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SOLUTIA

Solutions for a better life.

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March 13, 2009

Mr. Kenneth Bardo - LU-9J
U.S. EPA Region V
Corrective Action Section
77 West Jackson Boulevard
Chicago, IL 60604-3507

VIA FEDEX

Re: Long-Term Monitoring Program
4th Quarter 2008 Data Report
Solutia Inc., W. G. Krummrich Plant, Sauget, IL

Dear Mr. Bardo:

Enclosed please find the Long-Term Monitoring Program 4th Quarter 2008 Data Report for Solutia Inc.'s W. G. Krummrich Plant, Sauget, IL.

If you have any questions or comments regarding this report, please contact me at (314) 674-3312 or gmrina@solutia.com

Sincerely,

Gerald M. Rinaldi
Manager, Remediation Services

Enclosure

cc: Distribution List

DISTRIBUTION LIST

Long-Term Monitoring Program
4th Quarter 2008 Data Report
Solutia Inc., W. G. Krummrich Plant, Sauget, IL

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4TH QUARTER 2008
DATA REPORT

LONG-TERM MONITORING PROGRAM

SOLUTIA INC.
W.G. KRUMMRICH FACILITY
SAUGET, ILLINOIS

Prepared for

Solutia Inc.
575 Maryville Centre Drive
St. Louis, Missouri 63141

March 2009

URS

URS Corporation
1001 Highland Plaza Drive West, Suite 300
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Project # 21561996.00002

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1.0 INTRODUCTION

This report presents the results of the 4th Quarter 2008 (4Q08) sampling event performed at the Solutia Inc. (Solutia) W.G. Krummrich (WGK) Facility located in Sauget, Illinois (Site). This sampling event was conducted in accordance the Long-Term Monitoring Program (LTMP) Work Plan (Solutia 2008). The Site location is presented in **Figure 1**.

The LTMP was designed to evaluate the effectiveness of monitored natural attenuation (MNA), including: 1) a clear and meaningful trend of decreasing contaminant mass; 2) data that indirectly demonstrate the types and rates of natural attenuation processes active at the site; and 3) data that directly demonstrate the occurrence of biodegradation processes at the site.

Groundwater Sampling Location and Frequency - As specified in the LTMP Work Plan, groundwater samples will be collected for eight quarters from five monitoring wells downgradient of the Former Chlorobenzene Process Area (CPAMW-1D through CPAMW-5D) and five monitoring wells downgradient of the Former Benzene Storage Area (BSAMW-1S and BSAMW-2D through BSAMW-5D) to assess attenuation processes in the American Bottoms aquifer, as impacted groundwater from these source areas migrates toward and discharges to the Mississippi River.

Monitoring wells BSAMW-1S, 2D, 3D, 4D and 5D are located within the limiting flow lines downgradient of the Former Benzene Storage Area. Monitoring wells CPAMW-1D, 2D, 3D, 4D and 5D are located within the limiting flow lines downgradient of the Former Chlorobenzene Process Area. The North Tank Farm, Former Steamer Overhead Tank, and "Little Mo" (a former benzene storage tank) are also potential benzene and chlorobenzene source areas located within the limiting flow lines for the Former Chlorobenzene Process Area. Source areas and monitoring well locations are presented on **Figure 2**.

Quarterly sampling under the Long-Term Monitoring Program commenced 3Q08 and will continue for a total of eight quarters. At the end of eight quarters, groundwater quality and attenuation process data will be evaluated to determine if longer sampling intervals (e.g. semiannual or annual) are appropriate.

Groundwater Sampling Parameters - During the 4Q08 groundwater sampling event, groundwater samples were analyzed for benzene, monochlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene using USEPA Method 8260B to demonstrate a trend of decreasing contaminant mass and/or concentrations over time. In accordance with USEPA comments regarding the Long-Term Monitoring Plan, the following constituents were added to the groundwater monitoring parameter list on a semi-annual basis (1st and 3rd Quarters):

- 4-Chloroaniline: CPAMW-3D, CPAMW-4D, and CPAMW-5D
- 2-Chlorophenol: All Wells
- 1, 2, 4-Trichlorobenzene: All Wells
- 1,4-Dioxane: BSAMW-2D, BSAMW-3D, BSAMW-4D, and BSAMW-5D

MNA samples were collected from all ten long-term monitoring program wells. Evaluation of the types of active natural attenuation processes at the site is based on the following key geochemical parameters:

• Electron Donors:	Organic Carbon (Total and Dissolved)
• Electron Acceptors:	Iron (Total and Dissolved) Manganese (Total and Dissolved) Nitrate Sulfate
• Biodegradation Byproducts:	Carbon Dioxide Chloride Methane
• Biodegradation Indicators:	Alkalinity

Direct demonstration of the occurrence of biodegradation processes is completed quarterly utilizing Microbial Insights (www.microbe.com) Bio-Trap® Samplers for Phospholipid Fatty Acid Analysis, along with Stable Isotope Probes (SIPs) for benzene or chlorobenzene detection in select wells.

2.0 FIELD PROCEDURES

URS Corporation (URS) conducted 4Q08 field activities from November 17 through 24, 2008 in accordance with procedures outlined in the LTMP Work Plan, including the collection of appropriate quality assurance and quality control (QA/QC) samples. The following section summarizes field investigative procedures:

Groundwater Level Measurements – On November 17, 2008, URS personnel used an electronic oil/water interface probe to measure depth to static groundwater levels and if present, the thickness of non-aqueous phase liquid (NAPL), to 0.01 feet. Depth to groundwater measurements were collected from accessible existing wells (i.e., GM-, K- , PSMW- and PMA-series) and piezometers clusters (installed for the Sauget Area 2 RI/FS and WGK CA-750 Environmental Indicator projects) specified in the LTMP Work Plan **(Figure 3**). NAPL was not detected within any of the monitoring wells.

Well gauging information for the 4Q08 event is presented in **Table 1**. As the middle and deep hydrogeologic units are the primary migration pathway for constituents present in groundwater at the WGK Facility, a groundwater potentiometric surface map based on water level data from

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wells screened in the Middle Hydrogeologic Unit (MHU) and Deep Hydrogeologic Unit (DHU) is presented as (**Figure 3)**.

Groundwater Sampling - Low-flow sampling techniques were used for groundwater sample collection on November 20, 21 and 24, 2008. At each monitoring well, disposable, low-density polyethylene tubing was attached to a submersible pump, which was then lowered into the well to the middle of the screened interval. Monitoring wells were purged at a rate of 200 mL/minute to minimize drawdown. If significant drawdown occurred, flow rates were reduced.

Drawdown was measured periodically throughout purging to ensure that it did not exceed 25% of the distance between the pump intake and the top of the screen. Once the flow rate and drawdown were stable, field measurements were collected approximately every three to five minutes. Purging of a well was considered complete when the following water quality parameters remained stable over three consecutive flow-thru cell volumes:

Parameter	Stabilization Guidelines
Dissolved Oxygen (DO)	+/- 10% or +/-0.2 mg/L, whichever is greatest
Oxidation-Reduction Potential (ORP)	+/- 20 mV
PH	+/- 0.2 units
Specific Conductivity	+/- 3%

Sampling commenced upon completion of purging. Prior to sample collection, the flow-thru cell was bypassed to allow for collection of uncompromised groundwater. Samples were collected at a flow rate less than or equal to the rate at which stabilization was achieved. Sample containers were filled based on laboratory analysis to be performed. Bottles were filled in the following order:

- Volatile Organic Compounds (VOCs)
- Gas Sensitive Parameters (e.g., methane, carbon dioxide)
- General Chemistry (i.e., alkalinity, chloride, total and dissolved iron, total and dissolved manganese, nitrate, sulfate, and total and dissolved organic carbon)
- Field Parameters (i.e., dissolved oxygen, ferrous iron, and oxidation-reduction potential).

Samples collected for ferrous iron, dissolved iron and dissolved manganese analysis were filtered in the field using in-line 0.2 micron disposable filters, represented by a notation of “F (0.2)” in the sample nomenclature.

Quality assurance/quality control (QA/QC) samples consisting of analytical duplicates (AD) and equipment blanks (EB) were collected at a rate of 10% and matrix spike/matrix spike duplicates (MS/MSD) were collected at a rate of 5%. In addition, trip blanks accompanied each shipment containing samples for VOC analysis.

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Each investigative or QC sample was labeled immediately following collection. Sample identification number consisted of the following nomenclature "AAAMW#-MMYY-QAC" where:

- "**AAA**" denotes "Chlorobenzene Process Area (CPA)" or "Benzene Storage Area (BSA)"and "**MW-#**" denotes "Monitoring Well Number":
- **MMYY –** Month and year of sampling quarter, e.g.: Fourth quarter (November) 2008, 1108
- **"QAC"** denotes QA/QC sample
  - **AD –** analytical duplicate
  - **EB –** equipment blank
  - **MS or MSD –** Matrix Spike or Matrix Spike Duplicate

Upon collection and labeling, sample containers were immediately placed inside an iced cooler, packed in such a way as to help prevent breakage and maintain inside temperature at approximately 4°C. Field personnel recorded the project identification and number, sample description/location, required analysis, date and time of sample collection, type and matrix of sample, number of sample containers, preservative used (if applicable), analysis requested/comments, and sampler signature/date/time, with permanent ink on the chain-of-custody (COC). Prior to shipment, coolers were sealed between the lid and sides of the cooler with a custody seal, and then shipped to TestAmerica in Savannah, Georgia by means of an overnight delivery service. Field sampling data sheets are included in **Appendix A**, COC forms are included in **Appendix B**.

Field personnel and equipment were decontaminated according to procedures specified in the LTMP Work Plan to ensure the health and safety of those present, maintain sample integrity, and minimize movement of contamination between the work area and off-site locations. Equipment used on-site was decontaminated prior to beginning work, between sampling locations and/or uses, and prior to demobilizing from the site. Non-disposable purging and sampling equipment was decontaminated between each sample acquisition by washing with an Alconox® or equivalent detergent wash, a potable water rinse, and a distilled water rinse. Personnel and small equipment decontamination was performed at the sample locations. Disposable sampling equipment, such as gloves were collected and bagged on a daily basis and managed in accordance with Solutia procedures. Purge water was containerized and handled per Solutia procedures.

Biodegradation Evaluation Sampling - Bio-Trap® samplers and Stable Isotope Probes (SIPs), provided by Microbial Insights, Inc. (Rockford, TN), were utilized in the LTMP to provide information regarding biodegradation potential of the Shallow Hydrogeologic Unit (SHU), the MHU and the DHU. Bio-Trap® samplers are passive sampling tools which, over time, collect microbes across a membrane that serves as the sampling matrix. SIPs are similar passive

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sampling tools that are analyzed to measure the degradation of a specific contaminant (i.e., benzene and chlorobenzene).

On November 4, 2008, URS field personnel deployed Bio-Trap® samplers in each of the ten LTMP wells for PLFA analysis. A benzene SIP and a monochlorobenzene SIP were placed in monitoring wells BSAMW02D and CPAMW03D, respectively. Bio-Trap® samplers and SIPs were tied to nylon line attached to the well cap and lowered to the middle of the well screen.

On December 4, 2008, the Bio-Trap® samplers and SIPs were retrieved from the wells, sealed in Ziploc® bags, labeled with the proper well identification and placed in an iced sample cooler with a signed COC. Sealed sample coolers were sent to Microbial Insights, Inc. for analysis.

3.0 LABORATORY PROCEDURES

Samples were analyzed by TestAmerica for VOCs and MNA parameters, using the following methodologies:

- VOCs, via USEPA SW-846 Method 8260B
- MNA parameters: alkalinity (310.1), carbon dioxide (310.1), chloride (325.2), total and dissolved iron (6010B), total and dissolved manganese (6010B), methane (RSK 175), nitrate (353.2), sulfate (375.4), and total and dissolved organic carbon (415.1).

Dichlorobenzenes were quantitated using Method 8260B because of potential volatilization losses associated with Method 8270C. Laboratory results were provided in electronic and hard copy formats.

4.0 QUALITY ASSURANCE

Analytical data were reviewed for quality and completeness, as described in the LTMP Work Plan. Data qualifiers were added, as appropriate, and are included on the data tables and the laboratory result pages. The Quality Assurance report is included as **Appendix C**. Laboratory result pages (i.e. Form 1's) along with data validation review sheets are included in **Appendix D**.

A total of 14 samples (10 investigative groundwater samples, one field duplicate, one MS/MSD pair, and one equipment blank) were prepared and analyzed by Test America for combinations of VOCs, dissolved gasses, metals, and general chemistry. In addition, three trip blanks were included in the coolers that contained samples for VOC analysis and were analyzed for VOCs by USEPA SW-846 Method 8260B. The results for the various analyses were submitted as sample delivery groups (SDGs) KPS046 and KPS047. The samples contained in each SDG are listed below:

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KPS046	KPS047
CPAMW02-1108	TB112408
CPAMW02-F-1108	BSAMW03-1108-EB
CPAMW02-1108-AD	CPAMW03-1108
CPAMW01-1108	CPAMW03-F-1108
CPAMW01-F-1108	BSAMW02-1108
BSAMW01-1108	BSAMW02-F-1108
BSAMW01-F-1108	CPAMW05-1108
BSAMW04-1108	CPAMW05-F-1108
BSAMW04-F-1108	
TB112008	
BSAMW05-1108	
BSAMW05-F-1108	
CPAMW04-1108	
CPAMW04-F-1108	
BSAMW03-1108	
BSAMW03-F-1108	
TB112108	

Evaluation of the analytical data followed procedures outlined in the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, (USEPA, 1999) and the LTMP Work Plan (Solutia 2008).

Based on the above mentioned criteria, groundwater results reported for the analyses performed were accepted for their intended use. Acceptable levels of accuracy and precision, based on MS/MSD, laboratory control sample (LCS), surrogate and field duplicate data were achieved for these SDGs to meet the project objectives. Completeness which is defined as the percentage of analytical results which are judged to be valid, including estimated (J/UJ) data was 100 percent.

5.0 OBSERVATIONS

Groundwater analytical detections and MNA results for the 4Q08 LTMP sampling event are presented on **Tables 2** and **3,** respectively. Five constituents - benzene, chlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene and 1,4-dichlorobenzene - were analyzed in samples collected from the ten LTMP wells during this sampling event. Each of these constituents is discussed below:

Benzene - Benzene was detected in collected samples at levels above the laboratory reporting limit in eight of the ten wells sampled in 4Q08, ranging from 97 µg/L (BSAMW03D) to 1,200,000 µg/L (BSAMW01S). Downgradient of the Former Benzene Storage Area benzene was detected in the DHU at concentrations of 16,000 µg/L (BSAMW02D) and 97 µg/L (BSAMW03D). Near

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the river north of the Sauget Area 2 Groundwater Migration Control System (SA2 GMCS), benzene was detected in the DHU at concentrations of 590 µg/L (BSAMW04D) and 130 µg/L (BSAMW05D).

Benzene was detected at the Former Chlorobenzene Process Area at concentrations of 3,200 µg/L (CPAMW01D) and 2,000/1,900 µg/L (CPAMW02D and duplicate) at the North Tank Farm. Downgradient of the Former Chlorobenzene Storage Area, benzene was detected in the DHU at a concentration of 810 µg/L (CPAMW04D). Benzene was not detected in CPAMW03D or near the river north of the SA2 GMCS in DHU well CPAMW05D.

Chlorobenzenes (Total) - Total chlorobenzenes (chlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4, dichlorobenzene) were detected at levels above the laboratory reporting limit in nine of the ten wells sampled in 4Q08, ranging from 259 µg/L (CPAMW04D) to 51,030 µg/L (CPAMW02D-AD)/(50,040 µg/L-CPAMW02D). Elevated concentrations were also detected in source area well CPAMW01D (48,400 µg/L). Downgradient of the Former Chlorobenzene Storage Area, total chlorobenzenes were detected in the DHU at concentrations of 450 µg/L (CPAMW03D) and 259 µg/L (CPAMW04D). Total chlorobenzenes were detected in the DHU near the river north of SA2 GMCS at a concentration of 1,400 µg/L (CPAMW05D).

Downgradient of the Former Benzene Storage Area, total chlorobenzenes were detected at concentrations of 2,500 µg/L (BSAMW02D) and 1,798 µg/L (BSAMW03D). North of the SA2 GMCS, near the river, total chlorobenzenes were detected in the DHU at concentrations of 2,410 µg/L (BSAMW04D) and 349 µg/L (BSAMW05D).

Figure 4 displays benzene and total chlorobenzenes results from the 4Q08 sampling event. These constituents provide a good depiction of the areal extent of contaminant migration from source areas at the WGK Facility.

Monitored Natural Attenuation - The MNA results for this quarter are presented on **Table 3**. PLFA and SIP laboratory results are included in **Appendix E**. These data will be compared to other quarterly sampling data in the first annual natural attenuation evaluation report submitted following 2Q09 sampling.

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6.0 REFERENCES

Solutia Inc, 2008. Long Term Monitoring Program, Solutia, Inc., W.G. Krummrich Facility, Sauget, Illinois, April 2008.

USEPA, 1999. Contract Laboratory Program National Functional Guidelines for Organic Data Review.

USEPA, 2004. Contract Laboratory Program National Functional Guidelines for Inorganic Data Review.

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Figures

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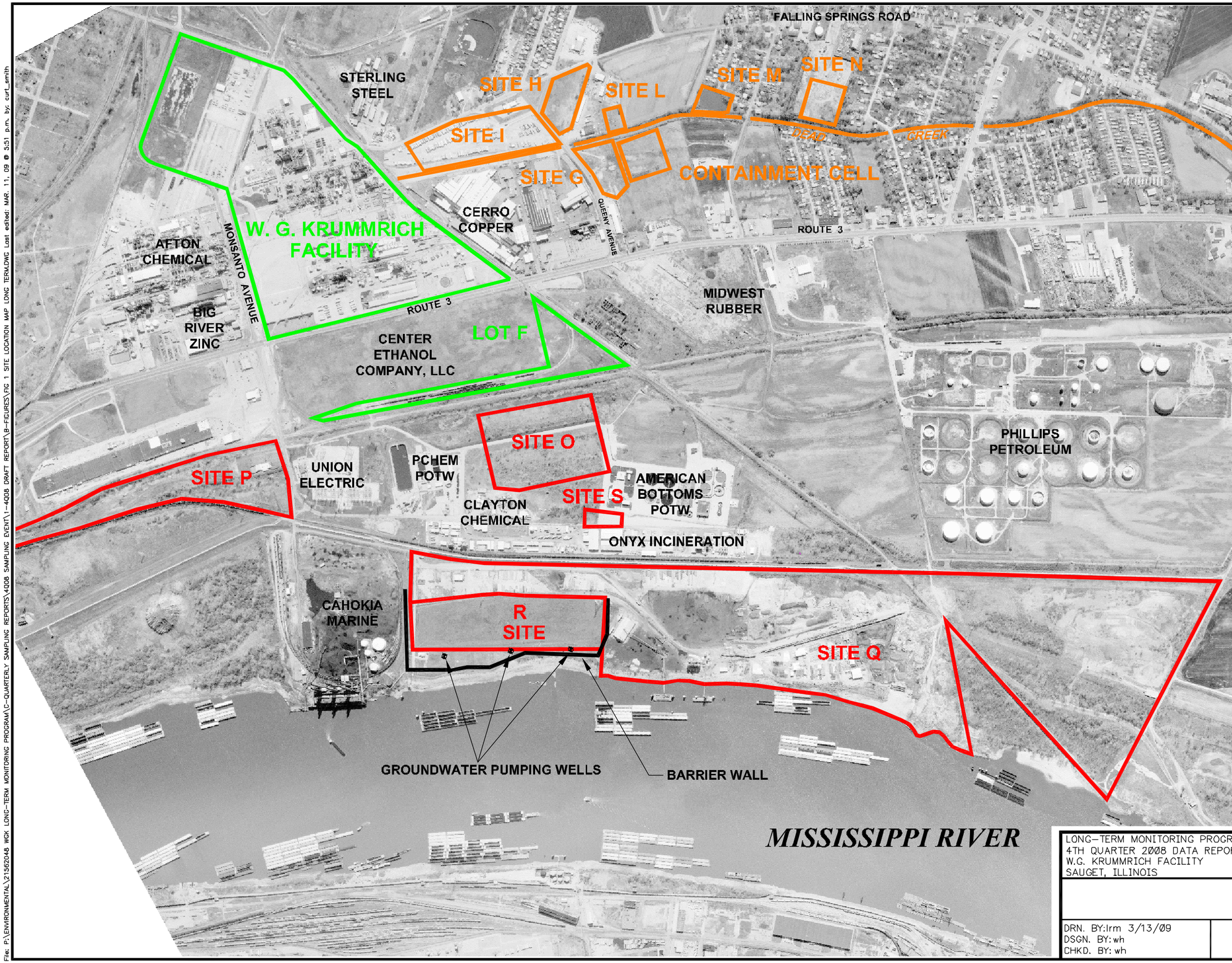

LEGEND

- W.G. KRUMMRICH FACILITY
- SAUGET AREA #1
- SAUGET AREA #2

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SCALE FEET

LONG-TERM MONITORING PROGRAM
4TH QUARTER 2008 DATA REPORT
W.G. KRUMMRICH FACILITY
SAUGET, ILLINOIS

PROJECT NO. 21562048

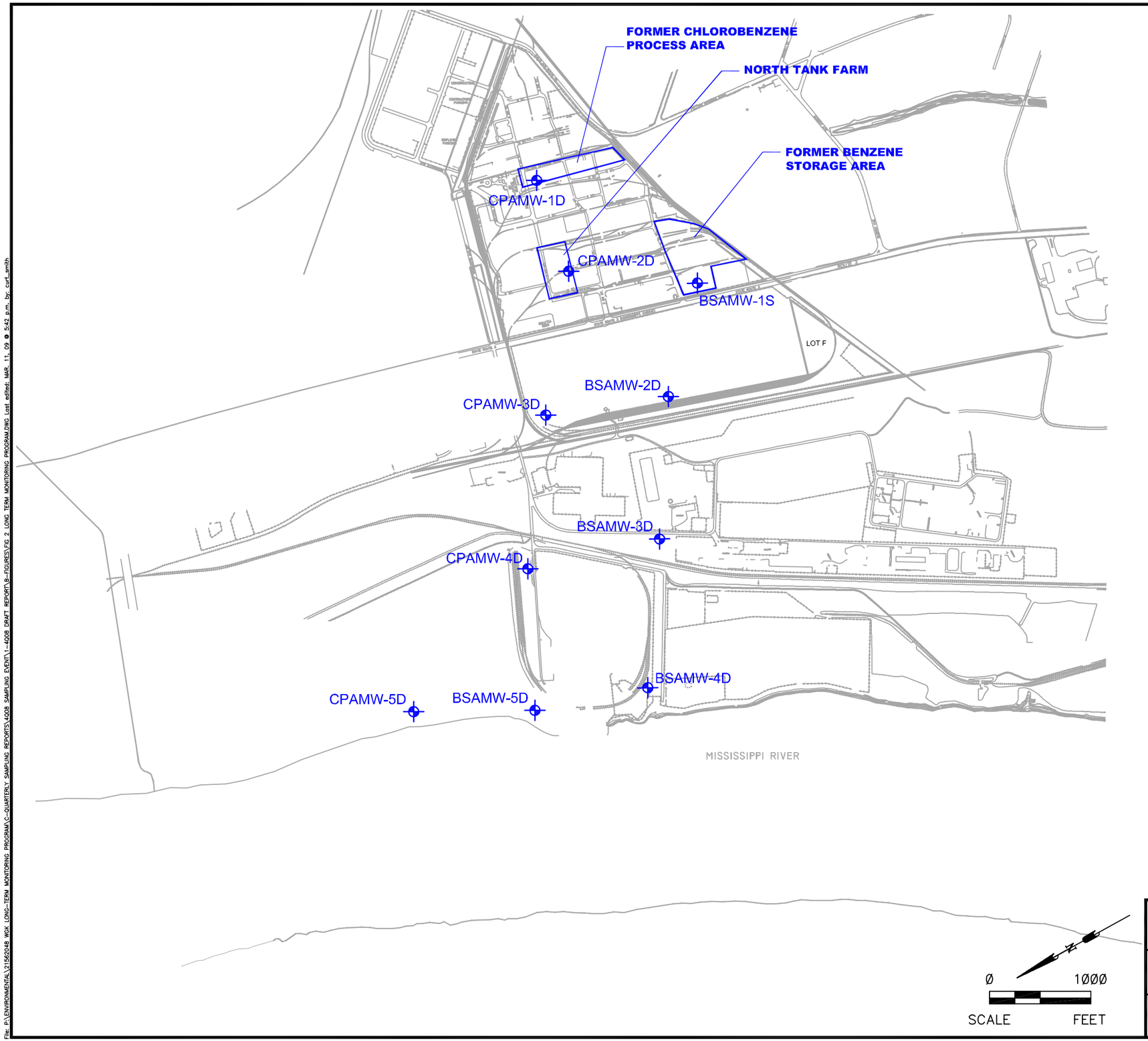
URS

DRN. BY: lrm 3/13/09
DSGN. BY: wh
CHKD. BY: wh

Site Location Map

FIG. NO. 1

File: P:\ENVIRONMENTAL\21562048 WGK LONG-TERM MONITORING PROGRAM\C-QUARTERLY SAMPLING REPORTS\4Q08 SAMPLING EVENT\1-4Q08 DRAFT REPORT\B-FIGURES\FIG 1 SITE LOCATION MAP LONG TERM.DWG Last edited: MAR. 11, 09 @ 5:51 p.m. by: curt_smith

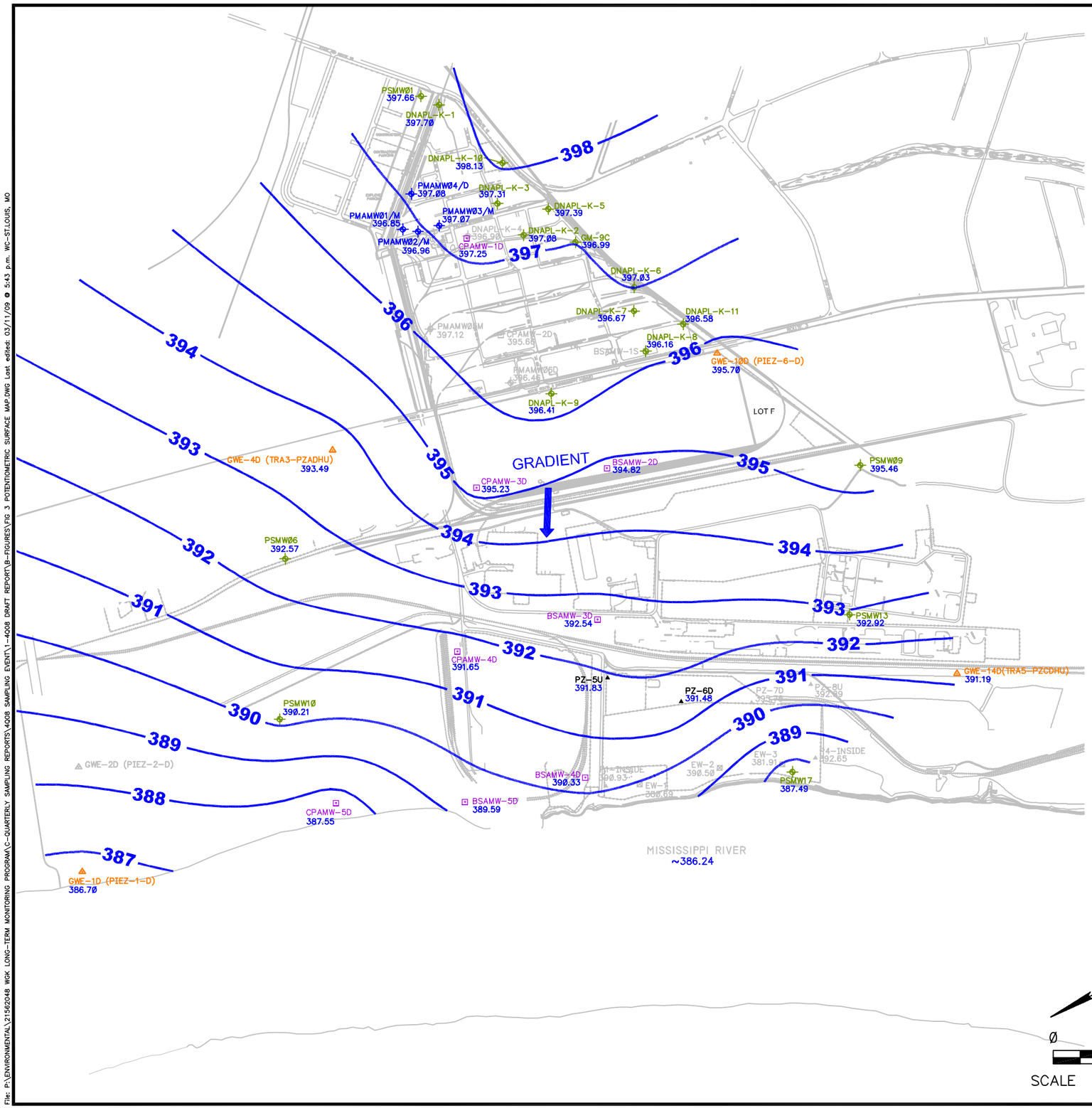


LEGEND

LONG-TERM MONITORING WELL LOCATION

LONG-TERM MONITORING PROGRAM 4TH QUARTER 2008 DATA REPORT W.G. KRUMMRICH FACILITY SAUGET, ILLINOIS	PROJECT NO. 21562048
URS	
DRN. BY:lrm 3/13/09 DSGN. BY:ekf CHKD. BY:tja	Long-Term Monitoring Program Well Locations
	FIG. NO. 2

