 ug/L and 1.5 ug/L in well WDMW-21 in November 2002 and November 2003, respectively; chloromethane at 0.51 ug/L in well WDMW-7 in May 2003; chloroethane at 2.9 ug/L in well WDMW-19 in November 2003; and chloroform at 19 ug/L and xylene (total) at 9 ug/L in well WDMW-9 in November 2004.

Railroad Avenue Groundwater Contamination Site
West Des Moines, Iowa

N

200 0 200 400 600 800 Feet

LEGEND

- MW-5 5.6/19/0.50 800.74 — Monitoring Well with Identification, Contaminant Concentration, and Groundwater Elevation (11/04/04) TCE/DCE/Vinyl Chloride (ug/L) (November 2004)
- OB-1 — Observation Well with Identification
- WDMW-13 — West Des Moines Water Supply Well with Identification
- SW-1 — Surface Water Location with Identification
- Groundwater Elevation Contour (ft msl) (11/04/04)
- 5 — TCE Isoconcentration Contour (ug/L)
- 70 — cis-1,2-DCE Isoconcentration Contour (ug/L)
- 2 — Vinyl Chloride Isoconcentration Contour (ug/L)

City Map Source: West Des Moines City Engineers Office, 1999.

BLACK & VEATCH Corporation

Figure 5-1
Contaminant Contour Map
and Groundwater Flow Direction
November 2004

Sep 07/09/04 c:/projects/desmoines/westdesmoines_070704.apr

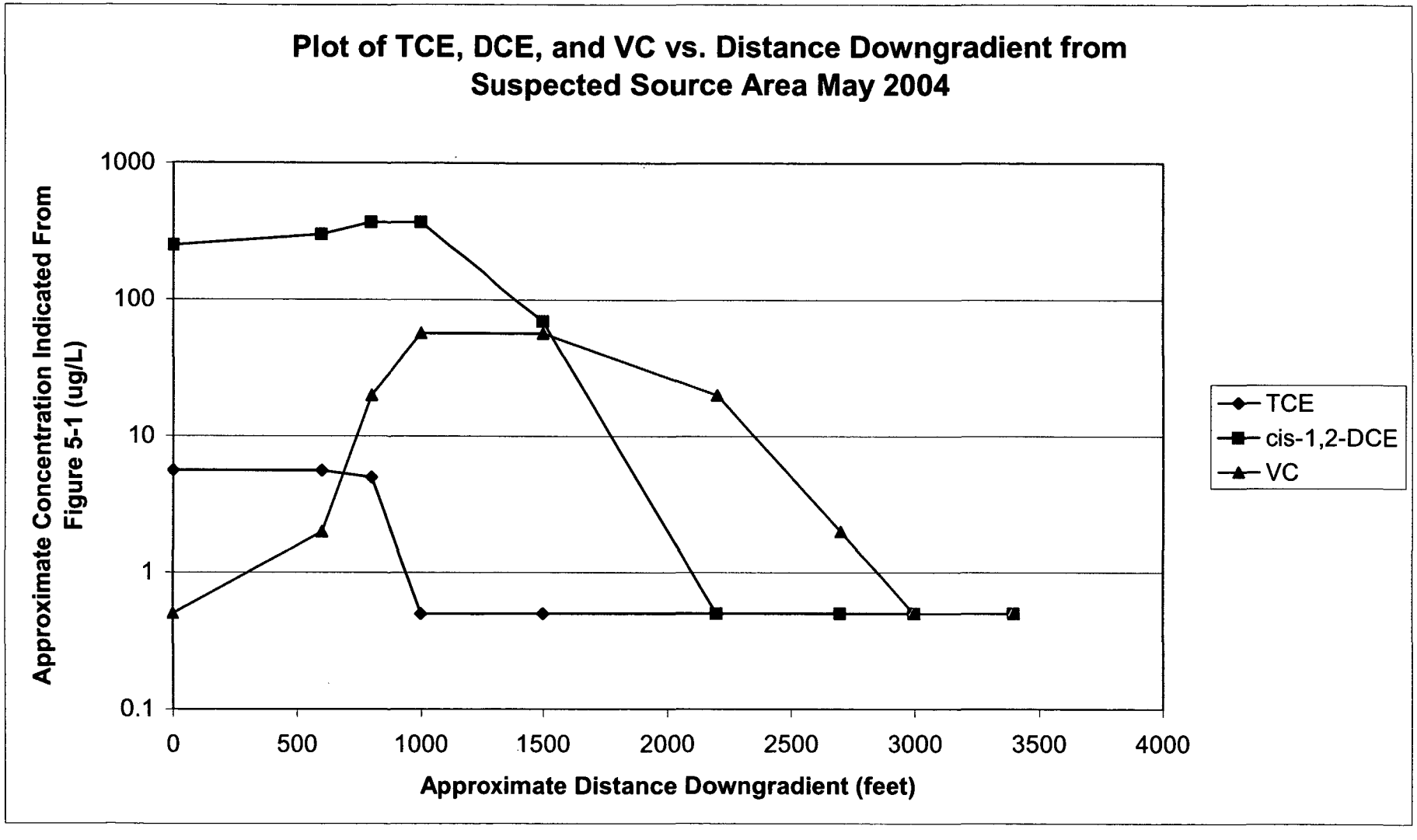

Figure 5-2
Plot of TCE, DCE, and VC vs.
Distance Downgradient from Source Area
May 2004

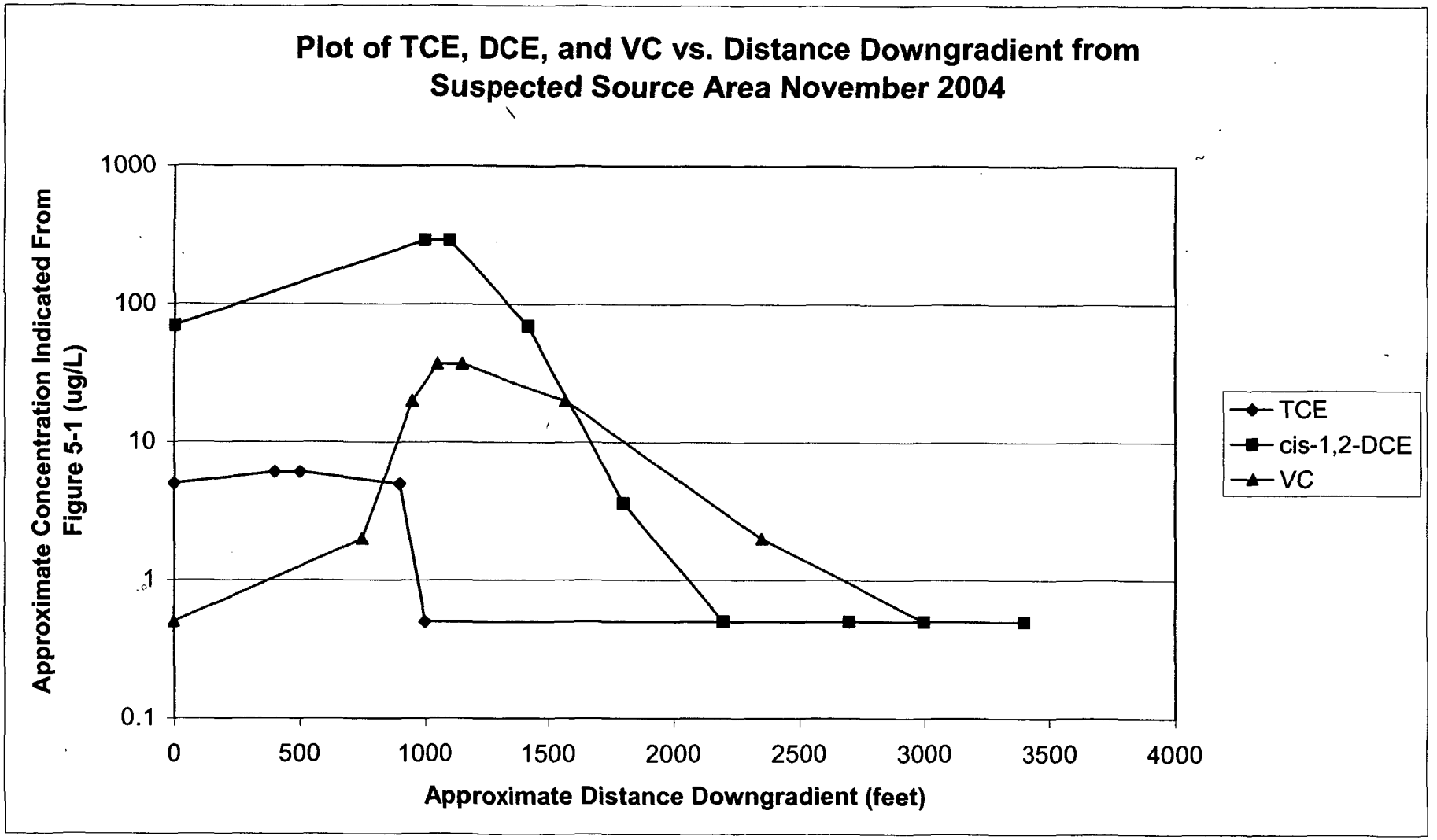

Figure 5-3
Plot of TCE, DCE, and VC vs.
Distance Downgradient from Source Area
November 2004

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Appendix A
Well Purging Forms

Black & Veatch Special Projects Corp.

File F.2.4
40124

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MONITORING WELL DEVELOPMENT/PURGING DATA

Well Number: MW-2

Project Name	Project Number	Date
RR Ave OU1 Phase B	40124	11-2-04

Field Investigator(s): G. Feltner

WELL DATA
Total Well Depth: 38.0'
Initial Water Level: 7.5'
Water Column Height: 30.5'
Well Diameter: 4"
(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"
Well Volume (gals): ~20 gal

3 Well Volumes: 60 gals
Amount of Water Removed from Well: _____ gals

METHOD OF WELL DEVELOPMENT
Y Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING
Method of Water Removal: Submersible pump
Was Well Pumped Dry? Yes (No)
Method of Sample Collection: Submersible pump

FINAL FIELD ANALYSIS
Temp ____ °C Spec. Cond ____ µS/cm pH ____ Turbidity ____ NTU DO ____ mg/L ORP ____ mV

Physical Appearance: _____

Remarks: Fe^{+2} = 3.2 mg/L

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
1157							7.52'		
1206	Start	pumping							
1215	14.2	1149	7.0	22	0.6	-77		~20 gal	
1223	14.3	1130	6.9	4.2	0.5	-74		~30 gal	~1.8 gpm
1227	14.3	1135	6.9	1.2	0.6	-74		~37 gal	
1230	14.3	1134	6.9	0.2	0.5	-74		~42 gal	
1231	Collect	sample	2475	Ø2					

Checked By _____ Date _____

Black & Veatch Special Projects Corp.

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MONITORING WELL DEVELOPMENT/PURGING DATA

Well Number: MW-4

Project Name	Project Number	Date
RR Ave OU1 Phase 8	46124	11-2-04

Field Investigator(s): G. Felkner

WELL DATA

Total Well Depth: 34.5'

Initial Water Level: 10.8

Water Column Height: ~~10.77~~ 23.7'

Well Diameter: 4"

(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Well Volume (gals): 15.5

3 Well Volumes: 46.5 gals

Amount of Water Removed from Well: ~40 gals

METHOD OF WELL DEVELOPMENT

X Pumping ____ Air Lift ____ Surging ____ Bailing ____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal: submersible pump

Was Well Pumped Dry? Yes (No)

Method of Sample Collection: submersible pump

FINAL FIELD ANALYSIS

Temp ____ °C Spec. Cond ____ µS/cm pH ____ Turbidity ____ NTU DO ____ mg/L ORP ____ mV

Physical Appearance

Remarks: Fe^{+2} = 2.4 mg/L

TIME	TEMP (°C)	SPECIFIC CONDUCTIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
1520	Initial	water	level				10.77		
1534	start	pumping							
1542	14.7	1042	6.8	20	0.5	24.5		~17 gal	~2 gpm
1546	14.7	1032	6.8	-0.4	0.5	2.1		~22 gal	
1549	14.7	1030	6.8	-1.1	0.5	-10		~29 gal	
1552	14.7	1030	6.8	-1.7	0.5	-13		~30 gal	
1553	Collect	sample	2475-3					~40 gal	
			2475-3-FD						

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Date

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MONITORING WELL DEVELOPMENT/PURGING DATA

Well Number: MW-5

Project Name: RR Ave OU1 Phase 8 | Project Number: 46124 | Date: 11-4-04

Field Investigator(s): G. Falkner / C. Ferguson

WELL DATA

Total Well Depth: 41.0' | Well Diameter: 4"

Initial Water Level: 13.58' | (x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Water Column Height: 27.42' | Well Volume (gals): 17.9

3 Well Volumes: ~53.7 gals | Amount of Water Removed from Well: ~45 gal gals

METHOD OF WELL DEVELOPMENT

X Pumping ____ Air Lift ____ Surging ____ Bailing ____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal: submersible pump | Was Well Pumped Dry? Yes (No)

Method of Sample Collection: submersible pump

Physical Appearance

Remarks: Fe^{+2} = 3.7 mg/L

TIME	TEMP (°C)	SPECIFIC CONDUCTIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
1057	~~Start Pumping~~						13.58		
1059	Start pumping								
1112	13.4	1205	6.9	6.7	0.3	5.7			
1115	13.4	1187	6.9	5.9	0.3	5.6		~28 gal	
1118	13.3	1180	6.9	6.0	0.3	5.3			
1121	13.4	1176	6.9	5.7	0.3	5.1		~30 gal	~1.4 gpm
1124	13.4	1169	6.9	5.5	0.3	5.0		~45 gal	
1125	Collect sample 2475-				10				

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MONITORING WELL DEVELOPMENT/PURGING DATA

Well Number: mw-6

Project Name: RR Ave OU1 Phase 8

Project Number: 46124

Date: 11-3-04

Field Investigator(s): G. Felkner

WELL DATA

Total Well Depth: 39.5'

Initial Water Level: 10.61

Water Column Height: 28.9'

Well Diameter: 4"

(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Well Volume (gals): 18.9

3 Well Volumes: 57 gals

Amount of Water Removed from Well: ~50 gals

METHOD OF WELL DEVELOPMENT

X Pumping ____ Air Lift ____ Surging ____ Bailing ____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal: Submersible pump

Was Well Pumped Dry? Yes (No)

Method of Sample Collection: Submersible pump

FINAL FIELD ANALYSIS

Temp ____ °C Spec. Cond ____ µS/cm pH ____ Turbidity ____ NTU DO ____ mg/L ORP ____ mV

Physical Appearance

Remarks: Fe^{+2} = 1.1 mg/L

TIME	TEMP (°C)	SPECIFIC CONDUCTIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
0912	Initial W.L.						10.61		
0926	Start pumping								
0933	15.5	1250	6.8	17.8	0.7	40		12 gal	1.7 gpm
0937	15.6	1257	6.8	6.6	0.7	17.5		20 gal	
0945	15.7	1279	6.8	-0.2	0.8	-2		~30 gal	
0948	15.7	1283	6.8	-0.2	0.8	-7		~35 gal	
0949	15.7	1284	6.8	-0.8	0.8	-9		~50 gal	
0950	Collect sample		2475 - 5						

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Date

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MONITORING WELL DEVELOPMENT/PURGING DATA

Well Number: MW-7

Project Name	Project Number	Date
RR Ave OU1 Phase 8	46124	11-4-04

Field Investigator(s): G. Felkner

WELL DATA
Total Well Depth: 42.5'
Initial Water Level: 13.30'
Water Column Height: 29.2
Well Diameter: 4"
(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"
Well Volume (gals): ~19

3 Well Volumes: ~57 gals
Amount of Water Removed from Well: ~55 gals

METHOD OF WELL DEVELOPMENT
X Pumping ____ Air Lift ____ Surging ____ Bailing ____ Other

METHOD OF SAMPLE COLLECTION/PURGING
Method of Water Removal: Submersible pump
Was Well Pumped Dry? Yes (No)
Method of Sample Collection: Submersible pump

Physical Appearance: ____

Remarks: Fe^{+2} = 0.8 mg/l

TIME	TEMP (°C)	SPECIFIC CONDUCTIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
0901	~~Start Pumping~~ Initial W.L.						13.30'		
0905	Start pumping								
0922	16.3	1175	6.8	12.4	0.4	117			
0925	16.3	1168	6.8	90	0.4	103		30 gal	
0930	16.3	1159	6.8	45	0.4	80			
0936	16.3	1157	6.8	4.1	0.4	76		~41 gal	
0939	16.3	1156	6.8	37	0.4	73		~55 gal	
0940	Collect sample		2475-9						

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MONITORING WELL DEVELOPMENT/PURGING DATA

Well Number: MW-8

Project Name: RR Ave OU1 Phase B | Project Number: 46124 | Date: 11-4-04

Field Investigator(s): G. Folkner / C. Ferguson

WELL DATA
Total Well Depth: 45.0' | Well Diameter: 4"
Initial Water Level: 12.64' | (x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"
Water Column Height: 32.36 | Well Volume (gals): 21.1

3 Well Volumes: ~63.3 gals | Amount of Water Removed from Well: _____ gals

METHOD OF WELL DEVELOPMENT
X Pumping | _____ Air Lift | _____ Surging | _____ Bailing | _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal: Submersible pump | Was Well Pumped Dry? Yes (No)

Method of Sample Collection: Submersible pump

Physical Appearance: _____

Remarks: Fe^{+2} = 3.8 mg/L

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
1458	~~Start Pumping~~ Initial W.L.						12.64'		
1501	Start pumping								
1510	13.4	1256	6.9	25	0.15	49			
1515	13.4	1264	6.9	25	0.13	27			
1522	13.4	1267	6.9	17	0.11	14			
1525	13.4	1269	6.9	11	0.11	10			
1528	13.4	1270	6.9	9	0.10	8.4			
1531	13.4	1271	6.9	7.8	0.10	7.6		~45 gal	~1.5 gpm
1534	13.4	1270	6.9	7.0	0.1	5.6			
1535	Collect sample 2475-11								

Checked By: _____ Date: _____

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MONITORING WELL DEVELOPMENT/PURGING DATA

Well Number: MW-9

Project Name: RR Ave OU1 | Project Number: 46124 | Date: 11-2-04

Field Investigator(s): G. Felkner

WELL DATA
Total Well Depth ~44.5' | Well Diameter 4"
Initial Water Level ~10' | (x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"
Water Column Height ~34' | Well Volume (gals) ~22 gals

3 Well Volumes ~67 gals | Amount of Water Removed from Well ~60 gals to dry gals

METHOD OF WELL DEVELOPMENT
X Pumping ____ Air Lift ____ Surging ____ Bailing ____ Other

METHOD OF SAMPLE COLLECTION/PURGING
Method of Water Removal submersible pump | Was Well Pumped Dry? Yes (No)
Method of Sample Collection submersible pump

FINAL FIELD ANALYSIS
Temp ____ °C Spec. Cond ____ µS/cm pH ____ Turbidity ____ NTU DO ____ mg/L ORP ____ mV

