



December 20, 2004

U. S. Army Engineer District, Nashville  
ATTN: CELRN-EP-R-M (Linda Ingram)  
110 Ninth Avenue South  
U.S. Court House Annex  
Nashville, TN 37203

**Submittal of Chemical Quality Assurance Report for the Groundwater Investigation,**  
**Plum Brook Ordnance Works, Sandusky, Ohio,**  
**Contract Number DACA62-00-D-0002**

Dear Mrs. Ingram:

As required by the Scope of Work (SOW) for contract number DACA62-00-D-0002, enclosed is the Chemical Quality Assurance Report (CQAR) for the Plum Brook Ordnance Works (PBOW). DataChek prepared the CQAR. DataChek followed the requirements outlined in the USACE document EM-200-1-6 *Chemical Quality Assurance for Hazardous, Toxic and Radioactive Waste (HTRW) Projects*. The report is based on an evaluation of the groundwater data collected in August 2004.

If you have any questions or require additional information regarding this submittal, please call me at (865) 560-5271.

Sincerely,

A handwritten signature in black ink that reads "Maureen F. McMyler".

Maureen F. McMyler  
Project Chemist

Enclosure

cc: Project file

**Chemical Quality Assurance Report**

**Groundwater Investigations**

**August 2004**

**Plum Brook Ordnance Works**

**Sandusky, Ohio**

**Prepared for the Shaw Group**

**By**

**DataChek**



**December 14, 2004**

# Table of Contents

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	<b>Page</b>
1.0 Executive Summary .....	1
2.0 Review of Project Samples, Field QA Samples and Field QC Samples .....	3
2.1 Analysis-Specific Data Validation Summaries .....	3
2.1.1 Volatile Organics by SW846-8260B .....	3
2.1.2 Explosives by SW846-8330 .....	4
2.1.3 Semivolatile Organics by SW846-8270C .....	5
2.1.4 Metals (Total and Dissolved) by SW846-6010B; Hg by Cold Vapor 7470A .....	6
3.0 Review of Sample Handling .....	7
4.0 Data Comparison Tables .....	7
 Attachment 1: Data Validation Summaries	
Attachment 2: Chain of Custody Forms	
Attachment 3: Project Data	

## List of Tables

Table 1: Samples Used in Preparation of the CQAR .....	2
Table 2: Data Comparison: Volatiles .....	8
Table 3: Data Comparison: Explosives .....	8
Table 4: Data Comparison: Semivolatile Organics .....	8
Table 5: Data Comparison: Metals .....	9
Table 6: Criteria for Comparing Field QC and QA Sample Data .....	10
Table 7: Validation Qualifiers .....	11
Table 8: Data Validation Reason Codes .....	12

**Chemical Quality Assurance Report  
Groundwater Investigations  
August 2004  
Plum Brook Ordnance Works, Sandusky, Ohio**

**1.0 Executive Summary**

The purpose of the Chemical Quality Assurance Report (CQAR) is to provide a comprehensive review of the quality of the chemical data associated with the groundwater investigation program, August 2004, for the Plum Brook Ordnance Works. The former PBOW site is currently owned by NASA and is operated as the Plum Brook Station (PBS) of the NASA John Glenn Research Center, which is located at Lewis Field based in Cleveland, Ohio. It is located approximately four miles south of Sandusky, Ohio, and 59 miles west of Cleveland. The areas surrounding PBOW are mostly agricultural and residential. Public access is restricted at PBOW except during the annual deer hunting season.

The PBOW site was built in early 1941 as a manufacturing plant for 2,4,6-TNT, dinitrotoluene (DNT), and pentolite. Production of explosives began on December 16, 1941 and continued until 1945. It is estimated that more than one billion pounds of explosives were manufactured during the 4-year operating period. Decontamination of TNT, acid, pentolite and DNT processing lines was completed in late 1945.

Based on review of historical use of the site and findings of previous investigations, potential contaminants in the groundwater at PBOW may include nitroaromatic compounds, volatile organic compounds (VOC), semivolatile organic compounds (SVOC), and metals. The analytical objective of the groundwater investigation is to produce data of known quality that can be used for several purposes. The data will be used to determine if hazardous substances are present at the site at concentrations that may constitute unacceptable risk to human health or the environment, determine the nature and extent of source areas, and determine whether contaminant distribution is consistent with DOD activities.

The CQAR for the Plum Brook Ordnance Works (PBOW) groundwater investigations, August 2004, has been prepared using a single set of a project sample, field quality assurance (QA) sample (field duplicate) and quality control (QC) sample (field split).

Samples used in the preparation of the CQAR are listed in Table 1. The analyte groups and analytical methods are provided below:

Parameter (Method)
Volatile Organics by GC/MS SW846 8260B
Explosives by SW846, 8330
Semivolatile Organics by SW846 8270C
Metals by SW846 6010B, 7470A

**Table 1: Samples Used in Preparation of the CQAR**

LOCATION	SAMPLE NO	SAMPLE DATE	PURPOSE	SDG	ANALYTICAL LAB
PBOW	DH3002	26-August-04	REG	H4H270215	STL
	DH3005		FD	H4H270215	STL
	DH3006		FS	F26367	Accutest

Two laboratories provided the analysis of the project samples and the associated laboratory QA/QC used in arriving at the results. Severn Trent Services (STL), Knoxville, TN, analyzed both the project sample and the field QA sample (field duplicate); and Accutest Laboratories, Orlando, Florida analyzed the field QC sample (field split).

*Sensitivity:* All samples were analyzed within the designated holding times and preservatives were added to the samples.

*Precision:* The variability between the project sample, field QA and field QC are summarized in Tables 2-5. The criteria for comparing the project samples and the QA/QC samples conforms to the levels defined in Table 6. A total of 72 comparisons for 15 different compounds or elements were made, and seven (9.7%) of the sample pairs were designated as disagreements and six (8.3%) as major disagreements.

*Accuracy:* Contamination in the volatiles' trip blank resulted in a "B" qualifier for carbon disulfide and toluene in the project and field duplicate samples.

*Completeness:* No data were rejected

*Comparability:* All of the analytical laboratories used the same method to analyze the samples. As a result all sample data can accurately be compared and analyzed.

## **2.0 Review of Project Samples, Field QA Samples, & Field QC Samples**

The sample data were evaluated following the logic identified in *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July, 2002) and *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (October 1999). Blank evaluation followed *USEPA Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses* (July 2002) and *Region III Modifications to National Functional Guidelines for Organic Data Review, Multi-Media, Multi-Concentration* (September 1994). Overall, the quality of the data was determined to be acceptable. Acceptable results were qualified as appropriate.

Several sample results for the organic compounds were assigned “J” qualifiers by the laboratory, which is standard practice for these methods, because they were quantitated between the method detection limit (MDL) and the reporting limit (RL). Due to the uncertainty associated with this region of quantitation, the validation reviewer retained the “J” qualifiers assigned by the laboratory to indicate an estimated quantity.

Data validation summaries (Attachment 1), which function as worksheets for the validation task, are included for each parameter in each data package. The following section highlights the key findings of the data validation for each analysis.

### **2.1 Analysis-Specific Data Validation Summaries**

#### **2.1.1 Volatile Organics by SW846 8260B**

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

**Holding Times/Sample Condition.** All samples were preserved correctly and analyzed within the QC holding time limit.

**Initial Calibration (ICAL) and Continuing Calibration (CCAL).** All initial and continuing calibrations associated with the project sample met QC criteria.

**Blanks.** Carbon disulfide and toluene were found in the trip blank associated with samples DH3002 and DH3005. The compounds were present in the samples at levels <5x the blank and a “B” qualifier was required for carbon disulfide in both samples and for toluene in DH3002.

**Surrogate Recoveries.** All surrogate recoveries were within the laboratory QC limits. No qualifiers were required.

**Matrix Spike/Matrix Spike Duplicate (MS/MSD).** The MS/MSD analyses for all samples were performed and all results were acceptable.

**Laboratory Control Sample (LCS).** LCS analyses were performed and QC criteria were met.

**Internal Standards (IS).** All internal standard area count recoveries and retention times met the QC criteria

**Field Duplicates (FD).** All field duplicate results were within the QC limits.

**Quantitation.** All results were acceptable as reported.

### **2.1.2 Explosives by SW846-8330**

Overall, the data are of good quality Data were reviewed for the following:

**Holding Times/Sample Condition.** Technical holding time criteria were met for all samples. Samples were acceptable as received.

**Initial and Continuing Calibration.** All initial and continuing calibration relative response factors (RRFs) associated with the project sample met QC criteria. No qualifiers were required.