File: P:\ENVIRONMENTAL\21562048 WGK LONG-TERM MONITORING PROGRAM\C-QUARTERLY SAMPLING REPORTS\4Q08 SAMPLING EVENT\1-4Q08 DRAFT REPORT\B-FIGURES\FIG 2 LONG TERM MONITORING PROGRAM.DWG Last edited: MAR. 11, 09 @ 5:42 p.m. by: curt_smith



LEGEND

- LONG-TERM MONITORING WELL USED FOR GROUNDWATER CONTOURING
- OTHER MONITORING WELL USED FOR GROUNDWATER CONTOURING
- PIEZOMETER CLUSTER USED FOR GROUNDWATER CONTOURING
- GMCS EXTRACTION WELL USED FOR GROUNDWATER CONTOURING
- GMCS PIEZOMETER USED FOR GROUNDWATER CONTOURING
- —392— GROUNDWATER ELEVATION CONTOUR (FT NAVD)
- INDICATES GROUNDWATER FLOW DIRECTION

NOTES:

1. GROUNDWATER LEVELS WERE MEASURED NOVEMBER 17th, 2008.
2. CONTOURS GENERATED PRIMARILY USING SURFER SOFTWARE VERSION 8. SOME INTERPRETATION WAS DONE USING PROFESSIONAL JUDGMENT AND CONTOUR LINES WERE MODIFIED BY HAND.
3. WELLS/PIEZOMETERS SHOWN IN GRAYSCALE WERE NOT USED FOR CONTOURING.
4. THE MISSISSIPPI RIVER STAGE ELEVATION PRESENTED ON THE FIGURE IS AN AVERAGE ELEVATION FOR THE TIME OF THE GAUGING EVENT. THE INFORMATION WAS OBTAINED FROM THE SITE R BUBBLER.
5. THE POTENTIOMETRIC SURFACE OBSERVED AROUND SITE R MAY BE ASSOCIATED WITH THE OPERATION OF THE SA2 GMCS.
6. NEITHER THE PHYSICAL NOR THE HYDROLOGIC BARRIERS CREATED BY THE SA2 GMCS WERE INCORPORATED INTO THE DEVELOPMENT OF THESE CONTOURS.
7. LOCATIONS WITH WELLS SCREENED IN BOTH THE MHU AND DHU UTILIZED THE DHU WELL FOR DEVELOPMENT OF THE POTENTIOMETRIC SURFACE MAP.
8. GROUNDWATER ELEVATION DATA FROM EW-1, EW-2, EW-3, PZ-7D, PZ-8U, P1-INSIDE, AND P4-INSIDE WERE NOT USED IN THE DEVELOPMENT OF THE POTENTIOMETRIC SURFACE DUE TO THE GROUNDWATER ELEVATIONS IN THESE WELLS APPEARING ANOMALOUS TO SURROUNDING WELLS. THE ANOMALOUS GROUNDWATER ELEVATIONS WERE A LIKELY RESULT OF EW-1 AND EW-3 OPERATING DURING THE GAUGING EVENT.
9. DATA FROM BSAMW-1S, WAS NOT INCLUDED IN THE DEVELOPMENT OF THE POTENTIOMETRIC SURFACE MAP SINCE THE WELL IS SCREENED IN THE SHALLOW HYDROGEOLOGIC UNIT.
10. DATA FROM PMAMW05M, CPAMW-2D, DNAPL-K-4, AND PMAMW06D WERE NOT INCLUDED IN THE DEVELOPMENT OF THE POTENTIOMETRIC SURFACE MAP DUE TO THE DATA APPEARING ANOMALOUS TO SURROUNDING GROUNDWATER LEVELS AND A REVIEW OF HISTORICAL POTENTOMETRIC SURFACE MAPS.

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LONG-TERM MONITORING PROGRAM
4TH QUARTER 2008 DATA REPORT
W.G. KRUMMRICH FACILITY
SAUGET, ILLINOIS

PROJECT NO. 21562048

URS

DRN. BY: lrm 3/13/09
DSGN. BY: ekf
CHKD. BY: tja

Potentiometric Surface Map
Middle Deep Hydrogeologic Unit

FIG. NO. 3

File: P:\ENVIRONMENTAL\21562048 WGK LONG-TERM MONITORING PROGRAM\C-QUARTERLY SAMPLING REPORTS\4Q08 SAMPLING EVENT\1-4Q08 DRAFT REPORT\B-FIGURES\FIG 3 POTENTIOMETRIC SURFACE MAP.DWG Last edited: 03/11/09 @ 5:43 p.m. WC-STLOUIS, MO

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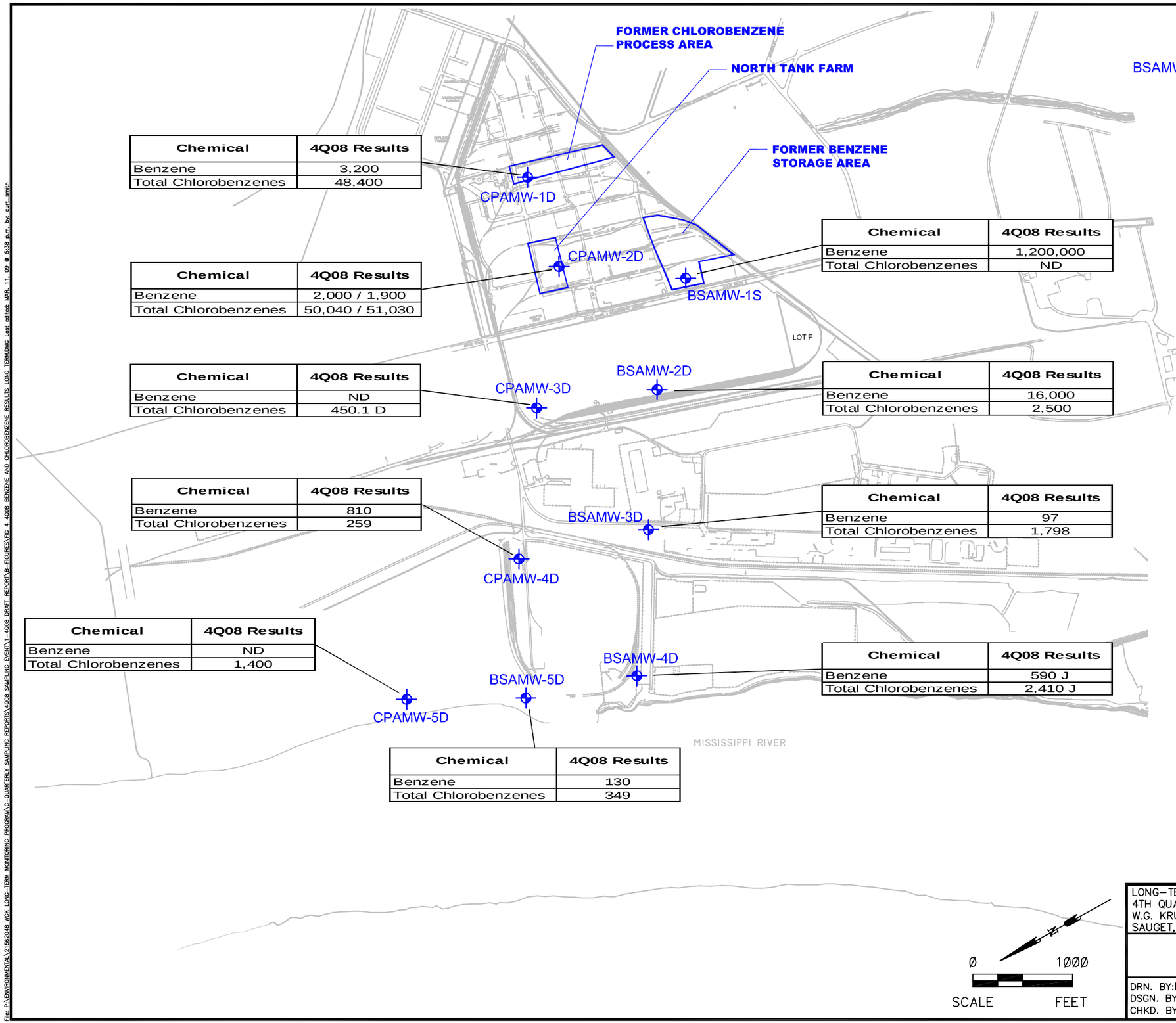

Chemical	4Q08 Results
Benzene	3,200
Total Chlorobenzenes	48,400

Chemical	4Q08 Results
Benzene	2,000 / 1,900
Total Chlorobenzenes	50,040 / 51,030

Chemical	4Q08 Results
Benzene	ND
Total Chlorobenzenes	450.1 D

Chemical	4Q08 Results
Benzene	810
Total Chlorobenzenes	259

Chemical	4Q08 Results
Benzene	ND
Total Chlorobenzenes	1,400

Chemical	4Q08 Results
Benzene	130
Total Chlorobenzenes	349

Chemical	4Q08 Results
Benzene	1,200,000
Total Chlorobenzenes	ND

Chemical	4Q08 Results
Benzene	16,000
Total Chlorobenzenes	2,500

Chemical	4Q08 Results
Benzene	97
Total Chlorobenzenes	1,798

Chemical	4Q08 Results
Benzene	590 J
Total Chlorobenzenes	2,410 J

LEGEND

BSAMW-1D — LONG-TERM MONITORING WELL LOCATION

NOTES:

1. TOTAL CHLOROBENZENES RESULTS INCLUDE THE SUM OF MONOCHLOROBENZENE, 1,2-DICHLOROBENZENE, 1,3-DICHLOROBENZENE, AND 1,4-DICHLOROBENZENE.
2. RESULTS SHOWN ARE IN ug/L.
3. ND DENOTES ANALYTE OR ANALYTES NOT DETECTED.
4. MULTIPLE SAMPLE RESULTS INDICATE A DUPLICATE SAMPLE.
5. D = SURROGATE OR MATRIX SPIKE RECOVERIES WERE NOT OBTAINED BECAUSE THE EXTRACT WAS DILUTED FOR ANALYSIS; ALSO COMPOUNDS ANALYZED AT A DILUTION WILL BE FLAGGED WITH A D.
6. J = ESTIMATED VALUE.

0 1000
SCALE FEET

LONG-TERM MONITORING PROGRAM
4TH QUARTER 2008 DATA REPORT
W.G. KRUMMRICH FACILITY
SAUGET, ILLINOIS

PROJECT NO. 21562048

URS

DRN. BY: lrm 3/13/09
DSGN. BY: EKF
CHKD. BY: tja

4Q08 Benzene and Total Chlorobenzenes Results

FIG. NO. 4

FILE: P:\ENVIRONMENTAL\21562048 WGK LONG-TERM MONITORING PROGRAM\C-QUARTERLY SAMPLING REPORTS\4Q08 SAMPLING EVENT\1-4Q08 DRAFT REPORT\B-FIGURES\FIG 4 4Q08 BENZENE AND CHLOROBENZENE RESULTS LONG TERM.DWG Last edited: MAR 11, 09 @ 5:38 p.m. by: curt_smith

Tables

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See last page of table for notes.

Table 1
Monitoring Well Gauging Information

Well ID	Construction Details						17-Nov-08				Area
	Ground Elevation (feet)*	Casing Elevation* (feet)	Depth to Top of Screen (feet bgs)	Depth to Bottom of Screen (feet bgs)	Top of Screen Elevation* (feet)	Bottom of Screen Elevation* (feet)	Depth to Water (feet btoc)	Depth to Product (feet btoc)	Depth to Bottom (feet btoc)	Water Elevation* (feet)	
Shallow Hydrogeologic Unit (SHU 395-380 feet NAVD 88)											
BSAMW-1S (PSMW05)	409.49	412.31	19.68	24.86	389.63	384.63	16.00	--	27.32	396.31	WGK
PMAMW01S	410.06	410.06	20.18	25.18	389.88	384.88	12.16	-	24.92	397.90	WGK
PMAMW02S	411.66	411.66	22.94	27.94	388.72	383.72	14.64	-	27.35	397.02	WGK
PMAMW03S	412.06	412.06	22.71	27.71	389.35	384.35	14.91	-	27.40	397.15	WGK
PMAMW04S	410.43	410.43	20.99	25.99	389.44	384.44	13.21	-	25.36	397.22	WGK
Middle Hydrogeologic Unit (MHU 380-350 feet NAVD 88)											
PMAMW01M	410.08	410.08	54.54	59.54	355.54	350.54	13.23	-	59.63	396.85	WGK
PMAMW02M	411.93	411.93	56.87	61.87	355.06	350.06	14.97	-	61.55	396.96	WGK
PMAMW03M	412.10	412.10	57.07	62.07	355.03	350.03	15.03	-	61.82	397.07	WGK
PMAMW05M	411.27	410.97	52.17	57.17	359.10	354.10	13.85	-	56.97	397.12	WGK
PSMW01	409.37	412.59	34.56	39.56	374.81	369.81	14.93	--	46.06	397.66	WGK
Deep Hydrogeologic Unit (DHU 350 feet NAVD 88 - Bedrock)											
BSAMW-2D (PSMW08)	412.00	415.13	65.79	70.79	346.21	341.21	20.31	--	77.05	394.82	WGK
BSAMW-3D (PSMW12)	412.91	415.74	104.80	109.80	308.11	303.11	23.20	--	114.82	392.54	WGK
BSAMW-4D (PSMW16D)	425.00	424.69	118.54	123.54	306.46	301.46	34.36	--	123.21	390.33	WGK
BSAMW-5D (PSMW15D(R))	420.80	420.49	116.25	120.85	304.95	299.95	30.90	--	120.95	389.59	WGK
CPAMW-1D (PSMW03)	408.62	408.32	66.12	71.12	342.50	337.50	11.07	--	70.81	397.25	WGK
CPAMW-2D (PSMW04)	408.51	408.20	99.96	104.96	308.55	303.55	12.54	--	104.67	395.66	WGK
CPAMW-3D (PSMW07)	410.87	410.67	101.90	106.90	308.97	303.97	15.44	--	112.87	395.23	WGK
CPAMW-4D (PSMW11)	421.57	421.20	116.44	121.44	305.13	300.13	29.55	--	121.02	391.65	WGK
CPAMW-5D (PSMW14D)	411.03	413.15	105.51	110.51	305.52	300.52	25.60	--	114.69	387.55	WGK
DNAPL-K-1	413.07	415.56	108.2	123.2	304.87	289.87	17.86	--	123.18	397.70	WGK
DNAPL-K-2	407.94	407.72	97.63	112.63	310.31	295.31	10.64	--	112.40	397.08	WGK
DNAPL-K-3	412.13	411.91	104.8	119.8	307.33	292.33	14.60	--	119.33	397.31	WGK
DNAPL-K-4	409.48	409.15	102.55	117.55	306.93	291.93	12.25	--	NG	396.90	WGK
DNAPL-K-5	412.27	411.91	102.15	117.15	310.12	295.12	14.52	--	116.50	397.39	WGK
DNAPL-K-6	410.43	410.09	102.47	117.47	307.96	292.96	13.06	--	116.95	397.03	WGK
DNAPL-K-7	408.32	407.72	100.4	115.4	307.92	292.92	11.05	--	115.38	396.67	WGK
DNAPL-K-8	408.56	411.38	102.65	117.65	305.91	290.91	15.22	--	117.20	396.16	WGK
DNAPL-K-9	406.45	405.97	97.42	112.42	309.03	294.03	9.56	--	111.20	396.41	WGK
DNAPL-K-10	413.50	413.25	105.43	120.43	308.07	293.07	15.12	--	120.35	398.13	WGK
DNAPL-K-11	412.20	411.78	105.46	120.46	306.74	291.74	15.20	--	120.30	396.58	WGK
EW-1	442.02	422.72	53	131	369.02	291.02	NG	NG**	NG	380.69	Site R
EW-2	418.53	419.84	41.50	104.90	377.03	313.63	NG	NG**	NG	390.50	Site R
EW-3	420.58	421.45	56.70	126.00	363.88	294.58	NG	NG**	NG	381.91	Site R
GM-9C	409.54	411.21	88	108	321.54	301.54	14.22	--	108.40	396.99	WGK

US EPA ARCHIVE DOCUMENT

See last page of table for notes.

Table 1
Monitoring Well Gauging Information

Well ID	Construction Details						17-Nov-08				Area
	Ground Elevation (feet)*	Casing Elevation* (feet)	Depth to Top of Screen (feet bgs)	Depth to Bottom of Screen (feet bgs)	Top of Screen Elevation* (feet)	Bottom of Screen Elevation* (feet)	Depth to Water (feet btoc)	Depth to Product (feet btoc)	Depth to Bottom (feet btoc)	Water Elevation* (feet)	
Deep Hydrogeologic Unit (DHU 350 feet NAVD 88 - Bedrock) (continued)											
GWE-1D (PIEZ-1D)	412.80	415.60	117	127	295.80	285.80	28.90	--	NG	386.70	Sauget Area 2
GWE-2D (PIEZ-2D)	417.45	417.14	127	137	290.45	280.45	NG	NG	NG	--	Sauget Area 2
GWE-4D (TRA3-PZADHU)	406.05	405.74	74	80	332.05	326.05	12.25	--	78.80	393.49	WGK
GWE-10D (PIEZ-6D)	410.15	412.87	102.5	112.5	307.65	297.65	17.17	--	114.88	395.70	Lot F
GWE-14D (TRA5-PZCDHU)	420.47	422.90	90	96	330.47	324.47	31.71	--	96.98	391.19	WGK
P1-INSIDE	423.00	424.26	55.00	130.00	368.00	293.00	NG	NG	NG	--	Site R
P4- INSIDE	420.50	423.64	52.50	132.50	368.00	288.00	NG	NG	NG	--	Site R
PMAMW04D (PSMW02)	411.22	410.88	68.84	73.84	342.38	337.38	13.8	-	73.37	397.08	WGK
PMAMW06D	407.63	407.32	96.49	101.49	311.14	306.14	10.86	-	101.29	396.46	WGK
PSMW06	404.11	406.63	99.80	104.80	304.31	299.31	14.06	--	109.84	392.57	WGK
PSMW09	403.92	403.52	100.40	105.40	303.52	298.52	8.06	--	105.15	395.46	WGK
PSMW10	409.63	412.18	101.23	106.23	308.40	303.40	21.97	--	111.31	390.21	WGK
PSMW13	405.80	405.53	106.08	111.08	299.72	294.72	12.61	--	110.24	392.92	WGK
PSMW17 (BWMW-4D)	420.22	423.26	121.25	126.25	298.97	293.97	35.77	--	134.06	387.49	WGK
PZ-5U	421.52	420.99	40.00	140.00	381.52	281.52	NG	NG**	NG	391.83	Site R
PZ-6D	421.64	418.64	41.70	131.70	377.55	287.55	NG	NG**	NG	391.48	Site R
PZ-7D	417.51	422.16	44.50	124.50	373.01	293.01	26.41	--	NG	395.75	Site R
PZ-8U	422.75	419.69	43.10	133.10	376.89	286.89	26.80	--	NG	392.89	Site R

Notes:
* - Elevation based upon North American Vertical Datum (NAVD) 88 datum
** - Groundwater elevation obtained by automatic gauging equipment.
bgs - below ground surface
btoc - Below top of casing
NG - not gauged

US EPA ARCHIVE DOCUMENT

Table 2
Groundwater Analytical Results

Sample ID	Sample Date	VOC (µg/L)						SVOC (µg/L)		
		Benzene	Chlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,4-Dioxane	4-Chloroaniline	2-Chlorophenol	1,2,4 Trichlorobenzene
BENZENE STORAGE AREA										
BSAMW01S-1108	11/20/2008	**1,200,000**	<10,000	<10,000	<10,000	<10,000	NA	NA	*	*
BSAMW02D-1108	11/24/2008	**16,000**	**2,500**	<200	<200	<200	*	NA	*	*
BSAMW03D-1108	11/21/2008	**97**	**1,300**	**36**	**22**	**440**	*	NA	*	*
BSAMW04D-1108	11/20/2008	**590 J**	**2,300 J**	**37 J**	< 20 J	**73 J**	*	NA	*	*
BSAMW05D-1108	11/21/2008	**130**	**310**	**19**	<2	**20**	*	NA	*	*
CHLOROBENZENE PROCESS AREA										
CPAMW01D-1108	11/20/2008	**3,200**	**13,000**	**22,000**	**1,400**	**12,000**	NA	NA	*	*
CPAMW02D-1108	11/20/2008	**2,000**	**33,000**	**2,400**	**640**	**14,000**	NA	NA	*	*
CPAMW02D-1108-AD	11/20/2008	**1,900**	**33,000**	**2,400**	**630**	**15,000**	NA	NA	*	*
CPAMW03D-1108	11/24/2008	<53	**420 D**	**13**	**1**	**16**	NA	*	*	*
CPAMW04D-0808	11/21/2008	**810**	**220**	**18**	<10	**21**	NA	*	*	*
CPAMW05D-1108	11/24/2008	<15	**1,400**	<10	<10	<10	NA	*	*	*

Notes:
µg/L = micrograms per liter
< = Result is non-detect, less than the reporting limit given.
BOLD indicates concentration greater than reporting limit.
* = Indicates samples that are collected semi-annually (1st and 3rd Quarter)
AD = Analytical Duplicate
D = Surrogate or matrix sprike recoveries were not obtained because the extract was diluted for analysis; also compounds analyzed at a dilution will be flagged with a D.
J = Estimated value
NA = sample not analyzed for select analyte in accordance with LTMP Work Plan

US EPA ARCHIVE DOCUMENT

Table 3
Monitored Natural Attenuation Results Summary

Sample ID	Sample Date	Alkalinity (mg/L)	Carbon Dioxide (mg/L)	Chloride (mg/L)	Dissolved Oxygen (mg/L)	Ethane (ug/L)	Ethylene (ug/L)	Ferrous Iron (mg/L)	Iron (mg/L)	Iron, Dissolved (mg/L)	Manganese (mg/L)	Manganese, Dissolved (mg/L)	Methane (ug/L)	Nitrogen, Nitrate (mg/L)	Sulfate as SO4 (mg/L)	Dissolved Organic Carbon (mg/L)	Total Organic Carbon (mg/L)	ORP (mV)
Benzene Storage Area																		
BSAMW01S-1108	11/20/2008	930	32	110	6.87	<0.35	<0.33		2.5		0.39		5,800	<0.05	<5		7.6	-130.70
BSAMW01S-F(0.2)1108	11/20/2008							1.75		2.1		0.39				6.6		
BSAMW02D-1108	11/24/2008	660	29	94	5.8	6.6	1		1.8		0.34		3,300	<0.05	110		4.8	-112.00
BSAMW02D-F(0.2)-1108	11/24/2008							1.63		1.7		0.34				3.7		
BSAMW03D-1108	11/21/2008	500	8.2	73	6.48	2.4	<0.33		11		0.55		320	<0.05	260		3.8	-102.60
BSAMW03D-F(0.2)-1108	11/21/2008							>5.0		11		0.56				4.4		
BSAMW04D-1108	11/20/2008	600	40	120	5.85	5.6	<0.33		8.3		0.54		84	<0.05	130		5.5	-86.90
BSAMW04D-F(0.2)-1108	11/20/2008							>5.0		8.1		0.53				4		
BSAMW05D-1108	11/21/2008	780	20	310	6.68	13	<0.33		17		0.5		5,700	<0.05	<10		5.9	-100.20
BSAMW05D-F(0.2)-1108	11/21/2008							>5.0		17		0.51				5		
Chlorobenzene Process Area																		
CPAMW01D-1108	11/20/2008	1,100	<4	180	0.25	51	<0.33		1.7		0.11		15,000	<0.5	13		16	2.50
CPAMW01D-F(0.2)-1108	11/20/2008							0.56		1.4		0.097				13		
CPAMW02D-1108	11/20/2008	620	40	85	6.92	6.8	<0.33		5.3		0.33		1,400	<0.05	<5		11	104.80
CPAMW02D-F(0.2)-1108	11/20/2008							4.85		5.1		0.33				11		
CPAMW03D-1108	11/24/2008	690	56	390	6.09	49	<0.33		15		0.71		33,000	<0.05	<5		7.9	-87.00
CPAMW03D-F(0.2)-1108	11/24/2008							>5.0		15		0.76				6.8		
CPAMW04D-1108	11/21/2008	770	15	310	6.39	15	<0.33		13		0.27		9,000	<0.05	<5		6	-112.20
CPAMW04D-F(0.2)-1108	11/21/2008							>5.0		13		0.27				5.4		
CPAMW05D-1108	11/24/2008	340	110	330	6.26	8.6	<0.33		76		2.5		52	<0.05	1,500		3.6	-72.70
CPAMW05D-F(0.2)-1108	11/24/2008							>5.0		78		2.6				3.1		

Notes:
DO and ORP were measured in the field using YSI 6920 equipped with a flow-thru cell.
Ferrous Iron readings were measured in the field using a LaMotte Colorimeter after the groundwater passed through a 0.2 µ filter.
mg/L = milligrams per liter
ug/L = micrograms per liter
< = Result is non-detect, less than the reporting limit given.
A blank space indicates sample not analyzed for select analyte.
F(0.2) = Sample was filtered utilizing a 0.2 µ filter in the field.
B = Compound was found in blank and sample
J = Estimated value
mV = millivolts
NC = Not collected

Appendix A

Groundwater Purging and Sampling Forms

US EPA ARCHIVE DOCUMENT

LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NAME: LTM Program PROJECT NUMBER: 21562048.00004 FIELD PERSONNEL: N. Salam & Shirey Moore
DATE: 11/ 20 /2008 WEATHER: ~35°F, Cloudy, windy
MONITORING WELL ID: BSAMW01 SAMPLE ID: BSAMW01-1108

INITIAL DATA

Well Diameter: 2 in
Total Well Depth (btoc): 27.36 ft
Depth to Water (btoc): 16.10 ft
Depth to LNAPL/DNAPL (btoc): – ft
Depth to Top of Screen (btoc): 22.50 ft
Screen Length: 5 ft

Water Column Height (do not include LNAPL or DNAPL): 11.20 ft btoc
If Depth to Top of Screen is > Depth to Water AND Screen Lenth is < 4 feet,
Place Pump at: Total Well Depth – 0.5 (Screen Length + DNAPL Column Height) = 19.26 ft btoc
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,
Place Pump at: Total Well Depth – (0.5 X Water Column Height + DNAPL Column Height) = – ft btoc
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = – ft btoc

Volume of Flow Through Cell): ~~500~~ 1150 mL
Minimum Purge Volume =
(3 x Flow Through Cell Volume) ~~1500~~ 3450 mL
Ambient PID/FID Reading: 0.1 ppm
Wellbore PID/FID Reading: 79.2 ppm

PURGE DATA

Pump Type: Stainless Steel Monsoon

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (ms/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
200	1355	16.40	Dark gray	Chemical	7.41	14.39	1.817	86.7	0.83	-64.1
1550	1400	16.32			7.35	14.38	1.832	60.2	0.75	-90.4
2500	1405	16.21			7.32	14.39	1.853	53.0	1.34	-106.3
3650	1410	16.21			7.29	14.52	1.869	28.6	2.89	-117.6
4800	1415	16.21			7.28	14.43	1.870	19.9	4.81	-123.6
5950	1420	16.21	Clear		7.27	14.37	1.877	12.6	5.81	-126.9
7100	1425	16.21			7.26	14.43	1.876	12.6	6.71	-128.6
8250	1430	16.21			7.26	14.46	1.878	8.1	6.74	-129.0
9400	1435	16.21			7.26	14.45	1.879	8.0	6.78	-130.0
10550	1440	16.21			7.26	14.50	1.875	7.0	6.81	-130.2

Start Time: 1355
Stop Time: 1440
Elapsed Time: 50
Average Purge Rate (mL/min): 200 mL/m
Water Quality Meter ID: YSI 6920
Date Calibrated: 11/ 19 /2008 End of the day