Physical Appearance ____

Remarks Fe^{+2} = 2.5 mg/L

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
0928	Start	pursing							
0947	14.0°	1078	6.9	6.3	0.4	-43		25 gal	~1.4 gpm
0959	14.0	1076	6.9	5.2	0.4	-50		40 gal	
1001	14.0	1077	6.9	1.2	0.5	-50		44 gal	
1004	14.0	1075	6.9	3.5	0.5	-51		~50 gal	
1005	Collect	sample	2475-01						

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MONITORING WELL DEVELOPMENT/PURGING DATA

Well Number: MW-11

Project Name	Project Number	Date
RR Ave OU1 Phase 8	46124	11-3-04

Field Investigator(s): G. Felkner

WELL DATA

Total Well Depth: 50.4

Initial Water Level: 12.71

Water Column Height: 37.69 ~~37.71~~

Well Diameter: 4"

(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Well Volume (gals): 24.6

3 Well Volumes: 73.8 gals

Amount of Water Removed from Well: ~50 gals

METHOD OF WELL DEVELOPMENT

X Pumping ____ Air Lift ____ Surging ____ Bailing ____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal: Submersible pump

Was Well Pumped Dry? Yes (No)

Method of Sample Collection: Submersible pump

Physical Appearance: ____

Remarks: Fe^{+2} = 4.4 mg/L

TIME	TEMP (°C)	SPECIFIC CONDUCTIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
1423	~~Start Pumping~~ Install Manifold						12.71		
1428	Start pump								
1439	12.4	1007	7.1	2.5	0.5	-87			
1441	12.4	1003	7.1	29	0.4	-90		~30 gal	~2 gpm
1447	12.4	1004	7.1	26	0.4	-96			
1450	12.4	990	7.1	8.0	0.4	-96		~38 gal	
1452	12.4	998	7.1	5.5	0.5	-97		~40 gal	
1454	12.4	997	7.1	4.2	0.5	-98		~50 gal	
1455	Collect sample 2475-8								

Checked By: ____ Date: ____

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MONITORING WELL DEVELOPMENT/PURGING DATA

Well Number: mw-12

Project Name: RR Ave OU1 Phase 8

Project Number: 46124

Date: 11-3-04

Field Investigator(s): G. Felkner

WELL DATA

Total Well Depth: 51.70'

Initial Water Level: 12.89

Water Column Height: 38.81

Well Diameter: 4"

(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Well Volume (gals): 25.4

3 Well Volumes: 76.2 gals

Amount of Water Removed from Well: ~40 gals

METHOD OF WELL DEVELOPMENT

X Pumping ____ Air Lift ____ Surging ____ Bailing ____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal: submersible pump

Was Well Pumped Dry? Yes (No)

Method of Sample Collection: submersible pump

FINAL FIELD ANALYSIS

Temp ____ °C Spec. Cond ____ µS/cm pH ____ Turbidity ____ NTU DO ____ mg/L ORP ____ mV

Physical Appearance

Remarks: Fe^{+2} = 3.4 mg/L

TIME	TEMP (°C)	SPECIFIC CONDUCTIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
1234	Install water						12.89		
1240	start pumping								
1245	13.4	1251	6.9	27.4	0.6	-39		~10 gals	2 gpm
1252	13.4	1249	6.9	14	0.6	-57		~21 gals	
1255	13.4	1248	6.9	2.7	0.6	-60			
1258	13.4	1250	6.9	0.6	0.6	-60			
1301	13.4	1250	6.9	-0.6	0.6	-63		~40	
1302	Collect sample 2475-7								

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Date

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MONITORING WELL DEVELOPMENT/PURGING DATA

Well Number: SW-1

Project Name	Project Number	Date
RR Ave Phase 8	46124	11-30-04

Field Investigator(s): G. Felknor / C. Ferguson

WELL DATA

Total Well Depth _____ Well Diameter _____

Initial Water Level _____ (x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Water Column Height _____ Well Volume (gals) _____

3 Well Volumes _____ gals Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal _____ Was Well Pumped Dry? Yes No

Method of Sample Collection _____

Physical Appearance: Surface water sample

Remarks: EPA Sample # 2475-36

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
	Start Pumping								
1530	11.0	424	8.4	21	10.7	-82			
1530	Collect	Sample	2475-36						

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Black & Veatch Special Projects Corp.

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MONITORING WELL DEVELOPMENT/PURGING DATA

Well Number: SW-2

Project Name	Project Number	Date
RR Ave Phase 8	46124	11-3-04

Field Investigator(s): G. Felknor / C. Ferguson

WELL DATA

Total Well Depth _____.
Initial Water Level _____.
Water Column Height _____.
Well Diameter _____
(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"
Well Volume (gals) _____

3 Well Volumes _____ gals
Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal _____.
Was Well Pumped Dry? Yes No

Method of Sample Collection _____.

Physical Appearance: Surface water sample

Remarks: EPA Sample # 2475-37

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
	Start Pumping								
1543	11.1	408	8.3	26	9.7	-44			
1543	Collect	sample	2475-37						

Checked By _____ Date _____

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Black & Veatch Special Projects Corp.

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MONITORING WELL DEVELOPMENT/PURGING DATA

Well Number: SW-3

Project Name: RL Area OU Phase B | Project Number: 46124 | Date: 11-4-04

Field Investigator(s): G. Fetkenhour / Chad Ferguson

WELL DATA

Total Well Depth _____.

Initial Water Level _____.

Water Column Height _____.

Well Diameter _____

(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Well Volume (gals) _____

3 Well Volumes _____ gals

Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal _____.

Was Well Pumped Dry? Yes No

Method of Sample Collection _____.

Physical Appearance _____

Remarks _____

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
	Start Pumping								
1345	Collect	sample	2475-39						
1345	13.1	558	8.2	30	8.0	125			

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MONITORING WELL DEVELOPMENT/PURGING DATA

Well Number: WDMW-1

Project Name: Railroad Avenue | Project Number: 46124 | Date: 11/3/04

Field Investigator(s): C. Ferguson

WELL DATA

Total Well Depth _____ Well Diameter _____

Initial Water Level _____ (x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Water Column Height _____ Well Volume (gals) _____

3 Well Volumes _____ gals Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal pump Was Well Pumped Dry? Yes (No)

Method of Sample Collection pump

Physical Appearance _____

Remarks EPA Sample # 2475-34

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
	Start Pumping (pump already running)								
1335	21.85	1,692	7.37	0.1	8.91	-57.0			
1336	25.04	1,689	7.37	-0.3	7.51	-62.0			
1338	25.20	1,683	7.40	13.3	7.00	-64.6			
1340	25.02	1,693	7.43	9.7	7.70	-65.3			

Checked By _____ Date _____

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MONITORING WELL
~~DEVELOPMENT/~~PURGING DATA

Well Number: WDMW-3

Project Name: Railroad Avenue | Project Number: 46124 | Date: 11/3/04

Field Investigator(s): C. Ferguson

WELL DATA

Total Well Depth _____. Well Diameter _____

Initial Water Level _____. (x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Water Column Height _____. Well Volume (gals) _____

3 Well Volumes _____ gals Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal pump. Was Well Pumped Dry? Yes (No)

Method of Sample Collection pump.

Physical Appearance clear, w/ slight sulfur odor

Remarks EPA Sample # 2475-34

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
	Start Pumping (pump already running)								
1551	24.71	1,761	7.53	8.6	9.07	-40.6			
1552	24.50	1,766	7.49	4.5	7.78	-62.0			
1554	24.51	1,767	7.48	4.7	7.71	-69.7			
1555	24.56	1,769	7.54	3.1	7.94	-76.5			

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MONITORING WELL DEVELOPMENT/PURGING DATA

Well Number: WDMW-4

Project Name	Project Number	Date
Railroad Avenue	46124	11/3/04

Field Investigator(s): C. Ferguson

WELL DATA

Total Well Depth _____

Initial Water Level _____

Water Column Height _____

Well Diameter _____

(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Well Volume (gals) _____

3 Well Volumes _____ gals

Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal pump

Was Well Pumped Dry? Yes (No)

Method of Sample Collection pump

Physical Appearance clear, slight sulfur odor

Remarks EPA Sample # 2475-31

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
	Start Pumping (pump already running)								
0915	24.22	1,729	7.24	3.5	7.20	143.7			
0916	24.73	1,741	7.36	8.6	~~8.64~~ 7.41 CMF	72.2			
0918	24.62	1,742	7.41	4.4	7.85	36.5			
0919	24.72	1,744	7.43	3.8	7.67	11.3			

Checked By _____ Date _____

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Black & Veatch Special Projects Corp.

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MONITORING WELL
~~DEVELOPMENT~~/PURGING DATA

Well Number: WDMW-6

Project Name	Project Number	Date
Railroad Avenue	46124	11/2/04

Field Investigator(s): C. Ferguson

WELL DATA

Total Well Depth _____.
Initial Water Level _____.
Water Column Height _____.

Well Diameter _____
(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"
Well Volume (gals) _____

3 Well Volumes _____ gals

Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal Pump.

Was Well Pumped Dry? Yes (No)

Method of Sample Collection pump.

Physical Appearance _____

Remarks EPA Sample # 2475-24

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
1308	Start Pumping (pump was initially not running)								
1313	13.99	2188	6.94	90.4	8.19	-38.2			
1318	14.22	2252	6.98	37.1	8.30	-30.9			
1323	14.21	2254	6.96	13.1	8.36	-26.8			
1328	14.14	2277	6.97	7.4	8.70	-25.4			
1330	14.12	2285	6.91	7.2	8.80	-22.9			

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Well Number WDMW-7

MONITORING WELL ~~DEVELOPMENT~~/PURGING DATA

Project Name: Railroad Avenue

Project Number: 46124

Date: 11/2/04

Field Investigator(s): C. Ferguson

WELL DATA

Total Well Depth _____.

Initial Water Level _____.

Water Column Height _____.

Well Diameter _____

(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Well Volume (gals) _____

3 Well Volumes _____ gals

Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal Grundfos pump.

Was Well Pumped Dry? Yes ~~No~~

Method of Sample Collection Grundfos pump.

Physical Appearance _____

Remarks EPA Sample # 2475-22

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO mg/L	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
	Start Pumping (City personnel started pump 11/1/04 afternoon)								
1047	13.11	1624	6.92	-0.2	6.60	-9.6			
1048	13.09	1638	6.96	0.9	6.51	-33.6			
1050	13.11	1636	6.93	0.6	6.23	-43.6			

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MONITORING WELL DEVELOPMENT/PURGING DATA

Well Number: WDMW-8

Project Name: Railroad Avenue

Project Number: 46124

Date: 11/3/04

Field Investigator(s): C. Ferguson

WELL DATA

Total Well Depth _____

Initial Water Level _____

Water Column Height _____

Well Diameter _____

(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Well Volume (gals) _____

3 Well Volumes _____ gals

Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal Pump

Was Well Pumped Dry? Yes (NO)

Method of Sample Collection pump

Physical Appearance _____

Remarks EPA Sample # 2475-32

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
0930	Start Pumping (pump was not running)								
0935	23.03	1,742	7.37	19.0	7.07	-72.2			
0940	23.25	1,734	7.38	12.6	7.14	-74.3			
0945	23.09	1,735	7.36	6.2	7.80	-79.0			
0948	23.12	1,740	7.37	6.5	7.64	-80.1			

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MONITORING WELL
~~DEVELOPMENT/~~PURGING DATA

Well Number: WDMW-9

Project Name	Project Number	Date
Railroad Avenue	46124	11/3/04

Field Investigator(s): C. Ferguson

WELL DATA

Total Well Depth _____.
Initial Water Level _____.
Water Column Height _____.

Well Diameter _____
(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"
Well Volume (gals) _____

3 Well Volumes _____ gals

Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal pump.

Was Well Pumped Dry? Yes (No)

Method of Sample Collection pump.

Physical Appearance _____

Remarks EPA Sample # 2475-33

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
0958	Start Pumping (pump was initially not running)								
1000	14.49	1,210	6.49	53.3	10.27	-18.7			
1005	14.18	1,210	6.28	37.7	8.87	-12.7			
1010	14.07	1,236	6.25	4.2	11.34	-12.5			
1015	13.97	1,261	6.26	8.7	11.59	-25.2			
1020	13.88	1,240	6.29	5.0	12.87	-22.0			

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MONITORING WELL ~~DEVELOPMENT~~/PURGING DATA

Well Number: WDMW-12

Project Name	Project Number	Date
Railroad Avenue	46124	11/2/04

Field Investigator(s): C. Ferguson

WELL DATA

Total Well Depth _____.
Initial Water Level _____.
Water Column Height _____.

Well Diameter _____
(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"
Well Volume (gals) _____

3 Well Volumes _____ gals

Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal Pump.

Was Well Pumped Dry? Yes (No)

Method of Sample Collection Pump.

Physical Appearance: cloudy w/ slight sulfur odor initially

Remarks: EPA sample # 2475-23

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO mg/L	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
1120	Start Pumping								
1130	13.17	1309	6.93	2.6	5.20	-47.6			
1135	13.26	1295	6.91	1.6	5.71	-55.1			
1140	13.29	1299	6.92	1.2	4.97	-58.0			

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MONITORING WELL
~~DEVELOPMENT~~/PURGING DATA

Well Number: WDMW-13

Project Name	Project Number	Date
Railroad Avenue	46124	11/2/09

Field Investigator(s): C. Ferguson

WELL DATA

Total Well Depth _____

Initial Water Level _____

Water Column Height _____

Well Diameter _____

(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Well Volume (gals) _____

3 Well Volumes _____ gals

Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

X Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal pump

Was Well Pumped Dry? Yes (No)

Method of Sample Collection pump

Physical Appearance _____

Remarks EPA Sample # 2475-17

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO mg/L	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
0830	Start Pumping (pump was not on initially)								
0845	13.66	1.175	656	0.7	6.84	-32.2			
0846	13.03	1.192	6.64	0.6	6.88	-52.9			
0848	12.96	1.189	6.68	0.9	6.64	-19.6			

Checked By _____ Date _____

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MONITORING WELL
~~DEVELOPMENT~~/PURGING DATA

Well Number: WDMW-14

Project Name: Railroad Avenue

Project Number: 46124

Date: 11/2/04

Field Investigator(s): C. Ferguson

WELL DATA

Total Well Depth _____.

Initial Water Level _____.

Water Column Height _____.

Well Diameter _____

(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Well Volume (gals) _____

3 Well Volumes _____ gals

Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal Pump.

Was Well Pumped Dry? Yes (No)

Method of Sample Collection Pump.

Physical Appearance _____

Remarks EPA Sample # 2475-~~24~~ CMF ~~25~~ CMF 26

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO mg/L	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
14:04	Start Pumping (Pump was not running)								
1410	12.90	861	7.45	1.7	7.32	-28.8			
1415	12.93	853	7.42	0.8	6.68	-20.5			
1420	12.91	856	7.39	0.3	6.80	-36.7			

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MONITORING WELL
~~DEVELOPMENT~~/PURGING DATA

Well Number: WD MW-15

Project Name	Project Number	Date
Railroad Avenue	46124	11/1/04

Field Investigator(s): C. Ferguson

WELL DATA

Total Well Depth _____ Well Diameter _____

Initial Water Level _____ (x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Water Column Height _____ Well Volume (gals) _____

3 Well Volumes _____ gals Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal pump Was Well Pumped Dry? Yes (No)

Method of Sample Collection pump

Physical Appearance _____

Remarks _____

EPA Sample # 2475-19

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO mg/L	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
14:45	Start Pumping							~~0 gal~~	CMF
14:48	15.38	736	7.14	-6.3	4.30	223.5			
14:53	15.23	798	7.21	-6.0	4.22	232.5			
14:56	15.09	797	7.23	-5.8	3.78	216.4		~~~~ gal	CMF

Checked By _____ Date _____

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MONITORING WELL
~~DEVELOPMENT~~/PURGING DATA

Well Number: WDMW-17

Project Name	Project Number	Date
Railroad Avenue	46124	11/1/04

Field Investigator(s): C. Ferguson

WELL DATA

Total Well Depth _____ Well Diameter _____

Initial Water Level _____ (x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Water Column Height _____ Well Volume (gals) _____

3 Well Volumes _____ gals Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal pump Was Well Pumped Dry? Yes (No)

Method of Sample Collection pump

Physical Appearance _____

Remarks _____

EPA Sample # 2475-20

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO mg/L	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
~~1522~~ 1543	Start Pumping							0 gal CMF	
1547	14.59	625	7.26	-4.4	4.65	75.4			
1549	14.60	619	7.05	-4.8	3.87	14.2			
1551	14.57	627	7.02	-3.9	3.66	5.9		~~30~~	CMF

CMF 1/6/04

Checked By _____ Date _____

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MONITORING WELL DEVELOPMENT/PURGING DATA

Well Number: WDMW-18

Project Name: RR Ave OU2 ~~OU3~~ | Project Number: 46124 | Date: 11-1-04

Field Investigator(s): G. Feltne

WELL DATA

Total Well Depth _____ Well Diameter _____

Initial Water Level _____ (x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Water Column Height _____ Well Volume (gals) _____

3 Well Volumes _____ gals Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

X Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal Pump on Was Well Pumped Dry? Yes (No)

Method of Sample Collection Pump

FINAL FIELD ANALYSIS

Temp ____ °C Spec. Cond ____ µS/cm pH ____ Turbidity ____ NTU DO ____ mg/L ORP ____ mV

Physical Appearance _____

Remarks Well on

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
1559	14.0	592	7.2	-2.5	7.5	32			
1601	13.9	593	7.2	4.9	8.8	19.7			
1604	13.8	592	7.3	-1.9	8.4	11.5			
1610	Collect sample 2475-16								

Checked By _____ Date _____

Black & Veatch Special Projects Corp.