**Blanks.** No contaminants were found in the associated method blanks.

**Surrogate Recoveries.** All surrogate recoveries were within laboratory QC limits.

**Matrix Spike/Matrix Spike Duplicates (MS/MSD).** The MS/MSD analyses results were within limits and no qualifiers were required.

**Laboratory Control Sample (LCS).** The explosives recoveries in the LCS analyses were within the QC limits and no qualifiers were required.

**Field Duplicates (FD).** All field duplicate results were within the QC limits.

**Quantitation.** The sample results were acceptable as reported.

### **2.1.3 Semivolatile Organics by SW846 8270C**

Overall, the data are of good quality with the exceptions noted below. Data were reviewed for the following:

**Holding Times/Sample Condition.** Technical holding time criteria were met for all samples.

**Initial and Continuing Calibration.** All initial and continuing calibration RRFs associated with the project sample met QC criteria. No compound results were rejected.

**Blanks.** No compounds were detected in the method blanks. No qualifiers were required.

**Surrogate Recoveries.** All surrogate recoveries were within the QC limits and no qualifiers were required.

**Matrix Spike/Matrix Spike Duplicate (MS/MSD).** The MS/MSD analyses for DH3002 and DH3005 were acceptable within QC limits. The MS/MSD recoveries associated with DH3006 had recoveries below the lower QC limit for 2,4-dinitrophenol but no qualifiers were added since the LCS was acceptable.

**Laboratory Control Sample (LCS).** LCS analyses were performed and all results were acceptable.

**Internal Standards (IS).** Internal standards analyses were within the +100, -50% laboratory criteria.

**Field Duplicates (FD).** All field duplicate results were within the QC limits.

**Quantitation.** All results were acceptable as reported by the laboratory.

**2.1.4 Metals (Total and Dissolved) by SW846 6010B; Hg by Cold Vapor 7470A**

Overall, the data are of good quality and are usable as reported by the laboratory with the exceptions noted below. Data were reviewed for the following:

**Holding Times/Sample Condition.** Technical holding time criteria were met for all samples.

**Initial and Continuing Calibrations.** All initial and continuing calibrations associated with the project sample met QC criteria.

**Blanks.** No elements were present in the method blanks or calibration blanks.

**Matrix Spike/Matrix Spike Duplicate (MS/MSD).** The MS/MSD recoveries for aluminum were above the QC limit for samples DH3002 and DH3005, and the element was qualified as “J” in those samples.

**ICP Check Samples.** The recoveries for the check samples were within the QC limits. No qualifiers were required.

**Laboratory Control Sample (LCS).** All the LCS had recoveries that met the QC limits. No qualifiers were required.

**ICP Serial Dilutions.** The serial dilution results were within the QC limits except for the following:

Sample Type	Samples Affected	Analyte / Analytes	Validation Qualifier
Field QC	DH3006T	potassium, sodium	J

**Field Duplicate.** Aluminum had a high RPD in the field duplicate and was qualified as “J” in samples DH3002 and DH3005

**Quantitation.** Results quantified between the minimum detection limit (MDL) and the reporting limit (RL), which the lab qualified as “B”, were qualified as estimated “J” unless blank contamination was present.

### **3.0 Review of Sample Handling**

All aspects of sample handling were reviewed as part of the sample data evaluation and recorded in each analysis-specific data validation summary. All chain of custody (COC) forms are available in Attachment 2. No major deficiencies were noted in the handling of the samples. All cooler temperatures were plainly identified as within the QC limit.

### **4.0 Data Comparison Tables**

Attachment 3 contains the complete project data set used to create the Comparison Tables. The data set lists all the appropriate samples, concentration units, detection limits, quantitation limits, and in the case of the metals, whether or not the sample was filtered. The detected compounds or elements were used to compare the project sample with the field QA and field QC samples.

All the detected analyte results are shown in Tables 2 through 5. In order to compare the project sample with both the field QA and field QC, compounds or elements detected in the project sample were listed for the corresponding samples as well, whether or not detected. Comparisons of results were categorized by agreement, disagreement or major disagreement as defined in Table 6.

Data comparisons were appropriate in 24 cases for 15 different compounds or elements where at least one of the compounds or elements was present in one of the three samples. Application of the comparison criteria resulted in six major disagreements (MD) and seven disagreements (D).

Benzene, carbon disulfide and toluene were the only volatile organic compounds detected in the samples. No compound was present in all of the three samples. There were two major disagreements, both involving the project and field split samples. The major disagreements are due partly to the higher reported detection limit for the field split. However, both the MDs and two of the Ds also are associated with carbon disulfide and toluene in the PS and FD samples that were qualified as “B”, or nondetected, due to blank contamination.

The explosives had no comparisons since all the results were nondetects. The semivolatiles had one occurrence. Bis (2-ethylhexyl)phthalate was detected in the field duplicate but not in the other two.

Of the 21 instances where the comparison criteria was applied to the metals results, five involved comparisons where one value was a nondetect, and 16 where all values were detects. Two cases were categorized as disagreements and four as major disagreements. The total aluminum result between the field duplicate and field split samples was greater than 2X (Table 6) resulting in a disagreement designation. The total iron results for the PS and FD samples compared to the FS were greater than 3X. Both the PS/FS and the FD/FS comparisons were designated as major disagreements. The disagreements and major disagreements associated with the nickel results were due to high detection limits for the FD sample.

**Table 2: Data Comparison: Volatiles**

Location Code	Detected Analyte <sup>1</sup>	Project Sample Sample No/ Date Result/Qual/Code <sup>2</sup>	Field Duplicate Sample No./Date Result/Qual/Code <sup>2</sup>	Field Split Sample No./Date Result/Qual/Code <sup>2</sup>	PS/FD <sup>3</sup>	PS/FS <sup>3</sup>	FD/FS <sup>3</sup>
PBOW		<b>DH3002</b> 26-August-04	<b>DH3005</b> 26-August-04	<b>DH3006</b> 26-August-04			
	benzene	0.21 J	0.18 J	1.0 U	A	D	D
	carbon disulfide	0.19 B 6d	0.22 B 6d	2.0 U	A	MD	D
	toluene	0.11 B 6d	1.0 U	2.0 U	A	MD	A

**Table 3: Data Comparison: Explosives**

Location Code	Detected Analyte <sup>1</sup>	Project Sample Sample No/ Date Result/Qual/Code <sup>2</sup>	Field Duplicate Sample No./Date Result/Qual/Code <sup>2</sup>	Field Split Sample No./Date Result/Qual/Code <sup>2</sup>	PS/FD <sup>3</sup>	PS/FS <sup>3</sup>	FD/FS <sup>3</sup>
PBOW		<b>DH3002</b> 26-August-04	<b>DH3005</b> 26-August-04	<b>DH3006</b> 26-August-04			
	No detected compounds						

**Table 4: Data Comparison: Semivolatiles**

Location Code	Detected Analyte <sup>1</sup>	Project Sample Sample No./ Date Result/Qual/Code <sup>2</sup>	Field Duplicate Sample No./Date Result/Qual/Code <sup>2</sup>	Field Split Sample No./Date Result/Qual/Code <sup>2</sup>	PS/FD <sup>3</sup>	PS/FS <sup>3</sup>	FD/FS <sup>3</sup>
PBOW		<b>DH3002</b> 26-August-04	<b>DH3005</b> 26-August-04	<b>DH3006</b> 26-August-04			
	bis(2ethylhexyl)phthalate	10 U	2.5 J	5.1 U	D	A	A

**Table 5: Data Comparison: Metals**

Location Code	Detected Analyte <sup>1</sup>	Project Sample Sample No./Date Result/Qual/Code <sup>2</sup>	Field Duplicate Sample No./ Date Result/Qual/Code <sup>2</sup>	Field Split Sample No./Date Result/Qual/Code <sup>2</sup>	PS/FD <sup>3</sup>	PS/FS <sup>3</sup>	FD/FS <sup>3</sup>
PBOW		<b>DH3002</b> 26-August-04	<b>DH3005</b> 26-August-04	<b>DH3006</b> 26-August-04			
	Aluminum T	717 J 17	1080 J 17	368	A	A	D
	Aluminum D	63.6 J	64.1 J	33 J	A	A	A
	Barium T	695	701	679	A	A	A
	Barium D	700	694	641	A	A	A
	Calcium T	118000	117000	122000	A	A	A
	Calcium D	117000	115000	113000	A	A	A
	Iron T	593	620	111 J	A	MD	MD
	Magnesium T	36600	37100	38100	A	A	A
	Magnesium D	37000	36400	35800	A	A	A
	Manganese T	57.5	56	56.6	A	A	A
	Manganese D	47	46.2	45.5	A	A	A
	Nickel T	3.1 J	40 U	1.1 U	MD	D	MD
	Potassium T	3980	4400	4610 J 13	A	A	A
	Potassium D	3730	3750	4280	A	A	A
	Sodium T	18500	18700	16900 J 13	A	A	A
	Sodium D	18700	18500	16000	A	A	A
	Thallium T	3.3 J	4.1 J	10 U	A	A	A
	Thallium D	10 U	5.8 J	10 U	A	A	A
	Zinc T	4.5 J	5.2 J	20 U	A	A	A
	Zinc D	4,2 J	20 U	20 U	A	A	A