SAMPLING DATA

Sample Date: 11/20 /2008
Sample Method: Stainless Steel Monsoon
Sample Time: 1440
Sample Flow Rate: 200 ml/min
Analysis: VOCs, SVOCs, PCBs, Metals, MNA
Date Calibrated: NA

COMMENTS:

MNA – Alkilinity, CO2, Chloride, Ferrous Iron, Methane, Nitrate, Sulfate, TOC

Ferrous Iron (Filtered 0.2 micron) = 1.75

LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NAME: LMT Program PROJECT NUMBER: 21562048.00004 FIELD PERSONNEL: N. Satam & M. Bobotti
DATE: 11/24 /2008 WEATHER: ~50°F, Cloudy, Sunny
MONITORING WELL ID: BSAMW02 SAMPLE ID: BSAMW02-1108

INITIAL DATA

Well Diameter: 2 in
Total Well Depth (btoc): 77.05 ft
Depth to Water (btoc): 20.70 ft
Depth to LNAPL/DNAPL (btoc): — ft
Depth to Top of Screen (btoc): 72.05 ft
Screen Length: 5 ft

Water Column Height (do not include LNAPL or DNAPL): 56.35 ft btoc
If Depth to Top of Screen is > Depth to Water AND Screen Lenth is < 4 feet,
Place Pump at: Total Well Depth – 0.5 (Screen Length + DNAPL Column Height) = 21.2 ft btoc
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,
Place Pump at: Total Well Depth – (0.5 X Water Column Height + DNAPL Column Height) = — ft btoc
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoc

Volume of Flow Through Cell): ~~500~~ ~~30~~ 1150 mL
Minimum Purge Volume =
(3 x Flow Through Cell Volume) ~~1500~~ 3450 mL
Ambient PID/FID Reading: 0.0 ppm
Wellbore PID/FID Reading: 0.0 ppm

PURGE DATA

Pump Type: Stainless Steel Monsoon

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (ms/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
200	1105	20.72	Clear	hydrocarbon	7.39	15.16	1.725	28.5	6.06	-53.0
1200	1110	20.72	↓	↓	7.39	15.20	1.724	25.6	6.04	-60.0
1300	1115	20.73			7.34	15.16	1.723	10.2	5.88	-97.8
1400	1120	20.72			7.25	15.25	1.727	4.8	5.87	-103.4
1500	1125	20.72			7.34	15.23	1.728	3.2	5.86	-104.9
1600	1130	20.72			7.33	15.23	1.732	2.1	4.98	-108.2
1700	1135	20.72			7.33	15.25	1.735	1.2	5.82	-110.2
1800	1140	20.72			7.33	15.27	1.733	1.2	5.83	-111.3
1900	1145	20.72	↓	↓	7.33	15.39	1.730	1.0	5.80	-112.0

Start Time: 1105
Stop Time: 1145
Elapsed Time: 40 min
Average Purge Rate (mL/min): 200mL/min
Water Quality Meter ID: YSI 6920
Date Calibrated: 11/24 /2008

SAMPLING DATA

Sample Date: 11/24 2008
Sample Method: Stainless Steel Monsoon
Sample Time: 1145
Sample Flow Rate: 200 mL/min
Analysis: VOCs, ~~SVOCs~~, Metals, MNA
Date Calibrated: NA

COMMENTS:

MNA – Alkilinity, CO2, Chloride, Ferrous Iron, Methane, Nitrate, Sulfate, TOC

Ferrous Iron (Filtered 0.2 micron) = 1.63

LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NAME: LTM Program
PROJECT NUMBER: 21562048.00004
FIELD PERSONNEL: S. Moore, N. Sutton
DATE: 11/21/2008
WEATHER: 30s, Sunny
MONITORING WELL ID: BSAMW03
SAMPLE ID: BSAMW03-1108

INITIAL DATA

Well Diameter: 2 in
Total Well Depth (btoc): 123.42 ft
Depth to Water (btoc): 114.78 ft
Depth to LNAPL/DNAPL (btoc): — ft
Depth to Top of Screen (btoc): 109.85 ft
Screen Length: 5 ft

Water Column Height (do not include LNAPL or DNAPL): 9.56 ft btoc
If Depth to Top of Screen is > Depth to Water AND Screen Lenth is <4 feet,
Place Pump at: Total Well Depth – 0.5 (Screen Length + DNAPL Column Height) = 67.1 ft btoc
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,
Place Pump at: Total Well Depth – (0.5 X Water Column Height + DNAPL Column Height) = — ft btoc
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoc

Volume of Flow Through Cell): ~~500~~ 1150 mL
Minimum Purge Volume =
(3 x Flow Through Cell Volume) ~~1500~~ 3450 mL
Ambient PID/FID Reading: 0.0 ppm
Wellbore PID/FID Reading: 0.0 ppm

PURGE DATA

Pump Type: Stainless Steel Monsoon

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (ms/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
860	1250	23.45	Clear	Musty	9.18	14.66	1.235	31.0	7.57	201
1400	1255	23.54			9.00	15.88	1.488	27.0	6.52	-54.0
2000	1300	23.62			8.96	15.14	1.562	10.0	6.62	-83.4
2550	1305	23.62			8.32	15.21	1.581	4.06	6.56	-93.2
3100	1310	23.62			8.31	15.13	1.591	2.02	6.54	-96.0
3650	1315	23.62			8.29	15.21	1.595	0.83	6.48	-100.6
4200	1320	23.62			8.28	15.21	1.599	0.3	6.47	-101.7
4750	1325	23.62			8.28	15.23	1.601	0.2	6.48	-102.1
5300	1330	23.62			8.28	15.22	1.602	0.0	6.48	-102.6

Start Time: 1250
Stop Time: 1330
Elapsed Time: 50
Average Purge Rate (mL/min): 250 mL/min
Water Quality Meter ID: YSI 6920
Date Calibrated: 11/21/2008

SAMPLING DATA

Sample Date: 11/21/2008
Sample Method: Stainless Steel Monsoon
Sample Time: 1330
Sample Flow Rate: 250 mL/min
Analysis: VOCs, ~~SVOCs, Metals~~, MNA SVOC not Sampled
Date Calibrated: ~~NA~~ 11/21/08

COMMENTS:

MNA – Alkilinity, CO2, Chloride, Ferrous Iron, Methane, Nitrate, Sulfate, TOC

Ferrous Iron (Filtered 0.2 micron) = Over range

LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NAME: LTM Program PROJECT NUMBER: 21562048.00004 FIELD PERSONNEL: N. Satam and Stacy Moore
DATE: 11/20/2008 WEATHER: ~ 30°F, windy, cloudy
MONITORING WELL ID: BSAMW04 SAMPLE ID: BSAMW04-1108

INITIAL DATA

Well Diameter: 2 in
Total Well Depth (btoc): 123.17 ft
Depth to Water (btoc): 34.41 ft
Depth to LNAPL/DNAPL (btoc): ft
Depth to Top of Screen (btoc): 118.54 ft
Screen Length: 5 ft

Water Column Height (do not include LNAPL or DNAPL): 88.76 ft btoc
If Depth to Top of Screen is > Depth to Water AND Screen Lenth is <4 feet,
Place Pump at: Total Well Depth – 0.5 (Screen Length + DNAPL Column Height) = 76.29 ft btoc
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,
Place Pump at: Total Well Depth – (0.5 X Water Column Height + DNAPL Column Height) = — ft btoc
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoc

Volume of Flow Through Cell): ~~500~~ 1150 mL
Minimum Purge Volume =
(3 x Flow Through Cell Volume) ~~1500~~ 3450 mL
Ambient PID/FID Reading: 0.0 ppm
Wellbore PID/FID Reading: 0.0 ppm

PURGE DATA

Pump Type: Stainless Steel Monsoon

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (ms/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
~~1550~~ 100	1550	34.41	Clear	None	7.04	13.70	1.627	7.4	63.6	-69.1
~~1550~~ 1550	1555	34.41	↓	↓	7.00	13.53	1.650	7.4	61.7	-75.1
2500	1600	34.41	↓	↓	6.90	13.60	1.672	1.3	59.9	-85.5
3450	1605	34.41	↓	↓	6.85	13.61	1.672	1.2	59.7	-85.7
4200	1610	34.41	↓	↓	6.83	13.68	1.673	1.0	59.0	-86.2
5950	1615	34.41	↓	↓	6.82	13.68	1.672	0.0	58.9	-86.5
7100	1620	34.41	Clear	Clear	6.82	13.63	1.673	0.0	58.5	-86.9

Start Time: 1550
Stop Time: 1625
Elapsed Time: 30 mins
Average Purge Rate (mL/min): 600 mL/min
Water Quality Meter ID: YSI 6920
Date Calibrated: 11/19/2008 End of the day

SAMPLING DATA

Sample Date: 11/20/2008
Sample Method: Stainless Steel Monsoon
Sample Time: 1625
Sample Flow Rate: 200 mL/min
Analysis: VOCs, SVOCs, Metals, MNA
Date Calibrated: NA

COMMENTS:

MNA – Alkilinity, CO2, Chloride, Ferrous Iron, Methane, Nitrate, Sulfate, TOC

Ferrous Iron (Filtered 0.2 micron) = Overrange

LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NAME: LTM Program PROJECT NUMBER: 21562048.00004 FIELD PERSONNEL: N. Satam and S. Moore
DATE: 11/21 /2008 WEATHER: ~30°F Sunny
MONITORING WELL ID: BSAMW05 SAMPLE ID: BSAMW05-1108

INITIAL DATA

Well Diameter: 2 in
Total Well Depth (btoc): 120.92 ft
Depth to Water (btoc): 30.91 ft
Depth to LNAPL/DNAPL (btoc): – ft
Depth to Top of Screen (btoc): 116.25 ft
Screen Length: 5 ft

Water Column Height (do not include LNAPL or DNAPL): 89.1 ft btoc
If Depth to Top of Screen is > Depth to Water AND Screen Lenth is <4 feet,
Place Pump at: Total Well Depth – 0.5 (Screen Length + DNAPL Column Height) = 71.37 ft btoc
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are (4ft,
Place Pump at: Total Well Depth – (0.5 X Water Column Height + DNAPL Column Height) = – ft btoc
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = – ft btoc

Volume of Flow Through Cell): ~~500~~ 1150 mL
Minimum Purge Volume =
(3 x Flow Through Cell Volume) ~~1500~~ 3450 mL
Ambient PID/FID Reading: 0.0 ppm
Wellbore PID/FID Reading: 0.0 ppm

PURGE DATA

Pump Type: Stainless Steel Monsoon

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (ms/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
~~0835~~ 200	0835	30.91	Clear	None	8.20	13.41	2.377	581.2	7.07	-77.0
1350	0840	30.91	↓	↓	8.24	13.13	2.395	1354.0	7.07	-85.0
2500	0845	30.91			8.24	13.14	2.416	429.0	7.01	-90.3
2650	0850	30.91			8.24	13.14	2.413	391.0	6.92	-96.5
3800	0855	30.91			8.23	13.21	2.414	390.0	6.89	-97.6
4950	0900	30.91			8.23	13.21	2.417	16.6	6.90	-99.0
5100	0905	30.91			8.23	13.20	2.413	5.2	6.74	-100.1
6250	0910	30.91			8.22	13.31	2.412	4.67	6.70	-100.1
7400	0915	30.91			8.25	13.33	2.412	4.68	6.69	-99.9
8550	0920	30.91	↓	↓	8.22	13.32	2.412	4.68	6.68	-100.2

Start Time: 0835
Stop Time: ~~08~~ 0925
Elapsed Time: 45 min
Average Purge Rate (mL/min): 200 ml/min
Water Quality Meter ID: YSI 6920
Date Calibrated: 11/21 /2008

SAMPLING DATA

Sample Date: 11/21 /2008
Sample Method: Stainless Steel Monsoon
Sample Time: 0925
Sample Flow Rate: 200ml/min
Analysis: VOCs, ~~SVOCs~~, Metals, MNA SVOC Sample not collected
Date Calibrated: NA

COMMENTS:

MNA – Alkilinity, CO2, Chloride, Ferrous Iron, Methane, Nitrate, Sulfate, TOC
Ferrous Iron (Filtered 0.2 micron) = Over range
Turbidity reading high although purge water is clear. Cleaned probe optics. Turbidity dropped down to 16.5

LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NAME: LTM Program PROJECT NUMBER: 21562048.00004 FIELD PERSONNEL: N. Satem & S Moore
DATE: 11/ 20 /2008 WEATHER: ~35°F, Cloudy, windy
MONITORING WELL ID: CPAMW01 SAMPLE ID: CPAMW01-1108

INITIAL DATA

Well Diameter: 2 in
Total Well Depth (btoc): 70.39 ft
Depth to Water (btoc): 11.15 ft
Depth to LNAPL/DNAPL (btoc): — ft
Depth to Top of Screen (btoc): 66.12 ft
Screen Length: 5 ft

Water Column Height (do not include LNAPL or DNAPL): 59.24 ft btoc
If Depth to Top of Screen is > Depth to Water AND Screen Lenth is (4 feet,
Place Pump at: Total Well Depth – 0.5 (Screen Length + DNAPL Column Height) = 67.69 ft btoc
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are (4ft,
Place Pump at: Total Well Depth – (0.5 X Water Column Height + DNAPL Column Height) = 68.50 ft btoc
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = ____ ft btoc

Volume of Flow Through Cell): ~~500~~ 1150 mL
Minimum Purge Volume =
(3 x Flow Through Cell Volume) ~~1500~~ 3450 mL
Ambient PID/FID Reading: 0.1 ppm
Wellbore PID/FID Reading: 3.4 ppm

PURGE DATA

Pump Type: Stainless Steel Monsoon

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (ms/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
2200	1115	11.18	Gray	Chemical	9.82	15.84	2.678	520	0.80	-13.5
1350	1120	11.18			9.23	15.81	2.674	487	0.79	-12.6
8500	1125	11.17			9.74	15.79	2.622	260.5	0.47	-8.3
3650	1130	11.17			9.71	15.73	2.604	168.5	0.42	-4.4
4800	1135	11.17			9.70	15.72	2.577	107.0	0.38	0.5
5950	1140	11.17			9.64	15.54	2.547	143.5	0.34	1.0
7100	1145	11.17			9.62	15.18	2.510	52.6	0.33	1.6
8250	1150	11.17			9.60	15.15	2.495	50.2	0.30	1.7
9400	1155	11.17			9.60	15.03	2.489	46.3	0.29	2.8
10550	1200	11.17			9.59	15.03	2.469	39.0	0.27	2.6
11700	1205	11.17	Clear		9.55	15.04	2.475	32.3	0.26	2.4
12850	1210	11.17			9.56	15.05	2.476	31.70	0.24	2.6
13500	1215	11.17			9.54	14.33	2.463	35.0	0.25	2.5

Start Time: 1115
Stop Time: 1215
Elapsed Time: 1 hr
Average Purge Rate (mL/min): 200 ml/min
Water Quality Meter ID: YSI 6920
Date Calibrated: 11/ 20 /2008

SAMPLING DATA

Sample Date: 11/ 20 /2008
Sample Method: Stainless Steel Monsoon
Sample Time: 1215
Sample Flow Rate: 200 ml/min
Analysis: VOCs, ~~SVOCs~~, PCBs, Metals, MNA
Date Calibrated: NA

COMMENTS:

MNA – Alkilinity, CO2, Chloride, Ferrous Iron, Methane, Nitrate, Sulfate, TOC

Ferrous Iron (Filtered 0.2 micron) = 0.56

LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NAME: LTM Program PROJECT NUMBER: 21562048.00004 FIELD PERSONNEL: N. Sutton, S. Moore
DATE: 11/20 /2008 WEATHER: ~30F, Cloudy
MONITORING WELL ID: CPAMW02 SAMPLE ID: CPAMW02-1108

INITIAL DATA

Well Diameter: 2 in
Total Well Depth (btoc): 104.62 ft
Depth to Water (btoc): 12.70 ft
Depth to LNAPL/DNAPL (btoc): — ft
Depth to Top of Screen (btoc): 99.96 ft
Screen Length: 5 ft

Water Column Height (do not include LNAPL or DNAPL): 91.92 ft btoc
If Depth to Top of Screen is > Depth to Water AND Screen Lenth is (4 feet,
Place Pump at: Total Well Depth – 0.5 (Screen Length + DNAPL Column Height) = 102.12 ft btoc
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are (4ft,
Place Pump at: Total Well Depth – (0.5 X Water Column Height + DNAPL Column Height) = — ft btoc
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoc

Volume of Flow Through Cell): ~~500~~ 1150 mL
Minimum Purge Volume =
(3 x Flow Through Cell Volume) ~~1500~~ 3450 mL
Ambient PID/FID Reading: NM ppm
Wellbore PID/FID Reading: NM ppm

PURGE DATA

Pump Type: Stainless Steel Monsoon

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (ms/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
200	0920	12.71	Black-gray	Chemical	6.92	16.69	1.342	202.2	1.03	-86.5
1350	0925	12.79	↓	↓	6.94	16.67	1.346	165.5	0.87	-91.5
2500	0930	12.85	↓	↓	6.96	16.96	1.365	83.1	0.59	-98.3
3650	0935	12.87	↓	↓	6.96	16.84	1.377	41.5	0.52	-99.3
4800	0940	12.87	↓	↓	6.96	16.97	1.382	32.6	0.51	-101.8
5950	0945	12.89	Clear	↓	6.94	17.05	1.385	19.1	0.51	-101.9
7100	0950	12.89	↓	↓	6.94	17.06	1.391	13.5	0.58	-102.5
8250	0955	12.89	↓	↓	6.931	17.07	1.392	6.4	0.54	-103.5
9400	1000	12.89	↓	↓	6.92	17.05	1.395	4.5	0.52	-103.8
10550	1005	12.89	↓	↓	6.92	17.03	1.396	2.5	0.53	-104.8

Start Time: 0920
Stop Time: 1010
Elapsed Time: 50 min
Average Purge Rate (mL/min): 200 mL/min
Water Quality Meter ID: YSI 6920
Date Calibrated: 11/20/2008

SAMPLING DATA

Sample Date: 11/20 /2008
Sample Method: Stainless Steel Monsoon
Sample Time: 1010
Sample Flow Rate: 200 mL/min
Analysis: VOCs, ~~SVOCs~~, PCBs, Metals
Date Calibrated: ~~NA~~ 11/19/08 (end of day)

COMMENTS:
MNA - Alk., CO_2, Chloride, Ferrous Iron, Methane, Nitrate, Sulfate, TOC
Ferrous Iron (Filtered 0.2 micron) = 4.85

LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NAME: LMT Program
PROJECT NUMBER: 21562048.00004
FIELD PERSONNEL: Mike Corbett and N. Sateen
DATE: 11/ 24 /2008
WEATHER: ~40°F, overcast, windy
MONITORING WELL ID: CPAMW03
SAMPLE ID: CPAMW03-1108

INITIAL DATA

Well Diameter: 2 in
Total Well Depth (btoc): 113.0 ft
Depth to Water (btoc): 17.80 ft
Depth to LNAPL/DNAPL (btoc): – ft
Depth to Top of Screen (btoc): 108.00 ft
Screen Length: 5 ft

Water Column Height (do not include LNAPL or DNAPL): 95.20 ft btoc
If Depth to Top of Screen is > Depth to Water AND Screen Lenth is <4 feet,
Place Pump at: Total Well Depth – 0.5 (Screen Length + DNAPL Column Height) = 62.90 ft btoc
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,
Place Pump at: Total Well Depth – (0.5 X Water Column Height + DNAPL Column Height) = – ft btoc
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = – ft btoc

Volume of Flow Through Cell): ~~500~~ 1150 mL
Minimum Purge Volume =
(3 x Flow Through Cell Volume) ~~1500~~ 3450 mL
Ambient PID/FID Reading: 0.0 ppm
Wellbore PID/FID Reading: 0.0 ppm

PURGE DATA

Pump Type: Stainless Steel Monsoon

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (ms/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
200	0920	17.80	Cloudy	hydrocarbon	6.83	15.50	2.471	78.8	5.92	-70.9
1200	0925	17.80	↓	↓	6.89	15.03	2.475	55.1	5.96	-79.4
1300	0930	17.80	↓	↓	6.92	14.08	2.491	27.3	6.02	-92.2
1400	0935	17.80	Clear	↓	6.93	13.66	2.480	14.5	6.08	-92.7
1500	0940	17.80	↓	↓	6.93	13.64	2.473	5.2	6.06	-90.0
1600	0945	17.80	↓	↓	6.95	13.69	2.471	3.7	6.10	-89.9
1700	0950	17.80	↓	↓	6.93	13.70	2.469	3.2	6.12	-88.6
1800	0955	17.80	↓	↓	6.94	13.73	2.467	3.0	6.11	-87.2
1900	1000	17.80	↓	↓	6.95	13.75	2.465	2.7	6.09	-87.0

Start Time: 0920
Stop Time: 1000
Elapsed Time: 40 mins
Average Purge Rate (mL/min): 200 mL/min
Water Quality Meter ID: YSI 6920
Date Calibrated: 11/ 24 /2008

SAMPLING DATA

Sample Date: 11/ 24 /2008
Sample Time: 1000
Analysis: VOCs, ~~SVOCs~~, Metals, MNA ← Not collected
Sample Method: Stainless Steel Monsoon
Sample Flow Rate: 200 mL/min
Date Calibrated: ~~NA~~ 11/24/8

COMMENTS:
MNA – Alkilinity, CO2, Chloride, Ferrous Iron, Methane, Nitrate, Sulfate, TOC
Ferrous Iron (Filtered 0.2 micron) = Over range

LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NAME: LTM Program
PROJECT NUMBER: 21562048.00004
FIELD PERSONNEL: S Moore, N. Sultan
DATE: 11/21/2008
WEATHER: 30s, sunny
MONITORING WELL ID: CPAMW04
SAMPLE ID: CPAMW04-1108

INITIAL DATA

Well Diameter: 2 in
Total Well Depth (btoc): 120.96 ft
Depth to Water (btoc): 29.50 ft
Depth to LNAPL/DNAPL (btoc): — ft
Depth to Top of Screen (btoc): 116.44 ft
Screen Length: 5 ft

Water Column Height (do not include LNAPL or DNAPL): 91.16 ft btoc
If Depth to Top of Screen is > Depth to Water AND Screen Lenth is <4 feet,
Place Pump at: Total Well Depth – 0.5 (Screen Length + DNAPL Column Height) = 118.46 ft btoc
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,
Place Pump at: Total Well Depth – (0.5 X Water Column Height + DNAPL Column Height) = — ft btoc
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoc

Volume of Flow Through Cell): ~~500~~ 1150 mL
Minimum Purge Volume =
(3 x Flow Through Cell Volume) ~~1500~~ 3450 mL
Ambient PID/FID Reading: 0.0 ppm
Wellbore PID/FID Reading: 0.0 ppm

PURGE DATA

Pump Type: Stainless Steel Monsoon

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (ms/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
200	1107	29.80	colorless	none	8.45	15.09	2.332	3.7	6.85	-86.6
1400	1111	29.50	↓	↓	8.35	15.22	2.389	4.2	6.69	-103.7
2600	1115	29.50			8.33	15.45	2.385	6.6	6.47	-108.1
3800	1119	29.50			8.31	15.53	2.392	-0.2	6.40	-110.0
5000	1123	29.50			8.30	15.63	2.390	-0.1	6.39	-112.2

Start Time: 1105
Stop Time: 1125
Elapsed Time: 20 min
Average Purge Rate (mL/min): 300
Water Quality Meter ID: YSI 6920
Date Calibrated: 11/21/2008

SAMPLING DATA

Sample Date: 11/21/2008
Sample Method: Stainless Steel Monsoon
Sample Time: 1130
Sample Flow Rate: 300
Analysis: VOCs, ~~SVOCs~~, Metals, MNA
Date Calibrated: NA

COMMENTS:

MNA – Alkilinity, CO2, Chloride, Ferrous Iron, Methane, Nitrate, Sulfate, TOC, DOC

Ferrous Iron (Filtered 0.2 micron) = Overrange

PURGE DATA CONTINUED: PSMW11

LOW FLOW GROUNDWATER SAMPLING DATA SHEET

PROJECT NAME: LTM Program
PROJECT NUMBER: 21562048.00004
FIELD PERSONNEL: N.Sutam & N. Satam
DATE: 11/24/2008
WEATHER: N 50°F, windy, sunny
MONITORING WELL ID: CPAMW05
SAMPLE ID: CPAMW05-1108

INITIAL DATA

Well Diameter: 2 in
Total Well Depth (btoc): 114.75 ft
Depth to Water (btoc): 26.55 ft
Depth to LNAPL/DNAPL (btoc): — ft
Depth to Top of Screen (btoc): 109.75 ft
Screen Length: 5 ft

Water Column Height (do not include LNAPL or DNAPL): 88.20 ft btoc
If Depth to Top of Screen is > Depth to Water AND Screen Lenth is <4 feet,
Place Pump at: Total Well Depth – 0.5 (Screen Length + DNAPL Column Height) = 68.15 ft btoc
If Depth to Top of Screen is < Depth to Water AND Water Column Height and Screen Length are < 4ft,
Place Pump at: Total Well Depth – (0.5 X Water Column Height + DNAPL Column Height) = — ft btoc
If Screen Length and/or water column height is < 4 ft, Place Pump at: Total Well Depth - 2 ft = — ft btoc

Volume of Flow Through Cell): ~~500~~ 1150 mL
Minimum Purge Volume =
(3 x Flow Through Cell Volume) ~~1500~~ 3450 mL
Ambient PID/FID Reading: 0.0 ppm
Wellbore PID/FID Reading: 0.0 ppm

PURGE DATA

Pump Type: Stainless Steel Monsoon

Purge Volume (mL)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (ms/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
1150	1520	26.55	cloudy	none	6.75	14.65	3.790	8.0	4.640	-89.4
2150	1325	26.55	clear		6.61	14.57	3.792	6.1	6.32	-78.6
3150	1400	26.55			6.54	14.57	3.793	1.0	6.55	-73.0
4150	1405	26.55			6.55	14.55	3.796	0.7	6.26	-75.0
5150	1410	26.55			6.53	14.56	3.796	0.4	6.28	-72.6
6150	1415	26.55			6.54	14.58	3.747	0.3	6.27	-72.6
7150	1420	26.55			6.52	14.59	3.798	0.1	6.26	-72.7

Start Time: 1550
Stop Time: 1420
Elapsed Time: 30 mins
Average Purge Rate (mL/min): 200 mL/min
Water Quality Meter ID: YSI 6920
Date Calibrated: 11/24/2008

SAMPLING DATA

Sample Date: 11/24/2008
Sample Method: Stainless Steel Monsoon
Sample Time: 1425
Sample Flow Rate: 200 mL/m
Analysis: VOCs, ~~SVOCs~~, Metals
Date Calibrated: NA 11/24/8

COMMENTS:

Ferrous Iron (Filtered 0.2 micron) = out of range

Appendix B

Chains-of-Custody

US EPA ARCHIVE DOCUMENT

Serial Number 019042 Cooler 2

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Savannah
5102 LaRoche Avenue
Savannah, GA 31404
Website: www.testamericainc.com
Phone: (912) 354-7858
Fax: (912) 352-0165

Alternate Laboratory Name/Location
Phone:
Fax:

PROJECT REFERENCE	PROJECT NO.	PROJECT LOCATION (STATE)
WGK LTM	21562048.00004	IL
TAL (LAB) PROJECT MANAGER: Lidya Gulizia	P.O. NUMBER: —	CONTRACT NO.: —
CLIENT (SITE) PM: T. Adams	CLIENT PHONE: 314-429-0100	CLIENT FAX: 314-429-0462
CLIENT NAME: WRS Corp.	CLIENT E-MAIL: thomas.adams@wrscorp.com	
CLIENT ADDRESS: 1001 Highlands Plaza Dr. W Ste 300 St. Louis, MO 63110		
COMPANY CONTRACTING THIS WORK (if applicable): —		

PAGE 1 OF 1

STANDARD REPORT DELIVERY ○
DATE DUE _____
EXPEDITED REPORT DELIVERY (SURCHARGE) ○
DATE DUE _____
NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

SAMPLE DATE	SAMPLE TIME	SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	HNO_3 Total Fe/Mn (6010B)	HCl 8260B-VOC	none 8270C-SVOC	none 310.1 Alk/CO_2	none 325.2/375.4 Sulfate/Chloride	none Methane RSK-175	H_2SO_4 353.2 Nitrate/Nitrite	HCl 415.1 TOC	HCl 415.1 DOC	HNO_3 Diss Fe/Mn (6010B)	REMARKS
11/20/08	1010	CPAMW02-1108 ✓	G	X				1	3	2	1	1	3	2	1			
	1010	CPAMW02-F-1108 ✓	G	X												1	1	
	1010	CPAMW02-1108-AD ✓	G	X				1	3	2	1	1	3	2	1			
	1010	CPAMW02-F-1108-AD	G	X												1	1	
	1215	CPAMW01-1108 ✓	G	X				1	3	2	1	1	3	2	1			
	1215	CPAMW01-F-1108 ✓	G	X												1	1	
	1440	BSAMW01-1108 ✓	G	X				1	3	2	1	1	3	2	1			
	1440	BSAMW01-F-1108 ✓	G	X												1	1	
	1620	BSA MW04-1108 ✓	G	X				1	3	2	1	1	3	2	1			
	1620	BSA MW04-F-1108 ✓	G	X												1	1	
		TB112008 ✓		X					3									