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MONITORING WELL
~~DEVELOPMENT~~/PURGING DATA

Well Number: WDMW-19

Project Name	Project Number	Date
Railroad Avenue	46124	11/2/04

Field Investigator(s): C. Ferguson

WELL DATA

Total Well Depth _____ Well Diameter _____

Initial Water Level _____ (x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Water Column Height _____ Well Volume (gals) _____

3 Well Volumes _____ gals Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal Pump Was Well Pumped Dry? Yes (No)

Method of Sample Collection Pump

Physical Appearance _____

Remarks EPA sample # 2475-21

TIME	TEMP (°C)	SPECIFIC CONDUCTIVITY	pH	TURBIDITY	DO mg/L	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
1000	Start Pumping (pump already running)								
1001	13.98	984	7.13	0.3	5.91	21.3 ~~33.4~~ CMF			
1002	14.07	990	7.08	-0.2	5.23	19.7 ~~30.7~~ CMF			
1003	14.10	994	7.10	0.9	5.82	14.9			

Checked By _____ Date _____

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MONITORING WELL DEVELOPMENT/PURGING DATA

Well Number: WDMW-20

Project Name: RR Ave OU1

Project Number: 46124.103

Date: 11-1-04

Field Investigator(s): G. Felkner

WELL DATA

Total Well Depth _____

Initial Water Level _____

Water Column Height _____

Well Diameter _____

(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Well Volume (gals) _____

3 Well Volumes _____ gals

Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

X Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal pumping

Was Well Pumped Dry? Yes No

Method of Sample Collection pump

FINAL FIELD ANALYSIS

Temp _____ °C Spec. Cond _____ µS/cm pH _____ Turbidity _____ NTU DO _____ mg/L ORP _____ mV

Physical Appearance clear

Remarks * sample clear

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
1510	15.8	422	6.8	48*	9.2	11			
1520	15.8	424	7.4	3.3	7.6	4.2			
1522	15.8	417	7.4	-1.4	8.0	-1.7			
1526	15.6	422	7.4	-4.5	7.7	-7.3			
1530	Collect	sample	24	75 -- 15					

Checked By

Date

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MONITORING WELL
~~DEVELOPMENT~~/PURGING DATA

Well Number: WDMW-21

Project Name	Project Number	Date
Railroad Avenue	46124	11/2/04

Field Investigator(s): C. Ferguson

WELL DATA

Total Well Depth _____ Well Diameter _____

Initial Water Level _____ (x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Water Column Height _____ Well Volume (gals) _____

3 Well Volumes _____ gals Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal pump Was Well Pumped Dry? Yes (No)

Method of Sample Collection pump

Physical Appearance _____

Remarks EPA Sample # 2475-18

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
0925	Start Pumping (pump was not running initially)								
0930	14.68	504	7.35	2.9	5.72	-73.7			
0935	14.56	475	7.44	0.3	5.31	-50.1			
0940	14.46	474	7.43	0.6	6.40	-50.3			

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MONITORING WELL
~~DEVELOPMENT~~/PURGING DATA

Well Number: WDMW-22

Project Name	Project Number	Date
Railroad Avenue	46124	11/2/04

Field Investigator(s): C. Ferguson

WELL DATA

Total Well Depth _____

Initial Water Level _____

Water Column Height _____

Well Diameter _____

(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Well Volume (gals) _____

3 Well Volumes _____ gals

Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal pump

Was Well Pumped Dry? Yes (NO)

Method of Sample Collection pump

Physical Appearance _____

Remarks EPA sample # 2475-287 CMF

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO mg/L	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
	Start Pumping (pump already running)								
1435	14.26	996	7.26	1.3	7.11	28.6			
1437	14.36	1,006	7.25	1.1	6.93	30.4			
1438	14.42	1,003	7.25	0.2	6.90	30.2			

Checked By _____ Date _____

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MONITORING WELL
~~DEVELOPMENT~~/PURGING DATA

Well Number: WDMW-23

Project Name	Project Number	Date
Railroad Avenue	46124	11/2/04

Field Investigator(s): C. Ferguson

WELL DATA

Total Well Depth _____.
Initial Water Level _____.
Water Column Height _____.

Well Diameter _____
(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"
Well Volume (gals) _____

3 Well Volumes _____ gals

Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal pump.

Was Well Pumped Dry? Yes (No)

Method of Sample Collection pump.

Physical Appearance _____

Remarks EPA Sample # 2475-30

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO mg/L	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
	Start Pumping (pump already running)								
1609	14.27	1,528	7.00	0.2	8.83	24.6			
1611	14.36	1,547	6.99	1.4	9.01	18.1			
1613	14.37	1,550	7.02	1.6	8.88	16.5			

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MONITORING WELL
~~DEVELOPMENT~~/PURGING DATA

Well Number: WDMW-24

Project Name	Project Number	Date
Railroad Avenue	46124	11/2/04

Field Investigator(s): C. Ferguson

WELL DATA

Total Well Depth _____

Initial Water Level _____

Water Column Height _____

Well Diameter _____

(x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Well Volume (gals) _____

3 Well Volumes _____ gals

Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal pump

Was Well Pumped Dry? Yes No

Method of Sample Collection pump

Physical Appearance _____

Remarks EPA Sample # 2475-29

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO mg/L	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
	Start Pumping (pump was already running)								
1544	14.40	1,961	7.26	1.2	7.13	-1.9			
1545	14.30	1,077	7.24	1.7	7.90	3.4			
1547	14.33	1,078	7.23	1.0	7.86	7.2			

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MONITORING WELL
~~DEVELOPMENT~~/PURGING DATA

Well Number: WDMW-25

Project Name	Project Number	Date
Railroad Avenue	46124	11/2/04

Field Investigator(s): C. Ferguson

WELL DATA

Total Well Depth _____. Well Diameter _____

Initial Water Level _____. (x) (height) x=.163 gal/ft @ 2", x=.653 gal/ft @ 4"

Water Column Height _____. Well Volume (gals) _____

3 Well Volumes _____ gals Amount of Water Removed from Well _____ gals

METHOD OF WELL DEVELOPMENT

_____ Pumping _____ Air Lift _____ Surging _____ Bailing _____ Other

METHOD OF SAMPLE COLLECTION/PURGING

Method of Water Removal pump. Was Well Pumped Dry? Yes (No)

Method of Sample Collection pump.

Physical Appearance _____

Remarks EPA Sample # 2475-28

TIME	TEMP (°C)	SPECIFIC CONDUC-TIVITY	pH	TURBIDITY	DO mg/L	ORP	WATER LEVEL	TOTAL WATER REMOVED	FLOW RATE
	Start Pumping (pump already running)								
1517	15.74	809	7.38	2.3	8.20	23.6			
1518	15.94	810	7.42	1.3	8.22	4.7			
1520	15.97	811	7.43	7.3	8.26	3.5			

Checked By _____ Date _____

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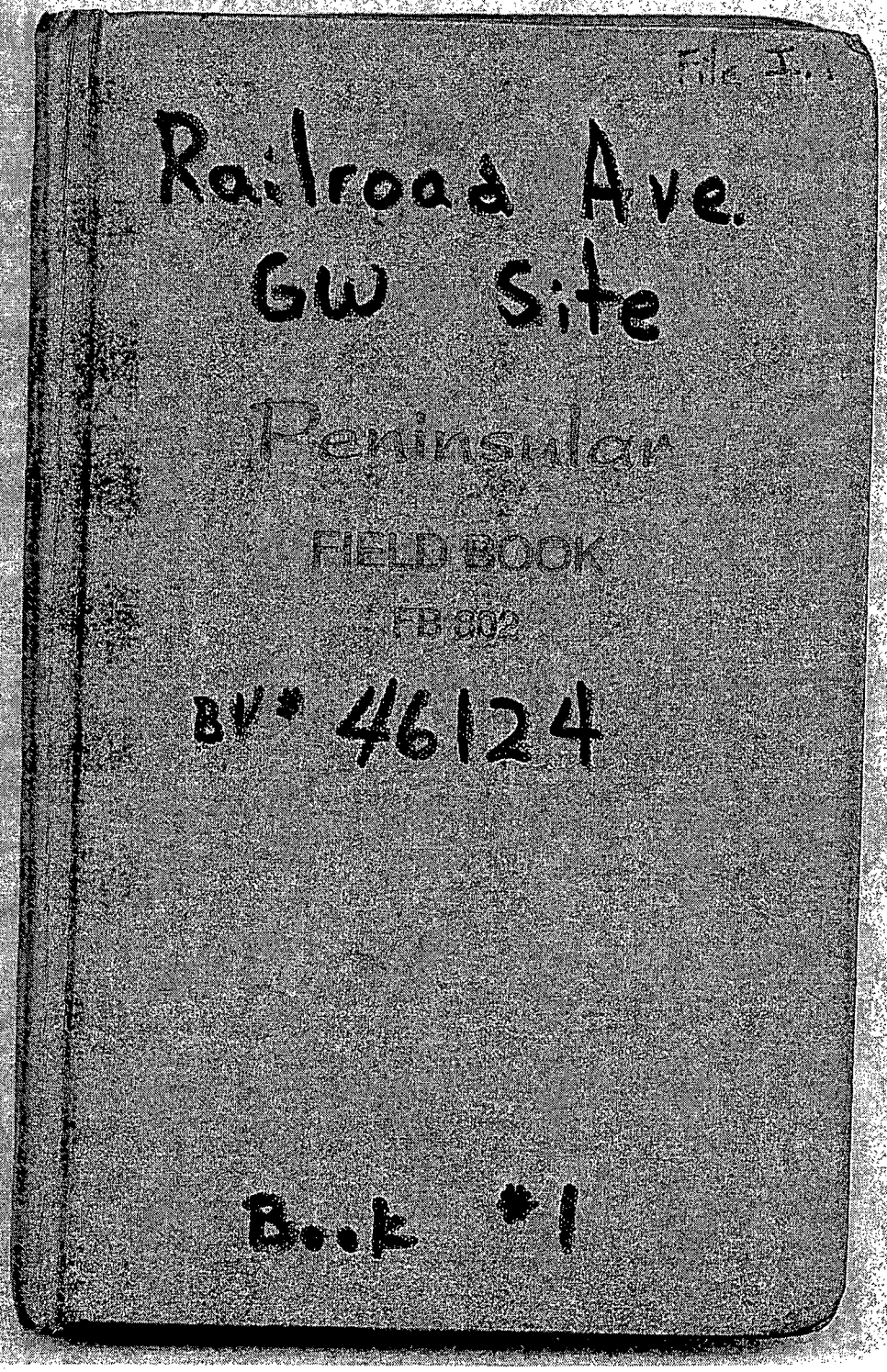
Appendix B
Field Logbooks


File I.
Railroad Ave.
GW Site
Peninsular
FIELD BOOK
FB 302
BV* 46124
Book #1

5-6-04 Amy Fell

1359 Go by excavation @ 8th + RR Ave. Excavated approximately 7 feet. No discoloration noticed. Call Bob Stewart w/ update. Head to Fed Ex. Leah heads home to K.C.

1429 Drop off YSI + water level meter @ Fed Ex Head to KC.

5-6-04 Amy Fell

11-1-04 Amy Fell

0645 Arrive Bvoc to load up and head out west w/ Chad Ferguson BVOC.

1115 Arrive WDM work trucks. Get key to restroom pool gate. Check in w/ Ed stampl.

1145 Arrive WDM work trucks. Get side key from John Luthra. Prepare to sample WDM wells today. Raining hard and has been raining last 4 days. Standing water everywhere.

1342 Calibrate YSI

Parameter	Std.	Reading
pH	7.0	7.0
SC	1413	1446
ORP	200-275	241

1410 Get Chad standing on well WDMW 15

1433 Arrive WDMW-14.

1450 Pump not running. Josh (WDMW-20) says will have to switch well back to City before starting.

1508 Arrive WDMW-20. Pump is on.

1530 Collect sample 2475-15 W-WDMW-20-110104

11-1-04 Amy Fell

1550 Arrive well WDMW-18.
1610 Collect sample
W-WDMW-18-110104
2475-16
1620 Collect sample
2475-55-FB
W-TB-110104-VOA
1625 Collect sample
2475-51-FB
W TB-110104-m/B/E
1630 Begin sample mngmt.
Prepare for tomorrow.
1731 Lv. site.

[signature] 11-1-04

0700 Arrive WDMWW. Prepare for day. Chad Ferguson (DV) onsite also.
0730 Bob Droustup arrives site. Prepare onsite lab.
0809 Check calibration YSI.

~~Sta~~ Parameter	Std	Reading
pH	7.0	6.9
SC	1413	1389 µS/cm
ORP	200-275	257 mV

0845 Arrive MW-1. Well has been run over and the well head has been removed.
0900 Pull onto MW-9.
0928 Start purging @ MW-9
0932 Update Bob Stewart on progress. Notify Bob about well MW-1 being gone.
1007 Collect sample
MW-9
W-MW-9-110204
2475-01
1057 Begin to dump purge water.
1100 Pull onto MW-2. Lock has been cut.
1206 Begin purging MW-2
1207 Lock piece in well w/ some water. The

126

11-2-04 Amy Fellows

diffusion bag cord is still in tact.

1231 Collect sample MW-2
W-MW-2-110204
2475-02

1313 Begin to dump purge water

1410 Go by MW-3. The well cover and concrete pad are missing only an open well casing remains.

1420 Find MW-4.

1422 Bob Dinsmore called w/ results from onsite lab. Social results match previous results.

1458 Cannot find MW-10 either. Use metal detector but looks dug up or buried deep.

1459 Update Bob Stewart that wells MW-3, MW-1, and MW-10 are gone or destroyed. Maybe able to salvage MW-3.

1518 Pull onto MW-4

1534 Start purging

1553 Collect samples @ MW-4
W-MW-4-110204
2475-3 and 2475-3-FD

11-2-04 Amy Fellows

127

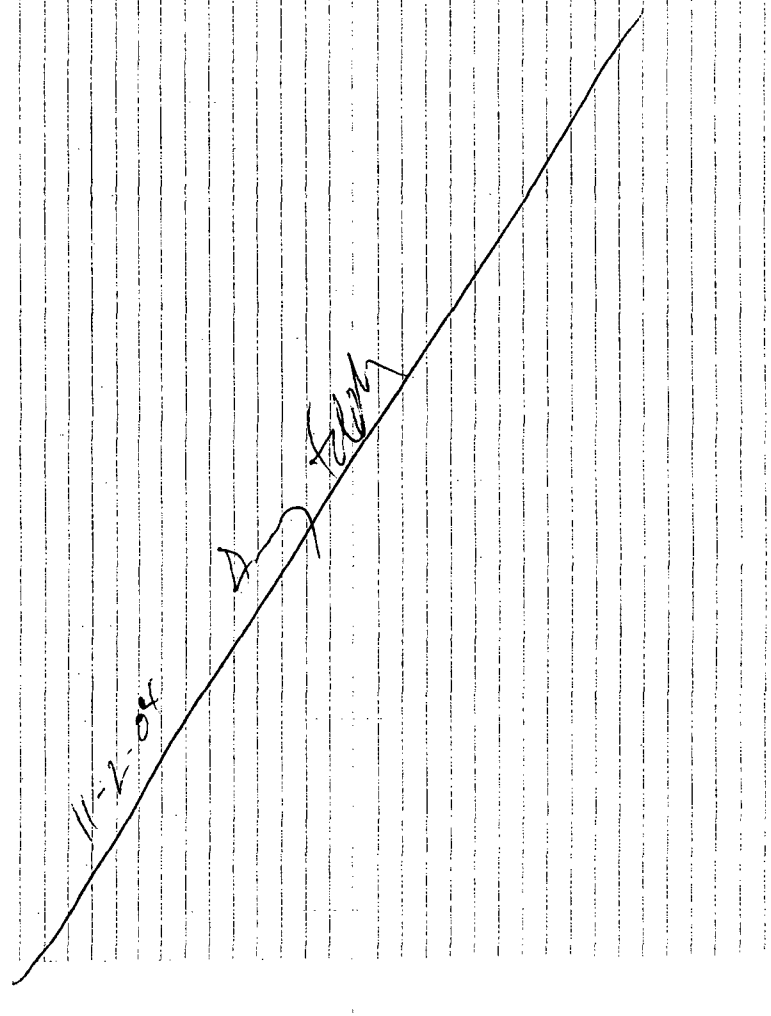
11-2-04 Amy Fellows

1640 Get ice

1700 Dump purge water.

1715 Start sample mgmt. and packing.

1930 Relinquish samples to Fed Ex



0725 Arrive WDMWW. Prepare for day. (initialed)

0745 ~~Arrive~~ Bob Dewstrae arrives site.

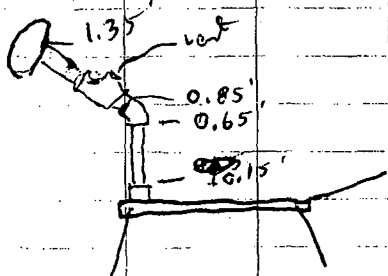
0810 Calibrate YSI

parameter	std	Reading
pH	7.0	6.9
Sc	1413	~~1413~~ 1430 µs/cm
ORP	200-275	267 mV

0832 At WDMW-13, W.L. = 9.80 ft below top of casing (well cap/plate where hole is drilled.)

0845 Install PT2X with level recorder @ well WDMW-13.

0847 Make measurements @ well head wdm-13



0910 Pull onto MW-6.

0938 Collect trip blank
W-TB-110304
2475-54-FB

0950 Collect sample
MW-6
W-MW-6-110304
2475-5 (ms/msd 2x volume)

1050 Begin to dump purge water

1120 Pick-up supplies for next wells

1230 Pull onto well MW-12.

1234 Collect water level 12.89'

1302 Collect sample
MW-12
W-MW-12-110304
2475-7

1338 Begin to dump purge water

1418 Pull onto MW-11

1455 Collect sample
MW-4
W-MW-11-110304
2475-8

1530 Collect sample
SW-1
W-SW-1-110304
2475-36

1543 Collect sample
SW-2 W-SW-2-110304
2475-37

 11-3-04 [signature]

1555 Dump purge water @ manhole (at back-up manhole).

1619 Arrive back @ start. Begin sample mgmt.

1820 Relinquish samples to FedEx.

11-3-04 [signature]

11-4-04 [signature]

0725 Arrive WDMWW w/ Chad Ferguson (BC). Prepare for day.

0820 Collect rinsate sample
2475-38
W-WDM-110404-RB

0850 Tony Clemenson w/ Howard R. Green Co. calls about destroyed wells MW-1, MW-3, and MW-10. I request H.R. Green replace wells with our Technical specifications. Tony agreed, he requested specs, location data, and preferred drilling co. I said I would pass info onto EPA PM, Bob Stewart.

0900 Pull and MW-7.

0905 Start purging MW-7.

0910 Collect trip blank
W-TB-110404
2475-53-FB

0940 Collect sample
MW-7
W-MW-7-110404
2475-9

1008 Install transducer in MW-7. W.L. @ 13.30' BTOC

11-4-04 [signature]

11-4-04 Amy Sellen

1022 Tony Clemenson called said they found well MW-1 intact except the concrete seal and protective cover are gone. We inspect well. W.L. @ 8.73' Brk. PVC in tact and locking cap ok. Check bottom w/ W.L. probe. The well was not secure when we arrived. There is a lot of mud (soft bottom) in well. Recommend reinstall concrete seal and protective cover and re-develop before sampling.

1030 Begin to dump purge water @ WDM PW manhole.

1055 Pull up to MW-5

1059 Start pumping MW-5

1125 Collect sample
MW-5
W-MW-5-110404
2475-10

1150 Begin to dump purge water.

1320 Replace lock @ MW-3 and t-in PVC casing.

1332 Arrive SW-3 area prepare to

11-4-04 Amy Sellen

11-4-04 Amy Sellen

samples.

1345 Collect sample
SW-3
W-SW-3-110404
2475-39

1350 Collect water levels

1430 Trying to find MW-8. Well has been buried from grading road.

1455 Find well MW-8

1501 Start pumping MW-8.

1535 Collect sample
MW-8
W-MW-8-110404
2475-11

1600 Finish collecting water levels and prepare to return to KC, MO.

1815 Drop off YSI @ Fed Ex, head to KC MO.

11-4-04 Amy Sellen

134 12-3-04 [signature]

0610 Lv. KC MO. for AR Ave site
0922 Arrive WDM WW.
0936 Jeff w/ WDM WW lets me in WDM WW 13.
W.L. = 10.80' below top of drilled hole @ top of plate.
Pull transducer.
0958 Arrive @ MW-7.
W.L. = 13.51' BTOC
Pull transducer
1013 Go by MW-10. Well head intact and looks OK.
1015 Go by MW-3. Well cap still locked. Needs concrete pad and flush mount well cover.
1019 Go by MW-1. Well head gone like MW-3. Lock and cap still in place.
1050 Dropped off sample supplies @ WDM WW and return to KC MO.
1445 Arrive BUSPK - OP, KS.