## Footnotes in Tables 2, 3, 4, and 5

- 1) Nondetected analyte results are provided in the Table for the purpose of establishing the basis for reporting the level of disagreement between the project and QA/QC samples. All results are reported in ug/l.
- 2) Result/Qual/Code: The Qual notation refers to the evaluator's qualifier added to the analytical value resulting from a review of the lab QA/QC data. See **Table 7** for qualifier definitions. See **Table 8** for a listing of data validation codes.
- 3) Agreement (A)/Disagreement (D)/major disagreement (MD)-- the level of disagreement is based on comparison criteria from **Table 6**: PS=project sample; FD=field duplicate; FS=field split.

**Table 6: Criteria for Comparing Field QC and QA Sample Data**

<b>Matrix</b>	<b>Parameter</b>	<b>Disagreement</b>	<b>Major Disagreement</b>
All	All	>5x difference when one result is < DL	>10x difference when one result is < DL
All	All	>3x difference when one result is < RL	>5x difference when one result is < RL
Water	All except TPH	>2x difference	>3x difference

Reference: CRREL Special Report No. 96-9, "Comparison Criteria for Environmental Chemical Analyses of Split Samples Sent to Different Laboratories – Corps of Engineers Archived Data", Grant, C.G., Jenkins, T.F., and Mudambi, A.R., USACE Cold Regions and Environmental Research Laboratory, Hanover NH, May 1996

## Table 7: Validation Qualifiers

U	Not detected. The compound/analyte was analyzed for, but not detected above the associated reporting limit.
J	The compound/analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed.
B	The concentration reported was detected significantly above the levels reported in the associated equipment rinse samples and/or laboratory method and trip blanks. (5X/10X Rule was applied).
R	The reported sample results are rejected due to the following: <ol style="list-style-type: none"><li>1. Severe deficiencies in the supporting quality control data.</li><li>2. Anomalies noted in the sampling and/or analysis process that could affect the validity of the reported data.</li><li>3. The presence or absence of the constituent cannot be verified based on the data provided.</li><li>4. To indicate not to use a particular result in the event of a reanalysis.</li></ol>
UJ	The compound/analyte was analyzed for, but not detected above the established reporting limit. However, review and evaluation of supporting QC data and/or sampling and analysis process have indicated that the “nondetect” may be inaccurate or imprecise. The nondetect result should be estimated.

**Table 8: Data Validation Reason Codes**

<b>Reason Code</b>	<b>Definition</b>
01	Sample received outside of 4+/-2 degrees Celsius
01A	Improper sample preservation
02	Holding time exceeded
02A	Extraction
02B	Analysis
03	Instrument performance – outside criteria
03A	BFB
03B	DFTPP
03C	DDT and/or Endrin % breakdown exceeds criteria
03D	Retention time windows
03E	Resolution
04	Initial calibration results outside specified criteria
04A	Compound mean RRF QC criteria not met
04B	Individual % RSD criteria not met
04C	Correlation coefficient >0.995
05	Continuing calibration results outside specified criteria
05A	Compound mean RRF QC criteria not met
05B	Compound % D QC criteria not met
06	Result qualified as a result of the 5x/10x blank correction
06A	Method or preparation blank
06B	ICB or CCB
06C	ER
06D	TB
06E	FB
07	Surrogate recoveries outside control limits
07A	Sample
07B	Associated method blank or LCS
08	MS/MSD/Duplicate results outside criteria
08A	MS and/or MSD recovery not within control limits (accuracy)
08B	% RPD outside acceptance criteria (precision)
09	Post digestion spike outside criteria (GFAA)
10	Internal standards outside specified control limits
10A	Recovery
10B	Retention time
11	Laboratory control sample recoveries outside specified limits
11A	Recovery
11B	% RPD (if run in duplicate)
12	Interference check standard
13	Serial dilution
14	Tentatively identified compounds
15	Quantitation
16	Multiple results available; alternate analysis preferred
17	Field duplicate RPD criteria is exceeded
18	Percent difference between original and second column exceeds QC criteria
19	Professional judgment was used to qualify the data
20	Pesticide clean-up checks
21	Target compound identification
22	Radiological calibration
23	Radiological quantitation
24	Reported result and/or lab qualifier revised to reflect validation findings

**Attachment 1**

**Data Validation Summaries**

H4 H270215 - STL  
SDG: F26367 - Accutest Project: Plum Brook Ordnance Works

Method: Volatiles - 8260B Matrix/No. Samples: Water - 3

Validation Samples: DH3002  
DH3005  
DH3006

Data Validation Report Summary

	Status Code	Comments
1. Sample Preservation, Handling, and Transport	<u>A</u>	<u></u>
2. Chain of Custody	<u>A</u>	<u></u>
3. Holding Times	<u>A</u>	<u></u>
4. GC/MS Tune/Inst Perf	<u>A</u>	<u></u>
5. Calibrations	<u>A</u>	<u></u>
6. Blanks	<u>A</u>	<u></u>
7. Blank Spike/LCS	<u>A</u>	<u></u>
8. Matrix Spike	<u>A</u>	<u></u>
9. Surrogates	<u>A</u>	<u></u>
10. Internal Standards	<u>A</u>	<u></u>
11. Compound Identification	<u>A</u>	<u></u>
12. System Performance	<u>A</u>	<u></u>
13. Field QC Samples	<u>X</u>	<u></u>
14. Overall Assessment	<u>X</u>	<u></u>

Status Codes:

A = Acceptable

R = Data Rejected

X = Data acceptable but qualified due to problems

Qualifications:

6d. carbon disulfide and toluene were present in the trip blank and qualified as "B" in DH3002 & DH3005 and DH3002, respectively.

Significant Findings/Recommendations:

Overall Data Quality:

Acceptable as qualified.

Validator's Signature: J. Thomas Kibele Date: 12/11/2004  
Peer Reviewer: \_\_\_\_\_ Date: \_\_\_\_\_

## SHAW E &amp; I INC

Client Sample ID: DH3002

## GC/MS Volatiles

Lot-Sample #....: H4H270215-001    Work Order #....: GN4JK1AE    Matrix.....: WATER  
 Date Sampled....: 08/26/04    Date Received...: 08/27/04  
 Prep Date.....: 08/31/04    Analysis Date...: 08/31/04  
 Prep Batch #....: 4244264  
 Dilution Factor: 1    Method.....: SW846 8260B

PARAMETER	RESULT	REPORTING			MDL	Rev Qual
		LIMIT	UNITS			
Chloromethane	ND	2.0	ug/L	0.12	u	
Bromomethane	ND	2.0	ug/L	0.38		
Vinyl chloride	ND	1.0	ug/L	0.24		
Chloroethane	ND	2.0	ug/L	0.24		
Methylene chloride	ND	2.0	ug/L	0.23		
Acetone	ND	10	ug/L	1.4		
Carbon disulfide	0.19 J	1.0	ug/L	0.10	B	6d
1,1-Dichloroethene	ND	1.0	ug/L	0.10	u	
1,1-Dichloroethane	ND	1.0	ug/L	0.10		
1,2-Dichloroethene (total)	ND	1.0	ug/L	0.20		
Chloroform	ND	1.0	ug/L	0.10		
1,2-Dichloroethane	ND	1.0	ug/L	0.10		
2-Butanone	ND	5.0	ug/L	0.75		
1,1,1-Trichloroethane	ND	1.0	ug/L	0.10		
Carbon tetrachloride	ND	1.0	ug/L	0.12		
Bromodichloromethane	ND	1.0	ug/L	0.10		
1,2-Dichloropropane	ND	1.0	ug/L	0.10		
cis-1,3-Dichloropropene	ND	1.0	ug/L	0.10		
Trichloroethene	ND	1.0	ug/L	0.10		
Dibromochloromethane	ND	1.0	ug/L	0.20		
1,1,2-Trichloroethane	ND	1.0	ug/L	0.25		
Benzene	0.21 J	1.0	ug/L	0.10	J	
trans-1,3-Dichloropropene	ND	1.0	ug/L	0.11	u	
Bromoform	ND	1.0	ug/L	0.14		
4-Methyl-2-pentanone	ND	5.0	ug/L	0.40		
2-Hexanone	ND	5.0	ug/L	0.76		
Tetrachloroethene	ND	1.0	ug/L	0.10		
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L	0.15		
Toluene	0.11 J	1.0	ug/L	0.10	B	6d
Chlorobenzene	ND	1.0	ug/L	0.10	u	
Ethylbenzene	ND	1.0	ug/L	0.10		
Styrene	ND	1.0	ug/L	0.10		
Xylenes (total)	ND	1.0	ug/L	0.30		