11/24/08 Per T. Adams, canceled SVOC analysis - JR Remaster

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[signature]	11/20/08	1700						
RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	SAVANNAH LOG NO.	LABORATORY REMARKS
[signature]	112108	0912	YES ○ NO ○		68042522	0.6/1.0 TEMP

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TAL0240-680 (1207)

Serial Number 019043

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Savannah
5102 LaRoche Avenue
Savannah, GA 31404

Website: www.testamericainc.com
Phone: (912) 354-7858
Fax: (912) 352-0165

Alternate Laboratory Name/Location
Phone:
Fax:

PROJECT REFERENCE: WGK Long Term Mon.	PROJECT NO.: 21562048.00004	PROJECT LOCATION (STATE): IL
TAL (LAB) PROJECT MANAGER: Lidya Gulzia	P.O. NUMBER: —	CONTRACT NO.: —
CLIENT (SITE) PM: J. Adams	CLIENT PHONE: 314-429-0100	CLIENT FAX: 314-429-0462
CLIENT NAME: URS Corp.	CLIENT E-MAIL: thomas_adams@urscorp.com	
CLIENT ADDRESS: 1001 Highlands Plaza Dr. W Ste 300 St. Louis, MO 63110		
COMPANY CONTRACTING THIS WORK (if applicable): —		

PAGE 1 OF 1

STANDARD REPORT DELIVERY ○
DATE DUE _____
EXPEDITED REPORT DELIVERY (SURCHARGE) ○
DATE DUE _____
NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

SAMPLE DATE	SAMPLE TIME	SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	6010B Total Fe Mn (HNO3)	8260B VOC (HCl)	310.1 Alk/CO2 (none)	325.2/375.4 Sulfate/Chloride (none)	Methane RSK175 (none)	353.2 Nitrate (H2SO4/none)	415.1 TOC (HCl)	415.1 DOC (HCl)	Diss Fe Mn 6010B (HNO3)	REMARKS
11/21/08	0925	BSAMW05-1108 ✓						1	3	2	1	2	2	2			
		BSAMW05-F-1108 ✓													1	1	
		BSAMW05-1108-MS ✓						1	3	1	1	3	2	1			
		BSAMW05-F-1108-MS ✓													1	1	
		BSAMW05-1108-MSD ✓						1	3	1	1	3	2	1			
		BSAMW05-F-1108-MSD ✓													1	1	
	1130	CPAMW04-1108 ✓						1	3	1	1	3	2	1			
	1130	CPAMW04-F-1108 ✓													1	1	
	1330	BSAMW03-1108 ✓						1	3	1	1	3	2	1			
	1330	BSAMW03-F-1108 ✓													1	1	
		TB 112108 ✓							3								

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[signature]	11/21/08	1600						
RECEIVED BY: (SIGNATURE)	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	SAVANNAH LOG NO.	LABORATORY REMARKS
[signature]	112208	0950	YES ○ NO ○		08042573	2.2 TEMP

TAL8240-680 (1207)

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Serial Number 019045

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

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Savannah, GA 31404

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Alternate Laboratory Name/Location

Phone:
Fax:

PROJECT REFERENCE	PROJECT NO.	PROJECT LOCATION (STATE)
WGK Long Term Monitoring	21562048.00004	IL

TAL (LAB) PROJECT MANAGER	P.O. NUMBER	CONTRACT NO.
Lidya Gulizia		

CLIENT (SITE) PM	CLIENT PHONE	CLIENT FAX
Thomas Adams	314-429-0100	314-429-0462

CLIENT NAME	CLIENT E-MAIL
URS Corporation	thomas_adams@urscorp.com

CLIENT ADDRESS: 1001 Highlands Plaza Dr. West, St. Louis, MO 63110 Ste 300

COMPANY CONTRACTING THIS WORK (if applicable): Solutia

PAGE 1 OF 1

STANDARD REPORT DELIVERY ◯

DATE DUE _____

EXPEDITED REPORT DELIVERY (SURCHARGE) ◯

DATE DUE _____

NUMBER OF COOLERS SUBMITTED PER SHIPMENT: 2

MATRIX TYPE: COMPOSITE (C) OR GRAB (G) INDICATE; AQUEOUS (WATER); SOLID OR SEMISOLID; AIR; NONAQUEOUS LIQUID (OIL, SOLVENT, ...)

REQUIRED ANALYSIS / NUMBER OF CONTAINERS SUBMITTED

SAMPLE DATE	SAMPLE TIME	SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	VOC 8260B (HCl)	Total Fe-Mn 6010B (HNO_3)	Dissolved Fe-Mn 6010B (HNO_3)	Alk/CO_2 310.1 (none)	Sulfate/Chloride 325.2/375.4 (none)	Methane RSK175 (none)	Nitrate 353.2 (H_2SO_4)	TOC 415.1 (HCl)	DOC 415.1 (HCl)	REMARKS
11/24/08	—	TB112408 ✓		X				3									
	0850	BSAMW03-1108-EB ✓		X				3	1		1	1	3	2	1		
	0850	BSAMW03-F-1108-EB		X						1						1	
	1000	CPAMW03-1108 ✓		X				3	1		1	1	3	2	1		
	1000	CPAMW03-F-1108 ✓		X						1						1	
	1145	BSAMW02-1108 ✓		X				3	1		1	1	3	2	1		
	1145	BSAMW02-F-1108 ✓		X						1						1	
	1425	CPAMW05-1108 ✓		X				3	1		1	1	3	2	1		
↓	1425	CPAMW05-F-1108 ✓		X						1						1	

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[signature]	11/24/08	1630						

RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO	SAVANNAH LOG NO.	LABORATORY REMARKS
[signature]	112503	0901	YES ◯ NO ◯		00042600	4.6/2.0 TEMP

TAL8240-680 (1207)

Appendix C

Quality Assurance Report

US EPA ARCHIVE DOCUMENT

QUALITY ASSURANCE REPORT

Solutia Inc.
W.G. Krummrich Facility
Sauget, Illinois

Long-Term Monitoring Program
4th Quarter 2008 Data Report

Prepared for

Solutia Inc.
575 Maryville Centre Drive
St. Louis, MO 63141

March 2009

URS Corporation
1001 Highland Plaza Drive West, Suite 300
St. Louis, MO 63110
(314) 429-0100
Project # 21562048.00004

US EPA ARCHIVE DOCUMENT

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2.0 RECEIPT CONDITION AND SAMPLE HOLDING TIMES 3

3.0 TRIP BLANKS, LABORATORY METHOD BLANK AND EQUIPMENT BLANK SAMPLES 4

4.0 SURROGATE SPIKE RECOVERIES 5

5.0 LABORATORY CONTROL SAMPLES RECOVERIES 5

6.0 MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) SAMPLES 5

7.0 FIELD DUPLICATE RESULTS 5

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9.0 RESULTS REPORTED FROM DILUTIONS 6

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

1.0 INTRODUCTION

This Quality Assurance Report presents the findings of a review of analytical data for groundwater samples collected in November 2008 at the Solutia W.G. Krummrich plant as part of the 4th Quarter 2008 Long-Term Monitoring Program. The samples were collected by URS Corporation personnel and analyzed by Test America Laboratories located in Savannah, Georgia using USEPA methods, Standard methods and USEPA SW-846 methodologies. Groundwater samples were tested for volatile organic compounds (VOCs), metals, dissolved gasses, and general chemistry.

One hundred percent of the data were subjected to a data quality review (Level III validation) The Level III validations were performed in order to confirm that the analytical data provided by Test America were acceptable in quality for their intended use.

A total of 14 samples (10 investigative groundwater samples, one field duplicate pair, one MS/MSD pair, and one equipment blank) were analyzed by Test America. These samples were analyzed as two Sample Delivery Groups (SDGs) KPS046 and KPS047 utilizing the following USEPA SW-846 Methods:

- Method 8260B for VOCs (Benzene, Chlorobenzene, 1,2-Dichlorobenzene, 1,3-Dichlorobenzene and 1,4-Dichlorobenzene)
- Method 6010B for total and dissolved iron and manganese

Samples were also analyzed for dissolved gasses and general chemistry parameters by the following methods:

- Method RSK-175 for Dissolved Gasses
- USEPA Method 310.1 for Alkalinity
- USEPA Method 325.2 for Chloride
- USEPA Method 353.2 for Nitrogen, Nitrate-Nitrite
- USEPA Method 375.4 for Sulfate
- USEPA Method 415.1 for Total and Dissolved Organic Carbon

In addition, three trip blanks were included in the coolers that contained groundwater samples for VOC analysis and were analyzed for VOCs by USEPA SW-846 Method 8260B.

Samples were reviewed following procedures outlined in the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999, USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004 and the Long-Term Monitoring Plan, 2008.

The above guidelines provided the criteria to review the data. Additional quantitative criteria are given in the analytical methods. Qualifiers assigned by the data reviewer have been applied to the laboratory reporting forms (Form-1s). The qualifiers indicate data that did not meet acceptance criteria and corrective actions were not successful or not performed. The various qualifiers are explained in **Tables 1** and **2** below.

TABLE 1 Laboratory Data Qualifiers

Lab Qualifier	Definition
U	Analyte was not detected at or above the reporting limit.
*	LCS, LCSD, MS, MSD, MD or surrogate exceeds the control limits.
E	Result exceeded the calibration range, secondary dilution required.
D	Surrogate or matrix spike recoveries were not obtained because the extract was diluted for analysis; also compounds analyzed at a dilution will be flagged with a D.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
X	Spike recovery exceeds upper or lower control limits.
F	MS, MSD or RPD exceeds upper or lower control limits.
P	The difference between the results of the two GC columns is greater than 40%
H	Sample was prepped or analyzed beyond the specified holding time.
B	Compound was found in the blank and sample.
4	MS, MSD: The analyte present in the original sample is 4 times greater than the matrix spike concentration; therefore, control limits are not applicable.

TABLE 2 URS Data Qualifiers

URS Qualifier	Definition
U	The analyte was analyzed for but was not detected.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Based on the criteria outlined, it is recommended that the results reported for these analyses are accepted for their intended use. Acceptable levels of accuracy, precision, and representativeness (based on MS/MSD, matrix duplicate, LCS, surrogate compounds and field duplicate results) were achieved for this data set, except where noted in this report. In addition, analytical completeness, defined as the percentage of analytical results that are judged to be valid, including estimated detect (**J**) or estimated non-detect (**UJ**)

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values was 100 percent, which meets the completeness goal of 95 percent.

The data review included evaluation of the following criteria:

Organics

- Receipt condition and sample holding times
- Laboratory method blanks, field equipment blanks and trip blank samples
- Surrogate spike recoveries
- Laboratory control sample (LCS) recoveries
- Matrix spike/matrix spike duplicate (MS/MSD) sample recoveries and relative percent difference (RPD) values
- Field duplicate results
- Results reported from dilutions
- Internal standard responses

Inorganics/General chemistry

- Receipt condition and sample holding times
- Laboratory method blank and field equipment blank samples
- LCS recoveries
- MS/MSD sample recoveries and matrix duplicate RPD values
- Field duplicate and laboratory duplicate results
- Results reported from dilutions

The following sections present the results of the data review.

2.0 RECEIPT CONDITION AND SAMPLE HOLDING TIMES

Sample holding time requirements for the analyses performed are presented in the methods and/or in the data review guidelines. Review of the sample collection, extraction and analysis dates involved comparing the chain-of-custody and the laboratory data summary forms for accuracy, consistency, and holding time compliance. Upon review of the KPS046 data, all sample vials for samples CPAMW04-1108 were received by the laboratory with headspace. Sample CPAMW04-1108 was qualified using professional judgment due to headspace. Qualifications using professional judgment are included in the table below.

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Field ID	Analyte	New RL	Qualification	Comments
CPAMW04-1108	All VOC detects and nondetects	-	**J/UJ**	Professional Judgment

Samples CPAMW02-1108-AD and CPAMW02-F-1108-AD were designated on the COC for MNA parameter analysis. MNA parameter analyses for these samples were cancelled by the lab at the request of URS. The cooler receipt form indicated a discrepancy between the sample IDs on the containers and the COC. All sample containers contained a D suffix though there weren't any D suffixes on the COCs. Sample identities were reported as from the COC and the quality of the data was not affected.

Upon review of the KPS047 data, the COC designated equipment blank sample BSAMW03-1108-EB to be analyzed for MNA parameters. MNA analyses for sample BSAMW03-1108-EB were cancelled by the laboratory at the request of URS. The cooler receipt form indicated that one out of three trip blank vials were received broken. The two intact trip blank vials contained sufficient sample for the requested analyses. Also one 125-ml bottle was received empty for sample CPAMW05-1108; sufficient sample was available in the remaining bottle for all requested analyses. Two out of three VOA vials for sample CPAMW03-1108 were received by the laboratory with headspace. The remaining vial without headspace was used for the requested analysis. No qualifications of data were required.

3.0 TRIP BLANKS, LABORATORY METHOD BLANK AND EQUIPMENT BLANK SAMPLES

Trip blank samples are used to assess VOC cross contamination of samples during shipment to the laboratory. One or two trip blanks were submitted with each cooler shipped containing samples for VOC analyses for a total of three trip blank samples. All associated samples were nondetect; therefore, no qualification of data was required.

Laboratory method blank samples evaluate the existence and magnitude of contamination problems resulting from laboratory activities. All laboratory method blank samples were analyzed at the method prescribed frequencies. All method blank samples were nondetect. No qualification of data was required.

Equipment blank samples are used to assess the effectiveness of equipment decontamination procedures. All equipment blank samples were nondetect with the exception of those that are further discussed in data reviews in **Appendix D**. Qualifications due to blank contamination are included in the table below.

Field ID	Parameter	Analyte	New RL	Qualification
CPAMW03-1108	VOCs	Benzene	53	**U**
CPAMW05-1108	VOCs	Benzene	15	**U**

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4.0 SURROGATE SPIKE RECOVERIES

Surrogate compounds are used to evaluate overall laboratory performance for sample preparation efficiency on a per sample basis. All samples analyzed for VOCs were spiked with surrogate compounds during sample preparation. USEPA National Functional Guidelines for Organic Data Review state how data is qualified, if surrogate spike recoveries do not meet acceptance criteria.

All surrogate recoveries were within evaluation criteria. Surrogates that were associated with quality control samples or were diluted out and not recovered did not require qualification. In addition, no qualification of data was required if only one SVOC acid or base fraction surrogate was outside criteria and USEPA National Functional Guidelines for Organic Data Review indicates to qualify data if two or more surrogates per SVOC fraction are outside criteria. No qualification of data was required.

5.0 LABORATORY CONTROL SAMPLE RECOVERIES

Groundwater laboratory control samples (LCS) are analyzed with each analytical batch to assess the accuracy of the analytical process. All LCS recoveries were within evaluation criteria. No qualification of data was required.

6.0 MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) SAMPLES

MS/MSD samples are analyzed to assess the accuracy and precision of the analytical process on an analytical sample in a particular matrix. MS/MSD samples were required to be collected at a frequency of one per 20 investigative samples in accordance with the work plan. URS Corporation submitted one MS/MSD sample set for 10 investigative samples meeting the work plan frequency requirement.

No qualifications were made to the data if the MS/MSD percent RPD was the only factor out of criteria. Also, USEPA National Functional Guidelines for Organic Data Review (October 1999) states that organic data should not be qualified based on MS/MSD criteria alone. Therefore, if recoveries were outside evaluation criteria due to matrix interference or abundance of analytes, no qualifiers were assigned unless these analytes had other quality control criteria outside evaluation criteria. Groundwater samples spiked and analyzed as MS/MSDs and their respective recoveries are discussed further in data reviews in **Appendix D**. Qualifications due to MS/MSD recoveries outside of evaluation criteria are included in the table below:

Field ID	Parameter	Analyte	Qualification
CPAMW02-1108	General Chemistry	Nitrate	**UJ**
BSAMW05-1108	General Chemistry	Nitrate	**UJ**

7.0 FIELD DUPLICATE RESULTS

Field duplicate results are used to evaluate precision of the entire data collection activity, including sampling, analysis and site heterogeneity. When results for both duplicate and sample values are greater than five times the practical quantitation limit (PQL), satisfactory precision is indicated by an RPD less than or equal to 25 percent for aqueous samples. Where one or both of the results of a field duplicate pair are reported at less than five times the PQL, satisfactory precision is indicated if the field duplicate results agree within 2

times the quantitation limit. Field duplicate results that do not meet these criteria may indicate unsatisfactory precision of the results.

One pair of field duplicate samples were collected for the 10 investigative samples. This satisfies the requirement in the work plan (one per 10 investigative samples or 10 percent). All groundwater field duplicate RPDs were within evaluation criteria.

8.0 INTERNAL STANDARD RESPONSES

Internal standard (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during each analytical run. IS areas must be within -50 percent to +100 percent for VOCs.

The internal standards area responses for VOCs were verified for the data review. All groundwater IS responses met the criteria as described above; therefore, no qualification of data was required.

9.0 RESULTS REPORTED FROM DILUTIONS

Sulfate and nitrate samples were diluted due to high levels of target analytes. The diluted sample results for these analytes were reported for the associated samples.

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Appendix D
Groundwater Analytical Results
(with Data Review Sheets)

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SDG KPS046

Results of Samples from Wells:

BSAMW01
BSAMW03
BSAMW04
BSAMW05
CPAMW01
CPAMW02
CPAMW04

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US EPA ARCHIVE DOCUMENT

Solutia Krummrich Data Review

Laboratory SDG: KPS046

Reviewer: Elizabeth Kunkel

Date Reviewed: 01/13/2009

Guidance: USEPA National Functional Guidelines for Organic Data Review 1999.
USEPA National Functional Guidelines for Inorganic Data Review 2004.

Applicable Work Plan: WGK Long Term Monitoring Plan (Solutia 2008)

Sample Identification #	Sample Identification #
CPAMW02-1108	CPAMW02-F-1108
CPAMW02-1108-AD	CPAMW01-1108
CPAMW01-F-1108	BSAMW01-1108
BSAMW01-F-1108	BSAMW04-1108
BSAMW04-F-1108	TB112008
BSAMW05-1108	BSAMW05-F-1108
CPAMW04-1108	CPAMW04-F-1108
BSAMW03-1108	BSAMW03-F-1108
TB112108	

1.0 Data Package Completeness

Were all items delivered as specified in the QAPP and COC?

No, several samples on the COC were designated for SVOC analysis. However, no sample containers were received for SVOC analysis. SVOC analysis is not required during the second and fourth quarters of this program. In addition, the samples CPAMW02-1108-AD and CPAMW02-F-1108-AD were designated on the COC for MNA parameter analysis. MNA parameter analyses for these samples were cancelled by the lab at the request of URS.

2.0 Laboratory Case Narrative \ Cooler Receipt Form

Were problems noted in the laboratory case narrative or cooler receipt form?

Yes, the laboratory case narrative indicated that several MS/MSD recoveries were outside evaluation criteria. MS/MSD recoveries and MS/MSD RPDs for benzene and chlorobenzene were outside evaluation criteria in sample BSAMW05-1108. MS/MSD recoveries for methane and chloride were outside evaluation criteria in sample BSAMW05-1108. MSD recoveries for iron, nitrate, nitrate-nitrite, and sulfate were outside evaluation criteria in sample BSAMW05-1108. MS/MSD recoveries for

chloride were outside evaluation criteria in sample BSAMW05-1108. MS/MSD recoveries for dissolved iron were outside evaluation criteria in sample BSAMW05-F-1108. MS recoveries for nitrate and nitrate-nitrite were outside evaluation criteria in sample CPAMW02-1108. Sample CPAMW04-1108 was qualified using professional judgment. Samples were diluted due to high levels of target analytes. These issues are addressed further in the appropriate sections below.

The cooler receipt form indicated a discrepancy between the sample IDs on the containers and the COC. All sample containers contained a D suffix though there weren't any D suffixes on the COCs. Sample identities were reported as from the COC and the quality of the data was not affected. Additionally, all sample vials for samples CPAMW04-1108 were received by the laboratory with headspace.

3.0 Holding Times

Were samples extracted/analyzed within QAPP limits?

Yes

Field ID	Parameter	Analyte	Qualification
N/A			

4.0 Blank Contamination

Were any analytes detected in the Method Blanks, Field Blanks or Trip Blanks?

No

Blank ID	Parameter	Analyte	Concentration	Units
N/A				

Qualifications due to blank contamination are included in the table below.

Field ID	Parameter	Analyte	New RL	Qualification
N/A				

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5.0 Laboratory Control Sample

Were LCS recoveries within evaluation criteria?

Yes

LCS ID	Parameter	Analyte	LCS/LCSD Recovery	RPD	LCS/LCSD/RPD Criteria
N/A					

Analytical data that required qualification based on LCS data are included in the table below.

Field ID	Parameter	Analyte	Qualification
N/A			

6.0 Surrogate Recoveries

Were surrogate recoveries within evaluation criteria?

Yes

Field ID	Parameter	Surrogate	Recovery	Criteria
N/A				

Analytical data that required qualification based on surrogate data are included in the table below.

Field ID	Parameter	Analyte	Qualification
N/A			

7.0 Matrix Spike and Matrix Spike Duplicate Recoveries

Were MS/MSD samples reported as part of this SDG?

Yes, sample BSAMW05-1108 was spiked and analyzed for VOCs, dissolved gases, total iron and manganese, chloride, nitrate and nitrate/nitrite, and sulfate, total and dissolved organic carbon. Sample BSAMW05-F-1108 was spiked and analyzed for dissolved iron and manganese. Sample CPAMW02-1108 was spiked and analyzed for nitrate and nitrate/nitrite.

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Were MS/MSD recoveries within evaluation criteria?

No

MS/MSD ID	Parameter	Analyte	MS/MSD Recovery	RPD	MS/MSD/RPD Criteria
BSAMW05-1108	VOCs	Benzene	**58/161**	**43**	77-119/30
BSAMW05-1108	VOCs	Chlorobenzene	**32/315**	**59**	85-116/30
BSAMW05-1108	Dissolved Gases	Methane	**74/69**	1	75-125/30
CPAMW02-1108	General Chemistry	Nitrate	**88**/91	4	90-110/10
CPAMW02-1108	General Chemistry	Nitrate - Nitrite	**88**/91	4	90-110/10
BSAMW05-1108	General Chemistry	Nitrate	98/**89**	10	90-110/10
BSAMW05-1108	General Chemistry	Nitrate - Nitrite	98/**89**	10	90-110/10
BSAMW05-1108	General Chemistry	Sulfate	122/**128**	5	75-125/30

Analytical data that required qualification based on MS/MSD data are included in the table below. The MS/MSD recoveries for inorganic compounds with sample concentrations greater than four times (4X) the matrix spike concentration did not require evaluation or qualification. USEPA National Functional Guidelines for Organic Data Review indicates that organic data should not be qualified based on MS/MSD data alone and LCS recoveries were within evaluation criteria, therefore no qualification of the data was required.

Field ID	Parameter	Analyte	Qualification
CPAMW02-1108	General Chemistry	Nitrate	**UJ**
BSAMW05-1108	General Chemistry	Nitrate	**UJ**

8.0 Internal Standard (IS) Recoveries

Were internal standard area recoveries within evaluation criteria?

Yes

Field ID	Parameter	Analyte	IS Area Recovery	IS Criteria
N/A				

Analytical data that required qualification based on IS data are included in the table below.

Field ID	Parameter	Analyte	Qualification
N/A			

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9.0 Laboratory Duplicate Results

Were laboratory duplicate samples collected as part of this SDG?

Yes, sample BSAMW04-1108 was duplicated and analyzed for alkalinity and carbon dioxide.

Were laboratory duplicate sample RPDs within criteria?

Yes

Field ID	Parameter	Analyte	RPD	Criteria
N/A				

Data qualified due to outlying laboratory duplicate recoveries are identified below:

Field ID	Parameter	Analyte	Qualification
N/A			

10.0 Field Duplicate Results

Were field duplicate samples collected as part of this SDG?

Yes

Field ID	Field Duplicate ID
CPAMW02-1108	CPAMW02-1108-AD

Were field duplicates within evaluation criteria?

Yes

Field ID	Field Duplicate ID	Parameter	Analyte	RPD	Qualification
N/A					

US EPA ARCHIVE DOCUMENT

11.0 Sample Dilutions

For samples that were diluted and nondetect, were undiluted results also reported?

No

The following table identifies the analyses which were reported as nondetect, diluted, and an undiluted run ***was not*** reported:

Field ID	Parameter	Dilution Factor
CPAMW01-1108	Nitrate	10
BSAMW05-1108	Sulfate	2

12.0 Additional Qualifications

Were additional qualifications applied?

Yes

Professional judgment was used to qualify VOCs in sample CPAMW04-1108 due to potential loss (volatilization) of analytes due to headspace in all sample vials.