12-3-04 [signature]

File I.1

Railroad Ave
GW Site

Peninsular

FIELD BOOK

FB 803

BV #46124

Book #2

11/1/04- Monday - WDM - C. Ferguson

1300 CF & G. Felkner arrive at City WW plant and gather sampling supplies.

1325 Checked calibration of YSI vs. standard solutions -- all parameters within ±10%. Loading car and van w/ sampling eqpt.

Setting up (CF) at MW-15.

1505 Collected sample from MW-15 W-WDMW15-110104, EPA # 2475-19.

Temp	Spec Cond.	pH	Turb	DO	ORP
15.09	797	7.23	-5.8	3.78	216.4

1515 CF setting up at WDMW-17.

1520 Door to pump house blew shut -- waiting for Jeff w/ the City to come unlock it.

1543 Begin purging WDMW-17

1555 Collected W-WDMW-17-110104, EPA # 2475-20.

11/1/04 [signature]

11/1/04- Monday - WDM - C. Ferguson

1610 CF at WDMW-18 w/ G. Felkner who is in the process of sampling that well. It has been raining all day so far, but it has increased in intensity in the last half hour. Waiting for GF.

1635 Back at City WW shop for sample mgmt, preparing additional VOA vials for tomorrow etc.

1730 Finished today's sample mgmt. End of day.

★ Late entries

0630 11/1/04 CF arrives at BEV W Building to pick up rental car on the way to Q building to meet w/ GF.

0730 Depart Q building for West Des Moines.

11/1/04 [signature]

4/2/04 - Tuesday - WDM - C. Ferguson

0705 C. Ferguson / G. Fellener arrive on site -- 46° & overcast, 52° later today. CF will continue sampling municipal wells today and GF will sample monitoring wells.

0710 Calibrating YSI 650 w/ standard solutions:

~~ORP~~ CMF

Parameter	Range	Reading
ORP	200-275	243.1
pH	7.0	6.97
Turb	100	112.5
Cond	1413	1410
Turb	0.0	-0.1

0750 ~~Bob~~ Bob (?) w/ IDNR on site at WW shop setting up his gas chromatograph. CF and GF preserving sample bottles.

0800 At WDMW-13 w/ City personnel.

0830 Opened building - could not fit data logger down the port. Turned the pump on to

— 4/2/04 — CF

11/2/04 - Tuesday - WDM - C. Ferguson

allow the well to purge.

0855 Collected W-WDMW-13-110204 -- EPA# 2475-17.

0920 Begin pumping WDMW-21.

0940 Collected W-WDMW-21-110204, EPA # 2475-18.

0950 CF setting up at WDMW-19.

1005 Pump already running. Collected sample W-WDMW-19-110204, EPA sample # 2475-21.

1030 Setting up at WDMW-7. City placed a Grundfos pump in the well last night, so it has been pumping for several hours.

1055 Collected sample W-WDMW-7-110204, EPA # 2475-22.

1100 Finished sampling @ WDMW-7, now heading back to WW shop to drop off split samples for DNR.

1115 Setting up at WDMW-12. The pump is not running.

1145 Collected W-WDMW-12-110204, EPA sample # 2475-23.

1150 Heading back to WW shop to drop off last sample for IDNR.

— 11/2/04 — CF

11/2/04 – Tuesday – WDM – C. Ferguson

1215 Met up w/ G. Fellener who is sampling monitoring wells w/ a whale pump. Discussed sampling schedule for remainder of the day. CF breaks for lunch prior to sampling WDMW-14.

1305 Met w/ Jeff G. (City of WDM) and WDMW-6 is running, so I will sample it now.

1308 Began pumping WDMW-6 (it was not running when I arrived.).

1320 Collected W-WDMW-6-110204, EPA sample # ~~2474~~ cmf 2475-24.

1331 Collected field duplicate too from well WDMW-6, W-WDMW-6-110204, EPA sample # 2475-25-FD.

1405 Took WDMW-6 back to the WW shop for IDNR. Now setting up at WDMW-14 (the pump was not running).

1420 Collected W-WDMW14-110204, EPA sample # 2475-26.

11/2/04 – Tuesday – WDM – C. Ferguson

1425 Finished at WDMW-14. CF now setting up at WDMW-22 (the pump is already running).

1440 Collected W-WDMW-22-110204, EPA sample # 2475-27.

1450 Setting up at WDMW-25.

~~Collected W-WDMW-25-110204, EPA sample # 2475-28.~~ cmf 11/2/04

1510 Got locked out of building #25 but Mitch just opened it for me again. Setting up at WDMW-25.

1520 Collected W-WDMW-25-110204, EPA sample # 2475-28

~~1600~~ cmf 11/2/04

1550 Collected W-WDMW24-110204, EPA sample # 2475-29.

1605 Setting up at WDMW-23.

1615 Collected W-WDMW-23-110204, EPA sample # 2475-30.

1630 Done sampling @ WDMW-23, now heading back to WW Shop.

1700 Could not locate any city personnel to open more well houses for me. Conducting sample mgmt.

– 11/2/04 – CF

(90)

11/3/04 – Wednesday – WDM – C. Ferguson

* late entry for Tuesday 11/2/04 –
depart WW shop at 19:10 to go to Fed Ex to drop off coolers, then end of day.

0715 CF/GF arrive on site, 34° now, 48° later today. CF will finish sampling the five remaining City wells today and GF will continue sampling monitoring wells.

0725 Calibrating YSI meter w/ standard solutions:

Parameter	Range	Reading
pH	7.0	6.99
~~Temp~~ Cond	1413	1452
Turb	0.0	-0.4
ORP	200 -275	243.1

0740 Preparing sample bottles.
0825 Heading over to WDMW-13 w/ Steve to place the water level transducer in the well.

– 11/3/04 – CLF

(91)

11/3/04 – Wednesday – WDM – C. Ferguson

0910 Finished w/ transducer at WDMW-13, CF now setting up to sample WDMW-4.
0920 Collected W-WDMW-4110304, EPA sample # 2475-31.
0930 Finished at #4, now setting up at WDMW-8 (pump was not running).
0950 Collected W-WDMW-8-110304, EPA sample # 2475-32.
1000 Setting up at WDMW-9 – (well was not running).
1025 Collected W-WDMW-9-110304, EPA sample # 2475-33.
1030 Heading back to WW shop to get Steve to open well houses WDMW-1 and WDMW-3.
1100 Back at WW shop. Met with Jeff who said that they need to reroute some other wells before they can turn on WDMW-1 or -3. Completing management of today's samples w/ GF.
1125 Breaking for lunch.

– 11/3/04 – CLF

(92)

11/3/04 - Wednesday - WDM - C. Ferguson

1215 Back at WW shop loading sampling materials. Will pick up ice for samples and then help GF sample monitoring wells until Jeff opens the WDMW-1 well house for me at 13:00.

1300 CF back at WDMW-1 waiting for City personnel to unlock the well house.

1330 Mitch came by & opened the well house for me. Setting up at WDMW-1.

1345 Collected W-WDMW-1-110304, EPA sample # 2475-34.

1405 CF waiting at WDMW-3 well house for City personnel to arrive and unlock it.

1430 Went back to WW shop & spoke to Mitch. He said they would get over and open WDMW-3 and start the pump around 3:00. CF heading over to help GF w/ sampling monitoring wells along the levee.

11/3/04 - [signature]

(93)

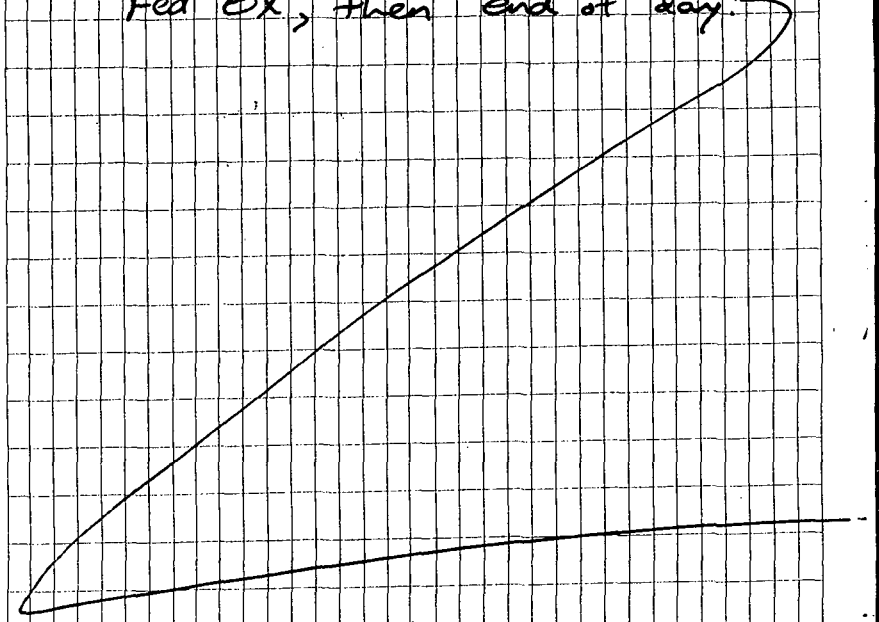
11/3/04 - Wednesday - WDM - C. Ferguson

1545 Finished surface water sampling along levee. Now CF over at WDMWD-3 for sampling.

1600 Collected W-WDMW-3-110304, EPA sample # 2475-35.

1615 Back at WW shop to complete sample mgmt (3 coolers).

1745 Leave site w/ 3 coolers and one YSI for drop off at Fed Ex, then end of day.



11/3/04 - [signature]

(94)

11/4/04 - Thursday - WDM - C. Ferguson

0720 CF/GF arrive on site after stopping to pick up ice for samples. 38° & sunny now, 52° later today. Will finish sampling three monitoring wells, collect one surface water sample, and collect water levels.

0750 Begin calibration of YSI 650.

		Range	Reading
-	pH		
	ORP	200-275	224
CMF	Cond	1,413	1,426
11/4/04 -	ORP		
	pH	7.0	6.98
	Turb	0.0-1.0	0.5

0815 Preparing to collect rinsate

0820 blank, sample W-WDM-~~RB~~ CMF 110404-RB, EPA sample # 2475-38.

0900 Setting up at MW-7.

0910 CF collected trip blank W-TB-110404 EPA sample # 2475-53-FB.

1025 Dumping purge water.

1050 Setting up at MW-5.

11/4/04 - [signature]

(95)

11/4/04 - Thursday - WDM - C. Ferguson

1150 Dumping purge water from sampling well MW-5.

1315 Stopped at hardware store to pick up saw and new locks to repair well MW-3.

1330 Preparing to collect the third (and last) surface water sample.

1345 Collected W-SW-3-110404, EPA sample # 2475-39.

1600 Finished sampling MW-8. Now collecting water levels from the other wells.

1645 Finished GW levels and dumping purge water. Now back at the WW shop to clean up and pack.

12-24-04

Appendix C
Field Sheets

File I.2.6.6
46124

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 1 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-1-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: MW-9

External Sample Number: W-MW-9-110204

Expected Conc: (or Circle One: (Low) Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/2/04 10:05
Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time		Analysis
1 - 1 Liter Cubitainer	4 Deg C	2	Days	1 Nitrogen, Nitrate in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Chloride in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Sulfate in Water
1 - 1 Liter Cubitainer	HNO3 acidify, 4 Deg C	180	Days	1 Metals in Water by ICP
1 - 1 Liter Cubitainer	ZnAc, NaOH, 4 Deg C	7	Days	1 Sulfide in Water
1 - 1 Liter amber glass	H2SO4 to pH<2, 4 Deg C	28	Days	1 Total Organic Carbon in Water
2 - 40mL VOA vial	4 Deg C	7	Days	1 Methane, Ethane, Ethene in Water by GC/FID
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14	Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Field
T= 14°C
SC= 1075 µS/cm
pH= 6.9 SU
turbidity = 3.5 NTU
DO= 0.5 mg/L
ORP= -51 mV

Sample Collected By: Amy Kelly

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 2 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-2-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: MW-2

External Sample Number: W-MW-2-110204

Expected Conc: (or Circle One: Low Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/2/04 12:31

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time		Analysis
1 - 1 Liter Cubitainer	4 Deg C	2	Days	1 Nitrogen, Nitrate in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Chloride in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Sulfate in Water
1 - 1 Liter Cubitainer	HNO3 acidify, 4 Deg C	180	Days	1 Metals in Water by ICP
1 - 1 Liter Cubitainer	ZnAc, NaOH, 4 Deg C	7	Days	1 Sulfide in Water
1 - 1 Liter amber glass	H2SO4 to pH<2, 4 Deg C	28	Days	1 Total Organic Carbon in Water
2 - 40mL VOA vial	4 Deg C	7	Days	1 Methane, Ethane, Ethene in Water by GC/FID
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14	Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A) Field

T = 14.3 °C

sc = 1134 µS/cm

pH = 6.9 stu

turbidity = 0.2 ntu

DO = 0.5 mg/L

ORP = -74 mV

Sample Collected By: [signature]

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 3 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-3-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: MW-4

External Sample Number: W-MW-4-110204

Expected Conc: (or Circle One: (Low) Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/2/04 15:53

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time		Analysis
1 - 1 Liter Cubitainer	4 Deg C	2	Days	1 Nitrogen, Nitrate in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Chloride in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Sulfate in Water
1 - 1 Liter Cubitainer	HNO3 acidify, 4 Deg C	180	Days	1 Metals in Water by ICP
1 - 1 Liter Cubitainer	ZnAc, NaOH, 4 Deg C	7	Days	1 Sulfide in Water
1 - 1 Liter amber glass	H2SO4 to pH<2, 4 Deg C	28	Days	1 Total Organic Carbon in Water
2 - 40mL VOA vial	4 Deg C	7	Days	1 Methane, Ethane, Ethene in Water by GC/FID
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14	Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A) Field

T= 14.7°C

SC= 1030 µS/cm

pH = 6.8 SU

turbidity= -1.7 NTU

DO= 0.5 mg/L

ORP= -13 mV

Sample Collected By: Amy Leah

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** ~~4~~ 3 **QC Code:** FD **Matrix:** Water **Tag ID:** 2475-~~4~~ 3-FD

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: MW-4

External Sample Number: W-MW-4-110204-D

Expected Conc: (or Circle One: (Low) Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/2/04 15:53

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time		Analysis
1 - 1 Liter Cubitainer	4 Deg C	2	Days	1 Nitrogen, Nitrate in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Chloride in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Sulfate in Water
1 - 1 Liter Cubitainer	HNO3 acidify, 4 Deg C	180	Days	1 Metals in Water by ICP
1 - 1 Liter Cubitainer	ZnAc, NaOH, 4 Deg C	7	Days	1 Sulfide in Water
1 - 1 Liter amber glass	H2SO4 to pH<2, 4 Deg C	28	Days	1 Total Organic Carbon in Water
2 - 40mL VOA vial	4 Deg C	7	Days	1 Methane, Ethane, Ethene in Water by GC/FID
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14	Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A) Field

T = 14.7 °C
SC = 1030 µS/cm
pH = 6.8 STU
turbidity = -1.7 NTU
DO = 0.5 mg/L
ORP = -13 mV

Sample Collected By: [signature]

1 12

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 5 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-5-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: mw-6

External Sample Number: W-mw-6-110304

Expected Conc: (or Circle One: Low Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/3/04 09:50
Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time		Analysis
1 - 1 Liter Cubitainer	4 Deg C	2	Days	1 Nitrogen, Nitrate in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Chloride in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Sulfate in Water
1 - 1 Liter Cubitainer	HNO3 acidify, 4 Deg C	180	Days	1 Metals in Water by ICP
1 - 1 Liter Cubitainer	ZnAc, NaOH, 4 Deg C	7	Days	1 Sulfide in Water
1 - 1 Liter amber glass	H2SO4 to pH<2, 4 Deg C	28	Days	1 Total Organic Carbon in Water
4 - 40mL VOA vial	4 Deg C	7	Days	1 Methane, Ethane, Ethene in Water by GC/FID
8 - 40mL VOA vial	4 Deg C, HCL to pH<2	14	Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Field

T = 15.7°C
sc = 1284 µS/cm
pH = 6.8 SU
turbidity = 0.8 NTU
DO = 0.8 mg/L
ORP = -9 mV

Extra MS/MSD volume

Sample Collected By: Amy Felt

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 7 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-7-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: MW-12

External Sample Number: W-MW-12-110304

Expected Conc: (or Circle One: Low Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/3/04 13:02
Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time		Analysis
1 - 1 Liter Cubitainer	4 Deg C	2	Days	1 Nitrogen, Nitrate in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Chloride in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Sulfate in Water
1 - 1 Liter Cubitainer	HNO3 acidify, 4 Deg C	180	Days	1 Metals in Water by ICP
1 - 1 Liter Cubitainer	ZnAc, NaOH, 4 Deg C	7	Days	1 Sulfide in Water
1 - 1 Liter amber glass	H2SO4 to pH<2, 4 Deg C	28	Days	1 Total Organic Carbon in Water
2 - 40mL VOA vial	4 Deg C	7	Days	1 Methane, Ethane, Ethene in Water by GC/FID
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14	Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Field

T = 13.4°C

SC = 1250 µS/cm

pH = 6.9 SU

Turbidity = -0.6 NTU

DO = 0.6 mg/L

ORP = -63 mV

Sample Collected By: Amy Fell

3

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 8 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-8-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: MW-11

External Sample Number: W-MW-11-110304

Expected Conc: (or Circle One: Low Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/3/04 14:55
Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time		Analysis
1 - 1 Liter Cubitainer	4 Deg C	2	Days	1 Nitrogen, Nitrate in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Chloride in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Sulfate in Water
1 - 1 Liter Cubitainer	HNO3 acidify, 4 Deg C	180	Days	1 Metals in Water by ICP
1 - 1 Liter Cubitainer	ZnAc, NaOH, 4 Deg C	7	Days	1 Sulfide in Water
1 - 1 Liter amber glass	H2SO4 to pH<2, 4 Deg C	28	Days	1 Total Organic Carbon in Water
2 - 40mL VOA vial	4 Deg C	7	Days	1 Methane, Ethane, Ethene in Water by GC/FID
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14	Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A) Field

T = 12.4°C
SC = 997 µS/cm
pH = 7.1 SU
turbidity = 4.2 NTU
DO = 0.5 mg/L
ORP = -98 mV

Sample Collected By: [signature]

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 9 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-9-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: MW-7