SURROGATE	PERCENT	RECOVERY
	RECOVERY	LIMITS
Dibromofluoromethane	89	(79 - 120)
1,2-Dichloroethane-d4	82	(71 - 127)
Toluene-d8	95	(80 - 120)
Bromofluorobenzene	74	(69 - 126)

(Continued on next page)

SHAW E & I INC

Client Sample ID: DH3005

GC/MS Volatiles

Lot-Sample #...: H4H270215-002    Work Order #...: GN4KG2AC    Matrix.....: WATER  
 Date Sampled...: 08/26/04    Date Received...: 08/27/04  
 Prep Date.....: 09/02/04    Analysis Date...: 09/02/04  
 Prep Batch #...: 4246279  
 Dilution Factor: 1    Method.....: SW846 8260B

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL	Res Qual
Chloromethane	ND	2.0	ug/L	0.12	u
Bromomethane	ND	2.0	ug/L	0.38	
Vinyl chloride	ND	1.0	ug/L	0.24	
Chloroethane	ND	2.0	ug/L	0.24	
Methylene chloride	ND	2.0	ug/L	0.23	
Acetone	ND	10	ug/L	1.4	
Carbon disulfide	0.22 J	1.0	ug/L	0.10	B 6d
1,1-Dichloroethene	ND	1.0	ug/L	0.10	
1,1-Dichloroethane	ND	1.0	ug/L	0.10	
1,2-Dichloroethene (total)	ND	1.0	ug/L	0.20	
Chloroform	ND	1.0	ug/L	0.10	
1,2-Dichloroethane	ND	1.0	ug/L	0.10	
2-Butanone	ND	5.0	ug/L	0.75	
1,1,1-Trichloroethane	ND	1.0	ug/L	0.10	
Carbon tetrachloride	ND	1.0	ug/L	0.12	
Bromodichloromethane	ND	1.0	ug/L	0.10	
1,2-Dichloropropane	ND	1.0	ug/L	0.10	
cis-1,3-Dichloropropene	ND	1.0	ug/L	0.10	
Trichloroethene	ND	1.0	ug/L	0.10	
Dibromochloromethane	ND	1.0	ug/L	0.20	
1,1,2-Trichloroethane	ND	1.0	ug/L	0.25	
Benzene	0.18 J	1.0	ug/L	0.10	J
trans-1,3-Dichloropropene	ND	1.0	ug/L	0.11	u
Bromoform	ND	1.0	ug/L	0.14	
4-Methyl-2-pentanone	ND	5.0	ug/L	0.40	
2-Hexanone	ND	5.0	ug/L	0.76	
Tetrachloroethene	ND	1.0	ug/L	0.10	
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L	0.15	
Toluene	ND	1.0	ug/L	0.10	
Chlorobenzene	ND	1.0	ug/L	0.10	
Ethylbenzene	ND	1.0	ug/L	0.10	
Styrene	ND	1.0	ug/L	0.10	
Xylenes (total)	ND	1.0	ug/L	0.30	

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	104	(79 - 120)
1,2-Dichloroethane-d4	106	(71 - 127)
Toluene-d8	103	(80 - 120)
Bromofluorobenzene	99	(69 - 126)

(Continued on next page)

## Report of Analysis

Client Sample ID: DH3006	
Lab Sample ID: F26367-1	
Matrix: AQ - Ground Water	Date Sampled: 08/26/04
Method: SW846 8260B	Date Received: 08/27/04
Project: PBOW	Percent Solids: n/a

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B024334.D	1	09/09/04	KW	n/a	n/a	VB1051
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q	Notes
67-64-1	Acetone	ND	50	5.0	ug/l		
71-43-2	Benzene	ND	1.0	0.50	ug/l		
75-27-4	Bromodichloromethane	ND	2.0	0.50	ug/l		
75-25-2	Bromoform	ND	2.0	0.50	ug/l		
108-90-7	Chlorobenzene	ND	2.0	0.50	ug/l		
75-00-3	Chloroethane	ND	2.0	1.0	ug/l		
67-66-3	Chloroform	ND	2.0	0.50	ug/l		
75-15-0	Carbon disulfide	ND	2.0	1.0	ug/l		
56-23-5	Carbon tetrachloride	ND	2.0	0.50	ug/l		
75-34-3	1,1-Dichloroethane	ND	2.0	0.50	ug/l		
75-35-4	1,1-Dichloroethylene	ND	2.0	0.50	ug/l		
107-06-2	1,2-Dichloroethane	ND	2.0	0.50	ug/l		
78-87-5	1,2-Dichloropropane	ND	2.0	0.50	ug/l		
124-48-1	Dibromochloromethane	ND	2.0	0.40	ug/l		
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	0.50	ug/l		
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	0.30	ug/l		
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	0.50	ug/l		
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	0.30	ug/l		
100-41-4	Ethylbenzene	ND	2.0	0.50	ug/l		
591-78-6	2-Hexanone	ND	10	2.5	ug/l		
108-10-1	4-Methyl-2-pentanone	ND	10	2.5	ug/l		
74-83-9	Methyl bromide	ND	2.0	1.0	ug/l		
74-87-3	Methyl chloride	ND	2.0	1.0	ug/l		
75-09-2	Methylene chloride	ND	5.0	1.0	ug/l		
78-93-3	Methyl ethyl ketone	ND	10	2.5	ug/l		
100-42-5	Styrene	ND	2.0	0.50	ug/l		
71-55-6	1,1,1-Trichloroethane	ND	2.0	0.50	ug/l		
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	0.30	ug/l		
79-00-5	1,1,2-Trichloroethane	ND	2.0	0.50	ug/l		
127-18-4	Tetrachloroethylene	ND	2.0	0.50	ug/l		
108-88-3	Toluene	ND	2.0	0.50	ug/l		
79-01-6	Trichloroethylene	ND	2.0	0.50	ug/l		

ND = Not detected      MDL - Method Detection Limit  
 RL = Reporting Limit  
 E = Indicates value exceeds calibration range

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound

## Report of Analysis

Client Sample ID: DH3006	Date Sampled: 08/26/04
Lab Sample ID: F26367-1	Date Received: 08/27/04
Matrix: AQ - Ground Water	Percent Solids: n/a
Method: SW846 8260B	
Project: PBOW	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q	
75-01-4	Vinyl chloride	ND	1.0	0.50	ug/l		<i>See Qual</i>
1330-20-7	Xylene (total)	ND	6.0	1.0	ug/l		<i>LL</i>

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%		86-115%
17060-07-0	1,2-Dichloroethane-D4	88%		73-126%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	96%		83-119%

ND = Not detected      MDL - Method Detection Limit  
 RL = Reporting Limit  
 E = Indicates value exceeds calibration range