Field ID	Analyte	New RL	Qualification	Comments
CPAMW04-1108	All VOC detects and nondetects	-	**J/UJ**	Professional Judgment

US EPA ARCHIVE DOCUMENT

SAMPLE SUMMARY

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
680-42522-1	CPAMW02-1108	Water	11/20/2008 1010	11/21/2008 0912
680-42522-2	CPAMW02-F-1108	Water	11/20/2008 1010	11/21/2008 0912
680-42522-3FD	CPAMW02-1108-AD	Water	11/20/2008 1010	11/21/2008 0912
680-42522-5	CPAMW01-1108	Water	11/20/2008 1215	11/21/2008 0912
680-42522-6	CPAMW01-F-1108	Water	11/20/2008 1215	11/21/2008 0912
680-42522-7	BSAMW01-1108	Water	11/20/2008 1440	11/21/2008 0912
680-42522-8	BSAMW01-F-1108	Water	11/20/2008 1440	11/21/2008 0912
680-42522-9	BSAMW04-1108	Water	11/20/2008 1620	11/21/2008 0912
680-42522-10	BSAMW04-F-1108	Water	11/20/2008 1620	11/21/2008 0912
680-42522-11TB	TB112008	Water	11/20/2008 0000	11/21/2008 0912
680-42573-1	BSAMW05-1108	Water	11/21/2008 0925	11/22/2008 0950
680-42573-1MS	BSAMW05-1108 MS	Water	11/21/2008 0925	11/22/2008 0950
680-42573-1MSD	BSAMW05-1108 MSD	Water	11/21/2008 0925	11/22/2008 0950
680-42573-2	BSAMW05-F-1108	Water	11/21/2008 0925	11/22/2008 0950
680-42573-2MS	BSAMW05-F-1108 MS	Water	11/21/2008 0925	11/22/2008 0950
680-42573-2MSD	BSAMW05-F-1108 MSD	Water	11/21/2008 0925	11/22/2008 0950
680-42573-3	CPAMW04-1108	Water	11/21/2008 1130	11/22/2008 0950
680-42573-4	CPAMW04-F-1108	Water	11/21/2008 1130	11/22/2008 0950
680-42573-5	BSAMW03-1108	Water	11/21/2008 1330	11/22/2008 0950
680-42573-6	BSAMW03-F-1108	Water	11/21/2008 1330	11/22/2008 0950
680-42573-7TB	TB 112108	Water	11/21/2008 0000	11/22/2008 0950

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SAMPLE RESULTS

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **CPAMW02-1108**

Lab Sample ID: 680-42522-1
Client Matrix: Water

Date Sampled: 11/20/2008 1010
Date Received: 11/21/2008 0912

8260B Volatile Organic Compounds (GC/MS)

Method: 8260B
Preparation: 5030B
Dilution: 200
Date Analyzed: 11/28/2008 1356
Date Prepared: 11/28/2008 1356

Analysis Batch: 680-124112

Instrument ID: GC/MS Volatiles - O
Lab File ID: o6501.d
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result (ug/L)	Qualifier	RL
Benzene	2000		200
Chlorobenzene	33000		200
1,2-Dichlorobenzene	2400		200
1,3-Dichlorobenzene	640		200
1,4-Dichlorobenzene	14000		200

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	107	75 - 120
Dibromofluoromethane	93	75 - 121
Toluene-d8 (Surr)	106	75 - 120

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **CPAMW02-1108-AD**

Lab Sample ID: 680-42522-3FD
Client Matrix: Water

Date Sampled: 11/20/2008 1010
Date Received: 11/21/2008 0912

8260B Volatile Organic Compounds (GC/MS)

Method: 8260B
Preparation: 5030B
Dilution: 200
Date Analyzed: 11/28/2008 1425
Date Prepared: 11/28/2008 1425

Analysis Batch: 680-124112

Instrument ID: GC/MS Volatiles - O
Lab File ID: o6503.d
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result (ug/L)	Qualifier	RL
Benzene	1900		200
Chlorobenzene	33000		200
1,2-Dichlorobenzene	2400		200
1,3-Dichlorobenzene	630		200
1,4-Dichlorobenzene	15000		200

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	105	75 - 120
Dibromofluoromethane	94	75 - 121
Toluene-d8 (Surr)	106	75 - 120

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **CPAMW01-1108**

Lab Sample ID: 680-42522-5
Client Matrix: Water

Date Sampled: 11/20/2008 1215
Date Received: 11/21/2008 0912

8260B Volatile Organic Compounds (GC/MS)

Method: 8260B
Preparation: 5030B
Dilution: 200
Date Analyzed: 11/28/2008 1454
Date Prepared: 11/28/2008 1454

Analysis Batch: 680-124112

Instrument ID: GC/MS Volatiles - O
Lab File ID: o6505.d
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result (ug/L)	Qualifier	RL
Benzene	3200		200
Chlorobenzene	13000		200
1,2-Dichlorobenzene	22000		200
1,3-Dichlorobenzene	1400		200
1,4-Dichlorobenzene	12000		200

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	107	75 - 120
Dibromofluoromethane	93	75 - 121
Toluene-d8 (Surr)	108	75 - 120

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **BSAMW01-1108**

Lab Sample ID: 680-42522-7
Client Matrix: Water

Date Sampled: 11/20/2008 1440
Date Received: 11/21/2008 0912

8260B Volatile Organic Compounds (GC/MS)

Method: 8260B
Preparation: 5030B
Dilution: 10000
Date Analyzed: 11/28/2008 1523
Date Prepared: 11/28/2008 1523

Analysis Batch: 680-124112

Instrument ID: GC/MS Volatiles - O
Lab File ID: o6507.d
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result (ug/L)	Qualifier	RL
Benzene	1200000		10000
Chlorobenzene	10000	U	10000
1,2-Dichlorobenzene	10000	U	10000
1,3-Dichlorobenzene	10000	U	10000
1,4-Dichlorobenzene	10000	U	10000

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	104	75 - 120
Dibromofluoromethane	95	75 - 121
Toluene-d8 (Surr)	109	75 - 120

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **BSAMW04-1108**

Lab Sample ID: 680-42522-9
Client Matrix: Water

Date Sampled: 11/20/2008 1620
Date Received: 11/21/2008 0912

8260B Volatile Organic Compounds (GC/MS)

Method: 8260B
Preparation: 5030B
Dilution: 20
Date Analyzed: 11/28/2008 1552
Date Prepared: 11/28/2008 1552

Analysis Batch: 680-124112

Instrument ID: GC/MS Volatiles - O
Lab File ID: o6509.d
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result (ug/L)	Qualifier	RL
Benzene	590		20
Chlorobenzene	2300		20
1,2-Dichlorobenzene	37		20
1,3-Dichlorobenzene	20	U	20
1,4-Dichlorobenzene	73		20

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	107	75 - 120
Dibromofluoromethane	94	75 - 121
Toluene-d8 (Surr)	109	75 - 120

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **TB112008**

Lab Sample ID: 680-42522-11TB
Client Matrix: Water

Date Sampled: 11/20/2008 0000
Date Received: 11/21/2008 0912

8260B Volatile Organic Compounds (GC/MS)

Method: 8260B
Preparation: 5030B
Dilution: 1.0
Date Analyzed: 11/28/2008 1258
Date Prepared: 11/28/2008 1258

Analysis Batch: 680-124112

Instrument ID: GC/MS Volatiles - O
Lab File ID: o6497.d
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result (ug/L)	Qualifier	RL
Benzene	1.0	U	1.0
Chlorobenzene	1.0	U	1.0
1,2-Dichlorobenzene	1.0	U	1.0
1,3-Dichlorobenzene	1.0	U	1.0
1,4-Dichlorobenzene	1.0	U	1.0

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	104	75 - 120
Dibromofluoromethane	96	75 - 121
Toluene-d8 (Surr)	104	75 - 120

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **BSAMW05-1108**

Lab Sample ID: 680-42573-1
Client Matrix: Water

Date Sampled: 11/21/2008 0925
Date Received: 11/22/2008 0950

8260B Volatile Organic Compounds (GC/MS)

Method: 8260B
Preparation: 5030B
Dilution: 2.0
Date Analyzed: 11/28/2008 1621
Date Prepared: 11/28/2008 1621

Analysis Batch: 680-124112

Instrument ID: GC/MS Volatiles - O
Lab File ID: o6511.d
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result (ug/L)	Qualifier	RL
Benzene	130		2.0
Chlorobenzene	310		2.0
1,2-Dichlorobenzene	19		2.0
1,3-Dichlorobenzene	2.0	U	2.0
1,4-Dichlorobenzene	20		2.0

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	109	75 - 120
Dibromofluoromethane	86	75 - 121
Toluene-d8 (Surr)	111	75 - 120

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **CPAMW04-1108**

Lab Sample ID: 680-42573-3
Client Matrix: Water

Date Sampled: 11/21/2008 1130
Date Received: 11/22/2008 0950

8260B Volatile Organic Compounds (GC/MS)

Method: 8260B
Preparation: 5030B
Dilution: 10
Date Analyzed: 11/28/2008 1649
Date Prepared: 11/28/2008 1649

Analysis Batch: 680-124112

Instrument ID: GC/MS Volatiles - O
Lab File ID: o6513.d
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result (ug/L)	Qualifier	RL
Benzene	810		10
Chlorobenzene	220		10
1,2-Dichlorobenzene	18		10
1,3-Dichlorobenzene	10		10
1,4-Dichlorobenzene	21		10

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	106	75 - 120
Dibromofluoromethane	93	75 - 121
Toluene-d8 (Surr)	110	75 - 120

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **BSAMW03-1108**

Lab Sample ID: 680-42573-5
Client Matrix: Water

Date Sampled: 11/21/2008 1330
Date Received: 11/22/2008 0950

8260B Volatile Organic Compounds (GC/MS)

Method: 8260B
Preparation: 5030B
Dilution: 10
Date Analyzed: 11/28/2008 1718
Date Prepared: 11/28/2008 1718

Analysis Batch: 680-124112

Instrument ID: GC/MS Volatiles - O
Lab File ID: o6515.d
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result (ug/L)	Qualifier	RL
Benzene	97		10
Chlorobenzene	1300		10
1,2-Dichlorobenzene	36		10
1,3-Dichlorobenzene	22		10
1,4-Dichlorobenzene	440		10

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	107	75 - 120
Dibromofluoromethane	92	75 - 121
Toluene-d8 (Surr)	107	75 - 120

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **TB 112108**

Lab Sample ID: 680-42573-7TB
Client Matrix: Water

Date Sampled: 11/21/2008 0000
Date Received: 11/22/2008 0950

8260B Volatile Organic Compounds (GC/MS)

Method: 8260B
Preparation: 5030B
Dilution: 1.0
Date Analyzed: 11/28/2008 1229
Date Prepared: 11/28/2008 1229

Analysis Batch: 680-124112

Instrument ID: GC/MS Volatiles - O
Lab File ID: o6495.d
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result (ug/L)	Qualifier	RL
Benzene	1.0	U	1.0
Chlorobenzene	1.0	U	1.0
1,2-Dichlorobenzene	1.0	U	1.0
1,3-Dichlorobenzene	1.0	U	1.0
1,4-Dichlorobenzene	1.0	U	1.0

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	104	75 - 120
Dibromofluoromethane	98	75 - 121
Toluene-d8 (Surr)	106	75 - 120

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **CPAMW02-1108**

Lab Sample ID: 680-42522-1
Client Matrix: Water

Date Sampled: 11/20/2008 1010
Date Received: 11/21/2008 0912

RSK-175 Dissolved Gases (GC)

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 12/04/2008 0917
Date Prepared: N/A

Analysis Batch: 680-124521

Instrument ID: GC Volatiles - U FID
Lab File ID: U12021.D
Initial Weight/Volume: 1000 uL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Ethane	6.8		0.35
Ethylene	0.33	U	0.33

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 12/04/2008 0917
Date Prepared: N/A

Analysis Batch: 680-124522

Instrument ID: GC Volatiles - U TCD
Lab File ID: U12021.D
Initial Weight/Volume: 1000 uL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Methane	1400		0.19

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **CPAMW01-1108**

Lab Sample ID: 680-42522-5
Client Matrix: Water

Date Sampled: 11/20/2008 1215
Date Received: 11/21/2008 0912

RSK-175 Dissolved Gases (GC)

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 12/04/2008 0930
Date Prepared: N/A

Analysis Batch: 680-124521

Instrument ID: GC Volatiles - U FID
Lab File ID: U12022.D
Initial Weight/Volume: 1000 uL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Ethane	51		0.35
Ethylene	0.33	U	0.33

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 12/04/2008 0930
Date Prepared: N/A

Analysis Batch: 680-124522

Instrument ID: GC Volatiles - U TCD
Lab File ID: U12022.D
Initial Weight/Volume: 1000 uL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Methane	15000		0.19

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **BSAMW01-1108**

Lab Sample ID: 680-42522-7
Client Matrix: Water

Date Sampled: 11/20/2008 1440
Date Received: 11/21/2008 0912

RSK-175 Dissolved Gases (GC)

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 12/04/2008 0943
Date Prepared: N/A

Analysis Batch: 680-124521

Instrument ID: GC Volatiles - U FID
Lab File ID: U12023.D
Initial Weight/Volume: 1000 uL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Ethane	0.35	U	0.35
Ethylene	0.33	U	0.33

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 12/04/2008 0943
Date Prepared: N/A

Analysis Batch: 680-124522

Instrument ID: GC Volatiles - U TCD
Lab File ID: U12023.D
Initial Weight/Volume: 1000 uL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Methane	5800		0.19

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **BSAMW04-1108**

Lab Sample ID: 680-42522-9
Client Matrix: Water

Date Sampled: 11/20/2008 1620
Date Received: 11/21/2008 0912

RSK-175 Dissolved Gases (GC)

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 12/04/2008 0956
Date Prepared: N/A

Analysis Batch: 680-124521

Instrument ID: GC Volatiles - U FID
Lab File ID: U12024.D
Initial Weight/Volume: 1000 uL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Ethane	5.6		0.35
Ethylene	0.33	U	0.33
Methane	84		0.19

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **BSAMW05-1108**

Lab Sample ID: 680-42573-1
Client Matrix: Water

Date Sampled: 11/21/2008 0925
Date Received: 11/22/2008 0950

RSK-175 Dissolved Gases (GC)

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 12/04/2008 1009
Date Prepared: N/A

Analysis Batch: 680-124521

Instrument ID: GC Volatiles - U FID
Lab File ID: U12025.D
Initial Weight/Volume: 1000 uL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Ethane	13		0.35
Ethylene	0.33	U	0.33

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 12/04/2008 1009
Date Prepared: N/A

Analysis Batch: 680-124522

Instrument ID: GC Volatiles - U TCD
Lab File ID: U12025.D
Initial Weight/Volume: 1000 uL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Methane	5700		0.19

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **CPAMW04-1108**

Lab Sample ID: 680-42573-3
Client Matrix: Water

Date Sampled: 11/21/2008 1130
Date Received: 11/22/2008 0950

RSK-175 Dissolved Gases (GC)

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 12/04/2008 1022
Date Prepared: N/A

Analysis Batch: 680-124521

Instrument ID: GC Volatiles - U FID
Lab File ID: U12026.D
Initial Weight/Volume: 1000 uL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Ethane	15		0.35
Ethylene	0.33	U	0.33

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 12/04/2008 1022
Date Prepared: N/A

Analysis Batch: 680-124522

Instrument ID: GC Volatiles - U TCD
Lab File ID: U12026.D
Initial Weight/Volume: 1000 uL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Methane	9000		0.19

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **BSAMW03-1108**

Lab Sample ID: 680-42573-5
Client Matrix: Water

Date Sampled: 11/21/2008 1330
Date Received: 11/22/2008 0950

RSK-175 Dissolved Gases (GC)

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 12/04/2008 1034
Date Prepared: N/A

Analysis Batch: 680-124521

Instrument ID: GC Volatiles - U FID
Lab File ID: U12027.D
Initial Weight/Volume: 1000 uL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Ethane	2.4		0.35
Ethylene	0.33	U	0.33
Methane	320		0.19

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **CPAMW02-1108**

Lab Sample ID: 680-42522-1
Client Matrix: Water

Date Sampled: 11/20/2008 1010
Date Received: 11/21/2008 0912

6010B Metals (ICP)-Total Recoverable

Method: 6010B
Preparation: 3005A
Dilution: 1.0
Date Analyzed: 12/04/2008 2034
Date Prepared: 12/03/2008 1707

Analysis Batch: 680-124550
Prep Batch: 680-124341

Instrument ID: ICP/AES - D
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

Analyte	Result (mg/L)	Qualifier	RL
Iron	5.3		0.050
Manganese	0.33		0.010

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **CPAMW02-F-1108**

Lab Sample ID:	680-42522-2	Date Sampled:	11/20/2008 1010
Client Matrix:	Water	Date Received:	11/21/2008 0912

6010B Metals (ICP)-Dissolved

Method:	6010B	Analysis Batch: 680-124550	Instrument ID:	ICP/AES - D
Preparation:	3005A	Prep Batch: 680-124341	Lab File ID:	N/A
Dilution:	1.0		Initial Weight/Volume:	50 mL
Date Analyzed:	12/04/2008 2039		Final Weight/Volume:	50 mL
Date Prepared:	12/03/2008 1707			

Analyte	Result (mg/L)	Qualifier	RL
Iron, Dissolved	5.1		0.050
Manganese, Dissolved	0.33		0.010

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **CPAMW01-1108**

Lab Sample ID:	680-42522-5	Date Sampled:	11/20/2008 1215
Client Matrix:	Water	Date Received:	11/21/2008 0912

6010B Metals (ICP)-Total Recoverable

Method:	6010B	Analysis Batch: 680-124550	Instrument ID:	ICP/AES - D
Preparation:	3005A	Prep Batch: 680-124341	Lab File ID:	N/A
Dilution:	1.0		Initial Weight/Volume:	50 mL
Date Analyzed:	12/04/2008 2044		Final Weight/Volume:	50 mL
Date Prepared:	12/03/2008 1707			

Analyte	Result (mg/L)	Qualifier	RL
Iron	1.7		0.050
Manganese	0.11		0.010

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **CPAMW01-F-1108**

Lab Sample ID:	680-42522-6	Date Sampled:	11/20/2008 1215
Client Matrix:	Water	Date Received:	11/21/2008 0912

6010B Metals (ICP)-Dissolved

Method:	6010B	Analysis Batch: 680-124550	Instrument ID:	ICP/AES - D
Preparation:	3005A	Prep Batch: 680-124341	Lab File ID:	N/A
Dilution:	1.0		Initial Weight/Volume:	50 mL
Date Analyzed:	12/04/2008 2049		Final Weight/Volume:	50 mL
Date Prepared:	12/03/2008 1707			

Analyte	Result (mg/L)	Qualifier	RL
Iron, Dissolved	1.4		0.050
Manganese, Dissolved	0.097		0.010

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **BSAMW01-1108**

Lab Sample ID:	680-42522-7	Date Sampled:	11/20/2008 1440
Client Matrix:	Water	Date Received:	11/21/2008 0912

6010B Metals (ICP)-Total Recoverable

Method:	6010B	Analysis Batch: 680-124550		Instrument ID:	ICP/AES - D
Preparation:	3005A	Prep Batch: 680-124341		Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Date Analyzed:	12/04/2008 2054			Final Weight/Volume:	50 mL
Date Prepared:	12/03/2008 1707				

Analyte	Result (mg/L)	Qualifier	RL
Iron	2.5		0.050
Manganese	0.39		0.010

Analytical Data

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **BSAMW01-F-1108**

Lab Sample ID:	680-42522-8	Date Sampled:	11/20/2008 1440
Client Matrix:	Water	Date Received:	11/21/2008 0912

6010B Metals (ICP)-Dissolved

Method:	6010B	Analysis Batch: 680-124550	Instrument ID:	ICP/AES - D
Preparation:	3005A	Prep Batch: 680-124341	Lab File ID:	N/A
Dilution:	1.0		Initial Weight/Volume:	50 mL
Date Analyzed:	12/04/2008 2059		Final Weight/Volume:	50 mL
Date Prepared:	12/03/2008 1707			

Analyte	Result (mg/L)	Qualifier	RL
Iron, Dissolved	2.1		0.050
Manganese, Dissolved	0.39		0.010

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **BSAMW04-1108**

Lab Sample ID:	680-42522-9	Date Sampled:	11/20/2008 1620
Client Matrix:	Water	Date Received:	11/21/2008 0912

6010B Metals (ICP)-Total Recoverable

Method:	6010B	Analysis Batch: 680-124550	Instrument ID:	ICP/AES - D
Preparation:	3005A	Prep Batch: 680-124341	Lab File ID:	N/A
Dilution:	1.0		Initial Weight/Volume:	50 mL
Date Analyzed:	12/04/2008 2105		Final Weight/Volume:	50 mL
Date Prepared:	12/03/2008 1707			

Analyte	Result (mg/L)	Qualifier	RL
Iron	8.3		0.050
Manganese	0.54		0.010

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **BSAMW04-F-1108**

Lab Sample ID:	680-42522-10	Date Sampled:	11/20/2008 1620
Client Matrix:	Water	Date Received:	11/21/2008 0912

6010B Metals (ICP)-Dissolved

Method:	6010B	Analysis Batch: 680-124550	Instrument ID:	ICP/AES - D
Preparation:	3005A	Prep Batch: 680-124341	Lab File ID:	N/A
Dilution:	1.0		Initial Weight/Volume:	50 mL
Date Analyzed:	12/04/2008 2110		Final Weight/Volume:	50 mL
Date Prepared:	12/03/2008 1707			

Analyte	Result (mg/L)	Qualifier	RL
Iron, Dissolved	8.1		0.050
Manganese, Dissolved	0.53		0.010

Analytical Data

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **BSAMW05-1108**

Lab Sample ID:	680-42573-1	Date Sampled:	11/21/2008 0925
Client Matrix:	Water	Date Received:	11/22/2008 0950

6010B Metals (ICP)-Total Recoverable

Method:	6010B	Analysis Batch: 680-124550	Instrument ID:	ICP/AES - D
Preparation:	3005A	Prep Batch: 680-124341	Lab File ID:	N/A
Dilution:	1.0		Initial Weight/Volume:	50 mL
Date Analyzed:	12/04/2008 2125		Final Weight/Volume:	50 mL
Date Prepared:	12/03/2008 1707			

Analyte	Result (mg/L)	Qualifier	RL
Iron	17		0.050
Manganese	0.50		0.010

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **BSAMW05-F-1108**

Lab Sample ID:	680-42573-2	Date Sampled:	11/21/2008 0925
Client Matrix:	Water	Date Received:	11/22/2008 0950

6010B Metals (ICP)-Dissolved

Method:	6010B	Analysis Batch: 680-124550	Instrument ID:	ICP/AES - D
Preparation:	3005A	Prep Batch: 680-124341	Lab File ID:	N/A
Dilution:	1.0		Initial Weight/Volume:	50 mL
Date Analyzed:	12/04/2008 2150		Final Weight/Volume:	50 mL
Date Prepared:	12/03/2008 1707			

Analyte	Result (mg/L)	Qualifier	RL
Iron, Dissolved	17		0.050
Manganese, Dissolved	0.51		0.010

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **CPAMW04-1108**

Lab Sample ID: 680-42573-3
Client Matrix: Water

Date Sampled: 11/21/2008 1130
Date Received: 11/22/2008 0950

6010B Metals (ICP)-Total Recoverable

Method:	6010B	Analysis Batch: 680-124550		Instrument ID:	ICP/AES - D
Preparation:	3005A	Prep Batch: 680-124341		Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Date Analyzed:	12/04/2008 2205			Final Weight/Volume:	50 mL
Date Prepared:	12/03/2008 1707				

Analyte	Result (mg/L)	Qualifier	RL
Iron	13		0.050
Manganese	0.27		0.010

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **CPAMW04-F-1108**

Lab Sample ID:	680-42573-4	Date Sampled:	11/21/2008 1130
Client Matrix:	Water	Date Received:	11/22/2008 0950

6010B Metals (ICP)-Dissolved

Method:	6010B	Analysis Batch: 680-124550	Instrument ID:	ICP/AES - D
Preparation:	3005A	Prep Batch: 680-124341	Lab File ID:	N/A
Dilution:	1.0		Initial Weight/Volume:	50 mL
Date Analyzed:	12/04/2008 2210		Final Weight/Volume:	50 mL
Date Prepared:	12/03/2008 1707			

Analyte	Result (mg/L)	Qualifier	RL
Iron, Dissolved	13		0.050
Manganese, Dissolved	0.27		0.010

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **BSAMW03-1108**

Lab Sample ID:	680-42573-5	Date Sampled:	11/21/2008 1330
Client Matrix:	Water	Date Received:	11/22/2008 0950

6010B Metals (ICP)-Total Recoverable

Method:	6010B	Analysis Batch: 680-124550	Instrument ID:	ICP/AES - D
Preparation:	3005A	Prep Batch: 680-124341	Lab File ID:	N/A
Dilution:	1.0		Initial Weight/Volume:	50 mL
Date Analyzed:	12/04/2008 2225		Final Weight/Volume:	50 mL
Date Prepared:	12/03/2008 1707			

Analyte	Result (mg/L)	Qualifier	RL
Iron	11		0.050
Manganese	0.55		0.010

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Client Sample ID: **BSAMW03-F-1108**

Lab Sample ID: 680-42573-6
Client Matrix: Water

Date Sampled: 11/21/2008 1330
Date Received: 11/22/2008 0950

6010B Metals (ICP)-Dissolved

Method:	6010B	Analysis Batch: 680-124550		Instrument ID:	ICP/AES - D
Preparation:	3005A	Prep Batch: 680-124341		Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Date Analyzed:	12/04/2008 2230			Final Weight/Volume:	50 mL
Date Prepared:	12/03/2008 1707				

Analyte	Result (mg/L)	Qualifier	RL
Iron, Dissolved	11		0.050
Manganese, Dissolved	0.56		0.010

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

General Chemistry

Client Sample ID: **CPAMW02-1108**

Lab Sample ID: 680-42522-1
Client Matrix: Water

Date Sampled: 11/20/2008 1010
Date Received: 11/21/2008 0912

Analyte	Result	Qual	Units		RL	Dil	Method
Chloride	85		mg/L		1.0	1.0	325.2
	Anly Batch: 680-123922		Date Analyzed	11/26/2008 1251			
Nitrate as N	0.050	~~U~~ UJ	mg/L		0.050	1.0	353.2
	Anly Batch: 680-124045		Date Analyzed	11/21/2008 1555			
Sulfate	5.0	U	mg/L		5.0	1.0	375.4
	Anly Batch: 680-124444		Date Analyzed	12/04/2008 1341			
Total Organic Carbon	11		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124401		Date Analyzed	12/03/2008 1501			

Analyte	Result	Qual	Units		RL	Dil	Method
Alkalinity	620		mg/L		1.0	1.0	310.1
	Anly Batch: 680-123541		Date Analyzed	11/21/2008 1554			
Carbon Dioxide, Free	40		mg/L		4.0	1.0	310.1
	Anly Batch: 680-123541		Date Analyzed	11/21/2008 1554			

Client Sample ID: **CPAMW02-F-1108**

Lab Sample ID: 680-42522-2
Client Matrix: Water

Date Sampled: 11/20/2008 1010
Date Received: 11/21/2008 0912

Analyte	Result	Qual	Units		RL	Dil	Method
Dissolved Organic Carbon-D	11		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124682		Date Analyzed	12/05/2008 0959			

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

General Chemistry

Client Sample ID: **CPAMW01-1108**

Lab Sample ID: 680-42522-5
Client Matrix: Water

Date Sampled: 11/20/2008 1215
Date Received: 11/21/2008 0912

Analyte	Result	Qual	Units		RL	Dil	Method
Chloride	180		mg/L		2.0	2.0	325.2
	Anly Batch: 680-123922		Date Analyzed	11/26/2008 1255			
Nitrate as N	0.50	U	mg/L		0.50	10	353.2
	Anly Batch: 680-124045		Date Analyzed	11/21/2008 1555			
Sulfate	13		mg/L		5.0	1.0	375.4
	Anly Batch: 680-124444		Date Analyzed	12/04/2008 1341			
Total Organic Carbon	16		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124401		Date Analyzed	12/03/2008 1518			

Analyte	Result	Qual	Units		RL	Dil	Method
Alkalinity	1100		mg/L		1.0	1.0	310.1
	Anly Batch: 680-123541		Date Analyzed	11/21/2008 1618			
Carbon Dioxide, Free	4.0	U	mg/L		4.0	1.0	310.1
	Anly Batch: 680-123541		Date Analyzed	11/21/2008 1618			

Client Sample ID: **CPAMW01-F-1108**

Lab Sample ID: 680-42522-6
Client Matrix: Water

Date Sampled: 11/20/2008 1215
Date Received: 11/21/2008 0912

Analyte	Result	Qual	Units		RL	Dil	Method
Dissolved Organic Carbon-D	13		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124682		Date Analyzed	12/05/2008 0959			

General Chemistry

Client Sample ID: **BSAMW01-1108**

Lab Sample ID: 680-42522-7
Client Matrix: Water

Date Sampled: 11/20/2008 1440
Date Received: 11/21/2008 0912

Analyte	Result	Qual	Units		RL	Dil	Method
Chloride	110		mg/L		2.0	2.0	325.2
	Anly Batch: 680-123922		Date Analyzed	11/26/2008 1255			
Nitrate as N	0.050	U	mg/L		0.050	1.0	353.2
	Anly Batch: 680-124045		Date Analyzed	11/21/2008 1555			
Sulfate	5.0	U	mg/L		5.0	1.0	375.4
	Anly Batch: 680-124444		Date Analyzed	12/04/2008 1341			
Total Organic Carbon	7.6		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124401		Date Analyzed	12/03/2008 1431			

Analyte	Result	Qual	Units		RL	Dil	Method
Alkalinity	930		mg/L		1.0	1.0	310.1
	Anly Batch: 680-123541		Date Analyzed	11/21/2008 1631			
Carbon Dioxide, Free	32		mg/L		4.0	1.0	310.1
	Anly Batch: 680-123541		Date Analyzed	11/21/2008 1631			

Client Sample ID: **BSAMW01-F-1108**

Lab Sample ID: 680-42522-8
Client Matrix: Water

Date Sampled: 11/20/2008 1440
Date Received: 11/21/2008 0912

Analyte	Result	Qual	Units		RL	Dil	Method
Dissolved Organic Carbon-D	6.6		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124682		Date Analyzed	12/05/2008 0959			

General Chemistry

Client Sample ID: **BSAMW04-1108**

Lab Sample ID: 680-42522-9
Client Matrix: Water

Date Sampled: 11/20/2008 1620
Date Received: 11/21/2008 0912

Analyte	Result	Qual	Units		RL	Dil	Method
Chloride	120		mg/L		2.0	2.0	325.2
	Anly Batch: 680-123922		Date Analyzed	11/26/2008 1302			
Nitrate as N	0.050	U	mg/L		0.050	1.0	353.2
	Anly Batch: 680-124045		Date Analyzed	11/21/2008 1555			
Sulfate	130		mg/L		25	5.0	375.4
	Anly Batch: 680-124444		Date Analyzed	12/04/2008 1413			
Total Organic Carbon	5.5		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124401		Date Analyzed	12/03/2008 1447			

Analyte	Result	Qual	Units		RL	Dil	Method
Alkalinity	600		mg/L		1.0	1.0	310.1
	Anly Batch: 680-123541		Date Analyzed	11/21/2008 1641			
Carbon Dioxide, Free	40		mg/L		4.0	1.0	310.1
	Anly Batch: 680-123541		Date Analyzed	11/21/2008 1641			

Client Sample ID: **BSAMW04-F-1108**

Lab Sample ID: 680-42522-10
Client Matrix: Water

Date Sampled: 11/20/2008 1620
Date Received: 11/21/2008 0912

Analyte	Result	Qual	Units		RL	Dil	Method
Dissolved Organic Carbon-D	4.0		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124682		Date Analyzed	12/05/2008 0959			