External Sample Number: W-MW-7-110404

Expected Conc: (or Circle One: Low Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/4/04 09:40
Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time		Analysis
1 - 1 Liter Cubitainer	4 Deg C	2	Days	1 Nitrogen, Nitrate in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Chloride in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Sulfate in Water
1 - 1 Liter Cubitainer	HNO3 acidify, 4 Deg C	180	Days	1 Metals in Water by ICP
1 - 1 Liter Cubitainer	ZnAc, NaOH, 4 Deg C	7	Days	1 Sulfide in Water
1 - 1 Liter amber glass	H2SO4 to pH<2, 4 Deg C	28	Days	1 Total Organic Carbon in Water
2 - 40mL VOA vial	4 Deg C	7	Days	1 Methane, Ethane, Ethene in Water by GC/FID
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14	Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A) Field

T = 16.3 °C
SC = 1156 µS/cm
pH = 6.8 SU
turbidity = 3.7 NTU
DO = 0.4 mg/L
ORP = 73 mV

Sample Collected By: [signature]

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 10 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-10-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: MW-5

External Sample Number: W-mw-5-110404

Expected Conc: (or Circle One: (Low) (Medium) High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/4/04 11:25

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time		Analysis
1 - 1 Liter Cubitainer	4 Deg C	2	Days	1 Nitrogen, Nitrate in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Chloride in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Sulfate in Water
1 - 1 Liter Cubitainer	HNO3 acidify, 4 Deg C	180	Days	1 Metals in Water by ICP
1 - 1 Liter Cubitainer	ZnAc, NaOH, 4 Deg C	7	Days	1 Sulfide in Water
1 - 1 Liter amber glass	H2SO4 to pH<2, 4 Deg C	28	Days	1 Total Organic Carbon in Water
2 - 40mL VOA vial	4 Deg C	7	Days	1 Methane, Ethane, Ethene in Water by GC/FID
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14	Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Field
T= 13.4°C
sc= 1169 µS/cm
pH= 6.9 STD
turbidity= 5.5 NTU
DO= 0.3 mg/L
ORP= 5.0 mV

Sample Collected By: _____

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 11 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-11-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: MW-8

External Sample Number: W-mw-8-110404

Expected Conc: (or Circle One: Low Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/4/04 15:35

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time		Analysis
1 - 1 Liter Cubitainer	4 Deg C	2	Days	1 Nitrogen, Nitrate in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Chloride in Water
1 - 1 Liter Cubitainer	4 Deg C	28	Days	1 Sulfate in Water
1 - 1 Liter Cubitainer	HNO3 acidify, 4 Deg C	180	Days	1 Metals in Water by ICP
1 - 1 Liter Cubitainer	ZnAc, NaOH, 4 Deg C	7	Days	1 Sulfide in Water
1 - 1 Liter amber glass	H2SO4 to pH<2, 4 Deg C	28	Days	1 Total Organic Carbon in Water
2 - 40mL VOA vial	4 Deg C	7	Days	1 Methane, Ethane, Ethene in Water by GC/FID
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14	Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A) Field

T = 13.4 °C
sc = 1270 µS/cm
pH = 6.9 SU
turbidity = 7.0 NTU
DO = 0.1 mg/L
ORP = 5.6 mV

Sample Collected By: Doug Loeh

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 15 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-15-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Well 20

External Sample Number: W-WDMW-20-110104

Expected Conc: (or Circle One: (Low) Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/01/04 15:30
Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A) Field

T = 15.6°C

SC = 422 µS/cm

pH = 7.4

turbidity = ~~[illegible]~~ 0.0

~~DO = [illegible]~~ gt

DO = 7.7 mg/L

ORP = -7.3 mV

Sample Collected By: Amy Felt

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 16 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-16-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Well 18

External Sample Number: W-WDMW-18-110104

Expected Conc: (or Circle One: (Low) Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/01/04 16:10

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Field

T = 13.8°C

SC = 582 µS/cm

pH = 7.3

turbidity = ~~15~~ 0.0

DO = 8.4 mg/L

ORP = 11.5 mV

Sample Collected By: [signature]

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 17 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-17-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Water Well 13

External Sample Number: W-~~B~~WDMW-13-110204

Expected Conc: (or Circle One: (Low) Medium High)

		Date	Time(24 hr)
Latitude: ___ ___ ___	**Sample Collection: Start:**	11/2/04	08:55
Longitude: ___ ___ ___	**End:**	__/__/__	__:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:
(N/A)

FINAL:

Temp	12.96	°C
Cond	1,189	µS/cm
pH	6.68	STU
ORP	-19.6	mV
Turb.	0.9	NTU
DO	6.64	mg/L

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 18 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-18-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Water Well 21

External Sample Number: W-WDMW-21-110204

Expected Conc: (or Circle One: (Low) Medium High)

		Date	Time(24 hr)
Latitude: ___ ___ ___	**Sample Collection:** **Start:**	11/2/04	09:40
Longitude: ___ ___ ___	**End:**	__/__/__	__:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Final:

Temp	14.46	°C
Cond	474	µs/cm
pH	7.43	STU
Turb	0.6	NTU
DO	6.40	mg/L
ORP	-50.3	mV

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 19 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-19-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Water Well #15

External Sample Number: W-WDMW-15-110104

Expected Conc: (or Circle One: (Low) Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/1/04 15:05

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

FINAL:

14:56 Temp	15.09	°C
Cond	797	µS/cm
pH	7.23	STD
Turb	-5.8	NTU
DO	3.78	mg/L
ORP	216.4	mV

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 20 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-20-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Water Well #17

External Sample Number: W-WDMW-17-110104

Expected Conc: (or Circle One: (Low) Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/1/04 15:55

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

FINAL:

15:51	Temp	14.57	°C
	Cond	627	µs/cm
	pH	7.02	STU
	Turb	-3.9	NTU
	DO	3.66	mg/L
	ORP	5.9	mV

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 21 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-21-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Water Well #19

External Sample Number: W-WDMW-19-110204

Expected Conc: (or Circle One: Low Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/2/04 10:05
Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Final:

Temp	14.10	°C
Cond	994	ms/cm
PH	7.10	STU
Turb	0.9	NTU
DO	5.82	mg/L
ORP	14.9	mV

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 22 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-22-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West ~~Demo~~ CMF Des Moines Water Well #7

External Sample Number: W-WDMW-7-110204

Expected Conc: (or Circle One: (Low) Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/2/04 10:55

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Final:

Temp	13.11	°C
Cond	1,636	MS/cm
pH	6.93	STU
Turb	0.6	NTU
DO	6.23	mg/L
ORP	-43.6	mV

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 23 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-23-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Water Well #12

External Sample Number: W-WDMW-12-110204

Expected Conc: (or Circle One: (Low) Medium High)

		Date	Time(24 hr)
Latitude: ___ ___ ___	**Sample Collection: Start:**	11/2/04	11:45
Longitude: ___ ___ ___	**End:**	__/__/__	__:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Final:

Temp	13.29	°C
Cond	1,299	µS/cm
pH	6.92	STU
Turb	1.2	NTU
DO	4.97	mg/L
ORP	-58.1	mV

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 24 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-24-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Water Well #6

External Sample Number: W-WDMW-6-110204

Expected Conc: (or Circle One: Low Medium High)

Latitude: ___ ___ ___
Longitude: ___ ___ ___

	Date	Time(24 hr)
Sample Collection: Start:	11/2/04	13:30
End:	__/__/__	__:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Final:

Temp	14.12	°C
Cond	2,285	µS/cm
pH	6.91	STU
Turb	7.2	NTU
DO	8.80	mg/L
ORP	-22.9	mV

Sample Collected By: C. Ferguson

Sample Collection Field Sheet

US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** ~~25~~ 24 **QC Code:** FD **Matrix:** Water **Tag ID:** 2475-~~25~~ 24-FD

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Water Well #6

External Sample Number: W-WDMW-6-110204-FD

Expected Conc: (or Circle One: Low Medium High)

		Date	Time(24 hr)
Latitude: ___ ___ ___	**Sample Collection: Start:**	11/2/04	13:31
Longitude: ___ ___ ___	**End:**	__/__/__	__:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A) Field duplicate for sample 2475-24 (W-WDMW-6-110204)

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 26 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-26-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Water Well #14

External Sample Number: W-WDMW-14-110204

Expected Conc: (or Circle One: (Low) Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/2/04 14:20

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg.C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Final:

Temp	12.91	°C
Cond	856	µS/cm
pH	7.39	STU
Turb	0.3	NTU
DO	6.80	mg/L
ORP	-36.7	mV

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 27 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-27-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Water Well #22

External Sample Number: W-WDMW-22-110204

Expected Conc: (or Circle One: (Low) Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/2/04 14:40
Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Final:

Temp	14.42	°C
Cond	1,003	µS/cm
pH	7.25	STU
Turb	0.2	NTU
DO	6.90	mg/L
ORP	30.2	mV

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 28 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-28-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Water Well # 25

External Sample Number: W-WDMW-25-110204

Expected Conc: (or Circle One: (Low) Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/2/04 15:20
Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Final:

Temp 15.97
Cond 811
pH 7.43
Turb 7.4
DO 8.26
ORP 3.5

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 29 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-29-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Water Well #24

External Sample Number: W-WDMW-24-110204

Expected Conc: (or Circle One: (Low) Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/2/04 15:50

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Final:

Temp 14.33 °C
Cond 1,078 µS/cm
pH 7.23 STU
Turb 1.0 NTU
ORP 7.2 mV
DO 7.86 mg/L

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 30 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-30-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Water Well #23

External Sample Number: W-WDMW-23-110204

Expected Conc: (or Circle One: Low Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/2/09 16:15

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH≤2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Final:

Temp	14.37	°C
Cond	1,550	µS/cm
pH	7.02	STU
Turb	1.6	NTU
DO	8.88	mg/L
ORP	16.5	mV

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 31 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-31-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Water Well #4

External Sample Number: W-WDMW-4-110304

Expected Conc: (or Circle One: ~~Low~~ Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/3/04 09:20

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:
(N/A)

FINAL:

Temp 24.72 °C
Cond 1,744 ms/cm
pH 7.43 STU
Turb 3.8 NTU
DO 7.67 mg/L
ORP 11.3 mV

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 32 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-32-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Water Well #8

External Sample Number: W-WDMW-8-110304

Expected Conc: (or Circle One: (Low) Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/3/04 09:50
Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:
(N/A)

FINAL:

Temp 23.12 °C
Cond 1,740 µS/cm
pH 7.37 STU
Turb 6.5 NTU
DO 7.64 mg/L
ORP -80.1 mV

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 33 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-33-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Water Well #9

External Sample Number: W-WDMW-9-110304

Expected Conc: (or Circle One: (Low) Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/3/04 10:25

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Final:

Temp	13.88	°C
Cond	12,410	µS/cm
pH	6.29	STU
Turb	5.0	NTU
DO	12.87	mg/L
ORP	-22.0	mV

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 34 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-34-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Water Well #1

External Sample Number: W-WDMW-1-110304

Expected Conc: (or Circle One: (Low) Medium High)

		Date	**Time(24 hr)**
Latitude: ___ ___ ___	**Sample Collection: Start:**	11/3/04	13:45
Longitude: ___ ___ ___	**End:**	__/__/__	__:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
~~1~~ 40mL VOA ~~vial~~	4 Deg C, HCL to pH<2	14 ~~Days~~	1 VOCs ~~in~~ Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Final:

Temp 25.02°C

Cond 1,693 MS/cm

pH 7.43 STU

Turb 9.7 NTU

DO 7.70 mg/L

ORP -65.3 mV

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 35 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-35-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines Water Well #3

External Sample Number: W-WDMW-3-110304

Expected Conc: (or Circle One: (Low) Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/3/04 16:00

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

FINAL:

Temp 24.56 °C

Cond 1,769 ~~mS~~/cm

pH 7.54 STU

Turb 3.1 NTU

DO 7.99 mg/L

ORP -76.5 mV

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 36 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-36-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines -- Surface Water Sample #1

External Sample Number: W-WDMSW-1-110304

Expected Conc: (or Circle One: (Low) Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/3/09 15:30

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

FINAL:

Temp 11.0°C

Cond 424 uS/cm

pH 8.4 STU

Turb 21 NTU

DO 10.7 mg/L

ORP -82

Sample Collected By: C. Ferguson / G. Felkner

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 37 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-37-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines -- Surface Water Sample #2

External Sample Number: W-WDMSW-2-110304

Expected Conc:	(or Circle One: (Low) Medium High)	**Date**	**Time(24 hr)**
Latitude: __ __ __	**Sample Collection: Start:**	11/3/04	15:43
Longitude: __ __ __	**End:**	__/__/__	__:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

FINAL:

Temp	11.1 °C
Cond	408 ms/cm
pH	8.3 STU
Turb	26 NTU
DO	9.7 mg/L
ORP	-44 mV

Sample Collected By: C. Ferguson / G. Felkner

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 38 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-38-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines -- Rinsate Blank

External Sample Number: W-WDM-110404-RB

Expected Conc: (or Circle One: (Low) Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/4/04 08:20

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Rinsate blank from sampling pump (submersible/whale)

Sample Collected By: C. Ferguson / G. Felkner

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 39 **QC Code:** __ **Matrix:** Water **Tag ID:** 2475-39-__

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: West Des Moines - Surface Water Sample #3

External Sample Number: W-SW-3-110404

Expected Conc: (or Circle One: ~~Low~~ Medium High)

		Date	Time(24 hr)
Latitude: ___ ___ ___	**Sample Collection: Start:**	11/04/04	13:45
Longitude: ___ ___ ___	**End:**	__/__/__	__:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Final:

Temp 13.1 °C
Cond 558 µS/cm
pH 8.2 STU
Turb 30 NTU
DO 8.0 mg/L
ORP 125 mV

Sample Collected By: C. Ferguson / G. Felkner

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 51 **QC Code:** FB **Matrix:** Water **Tag ID:** 2475-51-FB

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: M/E/E Trip Blank sample

External Sample Number: W-TB-110104-M/E/E

Expected Conc: (or Circle One: Low Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/01/04 16:25

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
2 - 40mL VOA vial	4 Deg C	7 Days	1 Methane, Ethane, Ethene in Water by GC/FID

Sample Comments:
(N/A)

Trip Blank

Sample Collected By: Amy Sell

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 53 **QC Code:** FB **Matrix:** Water **Tag ID:** 2475-53-FB

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: LDL VOA Trip Blank sample

External Sample Number: W-RRTB-110404

Expected Conc: (or Circle One: (Low) Medium High)

		Date	Time(24 hr)
Latitude: ___ ___ ___	**Sample Collection: Start:**	11/4/04	09:10
Longitude: ___ ___ ___	**End:**	__/__/__	__:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:
(N/A)

11/04/04 Trip Blank

Sample Collected By: C. Ferguson

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 54 **QC Code:** FB **Matrix:** Water **Tag ID:** 2475-54-FB

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: LDL VOA Trip Blank sample

External Sample Number: W-TB-110304

Expected Conc:	(or Circle One: Low Medium High)	**Date**	**Time(24 hr)**
Latitude: ___ ___ ___	**Sample Collection: Start:**	11/3/04	09:38
Longitude: ___ ___ ___	**End:**	__/__/__	__:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Trip Blank

Sample Collected By: Amy Farr

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 2475 **Sample Number:** 55 **QC Code:** FB **Matrix:** Water **Tag ID:** 2475-55-FB

Project ID: RSA713P8 **Project Manager:** Robert Stewart
Project Desc: Railroad Avenue GW Contamination site - Phase 8
City: West Des Moines **State:** Iowa
Program: Superfund
Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Location Desc: LDL VOA Trip Blank sample

External Sample Number: W-TB-110104-VOA-1

Expected Conc: (or Circle One: Low Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 11/01/04 16:20

Longitude: ___ ___ ___ **End:** __/__/__ __:__

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
4 - 40mL VOA vial	4 Deg C, HCL to pH<2	14 Days	1 VOCs in Water by GC/MS for Low Detection Limits

Sample Comments:

(N/A)

Trip Blank

Sample Collected By: Amy Fell

Appendix D
Chain of Custody Records

HVE +J
46124

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
Bob Stewart	RR Ave GW - Phase 8	01 & 02 Nov. 2004	1 of 1

CONTENTS OF SHIPMENT

SAMPLE NUMBER	TYPE OF CONTAINERS: CUBITAINER	1 Liter Amb BOTTLE	BOTTLE	VOA 2 ~~BOTTLE~~ VIAL	VOA SET (2 VIALS EA)	SAMPLED MEDIA: water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt, other sample numbers, etc.)
	NUMBERS OF CONTAINERS PER SAMPLE NUMBER										
2475-15					1	X					
2475-16					1	X					
2475-19					1	X					
2475-20					1	X					
2475-51-FB				1		X					
2475-55-FB					1	X					
2475-17					1	X					
2475-18					1	X					
2475-~~01~~ 01	4	1		1	1	X					
2475-~~02~~ 02	4	1		1	1	X					
2475-21					1	X					
2475-22					1	X					
2475-23					1	X					
2475-24					1	X					
2475-~~25~~ 24-FD					1	X					
2475-26					1	X					
2475-27					1	X					
2475-28					1	X					
2475-29					1	X					
2475-30					1	X					
2475-~~03~~ 25	4	1		1	1	X					
2475-~~03~~ 25-FD	4	1		1	1	X					
End											

DESCRIPTION OF SHIPMENT

50 PIECE(S) CONSISTING OF _____ BOX(ES)

3 ICE CHEST(S): OTHER _____

MODE OF SHIPMENT

X COMMERCIAL CARRIER: Fed Ex

___ COURIER

___ SAMPLER CONVEYED

814672197856 (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
[signature] X SEALED ☐ UNSEALED	11-2-04	1930	Fed Ex X SEALED ☐ UNSEALED	Deliv to Lab
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY

7-EPA-9262(Revised 5/85)

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER (Print): Bob Stewart

NAME OF SURVEY OR ACTIVITY: RR Ave Phase 8

DATE OF COLLECTION: DAY 03 MONTH Nov. YEAR 2004

SHEET 1 of 1

CONTENTS OF SHIPMENT

SAMPLE NUMBER	CUBITAINER	1 liter amber BOTTLE	BOTTLE	2 vial Voa ~~BOTTLE~~	4 VOA SET (2 VIALS EA)	water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt, other sample numbers, etc.)
~~2475-29~~					~~1~~	X					
~~2475-30~~											
2475-31					1	X					
2475-32					1	X					
2475-33					1	X					
2475-34					1	X					
2475-35					1	X					
2475-36					1	X					
2475-37					1	X					
2475-5	8	2		2	2	X					ms/msD volume
2475-7	4	1		1	1	X					
2475-8	4	1		1	1	X					
2475-54-FB					1	X					
End											

NUMBERS OF CONTAINERS PER SAMPLE NUMBER

DESCRIPTION OF SHIPMENT

36 PIECE(S) CONSISTING OF ______ BOX(ES)

3 ICE CHEST(S); OTHER ______

MODE OF SHIPMENT

X COMMERCIAL CARRIER: Fed Ex

___ COURIER

___ SAMPLER CONVEYED

81467219 6838 (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
[signatures] X SEALED ☐ UNSEALED	11-3-04	1815	Fed Ex X SEALED ☐ UNSEALED	Deliver to Lab
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION	SHEET
Bob Stewart	RR Ave Phase 8 RI	04 (DAY) Nov. (MONTH) 2004 (YEAR)	1 of 1

CONTENTS OF SHIPMENT

SAMPLE NUMBER	TYPE OF CONTAINERS: CUBITAINER	1 liter BOTTLE	BOTTLE	2 VOA Set BOTTLE	4 VOA SET (2 VIALS EA)	SAMPLED MEDIA: water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt, other sample numbers, etc.)
	NUMBERS OF CONTAINERS PER SAMPLE NUMBER										
2475-9	4	1		1	1						
2475-10	4	1		1	1						
2475-11	4	1		1	1						
2475-38					1						
2475-39					1						
2475-53FB					1						
	End										

DESCRIPTION OF SHIPMENT

24 PIECE(S) CONSISTING OF _____ BOX(ES)

2 ICE CHEST(S): OTHER _____

MODE OF SHIPMENT

_____ COMMERCIAL CARRIER: _____

_____ COURIER

X SAMPLER CONVEYED

_____ (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
[signature] ☐ SEALED ☒ UNSEALED	11/5/04	9:50 am	Barbara Jones ☐ SEALED ☒ UNSEALED	analyses
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY

7-EPA-9262(Revised 5/85)

Appendix E
Airbills

FedEx. *USA Airbill* FedEx Tracking Number 8146 7219 7856

Sender's Copy

1 From Please print and press hard.

Date 11/2/04 Sender's FedEx Account Number [redacted]

Sender's Name Chad Ferguson Phone (913) 458-2171

Company BLACK&VEATCH SPECIAL PROJ CORP

Address 6601 COLLEGE BLVD Dept./Floor/Suite/Room

City OVERLAND PARK State KS ZIP 66211

2 Your Internal Billing Reference 46124.103 IONAL
First 24 characters will appear on invoice.

3 To

Recipient's Name Nicole Roblez Phone (913) 551-5130

Company EPA Region VII Lab

Address 300 Minnesota Ave. Dept./Floor/Suite/Room
We cannot deliver to P.O. boxes or P.O. ZIP codes.