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound

**DATA VALIDATION WORKSHEETS  
VOLATILE ORGANICS**

Reviewer: Kitchings Date: 12/11

Project: Plumbrook H414270215  
SDG: F 26367 Matrix/No. Samples: w-3

<b>I. Technical Holding Times</b>									
<b>A. Sample Preservation, Handling and Transport</b>									
1. Have all samples been preserved correctly?	<input checked="" type="radio"/> Yes	No	N/A						
2. Have sample temperatures been kept at 4° C (+ or - 2°)?	<input checked="" type="radio"/> Yes	No	N/A						
3. Were all samples received in proper condition?	<input checked="" type="radio"/> Yes	No	N/A						
4. Were any qualifications required based on this information?	Yes	<input checked="" type="radio"/> No	N/A						
Coolers @ 2.3°C. <sup>3002</sup> 3005                      3.2°C    3006									
<b>B. Chain of Custody</b>									
1. Were all samples properly recorded on COCs?	<input checked="" type="radio"/> Yes	No	N/A						
DH3002 sample label did not match COC.									
2. Were correct analyses performed on samples?	<input checked="" type="radio"/> Yes	No	N/A						
<b>C. Holding Times</b>									
1. Were samples extracted and analyzed within acceptable holding times?	<input checked="" type="radio"/> Yes	No	N/A						
2. Were any qualifications required based on this information?	Yes	<input checked="" type="radio"/> No	N/A						
<table style="width:100%; border: none;"> <tr> <td style="text-align: center; width: 33%;">SAMPLED</td> <td style="text-align: center; width: 33%;">PREPPED</td> <td style="text-align: center; width: 33%;">ANALYZED</td> </tr> <tr> <td> <sup>3002</sup>3005    8/26             3006    8/26         </td> <td></td> <td> <sup>3002</sup>3005    8/31                             9/2             3006    9/9         </td> </tr> </table>				SAMPLED	PREPPED	ANALYZED	<sup>3002</sup> 3005    8/26  3006    8/26		<sup>3002</sup> 3005    8/31 9/2  3006    9/9
SAMPLED	PREPPED	ANALYZED							
<sup>3002</sup> 3005    8/26  3006    8/26		<sup>3002</sup> 3005    8/31 9/2  3006    9/9							
<b>II. GC/MS Instrument Performance Check</b>									
1. Were instrument performance check samples run for each analysis period?	<input checked="" type="radio"/> Yes	No	N/A						
2. Were ion abundance criteria met for bromofluorobenzene (BFB) analysis?	<input checked="" type="radio"/> Yes	No	N/A						
3. Do laboratory forms match raw data?	Yes	No	<input checked="" type="radio"/> N/A						
4. Were any qualifications required based on this information?	Yes	<input checked="" type="radio"/> No	N/A						
<b>Comments/Qualifications:</b>									
SCAL <sup>3006</sup> 9/9                      95 base criteria met.									

**DATA VALIDATION WORKSHEETS  
VOLATILE ORGANICS**

Reviewer: Kitchings Date: 12/11  
H4H270215  
 Project: Plumbrook SDG: F 26367 Matrix/No. Samples: W-3

<b>III. Initial Calibration</b>			
1. Were correct concentrations of standards used for initial calibration? Were samples analyzed within 12 hours of associated instrument performance check?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
2. Were initial calibration RRFs for all volatile target compounds and system monitoring compounds > or = 0.05? Do recalculations for RRFs agree with reported values?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
3. Were %RSDs < or = 30% for all volatile target compounds? Do recalculations for RSDs agree with reported values?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
4. Were any qualifications required based on this information?	<input type="radio"/> Yes	<input checked="" type="radio"/> No	N/A
<b>Comments/Qualifications:</b>  <div style="margin-left: 40px;">           3006            RRFs 70.10            RSDs ↘         </div>			
<b>IV. Continuing Calibration</b>			
1. Were continuing calibration samples run at the required frequency, and compared to the correct initial calibration?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
2. Did calculations from raw data agree with laboratory reported values for RRF and %D?	<input type="radio"/> Yes	<input type="radio"/> No	N/A
3. Were continuing calibration RRFs for volatile organic compounds and system monitoring compounds (surrogates) > or = 0.05?	<input type="radio"/> Yes	<input type="radio"/> No	N/A
4. Were %D between initial calibration RRF and the continuing calibration RRFs within + or - 25%?	<input type="radio"/> Yes	<input type="radio"/> No	N/A
5. Were any qualifications required based on this information?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
<b>Comments/Qualifications:</b>  <div style="margin-left: 40px;">           — none         </div>			

**DATA VALIDATION WORKSHEETS  
VOLATILE ORGANICS**

Reviewer: Kitchings Date: 12/11

Project: Plumbrook SDG: H4H 270215  
F26367 Matrix/No. Samples: W-3

**V. Blanks**

1. Were any target or non-target compounds reported in laboratory prep or calibration blanks?	Yes	<input type="radio"/> No	N/A
2. Were method blank analyses performed at required frequency, and for each GC/MS system used to analyze samples for each type of analysis (i.e., matrix)?	<input checked="" type="radio"/> Yes	No	N/A
3. Were any qualifications required based on this information?	Yes	<input type="radio"/> No	N/A

Comments/Qualifications: 3002, 3005  
GNGRHIAA 8/31 - chlorom @ 0.21 J      GPGNQIAA 9/2  
Acct. @ 1.7 J      - U's.  
3006 → VB1051-MB - U's.

**VI. System Monitoring Compounds (Surrogate Spikes)**

1. Were laboratory surrogate recoveries calculated and reported correctly?	<input checked="" type="radio"/> Yes	No	N/A
2. Were surrogate recoveries within acceptable limits?	<input checked="" type="radio"/> Yes	No	N/A
3. Were any qualifications required based on surrogate spike QC information?	Yes	<input type="radio"/> No	N/A

Comments/Qualifications:

	<u>3002</u>	<u>3005</u>	<u>3006</u>
<u>dbfm</u>	<u>89</u>	<u>104</u>	<u>103</u>
<u>1,2 dce</u>	<u>82</u>	<u>106</u>	<u>88</u>
<u>blue</u>	<u>95</u>	<u>103</u>	<u>100</u>
<u>bfb</u>	<u>74</u>	<u>99</u>	<u>96</u>

**VII. Matrix Spikes/Matrix Spike Duplicates**

1. Were MS/MSD samples analyzed at required frequency for each ample matrix?	<input checked="" type="radio"/> Yes	No	N/A
2. Were MS/MSD results for recovery and RPD within advisory limits?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
3. Were Samples used for MS/MSD field blanks?	Yes	<input type="radio"/> No	N/A
4. Were laboratory reported results correctly calculated from raw data?	Yes	No	<input type="radio"/> N/A
5. Were any qualifications required, based on results of MS/MSD samples in conjunction with other QC information?	Yes	<input type="radio"/> No	N/A

Comments/Qualifications: 4J KIAF / 4JKIAG

26367.1  
26367.2  
styrene high RPD  
MS = 74-144  
MSD =  $\frac{100-136}{100} = 36\%$   
RPD 0-8  
MS bk no gnd's  
RPD 0-8  
MS

Benzene       $\frac{8.73 - .21}{10.0} = 85.2\%$   
                      $\frac{8.74 - .21}{10.0} = 85.3\%$

RPD       $\frac{.01}{8.525} = 0.11\%$       LPS's - 0  
3      no gnd's

**DATA VALIDATION WORKSHEETS  
VOLATILE ORGANICS**

Reviewer: Kitchings Date: 12/11

Project: Plumbrook H4H270215  
SDG: F26367 Matrix/No. Samples: W-3

**VIII. Laboratory Control Sample (LCS)**

1. Were LCS samples run at correct frequency for each matrix samples?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
2. Were LCS calculations performed correctly, and did laboratory reported values match raw data? Were recoveries within laboratory QC limits?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
4. Were any qualifications required based on LCS data in conjunction with other QC information?	<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> No	N/A

**Comments/Qualifications:**  
 GN9RH1AC  
 84-90  
 TCE  $\frac{879}{10.0} = 87.9\%$   
 GP6NQ1AC/AD 96-111 ✓  
 94-112 ✓ RPDs 0.86-3.5 ✓

**IX. Internal Standards**

1. Were standard area counts within a factor of two (-50% to +100%) from associated calibration standard?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
2. Were retention times of internal standard within + or - 30 seconds of retention time of associated calibration check?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
3. Were any qualifications required based on internal standard results?	<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> No	N/A

**Comments/Qualifications:**  
 3206 - all w/in limits  
 RT's - ✓

**X. Target Compound Identification**

1. Are relative retention times (RRTs) within + or - 0.06 RRT units of standard RRT?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
2. Do sample compound spectra meet specified criteria in relation to laboratory standard spectra?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
3. Were all compounds accounted for on chromatogram?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A

**Comments/Qualifications:**  
 No raw data level III

**DATA VALIDATION WORKSHEETS  
VOLATILE ORGANICS**

Reviewer: Kitchings Date: 12/11  
 Project: Plumbrook H4H270215  
 SDG: F26317 Matrix/No. Samples: w-3