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

General Chemistry

Client Sample ID: **BSAMW05-1108**

Lab Sample ID: 680-42573-1
Client Matrix: Water

Date Sampled: 11/21/2008 0925
Date Received: 11/22/2008 0950

Analyte	Result	Qual	Units		RL	Dil	Method
Chloride	310		mg/L		5.0	5.0	325.2
	Anly Batch: 680-123922	Date Analyzed		11/26/2008 1341			
Nitrate as N	0.050	UJ	mg/L		0.050	1.0	353.2
	Anly Batch: 680-124047	Date Analyzed		11/22/2008 1510			
Sulfate	10	U	mg/L		10	2.0	375.4
	Anly Batch: 680-124444	Date Analyzed		12/04/2008 1437			
Total Organic Carbon	5.9		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124401	Date Analyzed		12/03/2008 1535			

Analyte	Result	Qual	Units		RL	Dil	Method
Alkalinity	780		mg/L		1.0	1.0	310.1
	Anly Batch: 680-123897	Date Analyzed		11/26/2008 0923			
Carbon Dioxide, Free	20		mg/L		4.0	1.0	310.1
	Anly Batch: 680-123897	Date Analyzed		11/26/2008 0923			

Client Sample ID: **BSAMW05-F-1108**

Lab Sample ID: 680-42573-2
Client Matrix: Water

Date Sampled: 11/21/2008 0925
Date Received: 11/22/2008 0950

Analyte	Result	Qual	Units		RL	Dil	Method
Dissolved Organic Carbon-D	5.0		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124677	Date Analyzed		12/05/2008 0959			

General Chemistry

Client Sample ID: **CPAMW04-1108**

Lab Sample ID: 680-42573-3
Client Matrix: Water

Date Sampled: 11/21/2008 1130
Date Received: 11/22/2008 0950

Analyte	Result	Qual	Units		RL	Dil	Method
Chloride	310		mg/L		5.0	5.0	325.2
	Anly Batch: 680-123922		Date Analyzed	11/26/2008 1341			
Nitrate as N	0.050	U	mg/L		0.050	1.0	353.2
	Anly Batch: 680-124045		Date Analyzed	11/22/2008 1510			
Sulfate	5.0	U	mg/L		5.0	1.0	375.4
	Anly Batch: 680-124444		Date Analyzed	12/04/2008 1343			
Total Organic Carbon	6.0		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124401		Date Analyzed	12/03/2008 1620			

Analyte	Result	Qual	Units		RL	Dil	Method
Alkalinity	770		mg/L		1.0	1.0	310.1
	Anly Batch: 680-123897		Date Analyzed	11/26/2008 0934			
Carbon Dioxide, Free	15		mg/L		4.0	1.0	310.1
	Anly Batch: 680-123897		Date Analyzed	11/26/2008 0934			

Client Sample ID: **CPAMW04-F-1108**

Lab Sample ID: 680-42573-4
Client Matrix: Water

Date Sampled: 11/21/2008 1130
Date Received: 11/22/2008 0950

Analyte	Result	Qual	Units		RL	Dil	Method
Dissolved Organic Carbon-D	5.4		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124677		Date Analyzed	12/05/2008 0959			

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

General Chemistry

Client Sample ID: **BSAMW03-1108**

Lab Sample ID: 680-42573-5
Client Matrix: Water

Date Sampled: 11/21/2008 1330
Date Received: 11/22/2008 0950

Analyte	Result	Qual	Units		RL	Dil	Method
Chloride	73		mg/L		1.0	1.0	325.2
	Anly Batch: 680-123922		Date Analyzed	11/26/2008 1251			
Nitrate as N	0.050	U	mg/L		0.050	1.0	353.2
	Anly Batch: 680-124045		Date Analyzed	11/22/2008 1510			
Sulfate	260		mg/L		50	10	375.4
	Anly Batch: 680-124444		Date Analyzed	12/04/2008 1423			
Total Organic Carbon	3.8		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124401		Date Analyzed	12/03/2008 1704			

Analyte	Result	Qual	Units		RL	Dil	Method
Alkalinity	500		mg/L		1.0	1.0	310.1
	Anly Batch: 680-123897		Date Analyzed	11/26/2008 0944			
Carbon Dioxide, Free	8.2		mg/L		4.0	1.0	310.1
	Anly Batch: 680-123897		Date Analyzed	11/26/2008 0944			

Client Sample ID: **BSAMW03-F-1108**

Lab Sample ID: 680-42573-6
Client Matrix: Water

Date Sampled: 11/21/2008 1330
Date Received: 11/22/2008 0950

Analyte	Result	Qual	Units		RL	Dil	Method
Dissolved Organic Carbon-D	4.4		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124677		Date Analyzed	12/05/2008 0959			

DATA REPORTING QUALIFIERS

Client: URS Corporation

Job Number: 680-42522-1
Sdg Number: KPS046

Lab Section	Qualifier	Description
GC/MS VOA		
	U	Indicates the analyte was analyzed for but not detected.
	F	MS or MSD exceeds the control limits
	E	Result exceeded calibration range, secondary dilution required.
	F	RPD of the MS and MSD exceeds the control limits
GC VOA		
	U	Indicates the analyte was analyzed for but not detected.
	F	MS or MSD exceeds the control limits
Metals		
	U	Indicates the analyte was analyzed for but not detected.
	4	MS, MSD: The analyte present in the original sample is 4 times greater than the matrix spike concentration; therefore, control limits are not applicable.
General Chemistry		
	U	Indicates the analyte was analyzed for but not detected.
	F	MS or MSD exceeds the control limits
	4	MS, MSD: The analyte present in the original sample is 4 times greater than the matrix spike concentration; therefore, control limits are not applicable.

SDG KPS047

Results of Samples from Wells:

BSAMW02
CPAMW03
CPAMW05

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Solutia Krummrich Data Review

Laboratory SDG: KPS047

Reviewer: Elizabeth Kunkel

Date Reviewed: 1/13/2009

Guidance: USEPA National Functional Guidelines for Organic Data Review 1999.
USEPA National Functional Guidelines for Inorganic Data Review 2004.

Applicable Work Plan: WGK Long Term Monitoring Plan (Solutia 2008)

Sample Identification #	Sample Identification #
TB112408	BSAMW03-1108-EB
CPAMW03-1108	CPAMW03-F-1108
BSAMW02-1108	BSAMW02-F-1108
CPAMW05-1108	CPAMW05-F-1108

1.0 Data Package Completeness

Were all items delivered as specified in the QAPP and COC?

No, the COC designated equipment blank sample BSAMW03-1108-EB to be analyzed for MNA parameters. MNA analyses for sample BSAMW03-1108-EB were cancelled by the laboratory at the request of URS.

2.0 Laboratory Case Narrative \ Cooler Receipt Form

Were problems noted in the laboratory case narrative or cooler receipt form?

Yes, the laboratory case narrative indicated that VOCs were detected in the equipment blank. Samples were diluted due to high levels of target analytes. These issues are addressed further in the appropriate sections below.

The cooler receipt form indicated that one out of three trip blank vials were received broken. The two intact trip blank vials contained sufficient sample for the requested analyses. Also one 125-ml bottle was received empty for sample CPAMW05-1108; sufficient sample was available in the remaining bottle for all requested analyses. Two out of three VOA vials for sample CPAMW03-1108 were received by the laboratory with headspace. The remaining vial without headspace was used for the requested analysis. No qualifications of data were required.

3.0 Holding Times

Were samples extracted/analyzed within QAPP limits?

Yes

Field ID	Parameter	Analyte	Qualification
N/A			

4.0 Blank Contamination

Were any analytes detected in the Method Blanks, Field Blanks or Trip Blanks?

Yes

Blank ID	Parameter	Analyte	Concentration	Units
BSAMW03-108-EB	VOCs	Benzene	37	µg/L
BSAMW03-108-EB	VOCs	Chlorobenzene	1.1	mg/L
BSAMW03-108-EB	VOCs	1,2-Dichlorobenzene	2.2	mg/L
BSAMW03-108-EB	VOCs	1,4-Dichlorobenzene	1.8	mg/L

Qualifications due to blank contamination are included in the table below. Analytical data that were reported nondetect or at concentrations greater than five times (5X) the associated blank concentration (10X for common laboratory contaminants) did not require qualification. Equipment blank sample BSAMW03-108-EB was reanalyzed to confirm the detections in the original sample. The result from the original sample will be reported.

Field ID	Parameter	Analyte	New RL	Qualification
CPAMW03-1108	VOCs	Benzene	53	**U**
CPAMW05-1108	VOCs	Benzene	15	**U**

5.0 Laboratory Control Sample

Were LCS recoveries within evaluation criteria?

Yes

LCS ID	Parameter	Analyte	LCS/LCSD Recovery	RPD	LCS/LCSD/RPD Criteria
N/A					

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Analytical data that required qualification based on LCS data are included in the table below.

Field ID	Parameter	Analyte	Qualification
N/A			

6.0 Surrogate Recoveries

Were surrogate recoveries within evaluation criteria?

Yes

Field ID	Parameter	Surrogate	Recovery	Criteria
N/A				

Analytical data that required qualification based on surrogate data are included in the table below.

Field ID	Parameter	Analyte	Qualification
N/A			

7.0 Matrix Spike and Matrix Spike Duplicate Recoveries

Were MS/MSD samples reported as part of this SDG?

No

Were MS/MSD recoveries within evaluation criteria?

N/A

MS/MSD ID	Parameter	Analyte	MS/MSD Recovery	RPD	MS/MSD/RPD Criteria
N/A					

Analytical data that required qualification based on MS/MSD data are included in the table below.

Field ID	Parameter	Analyte	Qualification
N/A			

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8.0 Internal Standard (IS) Recoveries

Were internal standard area recoveries within evaluation criteria?

Yes

Field ID	Parameter	Analyte	IS Area Recovery	IS Criteria
N/A				

Analytical data that required qualification based on IS data are included in the table below.

Field ID	Parameter	Analyte	Qualification
N/A			

9.0 Laboratory Duplicate Results

Were laboratory duplicate samples collected as part of this SDG?

No

Were laboratory duplicate sample RPDs within criteria?

N/A

Field ID	Parameter	Analyte	RPD	Criteria
N/A				

Data qualified due to outlying laboratory duplicate recoveries are identified below:

Field ID	Parameter	Analyte	Qualification
N/A			

10.0 Field Duplicate Results

Were field duplicate samples collected as part of this SDG?

No

Field ID	Field Duplicate ID
N/A	

Were field duplicates within evaluation criteria?

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N/A

Field ID	Field Duplicate ID	Parameter	Analyte	RPD	Qualification
N/A					

11.0 Sample Dilutions

For samples that were diluted and nondetect, were undiluted results also reported?

Analytes were detected in samples that were diluted.

The following table identifies the analyses which were reported as nondetect, diluted, and an undiluted run ***was not*** reported:

Field ID	Parameter	Dilution Factor
N/A		

12.0 Additional Qualifications

Were additional qualifications applied?

No

US EPA ARCHIVE DOCUMENT

SAMPLE SUMMARY

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
680-42600-1TB	TB112408	Water	11/24/2008 0000	11/25/2008 0854
680-42600-2EB	BSAMW03-108-EB	Water	11/24/2008 0850	11/25/2008 0854
680-42600-4	CPAMW03-1108	Water	11/24/2008 1000	11/25/2008 0854
680-42600-5	CPAMW03-F-1108	Water	11/24/2008 1000	11/25/2008 0854
680-42600-6	BSAMW02-1108	Water	11/24/2008 1145	11/25/2008 0854
680-42600-7	BSAMW02-F-1108	Water	11/24/2008 1145	11/25/2008 0854
680-42600-8	CPAMW05-1108	Water	11/24/2008 1425	11/25/2008 0854
680-42600-9	CPAMW05-F-1108	Water	11/24/2008 1425	11/25/2008 0854

SAMPLE RESULTS

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

Client Sample ID: **TB112408**

Lab Sample ID: 680-42600-1TB
Client Matrix: Water

Date Sampled: 11/24/2008 0000
Date Received: 11/25/2008 0854

8260B Volatile Organic Compounds (GC/MS)

Method: 8260B
Preparation: 5030B
Dilution: 1.0
Date Analyzed: 12/01/2008 1640
Date Prepared: 12/01/2008 1640

Analysis Batch: 680-124153

Instrument ID: GC/MS Volatiles - P
Lab File ID: p0035.d
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result (ug/L)	Qualifier	RL
Benzene	1.0	U	1.0
Chlorobenzene	1.0	U	1.0
1,2-Dichlorobenzene	1.0	U	1.0
1,3-Dichlorobenzene	1.0	U	1.0
1,4-Dichlorobenzene	1.0	U	1.0

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	87	75 - 120
Dibromofluoromethane	115	75 - 121
Toluene-d8 (Surr)	93	75 - 120

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

Client Sample ID: **BSAMW03-108-EB**

Lab Sample ID: 680-42600-2EB
Client Matrix: Water

Date Sampled: 11/24/2008 0850
Date Received: 11/25/2008 0854

8260B Volatile Organic Compounds (GC/MS)

Method: 8260B
Preparation: 5030B
Dilution: 1.0
Date Analyzed: 12/01/2008 1739
Date Prepared: 12/01/2008 1739

Analysis Batch: 680-124153

Instrument ID: GC/MS Volatiles - P
Lab File ID: p0039.d
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result (ug/L)	Qualifier	RL
Benzene	37		1.0
Chlorobenzene	1.1		1.0
1,2-Dichlorobenzene	2.2		1.0
1,3-Dichlorobenzene	1.0	U	1.0
1,4-Dichlorobenzene	1.8		1.0

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	93	75 - 120
Dibromofluoromethane	115	75 - 121
Toluene-d8 (Surr)	93	75 - 120

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

Client Sample ID: **BSAMW03-108-EB**

Lab Sample ID: 680-42600-2EB
Client Matrix: Water

Date Sampled: 11/24/2008 0850
Date Received: 11/25/2008 0854

8260B Volatile Organic Compounds (GC/MS)

Method: 8260B
Preparation: 5030B
Dilution: 1.0
Date Analyzed: 12/02/2008 1313
Date Prepared: 12/02/2008 1313

Analysis Batch: 680-124211
Run Type: RA

Instrument ID: GC/MS Volatiles - P
Lab File ID: p0069.d
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result (ug/L)	Qualifier	RL
Benzene	42		1.0
Chlorobenzene	1.3		1.0
1,2-Dichlorobenzene	3.2		1.0
1,3-Dichlorobenzene	1.0	U	1.0
1,4-Dichlorobenzene	2.9		1.0

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	92	75 - 120
Dibromofluoromethane	113	75 - 121
Toluene-d8 (Surr)	97	75 - 120

Do not use this data. Use all other data.

Analytical Data

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

Client Sample ID: **CPAMW03-1108**

Lab Sample ID: 680-42600-4
Client Matrix: Water

Date Sampled: 11/24/2008 1000
Date Received: 11/25/2008 0854

8260B Volatile Organic Compounds (GC/MS)

Method: 8260B
Preparation: 5030B
Dilution: 1.0
Date Analyzed: 12/01/2008 1907
Date Prepared: 12/01/2008 1907

Analysis Batch: 680-124153

Instrument ID: GC/MS Volatiles - P
Lab File ID: p0045.d
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result (ug/L)	Qualifier	RL
Benzene	~~53~~ 0.0 ND	"U"	~~1.0~~ 53
~~Chlorobenzene~~	~~490~~	~~E~~	~~1.0~~
1,2-Dichlorobenzene	13		1.0
1,3-Dichlorobenzene	1.1		1.0
1,4-Dichlorobenzene	16		1.0

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	95	75 - 120
Dibromofluoromethane	115	75 - 121
Toluene-d8 (Surr)	94	75 - 120

* Use these results only. All other data was reported from the 1.0 dilution (undiluted) analysis.

Analytical Data

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

Client Sample ID: **CPAMW03-1108**

Lab Sample ID: 680-42600-4
Client Matrix: Water

Date Sampled: 11/24/2008 1000
Date Received: 11/25/2008 0854

8260B Volatile Organic Compounds (GC/MS)

Method: 8260B
Preparation: 5030B
Dilution: 4.0
Date Analyzed: 12/02/2008 0000
Date Prepared: 12/02/2008 0000

Analysis Batch: 680-124153
Run Type: DL

Instrument ID: GC/MS Volatiles - P
Lab File ID: p0065.d
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result (ug/L)	Qualifier	RL
~~Benzene~~	~~46~~	~~D~~	~~4.0~~
* Chlorobenzene	420	D	4.0
~~1,2-Dichlorobenzene~~	~~10~~	~~D~~	~~4.0~~
~~1,3-Dichlorobenzene~~	~~4.0~~	~~U~~	~~4.0~~
~~1,4-Dichlorobenzene~~	~~12~~	~~D~~	~~4.0~~

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	92	75 - 120
Dibromofluoromethane	113	75 - 121
Toluene-d8 (Surr)	98	75 - 120

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

Client Sample ID: **BSAMW02-1108**

Lab Sample ID: 680-42600-6
Client Matrix: Water

Date Sampled: 11/24/2008 1145
Date Received: 11/25/2008 0854

8260B Volatile Organic Compounds (GC/MS)

Method: 8260B
Preparation: 5030B
Dilution: 200
Date Analyzed: 12/01/2008 2006
Date Prepared: 12/01/2008 2006

Analysis Batch: 680-124153

Instrument ID: GC/MS Volatiles - P
Lab File ID: p0049.d
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result (ug/L)	Qualifier	RL
Benzene	16000		200
Chlorobenzene	2500		200
1,2-Dichlorobenzene	200	U	200
1,3-Dichlorobenzene	200	U	200
1,4-Dichlorobenzene	200	U	200

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	90	75 - 120
Dibromofluoromethane	112	75 - 121
Toluene-d8 (Surr)	92	75 - 120

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

Client Sample ID: **CPAMW05-1108**

Lab Sample ID: 680-42600-8
Client Matrix: Water

Date Sampled: 11/24/2008 1425
Date Received: 11/25/2008 0854

8260B Volatile Organic Compounds (GC/MS)

Method: 8260B
Preparation: 5030B
Dilution: 10
Date Analyzed: 12/02/2008 1343
Date Prepared: 12/02/2008 1343

Analysis Batch: 680-124211

Instrument ID: GC/MS Volatiles - P
Lab File ID: p0071.d
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result (ug/L)	Qualifier	RL
Benzene	~~15~~ 0.0 ND	"U"	~~10~~ 15
Chlorobenzene	1400		10
1,2-Dichlorobenzene	10	U	10
1,3-Dichlorobenzene	10	U	10
1,4-Dichlorobenzene	10	U	10

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	92	75 - 120
Dibromofluoromethane	111	75 - 121
Toluene-d8 (Surr)	98	75 - 120

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

Client Sample ID: **CPAMW03-1108**

Lab Sample ID: 680-42600-4
Client Matrix: Water

Date Sampled: 11/24/2008 1000
Date Received: 11/25/2008 0854

RSK-175 Dissolved Gases (GC)

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 12/04/2008 1047
Date Prepared: N/A

Analysis Batch: 680-124521

Instrument ID: GC Volatiles - U FID
Lab File ID: U12028.D
Initial Weight/Volume: 1000 uL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Ethane	49		0.35
Ethylene	0.33	U	0.33

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 12/04/2008 1047
Date Prepared: N/A

Analysis Batch: 680-124522

Instrument ID: GC Volatiles - U TCD
Lab File ID: U12028.D
Initial Weight/Volume: 1000 uL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Methane	33000		0.19

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

Client Sample ID: **BSAMW02-1108**

Lab Sample ID: 680-42600-6
Client Matrix: Water

Date Sampled: 11/24/2008 1145
Date Received: 11/25/2008 0854

RSK-175 Dissolved Gases (GC)

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 12/04/2008 1059
Date Prepared: N/A

Analysis Batch: 680-124521

Instrument ID: GC Volatiles - U FID
Lab File ID: U12029.D
Initial Weight/Volume: 1000 uL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Ethane	6.6		0.35
Ethylene	1.0		0.33

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 12/04/2008 1059
Date Prepared: N/A

Analysis Batch: 680-124522

Instrument ID: GC Volatiles - U TCD
Lab File ID: U12029.D
Initial Weight/Volume: 1000 uL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Methane	3300		0.19

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

Client Sample ID: **CPAMW05-1108**

Lab Sample ID: 680-42600-8
Client Matrix: Water

Date Sampled: 11/24/2008 1425
Date Received: 11/25/2008 0854

RSK-175 Dissolved Gases (GC)

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 12/04/2008 1112
Date Prepared: N/A

Analysis Batch: 680-124521

Instrument ID: GC Volatiles - U FID
Lab File ID: U12030.D
Initial Weight/Volume: 1000 uL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Ethane	8.6		0.35
Ethylene	0.33	U	0.33
Methane	52		0.19

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

Client Sample ID: **CPAMW03-1108**

Lab Sample ID: 680-42600-4
Client Matrix: Water

Date Sampled: 11/24/2008 1000
Date Received: 11/25/2008 0854

6010B Metals (ICP)-Total Recoverable

Method: 6010B
Preparation: 3005A
Dilution: 1.0
Date Analyzed: 12/04/2008 2235
Date Prepared: 12/03/2008 1707

Analysis Batch: 680-124550
Prep Batch: 680-124341

Instrument ID: ICP/AES - D
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

Analyte	Result (mg/L)	Qualifier	RL
Iron	15		0.050
Manganese	0.71		0.010

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

Client Sample ID: **CPAMW03-F-1108**

Lab Sample ID: 680-42600-5
Client Matrix: Water

Date Sampled: 11/24/2008 1000
Date Received: 11/25/2008 0854

6010B Metals (ICP)-Dissolved

Method: 6010B
Preparation: 3005A
Dilution: 1.0
Date Analyzed: 12/04/2008 2240
Date Prepared: 12/03/2008 1707

Analysis Batch: 680-124550
Prep Batch: 680-124341

Instrument ID: ICP/AES - D
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

Analyte	Result (mg/L)	Qualifier	RL
Iron, Dissolved	15		0.050
Manganese, Dissolved	0.76		0.010

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

Client Sample ID: **BSAMW02-1108**

Lab Sample ID:	680-42600-6	Date Sampled:	11/24/2008 1145
Client Matrix:	Water	Date Received:	11/25/2008 0854

6010B Metals (ICP)-Total Recoverable

Method:	6010B	Analysis Batch: 680-124550	Instrument ID:	ICP/AES - D
Preparation:	3005A	Prep Batch: 680-124341	Lab File ID:	N/A
Dilution:	1.0		Initial Weight/Volume:	50 mL
Date Analyzed:	12/04/2008 2245		Final Weight/Volume:	50 mL
Date Prepared:	12/03/2008 1707			

Analyte	Result (mg/L)	Qualifier	RL
Iron	1.8		0.050
Manganese	0.34		0.010

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

Client Sample ID: **BSAMW02-F-1108**

Lab Sample ID:	680-42600-7	Date Sampled:	11/24/2008 1145
Client Matrix:	Water	Date Received:	11/25/2008 0854

6010B Metals (ICP)-Dissolved

Method:	6010B	Analysis Batch: 680-124550	Instrument ID:	ICP/AES - D
Preparation:	3005A	Prep Batch: 680-124341	Lab File ID:	N/A
Dilution:	1.0		Initial Weight/Volume:	50 mL
Date Analyzed:	12/04/2008 2250		Final Weight/Volume:	50 mL
Date Prepared:	12/03/2008 1707			

Analyte	Result (mg/L)	Qualifier	RL
Iron, Dissolved	1.7		0.050
Manganese, Dissolved	0.34		0.010

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

Client Sample ID: **CPAMW05-1108**

Lab Sample ID:	680-42600-8	Date Sampled:	11/24/2008 1425
Client Matrix:	Water	Date Received:	11/25/2008 0854

6010B Metals (ICP)-Total Recoverable

Method:	6010B	Analysis Batch: 680-124550	Instrument ID:	ICP/AES - D
Preparation:	3005A	Prep Batch: 680-124341	Lab File ID:	N/A
Dilution:	1.0		Initial Weight/Volume:	50 mL
Date Analyzed:	12/04/2008 2255		Final Weight/Volume:	50 mL
Date Prepared:	12/03/2008 1707			

Analyte	Result (mg/L)	Qualifier	RL
Iron	76		0.050
Manganese	2.5		0.010

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

Client Sample ID: **CPAMW05-F-1108**

Lab Sample ID:	680-42600-9	Date Sampled:	11/24/2008 1425
Client Matrix:	Water	Date Received:	11/25/2008 0854

6010B Metals (ICP)-Dissolved

Method:	6010B	Analysis Batch: 680-124550	Instrument ID:	ICP/AES - D
Preparation:	3005A	Prep Batch: 680-124341	Lab File ID:	N/A
Dilution:	1.0		Initial Weight/Volume:	50 mL
Date Analyzed:	12/04/2008 2300		Final Weight/Volume:	50 mL
Date Prepared:	12/03/2008 1707			

Analyte	Result (mg/L)	Qualifier	RL
Iron, Dissolved	78		0.050
Manganese, Dissolved	2.6		0.010

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

General Chemistry

Client Sample ID: **CPAMW03-1108**

Lab Sample ID: 680-42600-4
Client Matrix: Water

Date Sampled: 11/24/2008 1000
Date Received: 11/25/2008 0854

Analyte	Result	Qual	Units		RL	Dil	Method
Chloride	390		mg/L		5.0	5.0	325.2
	Anly Batch: 680-123922		Date Analyzed	11/26/2008 1302			
Nitrate as N	0.050	U	mg/L		0.050	1.0	353.2
	Anly Batch: 680-124259		Date Analyzed	11/25/2008 1603			
Sulfate	5.0	U	mg/L		5.0	1.0	375.4
	Anly Batch: 680-124444		Date Analyzed	12/04/2008 1345			
Total Organic Carbon	7.9		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124401		Date Analyzed	12/03/2008 1723			

Analyte	Result	Qual	Units		RL	Dil	Method
Alkalinity	690		mg/L		1.0	1.0	310.1
	Anly Batch: 680-123897		Date Analyzed	11/26/2008 1007			
Carbon Dioxide, Free	56		mg/L		4.0	1.0	310.1
	Anly Batch: 680-123897		Date Analyzed	11/26/2008 1007			

Client Sample ID: **CPAMW03-F-1108**

Lab Sample ID: 680-42600-5
Client Matrix: Water

Date Sampled: 11/24/2008 1000
Date Received: 11/25/2008 0854

Analyte	Result	Qual	Units		RL	Dil	Method
Dissolved Organic Carbon-D	6.8		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124682		Date Analyzed	12/05/2008 0959			

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

General Chemistry

Client Sample ID: **BSAMW02-1108**

Lab Sample ID: 680-42600-6
Client Matrix: Water

Date Sampled: 11/24/2008 1145
Date Received: 11/25/2008 0854

Analyte	Result	Qual	Units		RL	Dil	Method
Chloride	94		mg/L		1.0	1.0	325.2
	Anly Batch: 680-123922		Date Analyzed	11/26/2008 1251			
Nitrate as N	0.050	U	mg/L		0.050	1.0	353.2
	Anly Batch: 680-124259		Date Analyzed	11/25/2008 1603			
Sulfate	110		mg/L		25	5.0	375.4
	Anly Batch: 680-124444		Date Analyzed	12/04/2008 1413			
Total Organic Carbon	4.8		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124401		Date Analyzed	12/03/2008 1738			

Analyte	Result	Qual	Units		RL	Dil	Method
Alkalinity	660		mg/L		1.0	1.0	310.1
	Anly Batch: 680-123897		Date Analyzed	11/26/2008 1016			
Carbon Dioxide, Free	29		mg/L		4.0	1.0	310.1
	Anly Batch: 680-123897		Date Analyzed	11/26/2008 1016			

Client Sample ID: **BSAMW02-F-1108**

Lab Sample ID: 680-42600-7
Client Matrix: Water

Date Sampled: 11/24/2008 1145
Date Received: 11/25/2008 0854

Analyte	Result	Qual	Units		RL	Dil	Method
Dissolved Organic Carbon-D	3.7		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124682		Date Analyzed	12/05/2008 0959			

General Chemistry

Client Sample ID: **CPAMW05-1108**

Lab Sample ID: 680-42600-8
Client Matrix: Water

Date Sampled: 11/24/2008 1425
Date Received: 11/25/2008 0854

Analyte	Result	Qual	Units		RL	Dil	Method
Chloride	330		mg/L		5.0	5.0	325.2
	Anly Batch: 680-123922		Date Analyzed	11/26/2008 1342			
Nitrate as N	0.050	U	mg/L		0.050	1.0	353.2
	Anly Batch: 680-124259		Date Analyzed	11/25/2008 1603			
Sulfate	1500		mg/L		250	50	375.4
	Anly Batch: 680-124444		Date Analyzed	12/04/2008 1430			
Total Organic Carbon	3.6		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124401		Date Analyzed	12/03/2008 1752			

Analyte	Result	Qual	Units		RL	Dil	Method
Alkalinity	340		mg/L		1.0	1.0	310.1
	Anly Batch: 680-123897		Date Analyzed	11/26/2008 1024			
Carbon Dioxide, Free	110		mg/L		4.0	1.0	310.1
	Anly Batch: 680-123897		Date Analyzed	11/26/2008 1024			

Client Sample ID: **CPAMW05-F-1108**

Lab Sample ID: 680-42600-9
Client Matrix: Water

Date Sampled: 11/24/2008 1425
Date Received: 11/25/2008 0854

Analyte	Result	Qual	Units		RL	Dil	Method
Dissolved Organic Carbon-D	3.1		mg/L		1.0	1.0	415.1
	Anly Batch: 680-124682		Date Analyzed	12/05/2008 0959			

DATA REPORTING QUALIFIERS

Client: URS Corporation

Job Number: 680-42600-1
Sdg Number: KPS047

Lab Section	Qualifier	Description
GC/MS VOA		
	U	Indicates the analyte was analyzed for but not detected.
	E	Result exceeded calibration range, secondary dilution required.
	D	Surrogate or matrix spike recoveries were not obtained because the extract was diluted for analysis; also compounds analyzed at a dilution may be flagged with a D.
GC VOA		
	U	Indicates the analyte was analyzed for but not detected.
Metals		
	U	Indicates the analyte was analyzed for but not detected.
General Chemistry		
	U	Indicates the analyte was analyzed for but not detected.