To "HOLD" at FedEx location, print FedEx address here.

City Kansas City State KS ZIP 66101

NEW Peel and Stick FedEx USA Airbill

See back for application instructions.

Questions? Call 1-800-Go-FedEx® (800-463-3339)
Visit our Web site at www.fedex.com

By using this Airbill you agree to the service conditions on the back of this Airbill and in our current Service Guide, including terms that limit our liability.

0108065334

4a Express Package Service — Packages up to 150 lbs. Delivery commitment may be later in some areas.

- [X] FedEx Priority Overnight — Next business morning
- [ ] FedEx Standard Overnight — Next business afternoon
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations
- [ ] FedEx 2Day* — Second business day
- [ ] FedEx Express Saver* — Third business day

* FedEx Letter Rate not available. Minimum charge: One-pound rate

4b Express Freight Service — Packages over 150 lbs. Delivery commitment may be later in some areas.

- [ ] FedEx 1Day Freight* — Next business day
- [ ] FedEx 2Day Freight — Second business day
- [ ] FedEx 3Day Freight — Third business day

* Call for Confirmation:

5 Packaging — * Declared value limit $500

- [ ] FedEx Letter*
- [ ] FedEx Pak*
- [X] Other Pkg. — Includes FedEx Box, FedEx Tube, and customer pkg.

6 Special Handling

- [ ] Saturday Delivery — Available for FedEx Priority Overnight and FedEx 2Day to select ZIP codes
- [ ] Sunday Delivery — Available for FedEx Priority Overnight to select ZIP codes
- [ ] HOLD Weekday at FedEx Location — Not available with FedEx First Overnight
- [ ] HOLD Saturday at FedEx Location — Available for FedEx Priority Overnight and FedEx 2Day to select locations

Does this shipment contain dangerous goods? One box must be checked.

- [X] No
- [ ] Yes — As per attached Shipper's Declaration
- [ ] Yes — Shipper's Declaration not required
- [ ] Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg
- [ ] Cargo Aircraft Only

Dangerous Goods cannot be shipped in FedEx packaging.

7 Payment Bill to: Enter FedEx Acct. No. or Credit Card No. below.

- [X] Sender — Acct. No. in Section 1 will be billed.
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check

FedEx Acct. No. / Credit Card No. Exp. Date

Total Packages	Total Weight	Total Declared Value†	
		$ .00	FedEx Use Only

†Our liability is limited to $100 unless you declare a higher value. See back for details.

8 Release Signature — Sign to authorize delivery without obtaining signature.

By signing you authorize us to deliver this shipment without obtaining a signature and agree to indemnify and hold us harmless from any resulting claims.

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FedEx. *USA Airbill* FedEx Tracking Number 8146 7219 6838

Sender's Copy

1 From Please print and press hard.

Date 11/3/04 Sender's FedEx Account Number [redacted]

Sender's Name Chad Ferguson Phone (913) 458-2171

Company BLACK&VEATCH SPECIAL PROJ CORP

Address 6601 COLLEGE BLVD Dept./Floor/Suite/Room

City OVERLAND PARK State KS ZIP 66211

2 Your Internal Billing Reference 46124.0103
First 24 characters will appear on invoice.

3 To

Recipient's Name Nicole Roblez Phone (913) 551-5130

Company EPA Region VII Lab

Address 300 Minnesota Ave. Dept./Floor/Suite/Room
We cannot deliver to P.O. boxes or P.O. ZIP codes.

To "HOLD" at FedEx location, print FedEx address here.

City Kansas City State KS ZIP 66101

NEW Peel and Stick FedEx USA Airbill

See back for application instructions.

Questions? Call 1-800-Go-FedEx® (800-463-3339)
Visit our Web site at www.fedex.com

By using this Airbill you agree to the service conditions on the back of this Airbill and in our current Service Guide, including terms that limit our liability.

0108065334

4a Express Package Service — Packages up to 150 lbs. Delivery commitment may be later in some areas.

- [X] FedEx Priority Overnight — Next business morning
- [ ] FedEx Standard Overnight — Next business afternoon
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations
- [ ] FedEx 2Day* — Second business day
- [ ] FedEx Express Saver* — Third business day

* FedEx Letter Rate not available. Minimum charge: One-pound rate

4b Express Freight Service — Packages over 150 lbs. Delivery commitment may be later in some areas.

- [ ] FedEx 1Day Freight* — Next business day
- [ ] FedEx 2Day Freight — Second business day
- [ ] FedEx 3Day Freight — Third business day

* Call for Confirmation:

5 Packaging — * Declared value limit $500

- [ ] FedEx Letter*
- [ ] FedEx Pak*
- [X] Other Pkg. — Includes FedEx Box, FedEx Tube, and customer pkg.

6 Special Handling

- [ ] Saturday Delivery — Available for FedEx Priority Overnight and FedEx 2Day to select ZIP codes
- [ ] Sunday Delivery — Available for FedEx Priority Overnight to select ZIP codes
- [ ] HOLD Weekday at FedEx Location — Not available with FedEx First Overnight
- [ ] HOLD Saturday at FedEx Location — Available for FedEx Priority Overnight and FedEx 2Day to select locations

Does this shipment contain dangerous goods? One box must be checked.

- [X] No
- [ ] Yes — As per attached Shipper's Declaration
- [ ] Yes — Shipper's Declaration not required
- [ ] Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg
- [ ] Cargo Aircraft Only

Dangerous Goods cannot be shipped in FedEx packaging.

7 Payment Bill to: Enter FedEx Acct. No. or Credit Card No. below.

- [X] Sender — Acct. No. in Section 1 will be billed.
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check

FedEx Acct. No. / Credit Card No. Exp. Date

Total Packages	Total Weight	Total Declared Value†	
		$ .00	FedEx Use Only

†Our liability is limited to $100 unless you declare a higher value. See back for details.

8 Release Signature — Sign to authorize delivery without obtaining signature.

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Appendix F
Analytical Results

Railroad Avenue Site: Phase 8 RI, November 2004

*Detected parameters only

		Sample No.
ANALYTE = **ALL**		
Result of primary sample analyte =	ND ug/L	MW-4
Result of duplicate sample analyte =	ND ug/L	MW-4-D
RPD =	**0%**	
ANALYTE = **cis-1,2-DCE**		**Sample No.**
Result of primary sample analyte =	1.9 ug/L	WDMW-6
Result of duplicate sample analyte =	2.4 ug/L	WDMW-6-D
RPD =	**-23%**	

RPD = relative percent difference

RPD = (D1-D2)/(0.5(D1+D2))

RPD goal +/-20 percent for water media (BVSPC 2002a)

File I.7.7
46124

United States Environmental Protection Agency
Region 7
901 N. 5th Street
Kansas City, KS 66101

Date: 30 NOV 2004

Subject: Transmittal of Sample Analysis Results for ASR #: 2475

Project ID: RSA713P8

Project Description: Railroad Avenue GW Contamination site - Phase 8

From: Dale I. Bates, Director
Regional Laboratory, Environmental Services Division

To: Robert Stewart
SUPR/IANE

Enclosed are the analytical data for the above-referenced Analytical Services Request (ASR) and Project. The Regional Laboratory has reviewed and verified the results in accordance with procedures described in our Quality Manual (QM). In addition to all of the analytical results, this transmittal contains pertinent information that may have influenced the reported results and documents any deviations from the established requirements of the QM.

Please contact us within 14 days of receipt of this package if you determine there is a need for any changes. Please complete the enclosed Customer Satisfaction Survey and Data Disposition memo for this ASR.

If you have any questions or concerns relating to this data package, contact our customer service line at 913-551-5295.

Enclosures

cc: Analytical Data File.

Project Manager: Robert Stewart **Org:** SUPR/IANE **Phone:** 913-551-7654

Project ID: RSA713P8

Project Desc: Railroad Avenue GW Contamination site - Phase 8

Location: West Des Moines **State:** Iowa **Program:** Superfund

Site Name: RAILROAD AVENUE GROUNDWATER CONTAMINATION SITE - NORTH PLUME **Site ID:** A713 **Site OU:** 01

Purpose: Site Characterization

Explanation of Codes, Units and Qualifiers used on this report

Sample QC Codes: QC Codes identify the type of sample for quality control purpose.

__ = Field Sample
FB = Field Blank
FD = Field Duplicate

Units: Specific units in which results are reported.

Deg C = Degrees Celsius
NTU = Nephelometric Turbidity Units
SU = Standard Units (pH)
mg/L = Milligrams per Liter
ug/L = Micrograms per Liter
umhos/cm = Micromhos per Centimeter

Data Qualifiers: Specific codes used in conjunction with data values to provide additional information on the quality of reported results, or used to explain the absence of a specific value.

(Blank)= Values have been reviewed and found acceptable for use.
J = The identification of the analyte is acceptable; the reported value is an estimate.
U = The analyte was not detected at or above the reporting limit.
UJ = The analyte was not detected at or above the reporting limit. The reporting limit is an estimate.

ASR Number: 2475 **Sample Information Summary** **11/29/2004**

Project ID: RSA713P8 **Project Desc:** Railroad Avenue GW Contamination site - Phase 8

Sample No	QC Code	Matrix	Location Description	External Sample No	Start Date	Start Time	End Date	End Time	Receipt Date
1	- __	Water	MW-9	W-MW-9-110204	11/02/2004	10:05			11/03/2004
2	- __	Water	MW-2	W-MW-2-110204	11/02/2004	12:31			11/03/2004
3	- __	Water	MW-4	W-MW-4-110204	11/02/2004	15:53			11/03/2004
3	- FD	Water	MW-4/Field Duplicate of sample 3	W-MW-4-110204-D	11/02/2004	15:53			11/03/2004
5	- __	Water	MW-6	W-MW-6-110304	11/03/2004	09:50			11/04/2004
7	- __	Water	MW-12	W-MW-12-110304	11/03/2004	13:02			11/04/2004
8	- __	Water	MW-11	W-MW-11-110304	11/03/2004	14:55			11/04/2004
9	- __	Water	MW-7	W-MW-7-110404	11/04/2004	09:40			11/05/2004
10	- __	Water	MW-5	W-MW-5-110404	11/04/2004	11:25			11/05/2004
11	- __	Water	MW-8	W-MW-8-110404	11/04/2004	15:35			11/05/2004
15	- __	Water	West Des Moines Well 20	W-WDMW-20-110104	11/01/2004	15:30			11/03/2004
16	- __	Water	West Des Moines Well 18	W-WDMW-18-110104	11/01/2004	16:10			11/03/2004
17	- __	Water	West Des Moines Water Well 13	W-WDMW-13-110204	11/02/2004	08:55			11/03/2004
18	- __	Water	West Des Moines Water Well 21	W-WDMW-21-110204	11/02/2004	09:40			11/03/2004
19	- __	Water	West Des Moines Water Well 15	W-WDMW-15-110104	11/01/2004	15:05			11/03/2004
20	- __	Water	West Des Moines Water Well 17	W-WDMW-17-110104	11/01/2004	15:55			11/03/2004
21	- __	Water	West Des Moines Water Well 19	W-WDMW-19-110204	11/02/2004	10:05			11/03/2004
22	- __	Water	West Des Moines Water Well 7	W-WDMW-7-110204	11/02/2004	10:55			11/03/2004
23	- __	Water	West Des Moines Water Well 12	W-WDMW-12-110204	11/02/2004	11:45			11/03/2004
24	- __	Water	West Des Moines Water Well 6	W-WDMW-6-110204	11/02/2004	13:30			11/03/2004
24	- FD	Water	WDMW Well 6/Field Duplicate of	W-	11/02/2004	13:31			11/03/2004

Sample No	QC Code	Matrix	Location Description	External Sample No	Start Date	Start Time	End Date	End Time	Receipt Date
			sample 24	WDMW-6-110204-D					
26 - __		Water	West Des Moines Water Well 14	W-WDMW-14-110204	11/02/2004	14:20			11/03/2004
27 - __		Water	West Des Moines Water Well 22	W-WDMW-12-110204	11/02/2004	14:40			11/03/2004
28 - __		Water	West Des Moines Water Well 25	W-WDMW-25-110204	11/02/2004	15:20			11/03/2004
29 - __		Water	West Des Moines Water Well 24	W-WDMW-24-110204	11/02/2004	15:50			11/03/2004
30 - __		Water	West Des Moines Water Well 23	W-WDMW-23-110204	11/02/2004	16:15			11/03/2004
31 - __		Water	West Des Moines Water Well 4	W-WDMW-4-110304	11/03/2004	09:20			11/04/2004
32 - __		Water	West Des Moines Water Well 8	W-WDMW-8-110304	11/03/2004	09:50			11/04/2004
33 - __		Water	West Des Moines Water Well 9	W-WDMW-9-110304	11/03/2004	10:25			11/04/2004
34 - __		Water	West Des Moines Water Well 1	W-WDMW-1-110304	11/03/2004	13:45			11/04/2004
35 - __		Water	West Des Moines Water Well 3	W-WDMW-3-110304	11/03/2004	16:00			11/04/2004
36 - __		Water	West Des Moines-Surface Water sample 1	W-WDMSW-1-110304	11/03/2004	15:30			11/04/2004
37 - __		Water	West Des Moines-Surface Water sample 2	W-WDMSW-2-110304	11/03/2004	15:43			11/04/2004
38 - __		Water	West Des Moines - Rinsate Blank sample	W-WDM-110404-RB	11/04/2004	08:20			11/05/2004
39 - __		Water	West Des Moines-Surface water sample 3	W-SW-3-110404	11/04/2004	13:45			11/05/2004
51 - FB		Water	M/E/E Trip Blank sample	W-TB-110104-M/E/E	11/01/2004	16:25			11/03/2004
53 - FB		Water	LDL VOA Trip Blank sample		11/04/2004	09:10			11/05/2004
54 - FB		Water	LDL VOA Trip Blank sample	W-TB-110304	11/03/2004	09:38			11/04/2004
55 - FB		Water	LDL VOA Trip Blank sample	W-TB-110104-VOA	11/01/2004	16:20			11/03/2004

Analysis **Comments About Results For This Analysis**

1 Chloride in Water

Lab: Region 7 EPA Laboratory - Kansas City, Ks.

Method: EPA Region 7 RLAB Method 3135.11A

Samples: 1-__ 2-__ 3-__ 3-FD 5-__ 7-__ 8-__
9-__ 10-__ 11-__

Comments:
(N/A)

1 Conductivity by Field Measurement

Lab: (Field Measurement)

Method: Measurement of field parameter (no SOP)

Samples: 1-__ 2-__ 3-__ 3-FD 5-__ 7-__ 8-__
9-__ 10-__ 11-__ 15-__ 16-__ 17-__ 18-__
19-__ 20-__ 21-__ 22-__ 23-__ 24-__ 24-FD
26-__ 27-__ 28-__ 29-__ 30-__ 31-__ 32-__
33-__ 34-__ 35-__ 36-__ 37-__ 39-__

Comments:
(N/A)

1 Metals in Water by ICP

Lab: Region 7 ESAT Contract Lab (In-House)

Method: EPA Region 7 RLAB Method 3122.3B

Samples: 1-__ 2-__ 3-__ 3-FD 5-__ 7-__ 8-__
9-__ 10-__ 11-__

Comments:
(N/A)

1 Methane, Ethane, Ethene in Water by GC/FID

Lab: REAP Contract Lab (Out-Source)

Method: Similar to RECAP SOP for Methane, Ethane, and Ethene (see comments)

Samples: 1-__ 2-__ 3-__ 3-FD 5-__ 7-__ 8-__
9-__ 10-__ 11-__ 51-FB

Comments:

1 Nitrogen, Nitrate in Water

Lab: Region 7 EPA Laboratory - Kansas City, Ks.

Method: EPA Region 7 RLAB Method 3133.2F

Samples: 1-__ 2-__ 3-__ 3-FD 5-__ 7-__ 8-__

Analysis **Comments About Results For This Analysis**

Samples: 9-__ 10-__ 11-__

Comments:
(N/A)

1 pH of Water by Field Measurement

Lab: (Field Measurement)

Method: Measurement of field parameter (no SOP)

Samples: 1-__	2-__	3-__	3-FD	5-__	7-__	8-__
9-__	10-__	11-__	15-__	16-__	17-__	18-__
19-__	20-__	21-__	22-__	23-__	24-__	24-FD
26-__	27-__	28-__	29-__	30-__	31-__	32-__
33-__	34-__	35-__	36-__	37-__	39-__	

Comments:
(N/A)

1 Sulfate in Water

Lab: Region 7 EPA Laboratory - Kansas City, Ks.

Method: EPA Region 7 RLAB Method 3135.3C

Samples: 1-__	2-__	3-__	3-FD	5-__	7-__	8-__
9-__	10-__	11-__				

Comments:

1 Sulfide in Water

Lab: Region 7 EPA Laboratory - Kansas City, Ks.