<b>XI. Compound Quantitation and Reported Contract Required Quantitation Limits (CRQLs)</b>			
1. Were sample results correctly calculated and reported by laboratory?	Yes	No	N/A
2. Were correct internal standard quantitation ion and RRF used to quantify all compounds for all samples?	Yes	No	N/A
3. Were CRQLs adjusted to reflect sample dilutions and dry weight factors not accounted for by the method?	Yes	No	N/A
4. Were any laboratory QA/QC sample results calculated from peaks derived using manual integration?	Yes	No	N/A
5. Were any qualifications required based on this information?	Yes	No	N/A
<b>Comments/Qualifications:</b> No raw data - level <u>III</u>			
<b>XII. Field QC</b>			
1. Were any Field Duplicates associated with this SDG?	Yes	No	N/A
a. If Yes, were RPDs acceptable ( <sup>30</sup> 50% for water samples, <sup>50</sup> 100% for soil samples)?	Yes	No	N/A
2. Were any field blanks or equipment rinsates associated with this SDG?	Yes	No	N/A
a. If yes, were any compounds reported in samples >IDL?	Yes	No	N/A
b. Were any qualifications required based on this information?	Yes	<del>No</del>	N/A
<b>Comments/Qualifications:</b> D45002 → 3006 all U's 3002      3005 all < 30 .21 benz .18 = 15.4% .19 carb.d. .22 = 14.6% DHS001 TRIP BLANK Acet. @ 2.4 Carb.d. @ 0.12 chloroform @ 0.18 toluene @ 0.13 (B)			
<b>XIII. Overall Assessment of Data</b>			
1. Are there any specific concerns or limitations regarding the data in this SDG?	Yes	No	N/A
<b>Comments/Qualifications:</b>			

H44270215 - STL

SDG: F26367 Project: Plum Brook Ordnance Works

Method: Explosives - 8330 Matrix/No. of Samples: Water-3

Validation Samples: DH3002  
DH3005  
DH3006

Data Validation Report Summary

	Status Code	Comments
1. Sample Preservation, Handling, and Transport	<u>A</u>	<u></u>
2. Chain of Custody	<u>A</u>	<u></u>
3. Holding Times	<u>A</u>	<u></u>
4. GC/MS Tune/Inst Perf	<u>N/A</u>	<u></u>
5. Calibrations	<u>A</u>	<u></u>
6. Blanks	<u>A</u>	<u></u>
7. Blank Spike/LCS	<u>A</u>	<u></u>
8. Matrix Spike	<u>A</u>	<u></u>
9. Surrogates	<u>A</u>	<u></u>
10. Internal Standards	<u>N/A</u>	<u></u>
11. Compound Identification	<u>A</u>	<u></u>
12. System Performance	<u>A</u>	<u></u>
13. Field QC Samples	<u>A</u>	<u></u>
14. Overall Assessment	<u>A</u>	<u></u>

Status Codes:

A = Acceptable

R = Data Rejected

X = Data acceptable but qualified due to problems

Qualifications:

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Significant Findings/Recommendations:

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Overall Data Quality:

Acceptable as reported.

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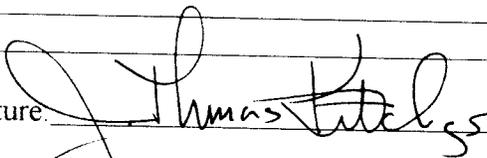
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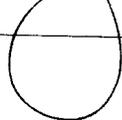
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Validator's Signature



Date: 12/11/2004

Peer Reviewer:



Date:



## SHAW E &amp; I INC

Client Sample ID: DH3005

## HPLC

Lot-Sample #...: H4H270215-002    Work Order #...: GN4KG1AA    Matrix.....: WATER  
 Date Sampled...: 08/26/04    Date Received...: 08/27/04  
 Prep Date.....: 08/30/04    Analysis Date...: 08/30/04  
 Prep Batch #...: 4243482  
 Dilution Factor: 1    Method.....: SW846 8330

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>	<u>MDL</u>	<i>Res Qual</i>
HMX	ND	0.50	ug/L	0.061	u
RDX	ND	0.50	ug/L	0.053	
1,3,5-Trinitrobenzene	ND	0.20	ug/L	0.052	
1,3-Dinitrobenzene	ND	0.20	ug/L	0.060	
Tetryl	ND	0.20	ug/L	0.078	
Nitrobenzene	ND	0.20	ug/L	0.072	
2,4,6-Trinitrotoluene	ND	0.20	ug/L	0.051	
4-Amino-2,6- dinitrotoluene	ND	0.20	ug/L	0.088	
2-Amino-4,6- dinitrotoluene	ND	0.20	ug/L	0.063	
2,6-Dinitrotoluene	ND	0.20	ug/L	0.072	
2,4-Dinitrotoluene	ND	0.20	ug/L	0.066	
2-Nitrotoluene	ND	0.20	ug/L	0.12	
4-Nitrotoluene	ND	0.20	ug/L	0.12	
3-Nitrotoluene	ND	0.20	ug/L	0.16	
					↓
<u>SURROGATE</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>			
1-Chloro-3-nitrobenzene	83	(52 - 139)			

### Report of Analysis

2.1  
2

Client Sample ID: DH3006	Date Sampled: 08/26/04
Lab Sample ID: F26367-1	Date Received: 08/27/04
Matrix: AQ - Ground Water	Percent Solids: n/a
Method: SW846 8330A SW846 3535A	
Project: PBOW	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	PP001003.D	1	09/09/04	MRE	09/02/04	OP11241	GPP37
Run #2							

Run #	Initial Volume	Final Volume
Run #1	1000 ml	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q	Res. Q. val
2691-41-0	HMX	ND	0.20	0.075	ug/l		
121-82-4	RDX	ND	0.20	0.075	ug/l		
99-65-0	1,3-Dinitrobenzene	ND	0.20	0.050	ug/l		
606-20-2	2,6-Dinitrotoluene	ND	0.20	0.050	ug/l		
121-14-2	2,4-Dinitrotoluene	ND	0.20	0.050	ug/l		
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.20	0.050	ug/l		
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.20	0.050	ug/l		
98-95-3	Nitrobenzene	ND	0.20	0.050	ug/l		
88-72-2	o-Nitrotoluene	ND	0.20	0.050	ug/l		
99-08-1	m-Nitrotoluene	ND	0.20	0.050	ug/l		
99-99-0	p-Nitrotoluene	ND	0.20	0.075	ug/l		
479-45-8	Tetryl	ND	0.20	0.075	ug/l		
99-35-4	1,3,5-Trinitrobenzene	ND	0.20	0.050	ug/l		
118-96-7	2,4,6-Trinitrotoluene	ND	0.20	0.050	ug/l		

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	87%		61-124%

ND = Not detected      MDL - Method Detection Limit  
 RL = Reporting Limit  
 E = Indicates value exceeds calibration range

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound

**DATA VALIDATION WORKSHEET  
EXPLOSIVES AND DEGRADATION PRODUCTS BY HPLC**

Reviewer: Kitchings

Date: 12/11

Project: Plum Brook

SDG: H4H 270215  
F 26367

Matrix/No. Samples: W-3

<b>I. Technical Holding Times</b>												
<b>A. Sample Preservation, Handling and Transport</b>												
1. Have all samples been preserved correctly?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A									
2. Have sample temperatures been kept at 4° C (+or- 2° C)	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A									
3. Were all samples received in proper condition?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A									
4. Were any qualifications required based on this information?	<input type="radio"/> Yes	<input checked="" type="radio"/> No	N/A									
Cooler @ <u>3002 3005 2.3° C.</u> <u>3006 3.2° C.</u>												
<b>B. Chain of Custody</b>												
1. Were all samples properly recorded on COCs?	<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> No	N/A									
2. Were correct analyses performed on samples?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A									
<b>C. Holding Times</b>												
1. Were samples extracted and analyzed within acceptable holding times?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A									
2. Were any qualifications required based on this information?	<input type="radio"/> Yes	<input checked="" type="radio"/> No	N/A									
<table border="0" style="width:100%"> <tr> <td style="text-align:center"><b>Sampled</b></td> <td style="text-align:center"><b>Prepped</b></td> <td style="text-align:center"><b>Analyzed</b></td> </tr> <tr> <td><u>3002 8/26</u> <u>3005 8/26</u></td> <td><u>8/30</u></td> <td><u>8/30</u></td> </tr> <tr> <td><u>3006 8/26</u></td> <td><u>9/2</u></td> <td><u>9/9</u></td> </tr> </table>				<b>Sampled</b>	<b>Prepped</b>	<b>Analyzed</b>	<u>3002 8/26</u> <u>3005 8/26</u>	<u>8/30</u>	<u>8/30</u>	<u>3006 8/26</u>	<u>9/2</u>	<u>9/9</u>
<b>Sampled</b>	<b>Prepped</b>	<b>Analyzed</b>										
<u>3002 8/26</u> <u>3005 8/26</u>	<u>8/30</u>	<u>8/30</u>										
<u>3006 8/26</u>	<u>9/2</u>	<u>9/9</u>										
<b>II. Initial Calibration</b>												
1. Were correct numbers and concentrations of standards used for initial calibration standards to establish calibration curve (i.e., water: 9 standards; soil: 7 standards)?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A									
2. For sample results calculated using initial calibration, was correct standard used for calculating sample result?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A									
3. Was calibration range within 25% of method range?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A									
4. Were retention Times ( RTs) within acceptable RT windows?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A									
<b>Comments/Qualifications:</b> <u>3006 1/3</u> <u>RSDs &lt; 5% &lt; 5%</u> <u>KV 2.20 &lt; 1.6%</u>												