Appendix E
Microbial Insights Data Package

US EPA ARCHIVE DOCUMENT

2340 Stock Creek Blvd.
Rockford TN 37853-3044
Phone: (865) 573-8188
Fax: (865) 573-8133
Email: info@microbe.com

Lipid Analysis Report

Client: Thomas Adams
URS Corp
1001 Highlands Plaza Dr. West
Suite 300
St. Louis, MO 63110

Phone: 314.429.0100

Fax: 314.429.0462

MI Identifier: 017FL **Date Rec:** 12/05/2008 **Report Date:** 02/18/2009

Client Project #: 21562048.00004 **Client Project Name:** WGK Longterm Monitoring

Purchase Order #:

Analysis Requested: PLFA

Comments:

Reported By:

Reviewed By:

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US EPA ARCHIVE DOCUMENT

MICROBIAL INSIGHTS, INC.

2340 Stock Creek Blvd. Rockford, TN 37853-3044
Tel. (865) 573-8188 Fax. (865) 573-8133

PLFA

Client: **URS Corp**
Project: WGK Longterm Monitoring

MI Project Number: **017FL**
Date Received: 12/05/2008

Sample Information

Sample Name:	**BSAMW01-1208**	**BSAMW02-1208**	**BSAMW02-1208 - 13C Benzene**	**BSAMW03-1208**	**BSAMW04-1208**
Sample Date:	12/04/2008	12/04/2008	12/04/2008	12/04/2008	12/04/2008
Sample Matrix:	beads	beads	beads	beads	beads

Biomass Concentrations

Total Biomass (cells/bead)	**1.05E+05**	**1.09E+05**	**1.3E+05**	**2.43E+04**	**7.06E+04**

Community Structure (% total PLFA)

Firmicutes (TerBrSats)	**5.51**	**5.22**	**1.87**	**0.00**	**0.00**
Proteobacteria (Monos)	**67.32**	**67.01**	**76.86**	**63.91**	**74.61**
Anaerobic metal reducers (BrMonos)	**0.54**	**3.31**	**0.56**	**0.00**	**0.00**
SRB/Actinomycetes (MidBrSats)	**0.62**	**2.76**	**0.85**	**2.95**	**0.61**
General (Nsats)	**24.22**	**20.38**	**19.31**	**31.42**	**21.27**
Eukaryotes (polyenoics)	**1.76**	**1.35**	**0.54**	**1.70**	**3.50**

Physiological Status (Proteobacteria only)

Slowed Growth	**0.28**	**0.13**	**0.05**	**0.46**	**0.29**
Decreased Permeability	**0.21**	**0.11**	**0.04**	**0.12**	**0.09**

Legend:
NA = Not Analyzed NS = Not Sampled

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MICROBIAL INSIGHTS, INC.

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Tel. (865) 573-8188 Fax. (865) 573-8133

PLFA

Client: **URS Corp**
Project: WGK Longterm Monitoring

MI Project Number: **017FL**
Date Received: 12/05/2008

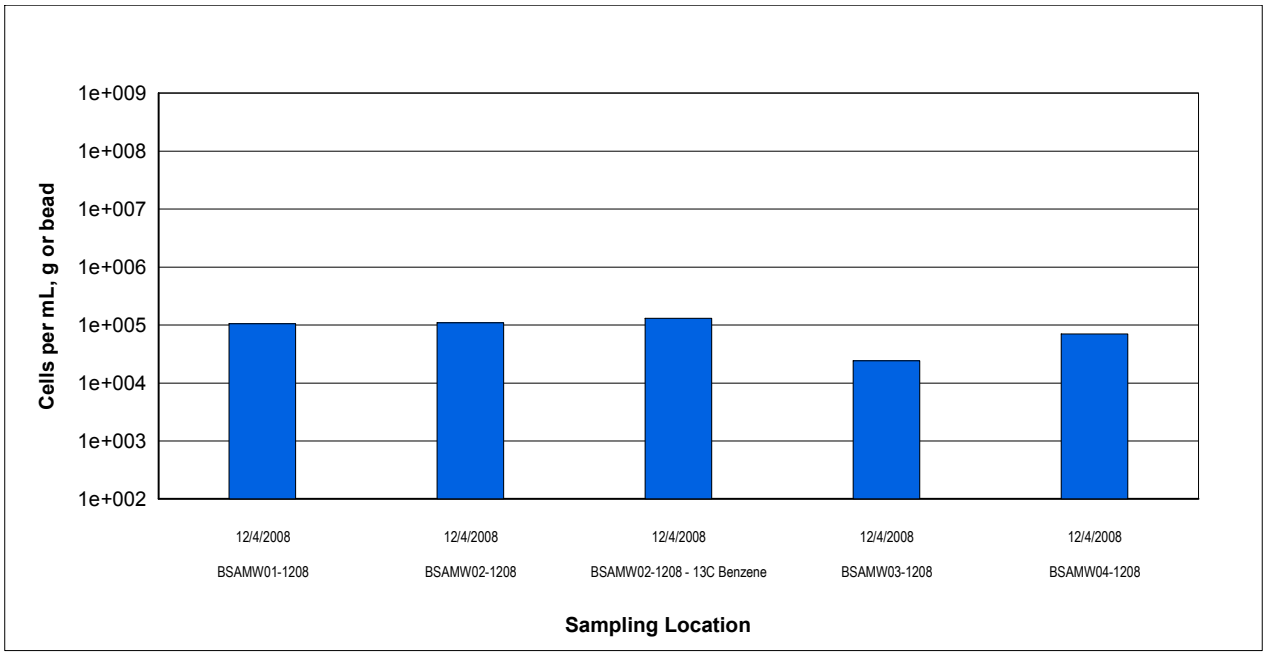

Figure 1. Biomass content is presented as a cell equivalent based on the total amount of phospholipid fatty acids (PLFA) extracted from a given sample. Total biomass is calculated based upon PLFA attributed to bacterial and eukaryotic biomass (associated with higher organisms).

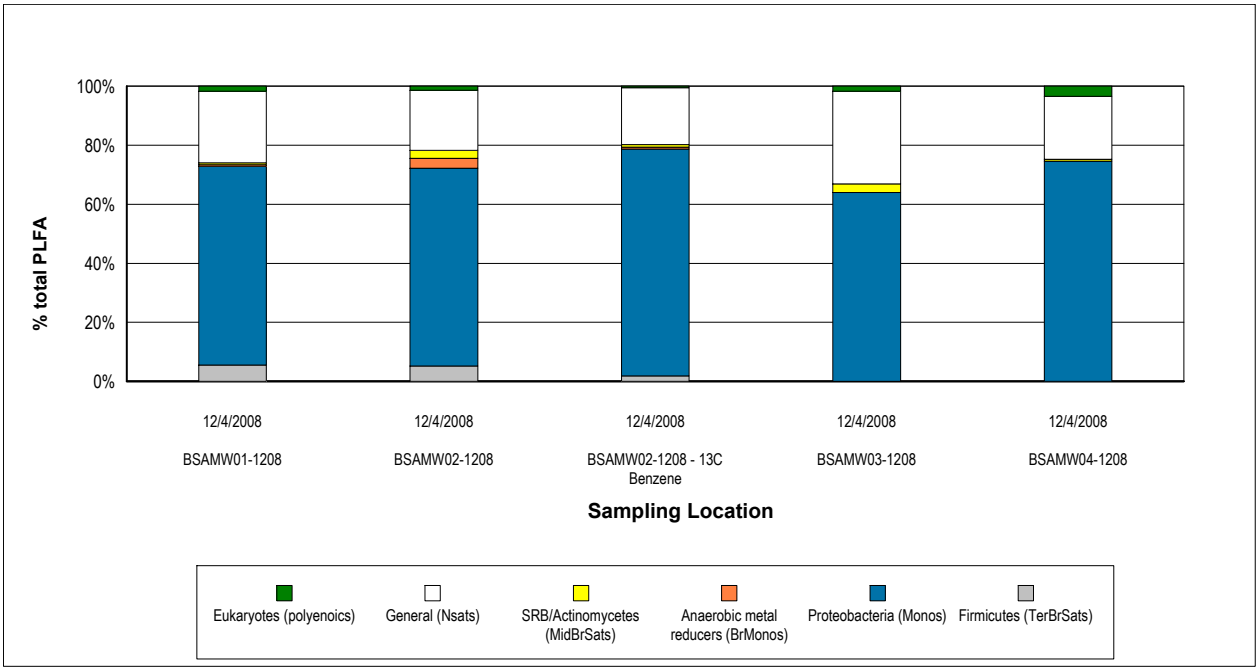

Figure 2. Relative percentages of total PLFA structural groups in the samples analyzed. Structural groups are assigned according to PLFA chemical structure, which is related to fatty acid biosynthesis.

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Client: **URS Corp**
Project: WGK Longterm Monitoring

MI Project Number: **017FL**
Date Received: 12/05/2008

Sample Information

Sample Name:	**CPAMW05-1208**	**CPAMW01-1208**	**CPAMW02-1208**	**CPAMW03-1208**	**CPAMW03-1208 - 13C Chlorobenzene**
Sample Date:	12/04/2008	12/04/2008	12/04/2008	12/04/2008	12/04/2008
Sample Matrix:	beads	beads	beads	beads	beads

Biomass Concentrations

Total Biomass (cells/bead)	**8.74E+04**	**2.15E+05**	**4.78E+04**	**5.35E+04**	**3.15E+05**

Community Structure (% total PLFA)

Firmicutes (TerBrSats)	**3.53**	**1.29**	**2.87**	**3.52**	**4.26**
Proteobacteria (Monos)	**72.92**	**75.50**	**73.67**	**72.00**	**39.91**
Anaerobic metal reducers (BrMonos)	**0.00**	**0.67**	**0.00**	**0.00**	**0.00**
SRB/Actinomycetes (MidBrSats)	**1.24**	**0.62**	**0.00**	**0.00**	**0.00**
General (Nsats)	**19.61**	**19.15**	**21.97**	**22.11**	**18.14**
Eukaryotes (polyenoics)	**2.68**	**2.79**	**1.50**	**2.37**	**37.69**

Physiological Status (Proteobacteria only)

Slowed Growth	**0.44**	**0.07**	**0.27**	**0.35**	**0.32**
Decreased Permeability	**0.17**	**0.11**	**0.07**	**0.19**	**0.13**

Legend:
NA = Not Analyzed NS = Not Sampled

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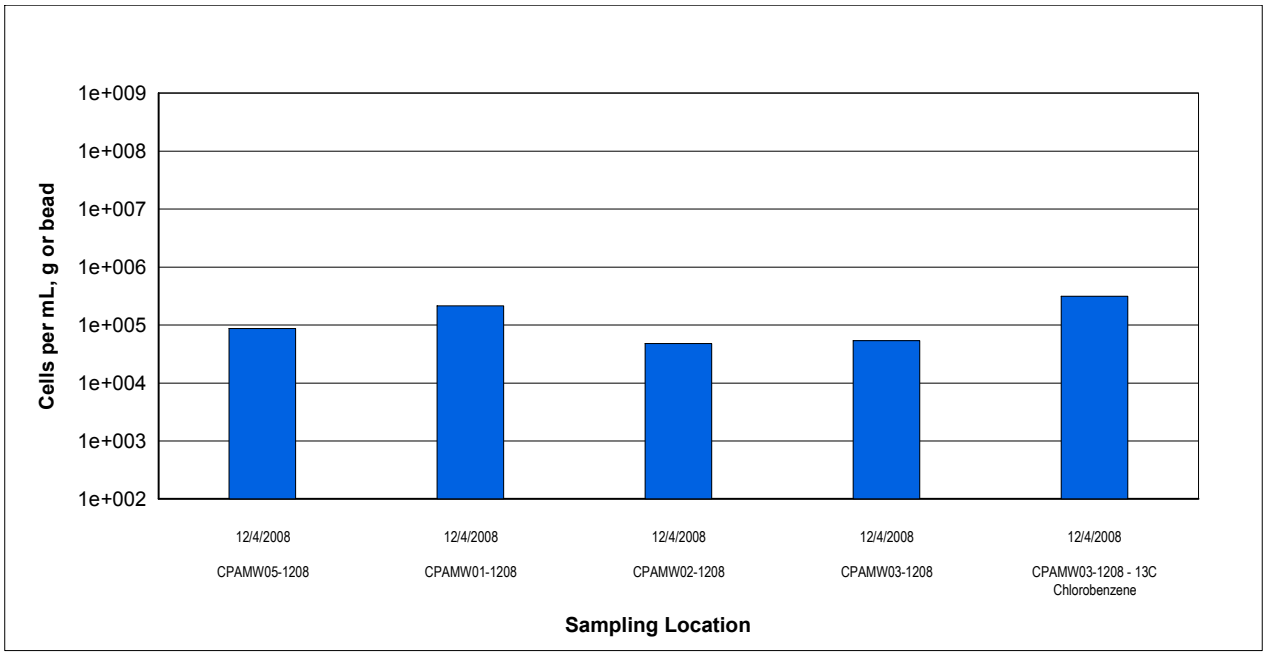
Client: **URS Corp**
Project: WGK Longterm Monitoring

MI Project Number: **017FL**
Date Received: 12/05/2008



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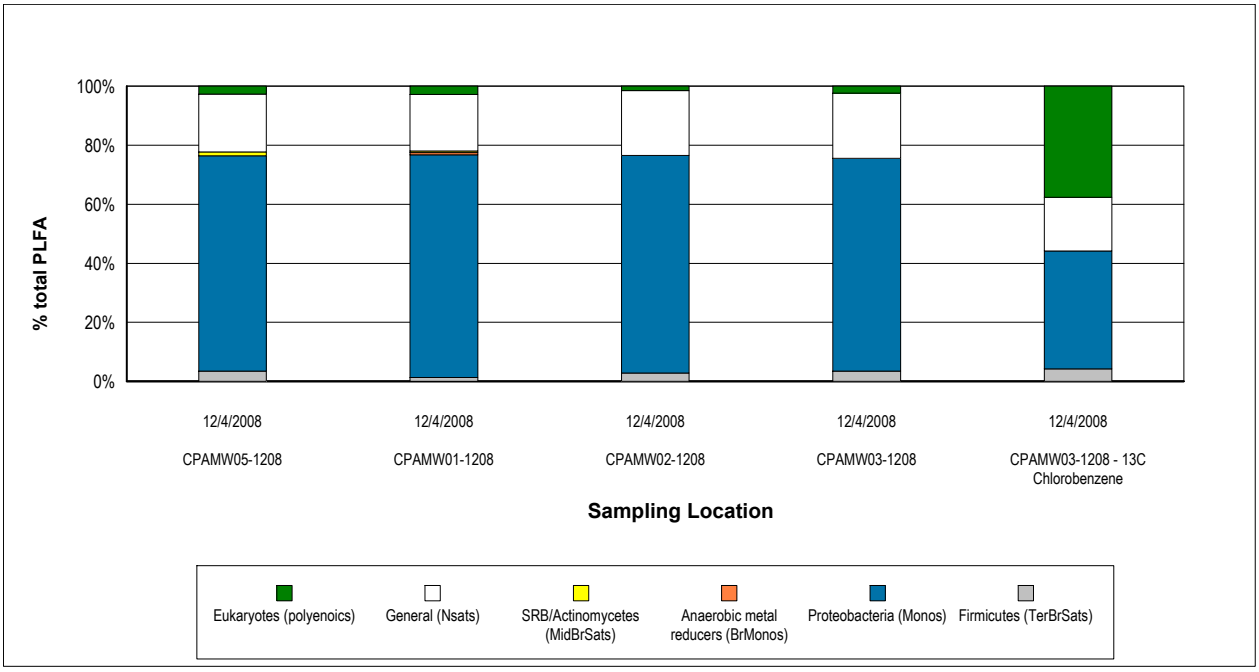

Figure 2. Relative percentages of total PLFA structural groups in the samples analyzed. Structural groups are assigned according to PLFA chemical structure, which is related to fatty acid biosynthesis.

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Client: **URS Corp**
Project: WGK Longterm Monitoring

MI Project Number: **017FL**
Date Received: 12/05/2008

Sample Information

Sample Name:	**CPAMW041-1208**
Sample Date:	12/04/2008
Sample Matrix:	beads

Biomass Concentrations

Total Biomass (cells/bead)	**2.28E+05**

Community Structure (% total PLFA)

Firmicutes (TerBrSats)	**0.47**
Proteobacteria (Monos)	**80.87**
Anaerobic metal reducers (BrMonos)	**0.00**
SRB/Actinomycetes (MidBrSats)	**0.69**
General (Nsats)	**17.36**
Eukaryotes (polyenoics)	**0.60**

Physiological Status (Proteobacteria only)

Slowed Growth	**0.27**
Decreased Permeability	**0.05**

Legend:
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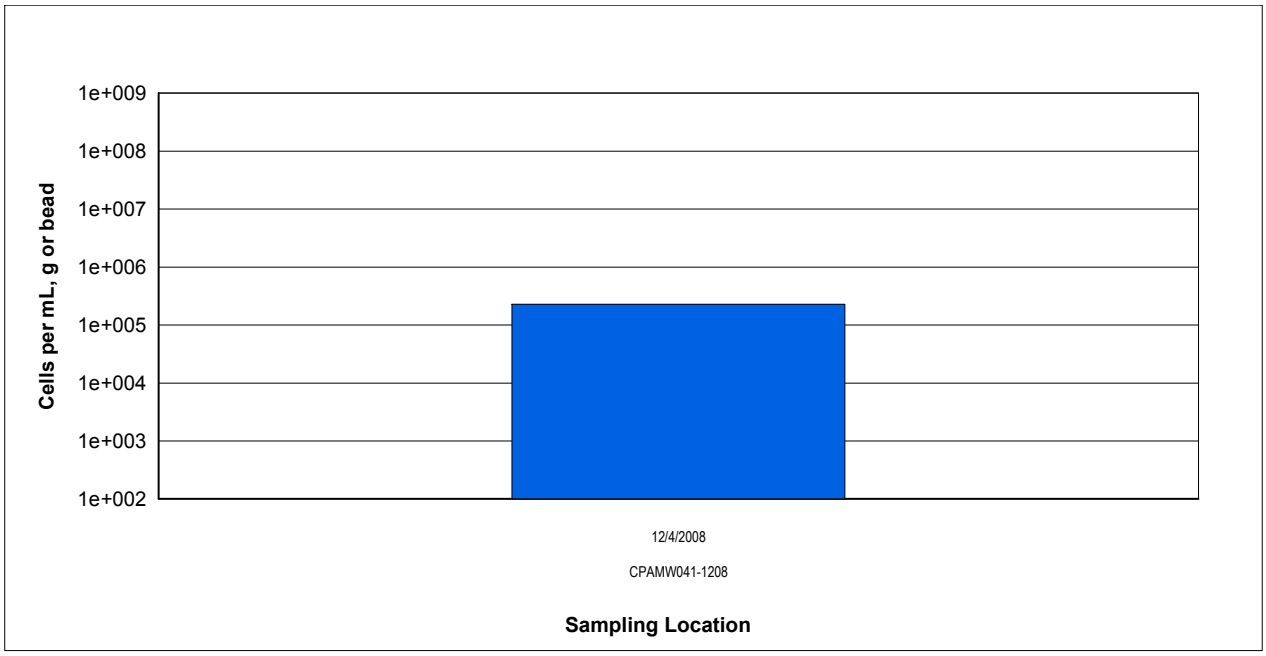
Project: WGK Longterm Monitoring

MI Project Number: **017FL**
Date Received: 12/05/2008



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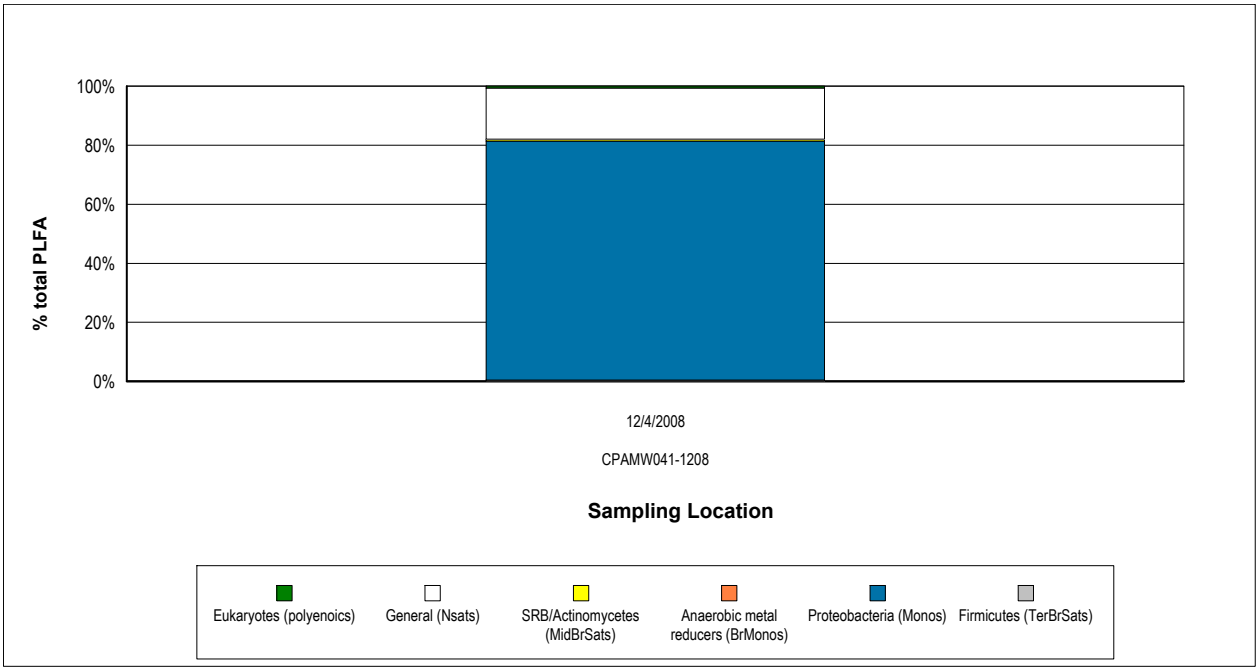

Figure 2. Relative percentages of total PLFA structural groups in the samples analyzed. Structural groups are assigned according to PLFA chemical structure, which is related to fatty acid biosynthesis.

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REPORT TO:
Reports will be provided to the contact(s) listed below. Parties other than the contact(s) listed below will require prior approval.

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Company: URS Corporation
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St. Louis, MO 63110

email: thomas_adams@urscorp.com
Phone: (314) 429-0100
Fax: (314) 429-0462

Project Manager: Thomas Adams
Project Name: WGK LongTerm Monitoring
Project No.: 21562048.00004

INVOICE TO:
For Invoices **paid by a third party** it is imperative that contact information & corresponding reference No. be provided.

Name: <-(same)
Company:
Address:

email:
Phone: ( )
Fax: ( )

Purchase Order No.
Subcontract No.

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Rockford, TN 37853-3044
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fax: (865) 573-8133
email: info@microbe.com
www.microbe.com

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☐ More samples to follow
☐ No Additional Samples

Saturday Delivery
Please see sampling protocol for instructions

Report Type: ☒ Standard (default) ☐ Comprehensive (15% surcharge) ☐ Historical (30% surcharge)

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Sample Information / **CENSUS:** Please select the target organism/gene

MI ID (Laboratory Use Only)	Sample Name	Date Sampled	Time Sampled	Matrix	PLFA	VFA	M/E/E	DGGE+3ID	DGGE+5ID	qDHC (Dehalococcoides)	DHC Functional genes	qDHB (Dehalobacter)	qDSM (Desulfuromonas)	qDSB (Desulfitobacterium)	qEBAC (Total)	qDSR (SRBs only)	qSRB/IRB	qMGN (methanogens)	qMOB (methanotrophs)	qDNF (Denitrifying)	qAOB (ammonia oxidizing)	qPM1 (MTBE aerobic)	qTOD (Intial PAHs aerobic)	qCAT (Intermediate PAHs aerobic)	qBSS (Toluen/Xylene Anaerobic)	qNAH (Napthalene aerobic)	add. qPCR:	add. qPCR:	add. qPCR:	RNA (Expression Option)*	Other: Benzene SIP	Other: Chlorobenzene SIP	Other:	Other:
017FL 1	BSAMW01-1208	12/4/08	1545		X																													
2, 3	BSAMW02-1208		1450		X																										X			
4	BSAMW03-1208		1425		X																													
5	BSAMW04-1208		1325		X																													
6	~~BSAMW05-1208~~ CPAMW05-1208 MC		~~1350~~ 1440 MC		X																													
7	CPAMW01-1208		1520		X																													
8	CPAMW02-1208		1535		X																													
9, 10	CPAMW03-1208		1505		X																											X		
11	CPAMW04-1208		1340		X																													
	~~CPAMW05-1208~~		~~1440~~		X			MC																										

Relinquished by: [signature] Date: 12/4/08
Received by: [signature] Date 12/5/08

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Rockford TN 37853-3044
Phone: (865) 573-8188
Fax: (865) 573-8133
Email: info@microbe.com

Lipid Analysis Report

Client: Thomas Adams
URS Corp
1001 Highlands Plaza Dr. West
Suite 300
St. Louis, MO 63110

Phone: 314.429.0100

Fax: 314.429.0462

MI Identifier: 048FL **Date Rec:** 12/12/2008 **Report Date:** 01/09/2009

Client Project #: 21562048.00004 **Client Project Name:** Solutia WGK Long Term Monitoring Prog

Purchase Order #:

Analysis Requested: PLFA

Comments:

Reported By:

Reviewed By:

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Tel. (865) 573-8188 Fax. (865) 573-8133

PLFA

Client: **URS Corp**
Project: Solutia WGK Long Term Monitoring Program

MI Project Number: **048FL**
Date Received: 12/12/2008

Sample Information

Sample Name:	**BSAMW05-1208**
Sample Date:	12/10/2008
Sample Matrix:	beads

Biomass Concentrations

Total Biomass (cells/bead)	**1.33E+05**

Community Structure (% total PLFA)

Firmicutes (TerBrSats)	**1.60**
Proteobacteria (Monos)	**79.30**
Anaerobic metal reducers (BrMonos)	**1.14**
SRB/Actinomycetes (MidBrSats)	**1.30**
General (Nsats)	**14.30**
Eukaryotes (polyenoics)	**2.36**

Physiological Status (Proteobacteria only)