Method: EPA Region 7 RLAB Method 3135.8C

Samples: 1-__	2-__	3-__	3-FD	5-__	7-__	8-__
9-__	10-__	11-__				

Comments:

1 Temperature of Water by Field Measurement

Lab: (Field Measurement)

Method: Measurement of field parameter (no SOP)

Samples: 1-__	2-__	3-__	3-FD	5-__	7-__	8-__
9-__	10-__	11-__	15-__	16-__	17-__	18-__
19-__	20-__	21-__	22-__	23-__	24-__	24-FD
26-__	27-__	28-__	29-__	30-__	31-__	32-__
33-__	34-__	35-__	36-__	37-__	39-__	

Analysis **Comments About Results For This Analysis**

Comments:
(N/A)

1 Total Dissolved Oxygen in Water by Field Measurement

Lab: (Field Measurement)

Method: Measurement of field parameter (no SOP)

Samples:							
	1-__	2-__	3-__	3-FD	5-__	7-__	8-__
	9-__	10-__	11-__	15-__	16-__	17-__	18-__
	19-__	20-__	21-__	22-__	23-__	24-__	24-FD
	26-__	27-__	28-__	29-__	30-__	31-__	32-__
	33-__	34-__	35-__	36-__	37-__	39-__	

Comments:
(N/A)

1 Total Organic Carbon in Water

Lab: REAP Contract Lab (Out-Source)

Method: Similar to EPA SW846 Method 9060 or StandardMethods (20th Edtion) 5310 B, C, or D (see comments)

Samples:							
	1-__	2-__	3-__	3-FD	5-__	7-__	8-__
	9-__	10-__	11-__				

Comments:
(N/A)

1 Turbidity of Water by Field Measurement

Lab: (Field Measurement)

Method: Measurement of field parameter (no SOP)

Samples:							
	1-__	2-__	3-__	3-FD	5-__	7-__	8-__
	9-__	10-__	11-__	15-__	16-__	17-__	18-__
	19-__	20-__	21-__	22-__	23-__	24-__	24-FD
	26-__	27-__	28-__	29-__	30-__	31-__	32-__
	33-__	34-__	35-__	36-__	37-__	39-__	

Comments:
(N/A)

1 VOCs in Water by GC/MS for Low Detection Limits

Lab: Contract Lab Program (Out-Source)

Method: CLP Statement of Work

Samples:							
	1-__	2-__	3-__	3-FD	5-__	7-__	8-__
	9-__	10-__	11-__	15-__	16-__	17-__	18-__
	19-__	20-__	21-__	22-__	23-__	24-__	24-FD
	26-__	27-__	28-__	29-__	30-__	31-__	32-__

Analysis **Comments About Results For This Analysis**

Samples: 33-__ 34-__ 35-__ 36-__ 37-__ 38-__ 39-__
53-FB 54-FB 55-FB

Comments:
Methyl tert-butyl ether in sample -7 was J-coded. Although the analyte in question has been positively identified in the sample, the quantitation is an estimate (J-coded) due to low recovery of surrogate analyte in this sample. The actual concentration for this analyte may be higher than the reported value.

Trichlorofluoromethane, 1,1-dichloroethene, 1,1,2-trichloro-1,2,2-trifluroethane, methyl acetate, methyl tert-butyl ether, 1,1,1-trichloroethane, carbon tetrachloride, and 1,2-dichloroethane in samples –1, -7, -18, -20, -24FD, -27, and –29; cis-1,3-dichloropropene, trans-1,3-dichlorpropene, and 1,1,2-trichloroethane in samples –5, -7, -8, –26 and –28; 4-methyl-2-pentanone and 2-hexanone in sample –38; and 1,1,2,2-tetrachloroethane and 1,2-dibromo-3-chloropropane in samples –1, -5, -7, -10, -20, -24FD, -26, -27, -28, -30, -32, -37, -38, -53FB, and –55FB were UJ-coded. These analytes were not found in the samples at or above the reporting limit, however, the reporting limit is an estimate (UJ-coded) due to low recoveries of surrogate analytes. The actual reporting limit for these analytes may be higher than the reported value.

Toluene and chlorobenzene were UJ-coded in sample -24. These analytes were not found in the sample at or above the reporting limit, however, the reporting limit is an estimate (UJ-coded) due to low recovery of these analytes in the laboratory matrix spike. The actual reporting limit for these analytes may be higher than the reported value.

Slight methylene chloride contamination was found in the laboratory method blank. Only samples containing this analyte at a level greater than ten times the contamination level of the blank are reported without being qualified. All samples that contained this analyte but at a level less than ten times the contamination in the blank have the result U-coded indicating that the reporting limit has been raised to the level found in the sample. Samples affected were: –2, -3, -7, -8, -15, -17, -18, -19, -20, -21,-22, -23, -24, -24FD, -26, -27, -28, -29, -30, -31, -33, -35, -36, and –54FB.

Analysis/ Analyte	Units	1-__	2-__	3-__	3-FD
1 Chloride in Water					
Chloride	mg/L	104	96.6	99.5	103
1 Conductivity by Field Measurement					
Conductivity	umhos/cm	1075	1134	1030	1030
1 Metals in Water by ICP					
Iron	ug/L	2130	3700	1920	1960
1 Methane, Ethane, Ethene in Water by GC/FID					
Ethane	ug/L	2 U	2 U	2 U	2 U
Ethene	ug/L	3 U	3 U	3 U	3 U
Methane	ug/L	1 U	5	1 U	1 U
1 Nitrogen, Nitrate in Water					
Nitrate as Nitrogen	mg/L	0.03 U	0.25	0.03 U	0.03 U
1 pH of Water by Field Measurement					
pH	SU	6.9	6.9	6.8	6.8
1 Sulfate in Water					
Sulfate	mg/L	230	291	243	236
1 Sulfide in Water					
Sulfide	mg/L	1.64	0.033	0.075	0.079
1 Temperature of Water by Field Measurement					
Temperature	Deg C	14.0	14.3	14.7	14.7
1 Total Dissolved Oxygen in Water by Field Measurement					
Dissolved Oxygen	mg/L	0.5	0.5	0.5	0.5
1 Total Organic Carbon in Water					
Total Organic Carbon	mg/L	1 U	1 U	1.1	1 U
1 Turbidity of Water by Field Measurement					
Turbidity	NTU	3.5	0.2	-1.7	-1.7
1 VOCs in Water by GC/MS for Low Detection Limits					
Acetone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromochloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromodichloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromoform	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromomethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
2-Butanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Disulfide	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Carbon Tetrachloride	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
Chlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloroform	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Cyclohexane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromo-3-Chloropropane	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
Dibromochloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromoethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,3-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U

Analysis/ Analyte	Units	1-__	2-__	3-__	3-FD
1,4-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Dichlorodifluoromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloroethane	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
1,1-Dichloroethene	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
cis-1,2-Dichloroethene	ug/L	6.6	0.50 U	0.50 U	0.50 U
trans-1,2-Dichloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloropropane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,3-Dichloropropene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
trans-1,3-Dichloropropene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Ethyl Benzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
2-Hexanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Isopropylbenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Methyl Acetate	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
Methyl tert-butyl ether	ug/L	0.50 UJ	2.6	0.50 U	0.50 U
Methylcyclohexane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Methylene Chloride	ug/L	0.50 U	0.73 U	0.58 U	0.50 U
4-Methyl-2-Pentanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2,2-Tetrachloroethane	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
Tetrachloroethene	ug/L	6.5	0.50 U	0.50 U	0.50 U
Toluene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2,3-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2,4-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,1-Trichloroethane	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
1,1,2-Trichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Trichloroethene	ug/L	3.3	0.50 U	0.50 U	0.50 U
Trichlorofluoromethane	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
1,1,2-Trichlorotrifluoroethane	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
Vinyl Chloride	ug/L	0.50 U	1.7	0.50 U	0.50 U
total Xylene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U

Analysis/ Analyte	Units	5-__	7-__	8-__	9-__
1 Chloride in Water					
Chloride	mg/L	95.9	94.0	75.7	90.6
1 Conductivity by Field Measurement					
Conductivity	umhos/cm	1284	1250	997	1156
1 Metals in Water by ICP					
Iron	ug/L	984	4620	4720	637
1 Methane, Ethane, Ethene in Water by GC/FID					
Ethane	ug/L	2 U	2 U	2 U	2 U
Ethene	ug/L	3 U	3 U	3 U	3 U
Methane	ug/L	1 U	2	1 U	3
1 Nitrogen, Nitrate in Water					
Nitrate as Nitrogen	mg/L	0.26	0.03 U	0.03 U	0.52
1 pH of Water by Field Measurement					
pH	SU	6.8	6.9	7.1	6.8
1 Sulfate in Water					
Sulfate	mg/L	387	311	54.5	245
1 Sulfide in Water					
Sulfide	mg/L	0.010 U	0.010 U	0.035	0.010 U
1 Temperature of Water by Field Measurement					
Temperature	Deg C	15.7	13.4	12.4	16.3
1 Total Dissolved Oxygen in Water by Field Measurement					
Dissolved Oxygen	mg/L	0.8	0.6	0.5	0.4
1 Total Organic Carbon in Water					
Total Organic Carbon	mg/L	1 U	1 U	2.7	1 U
1 Turbidity of Water by Field Measurement					
Turbidity	NTU	-0.8	-0.6	4.2	3.7
1 VOCs in Water by GC/MS for Low Detection Limits					
Acetone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromochloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromodichloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromoform	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromomethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
2-Butanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Disulfide	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Carbon Tetrachloride	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 U
Chlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloroform	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Cyclohexane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromo-3-Chloropropane	ug/L	0.50 UJ	0.50 UJ	0.50 U	0.50 U
Dibromochloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromoethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,3-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U

Analysis/ Analyte	Units	5-__	7-__	8-__	9-__
1,4-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Dichlorodifluoromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloroethane	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 U
1,1-Dichloroethene	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 U
cis-1,2-Dichloroethene	ug/L	4.8	0.50 U	3.6	170
trans-1,2-Dichloroethene	ug/L	0.50 U	0.50 U	0.50 U	1.0
1,2-Dichloropropane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,3-Dichloropropene	ug/L	0.50 UJ	0.50 UJ	0.50 UJ	0.50 U
trans-1,3-Dichloropropene	ug/L	0.50 UJ	0.50 UJ	0.50 UJ	0.50 U
Ethyl Benzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
2-Hexanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Isopropylbenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Methyl Acetate	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 U
Methyl tert-butyl ether	ug/L	0.50 U	1.7 J	0.50 U	0.50 U
Methylcyclohexane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Methylene Chloride	ug/L	0.50 U	0.76 U	0.59 U	0.50 U
4-Methyl-2-Pentanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2,2-Tetrachloroethane	ug/L	0.50 UJ	0.50 UJ	0.50 U	0.50 U
Tetrachloroethene	ug/L	5.2	0.50 U	0.50 U	0.50 U
Toluene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2,3-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2,4-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,1-Trichloroethane	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 U
1,1,2-Trichloroethane	ug/L	0.50 UJ	0.50 UJ	0.50 UJ	0.50 U
Trichloroethene	ug/L	2.5	0.50 U	0.50 U	0.50 U
Trichlorofluoromethane	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 U
1,1,2-Trichlorotrifluoroethane	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 U
Vinyl Chloride	ug/L	0.50 U	0.66	5.8	2.8
total Xylene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U

Analysis/ Analyte	Units	10-__	11-__	15-__	16-__
1 Chloride in Water					
Chloride	mg/L	39.7	44.9		
1 Conductivity by Field Measurement					
Conductivity	umhos/cm	1169	1270	422	582
1 Metals in Water by ICP					
Iron	ug/L	3370	4370		
1 Methane, Ethane, Ethene in Water by GC/FID					
Ethane	ug/L	2 U	4		
Ethene	ug/L	3 U	3 U		
Methane	ug/L	7	210		
1 Nitrogen, Nitrate in Water					
Nitrate as Nitrogen	mg/L	0.03 U	0.03 U		
1 pH of Water by Field Measurement					
pH	SU	6.9	6.9	7.4	7.3
1 Sulfate in Water					
Sulfate	mg/L	206	389		
1 Sulfide in Water					
Sulfide	mg/L	0.010 U	0.105		
1 Temperature of Water by Field Measurement					
Temperature	Deg C	13.4	13.4	15.6	13.8
1 Total Dissolved Oxygen in Water by Field Measurement					
Dissolved Oxygen	mg/L	0.3	0.1	7.7	8.4
1 Total Organic Carbon in Water					
Total Organic Carbon	mg/L	1.7	1.7		
1 Turbidity of Water by Field Measurement					
Turbidity	NTU	5.5	7.0	0.0	0.0
1 VOCs in Water by GC/MS for Low Detection Limits					
Acetone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromochloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromodichloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromoform	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromomethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
2-Butanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Disulfide	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Carbon Tetrachloride	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloroform	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Cyclohexane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromo-3-Chloropropane	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
Dibromochloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromoethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,3-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U

Analysis/ Analyte	Units	10-__	11-__	15-__	16-__
1,4-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Dichlorodifluoromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,2-Dichloroethene	ug/L	14	290	0.50 U	0.50 U
trans-1,2-Dichloroethene	ug/L	0.50 U	1.6	0.50 U	0.50 U
1,2-Dichloropropane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,3-Dichloropropene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
trans-1,3-Dichloropropene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Ethyl Benzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
2-Hexanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Isopropylbenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Methyl Acetate	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Methyl tert-butyl ether	ug/L	8.9	1.1	0.50 U	0.50 U
Methylcyclohexane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Methylene Chloride	ug/L	0.50 U	0.50 U	0.80 U	0.50 U
4-Methyl-2-Pentanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2,2-Tetrachloroethane	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
Tetrachloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Toluene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2,3-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2,4-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,1-Trichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2-Trichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Trichloroethene	ug/L	6.1	0.98	0.50 U	0.50 U
Trichlorofluoromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2-Trichlorotrifluoroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Vinyl Chloride	ug/L	0.50 U	37	0.50 U	0.50 U
total Xylene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U

Analysis/ Analyte	Units	17-__	18-__	19-__	20-__
1 Conductivity by Field Measurement					
Conductivity	umhos/cm	1189	474	797	627
1 pH of Water by Field Measurement					
pH	SU	6.68	7.43	7.23	7.02
1 Temperature of Water by Field Measurement					
Temperature	Deg C	12.96	14.46	15.09	14.57
1 Total Dissolved Oxygen in Water by Field Measurement					
Dissolved Oxygen	mg/L	6.64	6.40	3.78	3.66
1 Turbidity of Water by Field Measurement					
Turbidity	NTU	0.9	0.6	-5.8	-3.9
1 VOCs in Water by GC/MS for Low Detection Limits					
Acetone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromochloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromodichloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromoform	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromomethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
2-Butanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Disulfide	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Carbon Tetrachloride	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 UJ
Chlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloroform	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Cyclohexane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromo-3-Chloropropane	ug/L	0.50 U	0.50 U	0.50 U	0.50 UJ
Dibromochloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromoethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,3-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,4-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Dichlorodifluoromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloroethane	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 UJ
1,1-Dichloroethene	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 UJ
cis-1,2-Dichloroethene	ug/L	0.50 U	2.6	0.50 U	0.50 U
trans-1,2-Dichloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloropropane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,3-Dichloropropene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
trans-1,3-Dichloropropene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Ethyl Benzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
2-Hexanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Isopropylbenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Methyl Acetate	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 UJ
Methyl tert-butyl ether	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 UJ
Methylcyclohexane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U

Analysis/ Analyte	Units	17-__	18-__	19-__	20-__
Methylene Chloride	ug/L	0.56 U	0.54 U	1.6 U	1.1 U
4-Methyl-2-Pentanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2,2-Tetrachloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 UJ
Tetrachloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Toluene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2,3-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2,4-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,1-Trichloroethane	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 UJ
1,1,2-Trichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Trichloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Trichlorofluoromethane	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 UJ
1,1,2-Trichlorotrifluoroethane	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 UJ
Vinyl Chloride	ug/L	0.50 U	5.1	0.50 U	0.50 U
total Xylene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U

Analysis/ Analyte	Units	21-__	22-__	23-__	24-__
1 Conductivity by Field Measurement					
Conductivity	umhos/cm	994	1636	1299	2285
1 pH of Water by Field Measurement					
pH	SU	7.10	6.93	6.92	6.91
1 Temperature of Water by Field Measurement					
Temperature	Deg C	14.10	13.11	13.29	14.12
1 Total Dissolved Oxygen in Water by Field Measurement					
Dissolved Oxygen	mg/L	5.82	6.23	4.97	8.80
1 Turbidity of Water by Field Measurement					
Turbidity	NTU	0.9	0.6	1.2	7.2
1 VOCs in Water by GC/MS for Low Detection Limits					
Acetone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromochloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromodichloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromoform	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromomethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
2-Butanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Disulfide	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Carbon Tetrachloride	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 UJ
Chloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloroform	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Cyclohexane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromo-3-Chloropropane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Dibromochloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromoethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,3-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,4-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Dichlorodifluoromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,2-Dichloroethene	ug/L	0.50 U	0.50 U	2.1	1.9
trans-1,2-Dichloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloropropane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,3-Dichloropropene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
trans-1,3-Dichloropropene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Ethyl Benzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
2-Hexanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Isopropylbenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Methyl Acetate	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Methyl tert-butyl ether	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Methylcyclohexane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U

Analysis/ Analyte	Units	21-__	22-__	23-__	24-__
Methylene Chloride	ug/L	0.57 U	0.60 U	0.59 U	0.64 U
4-Methyl-2-Pentanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2,2-Tetrachloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Tetrachloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Toluene	ug/L	0.50 U	0.50 U	0.50 U	0.50 UJ
1,2,3-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2,4-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,1-Trichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2-Trichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Trichloroethene	ug/L	0.95	0.50 U	0.50 U	0.50 U
Trichlorofluoromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2-Trichlorotrifluoroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Vinyl Chloride	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
total Xylene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U

Analysis/ Analyte	Units	24-FD	26-__	27-__	28-__
1 Conductivity by Field Measurement					
Conductivity	umhos/cm	2285	856	1003	811
1 pH of Water by Field Measurement					
pH	SU	6.91	7.39	7.25	7.43
1 Temperature of Water by Field Measurement					
Temperature	Deg C	14.12	12.91	14.42	15.97
1 Total Dissolved Oxygen in Water by Field Measurement					
Dissolved Oxygen	mg/L	8.80	6.80	6.90	8.26
1 Turbidity of Water by Field Measurement					
Turbidity	NTU	7.2	0.3	0.2	7.4
1 VOCs in Water by GC/MS for Low Detection Limits					
Acetone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromochloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromodichloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromoform	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromomethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
2-Butanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Disulfide	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Carbon Tetrachloride	ug/L	0.50 UJ	0.50 U	0.50 UJ	0.50 U
Chlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloroform	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Cyclohexane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromo-3-Chloropropane	ug/L	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ
Dibromochloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromoethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,3-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,4-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Dichlorodifluoromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloroethane	ug/L	0.50 UJ	0.50 U	0.50 UJ	0.50 U
1,1-Dichloroethene	ug/L	0.50 UJ	0.50 U	0.50 UJ	0.50 U
cis-1,2-Dichloroethene	ug/L	2.4	0.50 U	0.50 U	0.50 U
trans-1,2-Dichloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloropropane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,3-Dichloropropene	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 UJ
trans-1,3-Dichloropropene	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 UJ
Ethyl Benzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
2-Hexanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Isopropylbenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Methyl Acetate	ug/L	0.50 UJ	0.50 U	0.50 UJ	0.50 U
Methyl tert-butyl ether	ug/L	0.50 UJ	0.50 U	0.50 UJ	0.50 U
Methylcyclohexane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U