**DATA VALIDATION WORKSHEET  
EXPLOSIVES AND DEGRADATION PRODUCTS BY HPLC**

Reviewer: Kitchings

Date: 12/11

H4H270215

Project: Plum Brook

SDG: F26367

Matrix/No. Samples: W-3

III. Continuing Calibration			
1. Were continuing calibration samples run at the required frequency, and compared to the correct initial calibration?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
2. Were RTs for all standard compounds in continuing calibration samples within acceptable RT window?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
3. Were continuing calibration recoveries within control limit of 75-125%?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
4. Did laboratory reported calculations and data match raw data?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
5. Were any qualifications required based on this information?	<input type="radio"/> Yes	<input checked="" type="radio"/> No	<input type="radio"/> N/A
<b>Comments/Qualifications:</b> 9/9 @ 14:24 70% <sup>1</sup> <4% <sup>2</sup> <4% @ 17:35 <4% <4%			
IV. Blanks			
1. Does data package include summary of method blank results?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
2. Were any compounds reported in laboratory method blanks?	<input type="radio"/> Yes	<input checked="" type="radio"/> No	<input type="radio"/> N/A
3. Were method blank analyses performed at required frequency?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
4. Were any qualifications required based on this information?	<input type="radio"/> Yes	<input checked="" type="radio"/> No	<input type="radio"/> N/A
<b>Comments/Qualifications:</b> GN7851AA 8/30 all u's. OP11241-MD 9/2 all u's.			
V. System Monitoring Compounds (Surrogate Spikes)			
1. Were all samples spiked with correct surrogate compounds?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
2. Were laboratory surrogate recoveries calculated and reported correctly on data forms?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
3. Were surrogate recoveries within laboratory established limits?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
4. Were any qualifications required based on surrogate spike QC information?	<input type="radio"/> Yes	<input checked="" type="radio"/> No	<input type="radio"/> N/A
<b>Comments/Qualifications:</b> 3002 83% 3005 83% 3006 87%			

**DATA VALIDATION WORKSHEET  
EXPLOSIVES AND DEGRADATION PRODUCTS BY HPLC**

Reviewer: Kitchings

Date: 12/11

Project: Plum Brook

SDG: H4H270215  
F26367

Matrix/No. Samples: W3

VI. Matrix Spikes/ Matrix Spike Duplicates			
1. Were MS/MSD samples analyzed at required frequency for each ample matrix (at least 5%)?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
2. Were MS/MSD results for recovery, +or- 40% RPD (<30) within laboratory QC limits?	<input type="radio"/> Yes	<input checked="" type="radio"/> No	<input type="radio"/> N/A
3. Were Samples used for MS/MSD field blanks?	<input type="radio"/> Yes	<input checked="" type="radio"/> No	<input type="radio"/> N/A
4. Were matrix spike recoveries and RPDs calculated and reported correctly?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
5. Were any qualifications required, based on results of MS/MSD samples in conjunction with other QC information?	<input type="radio"/> Yes	<input checked="" type="radio"/> No	<input type="radio"/> N/A
<p><b>Comments/Qualifications:</b> MS 69-90      2.62 / 3.0 = 87.3      OP 11241-MS/MSD            GN4JKIAC/1AD.      2.4 - dnt.      tetryl @ zero - LCS Gk = no gnu            tetryl @ zero      MSD. 69-93      2.70 / 3.0 = 90.0%      MS - 100-120            LCS - Gk any - no      RPD 0 - 4.1      RPD = .08 / 2.66 = 3.02%      MSD 96-116            quals.      RPD 2-6 ✓</p>			
VII. Laboratory Control Sample (LCS)			
1. Were LCS samples run?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
2. If performed, were LCS recoveries within the QC limits?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
3. If performed, were LCS calculations performed correctly, and did laboratory reported values match raw data?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
4. Were any qualifications required based on LCS data in conjunction with other QC information?	<input type="radio"/> Yes	<input checked="" type="radio"/> No	<input type="radio"/> N/A
<p><b>Comments/Qualifications:</b> GN785IAC 8/30      57-102            2,4,6-tnt      <math>\frac{2.82}{3.00} = 94\%</math>            T1241-BS 9/9      92-116            1,3,5 tnb.      <math>\frac{2.6}{5.0} / 2.6 = 104\%</math></p>			
VIII. Field QC Samples			

**DATA VALIDATION WORKSHEET  
EXPLOSIVES AND DEGRADATION PRODUCTS BY HPLC**

Reviewer: Kitchings Date: 12/11

Project: Plum Brook SDG: H4H270215  
FZ6367 Matrix/No. Samples: W-3

1. Were field blank or equipment rinsate samples associated with this SDG?	Yes	<u>No</u>	N/A
2. Were any compounds present in any associated field blank samples?	Yes	No	N/A
3. Were any field duplicate pairs analyzed in this SDG?	<u>Yes</u>	No	N/A
4. Were RPDs field duplicate pairs within acceptable limits ( + or -20%)	<u>Yes</u>	No	N/A
5. Were any qualifications required based on field QC information?	Yes	<u>No</u>	N/A

Comments/Qualifications: 3002 3005  
L all u's, J

**IX. Compound Identification**

1. Are relative retention times (RRTs) within acceptable RRT windows?	Yes	No	<u>N/A</u>
2. Were identified compounds confirmed on second column?	Yes	No	N/A
3. Were any qualification required based on this information?	Yes	No	<u>N/A</u>

Comments/Qualifications: No raw data - level II

**X. Overall Assessment of Data**

1. Are there any specific concerns or limitations regarding the data in this SDG?	Yes	<u>No</u>	N/A
Comments/Qualifications:			

HH270215 - STL

SDG: F 26367 - Accutest Project: Plum Brook Ordnance Works

Method: Semivolatiles - 8270C Matrix/No. Samples: Water - 3

Validation Samples: DH3002

DH3005

DH3006

### Data Validation Report Summary

	Status Code	Comments
1. Sample Preservation, Handling, and Transport	<u>A</u>	<u></u>
2. Chain of Custody	<u>A</u>	<u></u>
3. Holding Times	<u>A</u>	<u></u>
4. GC/MS Tune/Inst Perf	<u>A</u>	<u></u>
5. Calibrations	<u>A</u>	<u></u>
6. Blanks	<u>A</u>	<u></u>
7. Blank Spike/LCS	<u>A</u>	<u></u>
8. Matrix Spike	<u>A</u>	<u></u>
9. Surrogates	<u>A</u>	<u></u>
10. Internal Standards	<u>A</u>	<u></u>
11. Compound Identification	<u>A</u>	<u></u>
12. System Performance	<u>A</u>	<u></u>
13. Field QC Samples	<u>A</u>	<u></u>
14. Overall Assessment	<u>A</u>	<u></u>

Status Codes:

A = Acceptable

R = Data Rejected

X = Data acceptable but qualified due to problems

SDG: 444270215  
F26367

Method: Semivolatiles

Page 2

Qualifications:

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Significant Findings/Recommendations:

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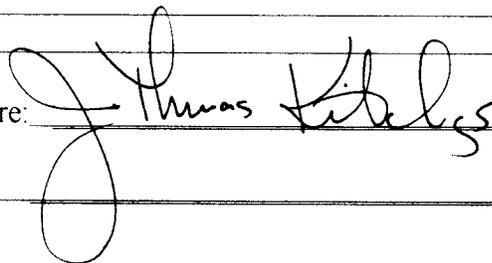
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Overall Data Quality:

Acceptable as reported.