Slowed Growth	**0.13**
Decreased Permeability	**0.11**

Legend:
NA = Not Analyzed NS = Not Sampled

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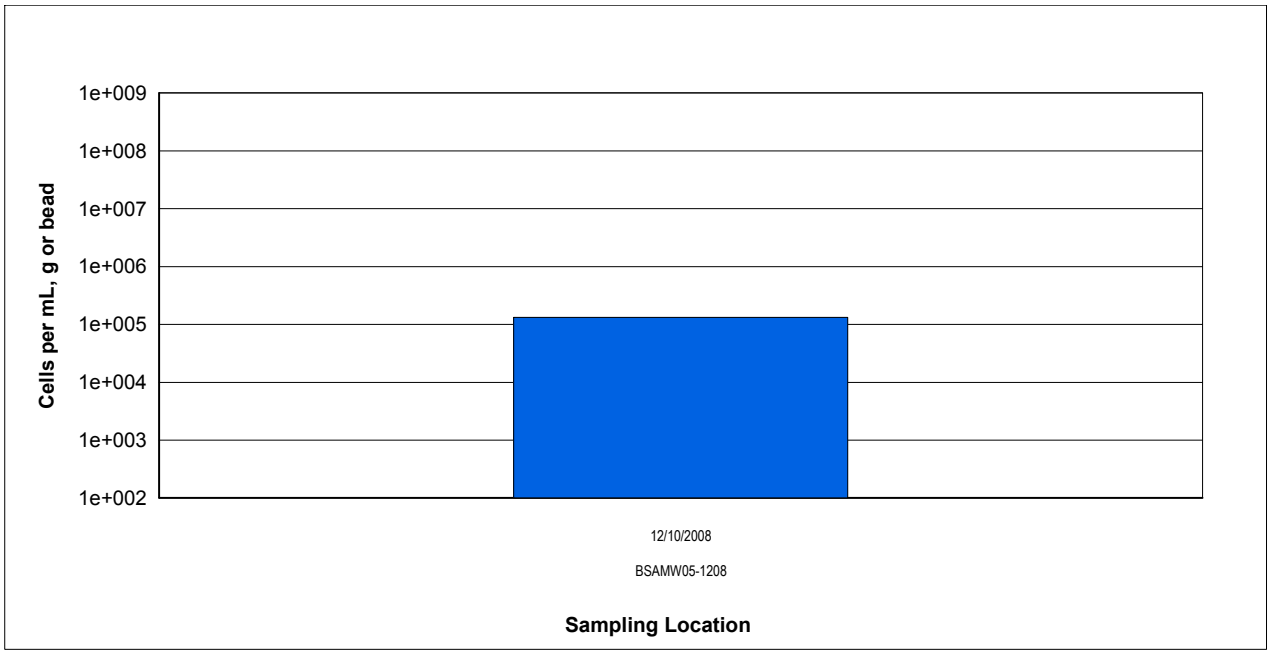
PLFA

Client: **URS Corp**
Project: Solutia WGK Long Term Monitoring Program

MI Project Number: **048FL**
Date Received: 12/12/2008



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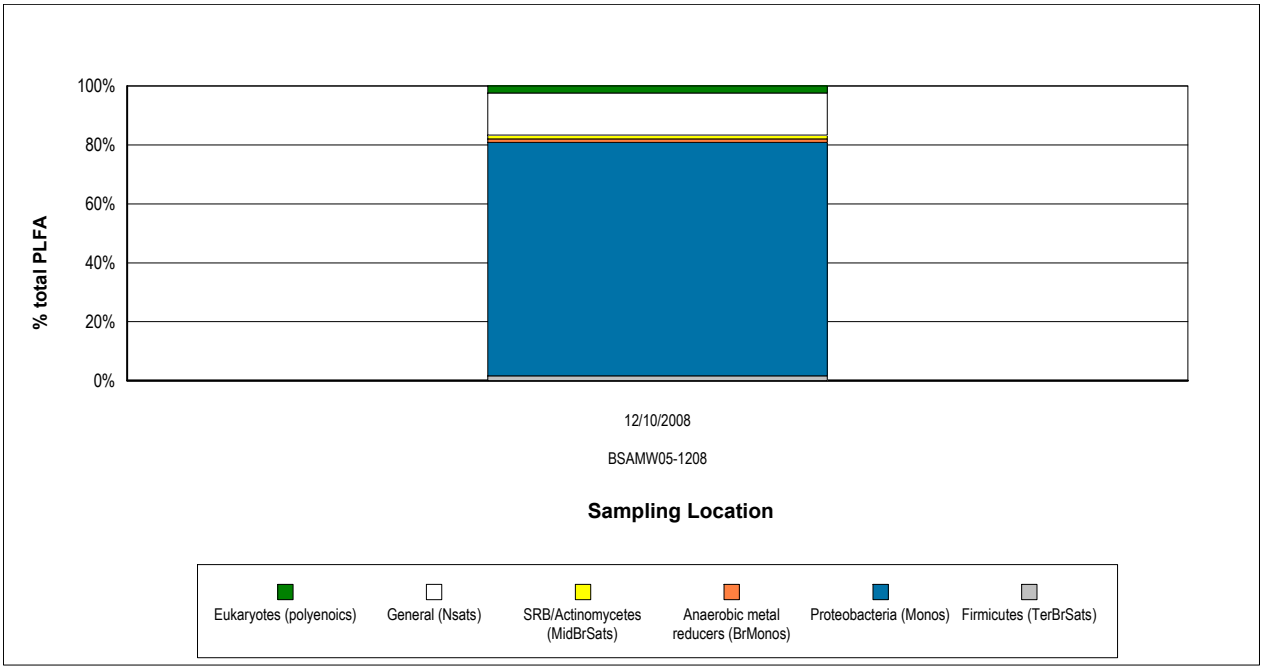

Figure 2. Relative percentages of total PLFA structural groups in the samples analyzed. Structural groups are assigned according to PLFA chemical structure, which is related to fatty acid biosynthesis.

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REPORT TO:
Reports will be provided to the contact(s) listed below. Parties other than the contact(s) listed below will require prior approval.

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Address: 1001 Highlands Plaza Drive West
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St. Louis MO 63110
email: thomas.adams@urscorp.com
Phone: (314) 429-0100
Fax: (314) 429 0462

Project Manager: Jeff Adams
Project Name: Solutia WGK Long Term Monitoring Program
Project No.: 21562048.00004

INVOICE TO:
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Company:
Address: SAME
email:
Phone: ( )
Fax: ( )

Purchase Order No.
Subcontract No.

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email: info@microbe.com
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Please Check One:
☐ More samples to follow
☒ No Additional Samples

Saturday Delivery
Please see sampling protocol for instructions

Report Type: ☐ Standard (default) ☐ Comprehensive (15% surcharge) ☐ Historical (30% surcharge)

Please contact us prior to submitting samples regarding questions about the analyses you are requesting at (865) 573-8188 (8:00 am to 4:00 pm M-F). After these hours please call (865) 300-8053.

Sample Information											CENSUS: Please select the target organism/gene																								
MI ID (Laboratory Use Only)	Sample Name	Date Sampled	Time Sampled	Matrix	PLFA	VFA	M/E/E	DGGE+3ID	DGGE+5ID		qDHC (Dehalococcoides)	DHC Functional genes	qDHB (Dehalobacter)	qDSM (Desulfuromonas)	qDSB (Desulfitobacterium)	qEBAC (Total)	qDSR (SRBs only)	qSRB/IRB	qMGN (methanogens)	qMOB (methanotrophs)	qDNF (Dentrifying)	qAOB (ammonia oxidizing)	qPM1 (MTBE aerobic)	qTOD (intial PAHs aerobic)	qCAT (intermediate PAHs aerobic)	qBSS (Toluen/Xylene Anaerobic)	qNAH (Napthalene aerobic)	add. qPCR:	add. qPCR:	add. qPCR:	RNA (Expression Option)*	Other:	Other:	Other:	Other:
048FL 1	BSAMW05-1208	12/10/08	17:00	W	X																														

Relinquished by: [signature] for URS Date: 12/11/08
Received by: [signature] Date 12/12/08

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Web: www.microbe.com

SITE LOGIC Report

Stable Isotope Probing (SIP) Study

Contact: Thomas Adams
Address: URS Corp – St. Louis MO
1001 Highlands Plaza Drive West
Suite 300
St. Louis, MO 63110

Phone: 314.429.0100

Email: thomas_adams@urscorp.com

MI Identifier:	017FL

Report Date: 2/18/09

Project: WGK Longterm Monitoring

Comments:

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Executive Summary

Bio-Trap® samplers baited with ^{13}C labeled benzene (BSAMW02) or ^{13}C chlorobenzene (CPAMW03) were deployed in monitoring wells for 30 days and then recovered for analysis. A complete summary of the results is provided in Table 1.

- Moderate levels (~10^5 cells/bead) of total biomass were detected in both the benzene (BSAMW02) and chlorobenzene (CPAMW03) baited Bio-Trap samplers.
- Quantification of the ^{13}C enriched biomass demonstrated a high level of utilization of benzene by the indigenous microbes in well BSAMW02.
- No incorporation of the ^{13}C into the biomass was seen in the chlorobenzene baited Bio-Trap in well CPAMW03.
- Quantification of ^{13}C dissolved inorganic carbon (DIC) demonstrated high levels of benzene mineralization in well BSAMW02. There was a low level of chlorobenzene mineralization in CPAMW03.
- Comparison of pre- and post-deployment ^{13}C labeled benzene in well BSAMW02 showed essentially no loss of the ^{13}C labeled benzene. There was a 60% loss of the ^{13}C labeled chlorobenzene in CPAMW03.

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Overview of Approach

Stable Isotope Probing (SIP)

Stable isotope probing (SIP) is an innovative method to track the environmental fate of a "labeled" contaminant of concern to unambiguously demonstrate biodegradation. Two stable carbon isotopes exist in nature – carbon 12 (^{12}C) which accounts for 99% of carbon and carbon 13 (^{13}C) which is considerably less abundant (~1%). With the SIP method, the Bio-Trap® sampler is baited with a specially synthesized form of the contaminant containing ^{13}C labeled carbon. Since ^{13}C is rare, the labeled compound can be readily differentiated from the contaminants present at the site. Following deployment, the Bio-Trap® is recovered and three approaches are used to conclusively demonstrate biodegradation of the contaminant of concern.

- The loss of the labeled compound provides an estimate of the degradation rate (% loss of ^{13}C).
- Quantification of ^{13}C enriched phospholipid fatty acids (PLFA) indicates incorporation into microbial biomass.
- Quantification of ^{13}C enriched dissolved inorganic carbon (DIC) indicates contaminant mineralization.

Phospholipid Fatty Acids (PLFA): PLFA are a primary component of the membrane of all living cells including bacteria. PLFA decomposes rapidly upon cell death (1, 2), so the total amount of PLFA present in a sample is indicative of the viable biomass. When combined with stable isotope probing (SIP), incorporation of ^{13}C into PLFA is a conclusive indicator of biodegradation.

Some organisms produce "signature" types of PLFA allowing quantification of important microbial functional groups (e.g. iron reducers, sulfate reducers, or fermenters). The relative proportions of the groups of PLFA provide a "fingerprint" of the microbial community. In addition, *Proteobacteria* modify specific PLFA during periods of slow growth or in response to environmental stress providing an index of their health and metabolic activity.

CENSUS: CENSUS is based on a technique called quantitative polymerase chain reaction (qPCR) whereby many copies of a specific gene are generated. As each gene copy is made, a fluorescent marker is released, measured, and used to quantify the number of target genes present in a sample. The choice of target gene depends on the contaminant of concern. For example, at MTBE impacted sites, CENSUS quantification of *Methylibium petroleiphilum* PM1 (qPM1), a known MTBE-utilizing bacterium, would be used as an index of the MTBE-degrading community.

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Results

Table 1. Summary of the results obtained from MICRO, GEO, and COC samplers within Bio-Trap® Units. Interpretation guidelines and definitions are found later in the document.

Sample Name	BSAMW02-1208-13C Benzene	CPAMW03-1208-13C Chlorobenzene
^{13}C Contaminant Loss		
Benzene Pre-deployment (mg/bd)	1.37	----
Benzene Post-deployment (mg/bd)	1.38	----
Chlorobenzene Pre-deployment (mg/bd)	----	0.49
Chlorobenzene Post-deployment (mg/bd)	----	0.20
% Loss	-1%	60%
First Order Rate Constant (1/days)	0.000	0.030
Half Life (days)	-4080	23
Biomass & ^{13}C Incorporation		
Total Biomass (Cells/bd)	1.30E+05	3.15E+05
^{13}C Enriched Biomass (Cells/bd)	1.27E+04	0.0.E+00
% ^{13}C Incorporation	9.81%	0.00%
Average PLFA Del (‰)	8204	----
Maximum PLFA Del (‰)	11518	----
^{13}C Mineralization		
DIC Del (‰)	12672	44
% 13C	13.26%	1.15%
Community Structure (% total PLFA)		
Firmicutes (TerBrSats)	1.9	4.3
Proteobacteria (Monos)	76.9	39.9
Anaerobic metal reducers (BrMonos)	0.6	0.0
Actinomycetes (MidBrSats)	0.9	0.0
General (Nsats)	19.3	18.1
Eukaryotes (Polyenoics)	0.5	37.7
Physiological Status (Proteobacteria only)		
Slowed Growth	0.05	0.32
Decreased Permeability	0.04	0.13

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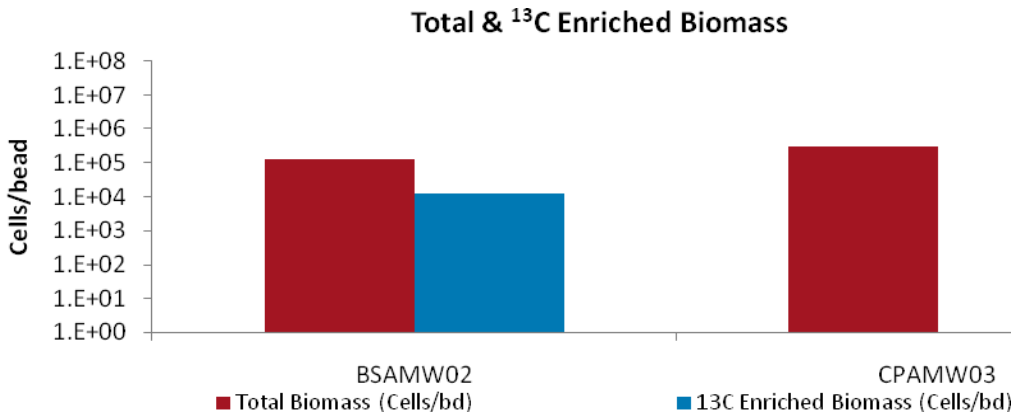

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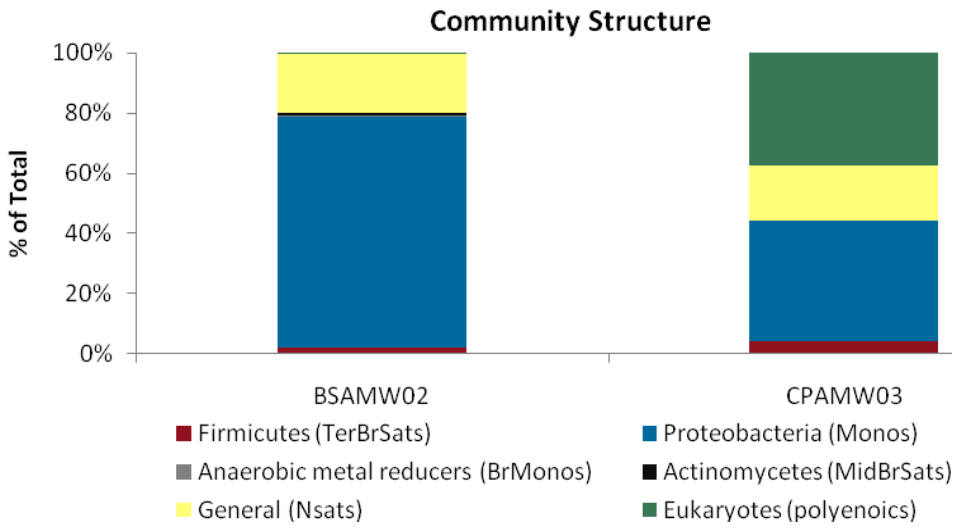

Figure 2. Relative percentages of total PLFA structural groups in the samples analyzed. Structural groups are assigned according to PLFA chemical structure, which is related to fatty acid biosynthesis. See the table in the interpretation section for detailed descriptions of the structural groups.

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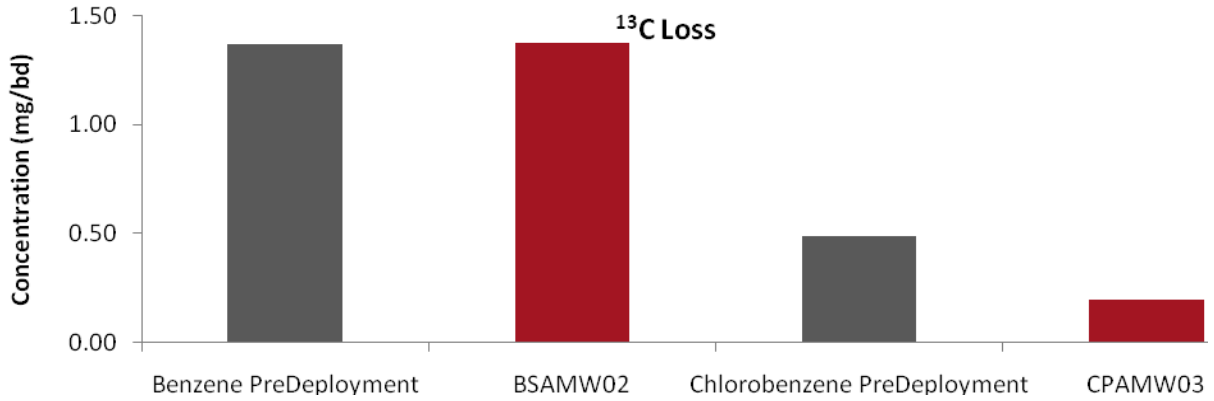

Figure 3. Comparison of Pre-deployment concentrations loaded on Bio-Sep beads to the concentrations detected after incubation.

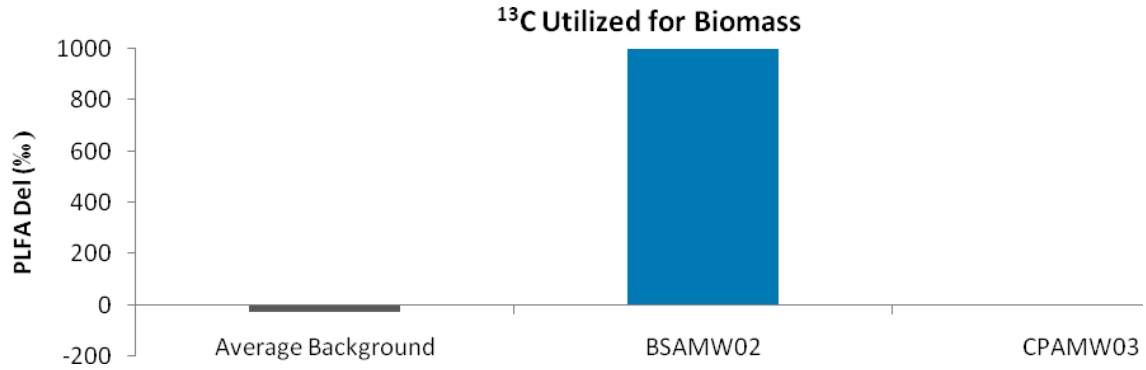

Figure 4. Comparison of the average Del value obtained from PLFA biomarkers from each Bio-Trap® unit to the average background Del observed in samples not exposed to ^{13}C enriched compounds.

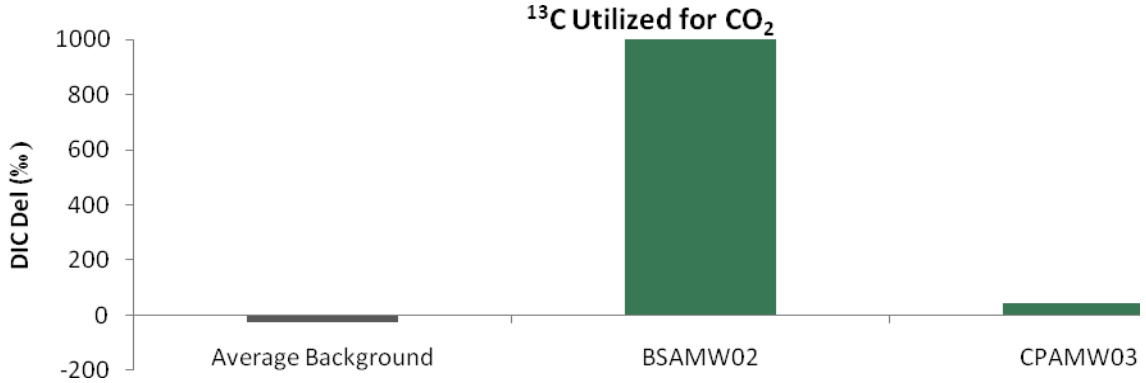

Figure 5. Comparison of the Del value obtained from DIC from each Bio-Trap® unit to the average background Del observed in samples not exposed to ^{13}C enriched compounds.

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Interpretation

Interpretation of the results of the SIP Bio-Trap® study must be performed with due consideration of site conditions, site activities, and the desired treatment mechanism. The following discussion describes interpretation of results in general terms and is meant to serve as a guide.

Contaminant Concentration: Bio-Traps® are baited with a ^{13}C labeled contaminant of concern and a pre-deployment concentration is determined prior to shipping. Following deployment, Bio-Traps® are recovered for analysis including measurement of the concentration of the ^{13}C labeled contaminant remaining. Pre- and post-deployment concentrations are used to calculate percent loss, to estimate the first order degradation rate constant (k), and to estimate the contaminant half life (Results Summary Table). For a description of how the first order rate constant is calculated, please see the glossary at the end of the report. The first order rate constant can be used to compare different wells or treatments depending on the design of the study. A higher value is indicative of a greater biodegradation rate.

Alternatively, the contaminant half life can be used to make the same types of comparisons between wells and treatments. By definition, half life is the amount of time required for the contaminant concentration to equal half of the initial concentration (see glossary for calculation).

Biomass Concentrations: PLFA analysis is one of the most reliable and accurate methods available for the determination of viable (live) biomass. Phospholipids break down rapidly upon cell death, so biomass calculations based on PLFA content do not include "fossil" lipids from dead cells. Total biomass (cells/bead) is calculated from total PLFA using a conversion factor of 20,000 cells/pmole of PLFA. When making comparisons between wells, treatments, or over time, differences of one order of magnitude or more are considered significant.

Total Biomass		
Low	**Moderate**	**High**
10^3 to 10^4 cells	10^5 to 10^6 cells	10^7 to 10^8 cells

For SIP studies, the ^{13}C enriched PLFA is also determined to conclusively demonstrate contaminant biodegradation and quantify incorporation into biomass as a result of the ^{13}C being used for cellular growth. The % ^{13}C incorporation (^{13}C enriched biomass/total biomass) is also provided in the data summary table, but the value must be interpreted carefully especially when comparing wells or treatments. Typically, biodegradation of a contaminant of concern is performed by a small subset of the total microbial community. For Bio-Traps® with large total biomass, the % ^{13}C incorporation value could be low despite significant ^{13}C labeled biomass and loss of the compound. The % ^{13}C incorporation should be viewed in light of total biomass, percent loss, and dissolved inorganic carbon (DIC) results.

^{13}C enrichment data is often reported as a del value. The del value is the difference between the isotopic ratio ($^{13}C/^{12}C$) of the sample (R_x) and a standard (R_{std}) normalized to the isotopic ratio of the standard (R_{std}) and multiplied by 1,000 (units are parts per thousand, denoted ‰).

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R_{std} is the naturally occurring isotopic ratio and is approximately 0.011180 (roughly 1% of naturally occurring carbon is ^{13}C). The isotopic ratio, R_x, of PLFA is typically less than the R_{std} under natural conditions, resulting in a del value between -20 and -30‰. For a SIP Bio-Trap® study, biodegradation and incorporation of the ^{13}C labeled compound into PLFA results in a larger $^{13}C/^{12}C$ ratio (R_x) and thus del values greater than under natural conditions. Typical PLFA del values are provided below.

PLFA Del (‰)		
Low	**Moderate**	**High**
0 to 100	100 to 1,000	>1,000

Dissolved Inorganic Carbon (DIC): Often, bacteria can utilize the ^{13}C labeled compound as both a carbon and energy source. The ^{13}C portion used as a carbon source for growth can be incorporated into PLFA as discussed above, while the ^{13}C used for energy is oxidized to $^{13}CO_2$ (mineralized).

^{13}C enriched CO_2 data is often reported as a del value as described above for PLFA. Under natural conditions, the R_x of CO_2 is approximately the same as R_{std} (0.01118 or about 1.1% ^{13}C). For an SIP Bio-Trap® study, mineralization of the ^{13}C labeled contaminant of concern would lead to a greater value of R_x (increased $^{13}CO_2$ production) and thus a positive del value. As with PLFA, del values between 0 and 100‰ are considered low, values between 100 and 1,000‰ are considered moderate, and values greater than 1,000‰ are considered high. Thus DIC %^{13}C are considered low if the value is less than 1.23%, moderate if between 1.23 and 2.24%, and high if greater than 2.24%.

Dissolved Inorganic Carbon (DIC) Del and % ^{13}C		
Low	**Moderate**	**High**
0 to 100	100 to 1,000	>1,000
1.11 to 1.23%	1.23 to 2.24 %	>2.24 %

CENSUS: CENSUS analysis provides quantification of an organism or functional genes responsible for biodegradation of the contaminant of interest. CENSUS results can be compared between wells, between treatments, or over time to evaluate degrader populations, depending upon the design of the study. CENSUS analysis is often included in SIP studies to provide an additional line of evidence supporting biodegradation as a treatment mechanism and can be used for long-term monitoring of a degrader population following completion of the SIP study.

Community Structure (% total PLFA): Community structure data is presented as a percentage of PLFA structural groups normalized to the total PLFA biomass. The relative proportions of the PLFA structural groups provide a "fingerprint" of the types of microbial groups (e.g. anaerobes, sulfate reducers, etc.) present and therefore offer insight into the dominant metabolic processes occurring at the sample location. Thorough interpretation of the PLFA structural groups depends in part on an understanding of site conditions and the desired microbial biodegradation pathways. For example, an increase in mid chain branched saturated PLFA (MidBrSats), indicative of sulfate reducing bacteria (SRB) and *Actinomycetes*, may be desirable at a site where anaerobic BTEX biodegradation is the treatment mechanism, but would not be desirable for a corrective action promoting aerobic BTEX or MTBE biodegradation. The following table provides a brief summary of each PLFA structural group and its potential relevance to bioremediation.

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Table 2. Description of PLFA structural groups.

PLFA Structural Group	General classification	Potential Relevance to Bioremediation Studies
Monoenoic (Monos)	Abundant in Proteobacteria (Gram negative bacteria), typically fast growing, utilize many carbon sources, and adapt quickly to a variety of environments.	Proteobacteria is one of the largest groups of bacteria and represents a wide variety of both aerobes and anaerobes. The majority of Hydrocarbon utilizing bacteria fall within the Proteobacteria
Terminally Branched Saturated (TerBrSats)	Characteristic of Firmicutes (Low G+C Gram-positive bacteria), and also found in Bacteriodes, and some Gram-negative bacteria (especially anaerobes).	Firmicutes are indicative of presence of anaerobic fermenting bacteria (mainly *Clostridia/Bacteriodes*-like), which produce the H_2 necessary for reductive dechlorination
Branched Monoenoic (BrMonos)	Found in the cell membranes of micro-aerophiles and anaerobes, such as sulfate- or iron-reducing bacteria	In contaminated environments high proportions are often associated with anaerobic sulfate and iron reducing bacteria
Mid-Chain Branched Saturated (MidBrSats)	Common in sulfate reducing bacteria and also Actinobacteria (High G+C Gram-positive bacteria).	In contaminated environments high proportions are often associated with anaerobic sulfate and iron reducing bacteria
Normal Saturated (Nsats)	Found in all organisms.	High proportions often indicate less diverse populations.
Polyenoic	Found in eukaryotes such as fungi, protozoa, algae, higher plants, and animals.	Eukaryotic scavengers will often rise up and prey on contaminant utilizing bacteria

Physiological Status (*Proteobacteria*): Some *Proteobacteria* modify specific PLFA as a strategy to adapt to stressful environmental conditions (3, 4). For example, *cis* monounsaturated fatty acids may be modified to cyclopropyl fatty acids during periods of slowed growth or modified to *trans* monounsaturated fatty acids to decrease membrane permeability in response to environmental stress. The ratio of product to substrate fatty acid thus provides an index of their health and metabolic activity. In general, status ratios greater than 0.25 indicate a response to unfavorable environmental conditions.

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Glossary

Del: A Del value is the difference between the isotopic ratio ($^{13}C/^{12}C$) of the sample (R_x) and a standard (R_{std}) normalized to the isotopic ratio of the standard (R_{std}) and multiplied by 1,000 (units are parts per thousand denoted ‰).

$$Del = (R_x - R_{std})/R_{std} \times 1000$$

First Order Rate Constant: The first order rate is expression is $C=C_o e^{-kt}$ where C is the post-deployment concentration (mg/bead), C_o is the pre-deployment concentration (mg/bead), k is the first order rate constant (1/days), and t is the deployment time (days). Upon rearrangement and using pre-and post-deployment concentrations, $k=-\ln(C/C_o)/t$.

Half Life: Half life is the amount of time required for the contaminant concentration to equal half of the initial concentration and is expressed as $C=C_o/2$. Substituting into the rate expression and solving for half life ($t_{1/2}$), $t_{1/2} = \ln(0.5)/-k$. As opposed to the rate constant, a higher half life ($t_{1/2}$) indicates a lower degradation rate.

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