Analysis/ Analyte	Units	24-FD	26-__	27-__	28-__
Methylene Chloride	ug/L	0.79 U	0.80 U	0.88 U	1.3 U
4-Methyl-2-Pentanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2,2-Tetrachloroethane	ug/L	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ
Tetrachloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Toluene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2,3-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2,4-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,1-Trichloroethane	ug/L	0.50 UJ	0.50 U	0.50 UJ	0.50 U
1,1,2-Trichloroethane	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 UJ
Trichloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Trichlorofluoromethane	ug/L	0.50 UJ	0.50 U	0.50 UJ	0.50 U
1,1,2-Trichlorotrifluoroethane	ug/L	0.50 UJ	0.50 U	0.50 UJ	0.50 U
Vinyl Chloride	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
total Xylene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U

Analysis/ Analyte	Units	29-__	30-__	31-__	32-__
1 Conductivity by Field Measurement					
Conductivity	umhos/cm	1078	1550	1744	1740
1 pH of Water by Field Measurement					
pH	SU	7.23	7.02	7.43	7.37
1 Temperature of Water by Field Measurement					
Temperature	Deg C	14.33	14.37	24.72	23.12
1 Total Dissolved Oxygen in Water by Field Measurement					
Dissolved Oxygen	mg/L	7.86	8.88	7.67	7.64
1 Turbidity of Water by Field Measurement					
Turbidity	NTU	1.0	1.6	3.8	6.5
1 VOCs in Water by GC/MS for Low Detection Limits					
Acetone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromochloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromodichloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromoform	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromomethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
2-Butanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Disulfide	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Carbon Tetrachloride	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
Chlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloroform	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Cyclohexane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromo-3-Chloropropane	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 UJ
Dibromochloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromoethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,3-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,4-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Dichlorodifluoromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloroethane	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
1,1-Dichloroethene	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
cis-1,2-Dichloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
trans-1,2-Dichloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloropropane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,3-Dichloropropene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
trans-1,3-Dichloropropene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Ethyl Benzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
2-Hexanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Isopropylbenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Methyl Acetate	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
Methyl tert-butyl ether	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
Methylcyclohexane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U

Analysis/ Analyte	Units	29-__	30-__	31-__	32-__
Methylene Chloride	ug/L	2.2 U	0.87 U	0.74 U	0.50 U
4-Methyl-2-Pentanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2,2-Tetrachloroethane	ug/L	0.50 U	0.50 UJ	0.50 U	0.50 UJ
Tetrachloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Toluene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2,3-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2,4-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,1-Trichloroethane	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
1,1,2-Trichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Trichloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Trichlorofluoromethane	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
1,1,2-Trichlorotrifluoroethane	ug/L	0.50 UJ	0.50 U	0.50 U	0.50 U
Vinyl Chloride	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
total Xylene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U

Analysis/ Analyte	Units	33-__	34-__	35-__	36-__
1 Conductivity by Field Measurement					
Conductivity	umhos/cm	1240	1693	1769	424
1 pH of Water by Field Measurement					
pH	SU	6.29	7.43	7.54	8.4
1 Temperature of Water by Field Measurement					
Temperature	Deg C	13.88	25.02	24.56	11.0
1 Total Dissolved Oxygen in Water by Field Measurement					
Dissolved Oxygen	mg/L	12.87	7.70	7.94	10.7
1 Turbidity of Water by Field Measurement					
Turbidity	NTU	5.0	9.7	3.1	21
1 VOCs in Water by GC/MS for Low Detection Limits					
Acetone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromochloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromodichloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromoform	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Bromomethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
2-Butanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Disulfide	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Carbon Tetrachloride	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Chloroform	ug/L	19	0.50 U	0.50 U	0.50 U
Chloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Cyclohexane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromo-3-Chloropropane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Dibromochloromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromoethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,3-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,4-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Dichlorodifluoromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,2-Dichloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
trans-1,2-Dichloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloropropane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,3-Dichloropropene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
trans-1,3-Dichloropropene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Ethyl Benzene	ug/L	1.5	0.50 U	0.50 U	0.50 U
2-Hexanone	ug/L	5.0 U	5.0 U	5.0 U	5.0 U
Isopropylbenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Methyl Acetate	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Methyl tert-butyl ether	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Methylcyclohexane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U

ASR Number: 2475 **RLAB Approved Sample Analysis Results** **11/29/2004**

Project ID: RSA713P8 **Project Desc:** Railroad Avenue GW Contamination site - Phase 8

Analysis/ Analyte	Units	33-__	34-__	35-__	36-__
Methylene Chloride	ug/L	0.62 U	0.50 U	0.58 U	0.52 U
4-Methyl-2-Pentanone	ug/L	4.6	5.0 U	5.0 U	5.0 U
Styrene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2,2-Tetrachloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Tetrachloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Toluene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2,3-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,2,4-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,1-Trichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2-Trichloroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Trichloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Trichlorofluoromethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2-Trichlorotrifluoroethane	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
Vinyl Chloride	ug/L	0.50 U	0.50 U	0.50 U	0.50 U
total Xylene	ug/L	9.0	0.50 U	0.50 U	0.50 U

Analysis/ Analyte	Units	37-__	38-__	39-__	51-FB
1 Conductivity by Field Measurement					
Conductivity	umhos/cm	408		558	
1 Methane, Ethane, Ethene in Water by GC/FID					
Ethane	ug/L				2 U
Ethene	ug/L				3 U
Methane	ug/L				1 U
1 pH of Water by Field Measurement					
pH	SU	8.3		8.2	
1 Temperature of Water by Field Measurement					
Temperature	Deg C	11.1		13.1	
1 Total Dissolved Oxygen in Water by Field Measurement					
Dissolved Oxygen	mg/L	9.7		8.0	
1 Turbidity of Water by Field Measurement					
Turbidity	NTU	26		30	
1 VOCs in Water by GC/MS for Low Detection Limits					
Acetone	ug/L	5.0 U	5.1	5.0 U	
Benzene	ug/L	0.50 U	0.50 U	0.50 U	
Bromochloromethane	ug/L	0.50 U	0.50 U	0.50 U	
Bromodichloromethane	ug/L	0.50 U	0.50 U	0.50 U	
Bromoform	ug/L	0.50 U	0.50 U	0.50 U	
Bromomethane	ug/L	0.50 U	0.50 U	0.50 U	
2-Butanone	ug/L	5.0 U	5.0 U	5.0 U	
Carbon Disulfide	ug/L	0.50 U	0.50 U	0.50 U	
Carbon Tetrachloride	ug/L	0.50 U	0.50 U	0.50 U	
Chlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	
Chloroethane	ug/L	0.50 U	0.50 U	0.50 U	
Chloroform	ug/L	0.50 U	0.50 U	0.50 U	
Chloromethane	ug/L	0.50 U	0.50 U	0.50 U	
Cyclohexane	ug/L	0.50 U	0.50 U	0.50 U	
1,2-Dibromo-3-Chloropropane	ug/L	0.50 UJ	0.50 UJ	0.50 U	
Dibromochloromethane	ug/L	0.50 U	0.50 U	0.50 U	
1,2-Dibromoethane	ug/L	0.50 U	0.50 U	0.50 U	
1,2-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	
1,3-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	
1,4-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	
Dichlorodifluoromethane	ug/L	0.50 U	0.50 U	0.50 U	
1,1-Dichloroethane	ug/L	0.50 U	0.50 U	0.50 U	
1,2-Dichloroethane	ug/L	0.50 U	0.50 U	0.50 U	
1,1-Dichloroethene	ug/L	0.50 U	0.50 U	0.50 U	
cis-1,2-Dichloroethene	ug/L	0.50 U	0.50 U	0.50 U	
trans-1,2-Dichloroethene	ug/L	0.50 U	0.50 U	0.50 U	
1,2-Dichloropropane	ug/L	0.50 U	0.50 U	0.50 U	
cis-1,3-Dichloropropene	ug/L	0.50 U	0.50 U	0.50 U	
trans-1,3-Dichloropropene	ug/L	0.50 U	0.50 U	0.50 U	
Ethyl Benzene	ug/L	0.50 U	0.50 U	0.50 U	
2-Hexanone	ug/L	5.0 U	5.0 UJ	5.0 U	

Analysis/ Analyte	Units	37-__	38-__	39-__	51-FB
Isopropylbenzene	ug/L	0.50 U	0.50 U	0.50 U	
Methyl Acetate	ug/L	0.50 U	0.50 U	0.50 U	
Methyl tert-butyl ether	ug/L	0.50 U	0.50 U	0.50 U	
Methylcyclohexane	ug/L	0.50 U	0.50 U	0.50 U	
Methylene Chloride	ug/L	0.50 U	0.50 U	0.50 U	
4-Methyl-2-Pentanone	ug/L	5.0 U	5.0 UJ	5.0 U	
Styrene	ug/L	0.50 U	0.64	0.50 U	
1,1,2,2-Tetrachloroethane	ug/L	0.50 UJ	0.50 UJ	0.50 U	
Tetrachloroethene	ug/L	0.50 U	0.50 U	0.50 U	
Toluene	ug/L	0.50 U	0.50 U	0.50 U	
1,2,3-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	
1,2,4-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U	
1,1,1-Trichloroethane	ug/L	0.50 U	0.50 U	0.50 U	
1,1,2-Trichloroethane	ug/L	0.50 U	0.50 U	0.50 U	
Trichloroethene	ug/L	0.50 U	0.50 U	0.50 U	
Trichlorofluoromethane	ug/L	0.50 U	0.50 U	0.50 U	
1,1,2-Trichlorotrifluoroethane	ug/L	0.50 U	0.50 U	0.50 U	
Vinyl Chloride	ug/L	0.50 U	0.50 U	0.50 U	
total Xylene	ug/L	0.50 U	0.50 U	0.50 U	

Analysis/ Analyte	Units	53-FB	54-FB	55-FB
1 VOCs in Water by GC/MS for Low Detection Limits				
Acetone	ug/L	5.0 U	5.0 U	5.0 U
Benzene	ug/L	0.50 U	0.50 U	0.50 U
Bromochloromethane	ug/L	0.50 U	0.50 U	0.50 U
Bromodichloromethane	ug/L	0.50 U	0.50 U	0.50 U
Bromoform	ug/L	0.50 U	0.50 U	0.50 U
Bromomethane	ug/L	0.50 U	0.50 U	0.50 U
2-Butanone	ug/L	5.0 U	5.0 U	5.0 U
Carbon Disulfide	ug/L	0.50 U	0.50 U	0.50 U
Carbon Tetrachloride	ug/L	0.50 U	0.50 U	0.50 U
Chlorobenzene	ug/L	0.50 U	0.50 U	0.50 U
Chloroethane	ug/L	0.50 U	0.50 U	0.50 U
Chloroform	ug/L	0.50 U	0.50 U	0.50 U
Chloromethane	ug/L	0.50 U	0.50 U	0.50 U
Cyclohexane	ug/L	0.50 U	0.50 U	0.50 U
1,2-Dibromo-3-Chloropropane	ug/L	0.50 UJ	0.50 U	0.50 UJ
Dibromochloromethane	ug/L	0.50 U	0.50 U	0.50 U
1,2-Dibromoethane	ug/L	0.50 U	0.50 U	0.50 U
1,2-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U
1,3-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U
1,4-Dichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U
Dichlorodifluoromethane	ug/L	0.50 U	0.50 U	0.50 U
1,1-Dichloroethane	ug/L	0.50 U	0.50 U	0.50 U
1,2-Dichloroethane	ug/L	0.50 U	0.50 U	0.50 U
1,1-Dichloroethene	ug/L	0.50 U	0.50 U	0.50 U
cis-1,2-Dichloroethene	ug/L	0.50 U	0.50 U	0.50 U
trans-1,2-Dichloroethene	ug/L	0.50 U	0.50 U	0.50 U
1,2-Dichloropropane	ug/L	0.50 U	0.50 U	0.50 U
cis-1,3-Dichloropropene	ug/L	0.50 U	0.50 U	0.50 U
trans-1,3-Dichloropropene	ug/L	0.50 U	0.50 U	0.50 U
Ethyl Benzene	ug/L	0.50 U	0.50 U	0.50 U
2-Hexanone	ug/L	5.0 U	5.0 U	5.0 U
Isopropylbenzene	ug/L	0.50 U	0.50 U	0.50 U
Methyl Acetate	ug/L	0.50 U	0.50 U	0.50 U
Methyl tert-butyl ether	ug/L	0.50 U	0.50 U	0.50 U
Methylcyclohexane	ug/L	0.50 U	0.50 U	0.50 U
Methylene Chloride	ug/L	0.50 U	0.76 U	0.50 U
4-Methyl-2-Pentanone	ug/L	5.0 U	5.0 U	5.0 U
Styrene	ug/L	0.50 U	0.50 U	0.50 U
1,1,2,2-Tetrachloroethane	ug/L	0.50 UJ	0.50 U	0.50 UJ
Tetrachloroethene	ug/L	0.50 U	0.50 U	0.50 U
Toluene	ug/L	0.50 U	0.50 U	0.50 U
1,2,3-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U
1,2,4-Trichlorobenzene	ug/L	0.50 U	0.50 U	0.50 U
1,1,1-Trichloroethane	ug/L	0.50 U	0.50 U	0.50 U
1,1,2-Trichloroethane	ug/L	0.50 U	0.50 U	0.50 U

Analysis/ Analyte	Units	53-FB	54-FB	55-FB
Trichloroethene	ug/L	0.50 U	0.50 U	0.50 U
Trichlorofluoromethane	ug/L	0.50 U	0.50 U	0.50 U
1,1,2-Trichlorotrifluoroethane	ug/L	0.50 U	0.50 U	0.50 U
Vinyl Chloride	ug/L	*0.50 U*	*0.50 U*	*0.50 U*
total Xylene	ug/L	0.50 U	0.50 U	0.50 U

Appendix G
Monitored Natural Attenuation Screening Step 1
(USEPA 1998)

North Plume Area Railroad Avenue Site, West Des Moines, Iowa
MNA Screening Step 1 (USEPA 1998)

Analyte	Average Concentration in Most Contaminated Zone (May and November 2004)	Points Awarded[1]
Dissolved Oxygen	0.1 mg/L	3
Nitrate	<0.03 mg/L	2
Iron (II)	3.5 mg/L	3
Sulfate	335 mg/L	0
Sulfide	0.11 mg/L	0
Methane	0.16 mg/L	1[2]
ORP (Eh)	-6 mv	1
pH	7.0 SU	0
Total Organic Carbon	1.7 mg/L	0
Temperature	13.6 degrees C	0
Chloride	45 mg/L	0
PCE (source product)	< 0.5 ug/L	0
TCE (source/daughter product)	1 ug/L	1[2]
cis-1,2-DCE (daughter product)	330 ug/L	2
Vinyl Chloride (daughter product)	47 ug/L	2
Ethene/Ethane (daughter product VC)	4 ug/L (maximum)	1[2]
	Total Screening Points	16[3]

Total screening points of 16 indicate adequate evidence[3] for anaerobic biodegradation of chlorinated organics (USEPA 1998).

Note 1 = See attached Table 2.3 (USEPA 1998).
Note 2 = Partial points awarded, see attached Table 2.3 (USEPA 1998).
Note 3 = See attached Table 2.4 (USEPA 1998).

Table 2.3 Analytical Parameters and Weighting for Preliminary Screening for Anaerobic Biodegradation Processes[a/]

Analysis	Concentration in Most Contaminated Zone	Interpretation	Value
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at higher concentrations	3
Oxygen*	>5 mg/L	Not tolerated; however, VC may be oxidized aerobically	-3
Nitrate*	<1 mg/L	At higher concentrations may compete with reductive pathway	2
Iron II*	>1 mg/L	Reductive pathway possible; VC may be oxidized under Fe(III)-reducing conditions	3
Sulfate*	<20 mg/L	At higher concentrations may compete with reductive pathway	2
Sulfide*	>1 mg/L	Reductive pathway possible	3
Methane*	<0.5 mg/L >0.5 mg/L	VC oxidizes Ultimate reductive daughter product, VC Accumulates	0 3
Oxidation Reduction Potential* (ORP) against Ag/AgCl electrode	<50 millivolts (mV) <-100mV	Reductive pathway possible Reductive pathway likely	1 2
pH*	5 < pH < 9 5 > pH >9	Optimal range for reductive pathway Outside optimal range for reductive pathway	0 -2
TOC	> 20 mg/L	Carbon and energy source; drives dechlorination; can be natural or anthropogenic	2
Temperature*	> 20°C	At T >20°C biochemical process is accelerated	1
Carbon Dioxide	>2x background	Ultimate oxidative daughter product	1
Alkalinity	>2x background	Results from interaction between CO_2 and aquifer minerals	1
Chloride*	>2x background	Daughter product of organic chlorine	2
Hydrogen	>1 nM	Reductive pathway possible, VC may accumulate	3
Hydrogen	<1 nM	VC oxidized	0
Volatile Fatty Acids	> 0.1 mg/L	Intermediates resulting from biodegradation of more complex compounds; carbon and energy source	2
BTEX*	> 0.1 mg/L	Carbon and energy source; drives dechlorination	2
Tetrachloroethene		Material released	0
Trichloroethene*		Material released Daughter product of PCE	0 2[a/]
DCE*		Material released Daughter product of TCE If cis is > 80% of total DCE it is likely a daughter product 1,1-DCE can be chemical reaction product of TCA	0 2[a/]
VC*		Material released Daughter product of DCE	0 2[a/]
1,1,1-Trichloroethane*		Material released	0
DCA		Daughter product of TCA under reducing conditions	2
Carbon Tetrachloride		Material released	0
Chloroethane*		Daughter product of DCA or VC under reducing conditions	2
Ethene/Ethane	>0.01mg/L >0.1 mg/L	Daughter product of VC/ethene	2 3
Chloroform		Material released Daughter product of Carbon Tetrachloride	0 2
Dichloromethane		Material released Daughter product of Chloroform	0 2

* Required analysis. a/ Points awarded only if it can be shown that the compound is a daughter product (i.e., not a constituent of the source NAPL).

Table 2.4 Interpretation of Points Awarded During Screening Step 1

Score	Interpretation
0 to 5	Inadequate evidence for anaerobic biodegradation* of chlorinated organics
6 to 14	Limited evidence for anaerobic biodegradation* of chlorinated organics
15 to 20	Adequate evidence for anaerobic biodegradation* of chlorinated organics
> 20	Strong evidence for anaerobic biodegradation* of chlorinated organics

**reductive dechlorination*