Validator's Signature:



Date: 12/11/2004

Peer Reviewer:

Date:

## SHAW E &amp; I INC

Client Sample ID: DH3002

## GC/MS Semivolatiles

Lot-Sample #....: H4H270215-001    Work Order #....: GN4JK1AH    Matrix.....: WATER  
 Date Sampled....: 08/26/04    Date Received...: 08/27/04  
 Prep Date.....: 08/30/04    Analysis Date...: 09/02/04  
 Prep Batch #....: 4243057  
 Dilution Factor: 1    Method.....: SW846 8270C

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL	<i>Residual</i>
Phenol	ND	10	ug/L	1.8	cc
bis(2-Chloroethyl) - ether	ND	10	ug/L	1.6	
2-Chlorophenol	ND	10	ug/L	1.2	
1,3-Dichlorobenzene	ND	10	ug/L	1.6	
1,4-Dichlorobenzene	ND	10	ug/L	1.4	
1,2-Dichlorobenzene	ND	10	ug/L	1.7	
2-Methylphenol	ND	10	ug/L	2.0	
2,2'-oxybis(1-Chloro- propane)	ND	10	ug/L	1.4	
4-Methylphenol	ND	10	ug/L	3.6	
N-Nitrosodi-n-propyl- amine	ND	10	ug/L	2.1	
Hexachloroethane	ND	10	ug/L	1.9	
Nitrobenzene	ND	10	ug/L	1.8	
Isophorone	ND	10	ug/L	1.6	
2-Nitrophenol	ND	10	ug/L	2.4	
2,4-Dimethylphenol	ND	10	ug/L	3.7	
bis(2-Chloroethoxy) methane	ND	10	ug/L	1.5	
2,4-Dichlorophenol	ND	10	ug/L	2.0	
1,2,4-Trichloro- benzene	ND	10	ug/L	1.5	
Naphthalene	ND	10	ug/L	1.7	
4-Chloroaniline	ND	10	ug/L	1.8	
Hexachlorobutadiene	ND	10	ug/L	1.4	
4-Chloro-3-methylphenol	ND	10	ug/L	2.2	
2-Methylnaphthalene	ND	10	ug/L	1.6	
Hexachlorocyclopenta- diene	ND	50	ug/L	7.9	
2,4,6-Trichloro- phenol	ND	10	ug/L	2.0	
2,4,5-Trichloro- phenol	ND	10	ug/L	1.6	
2-Chloronaphthalene	ND	10	ug/L	1.6	
2-Nitroaniline	ND	50	ug/L	1.4	
Dimethyl phthalate	ND	10	ug/L	1.1	
Acenaphthylene	ND	10	ug/L	1.7	
2,6-Dinitrotoluene	ND	10	ug/L	1.7	

(Continued on next page)

## SHAW E &amp; I INC

Client Sample ID: DH3002

## GC/MS Semivolatiles

Lot-Sample #...: H4H270215-001 Work Order #...: GN4JK1AH Matrix.....: WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL	Req Qual
3-Nitroaniline	ND	50	ug/L	1.3	u
Acenaphthene	ND	10	ug/L	1.5	
2,4-Dinitrophenol	ND	50	ug/L	15	
4-Nitrophenol	ND	50	ug/L	15	
Dibenzofuran	ND	10	ug/L	1.6	
2,4-Dinitrotoluene	ND	10	ug/L	1.6	
Diethyl phthalate	ND	10	ug/L	1.3	
4-Chlorophenyl phenyl ether	ND	10	ug/L	1.6	
Fluorene	ND	10	ug/L	1.3	
4-Nitroaniline	ND	50	ug/L	1.3	
4,6-Dinitro- 2-methylphenol	ND	50	ug/L	11	
N-Nitrosodiphenylamine	ND	10	ug/L	1.6	
4-Bromophenyl phenyl ether	ND	10	ug/L	1.4	
Hexachlorobenzene	ND	10	ug/L	0.90	
Pentachlorophenol	ND	50	ug/L	8.6	
Phenanthrene	ND	10	ug/L	0.84	
Anthracene	ND	10	ug/L	0.83	
Carbazole	ND	10	ug/L	1.2	
Di-n-butyl phthalate	ND	10	ug/L	1.4	
Fluoranthene	ND	10	ug/L	1.3	
Pyrene	ND	10	ug/L	0.96	
Butyl benzyl phthalate	ND	10	ug/L	1.3	
3,3'-Dichlorobenzidine	ND	50	ug/L	1.2	
Benzo (a) anthracene	ND	10	ug/L	1.2	
Chrysene	ND	10	ug/L	0.98	
bis(2-Ethylhexyl) phthalate	ND	10	ug/L	2.2	
Di-n-octyl phthalate	ND	10	ug/L	2.4	
Benzo (b) fluoranthene	ND	10	ug/L	2.1	
Benzo (k) fluoranthene	ND	10	ug/L	1.7	
Benzo (a) pyrene	ND	10	ug/L	1.6	
Indeno (1,2,3-cd) pyrene	ND	10	ug/L	2.1	
Dibenz (a, h) anthracene	ND	10	ug/L	2.5	
Benzo (ghi) perylene	ND	10	ug/L	2.1	

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2-Fluorophenol	46	(36 - 98 )
Phenol-d5	73	(49 - 109)
Nitrobenzene-d5	78	(57 - 120)
2-Fluorobiphenyl	88	(56 - 118)
2,4,6-Tribromophenol	119	(55 - 134)
Terphenyl-d14	90	(33 - 142)

## SHAW E &amp; I INC

Client Sample ID: DH3005

## GC/MS Semivolatiles

Lot-Sample #...: H4H270215-002      Work Order #...: GN4KG1AD      Matrix.....: WATER  
 Date Sampled...: 08/26/04      Date Received...: 08/27/04  
 Prep Date.....: 08/30/04      Analysis Date...: 09/04/04  
 Prep Batch #...: 4243057  
 Dilution Factor: 1      Method.....: SW846 8270C

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL	Res Qual
Phenol	ND	10	ug/L	1.8	u
bis(2-Chloroethyl)- ether	ND	10	ug/L	1.6	
2-Chlorophenol	ND	10	ug/L	1.2	
1,3-Dichlorobenzene	ND	10	ug/L	1.6	
1,4-Dichlorobenzene	ND	10	ug/L	1.4	
1,2-Dichlorobenzene	ND	10	ug/L	1.7	
2-Methylphenol	ND	10	ug/L	2.0	
2,2'-oxybis(1-Chloro- propane)	ND	10	ug/L	1.4	
4-Methylphenol	ND	10	ug/L	3.6	
N-Nitrosodi-n-propyl- amine	ND	10	ug/L	2.1	
Hexachloroethane	ND	10	ug/L	1.9	
Nitrobenzene	ND	10	ug/L	1.8	
Isophorone	ND	10	ug/L	1.6	
2-Nitrophenol	ND	10	ug/L	2.4	
2,4-Dimethylphenol	ND	10	ug/L	3.7	
bis(2-Chloroethoxy) methane	ND	10	ug/L	1.5	
2,4-Dichlorophenol	ND	10	ug/L	2.0	
1,2,4-Trichloro- benzene	ND	10	ug/L	1.5	
Naphthalene	ND	10	ug/L	1.7	
4-Chloroaniline	ND	10	ug/L	1.8	
Hexachlorobutadiene	ND	10	ug/L	1.4	
4-Chloro-3-methylphenol	ND	10	ug/L	2.2	
2-Methylnaphthalene	ND	10	ug/L	1.6	
Hexachlorocyclopenta- diene	ND	50	ug/L	7.9	
2,4,6-Trichloro- phenol	ND	10	ug/L	2.0	
2,4,5-Trichloro- phenol	ND	10	ug/L	1.6	
2-Chloronaphthalene	ND	10	ug/L	1.6	
2-Nitroaniline	ND	50	ug/L	1.4	
Dimethyl phthalate	ND	10	ug/L	1.1	
Acenaphthylene	ND	10	ug/L	1.7	
2,6-Dinitrotoluene	ND	10	ug/L	1.7	

(Continued on next page)

## SHAW E &amp; I INC

Client Sample ID: DH3005

## GC/MS Semivolatiles

Lot-Sample #...: H4H270215-002 Work Order #...: GN4KG1AD Matrix.....: WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL	Res Qual
3-Nitroaniline	ND	50	ug/L	1.3	↓
Acenaphthene	ND	10	ug/L	1.5	
2,4-Dinitrophenol	ND	50	ug/L	15	
4-Nitrophenol	ND	50	ug/L	15	
Dibenzofuran	ND	10	ug/L	1.6	
2,4-Dinitrotoluene	ND	10	ug/L	1.6	
Diethyl phthalate	ND	10	ug/L	1.3	
4-Chlorophenyl phenyl ether	ND	10	ug/L	1.6	
Fluorene	ND	10	ug/L	1.3	
4-Nitroaniline	ND	50	ug/L	1.3	
4,6-Dinitro- 2-methylphenol	ND	50	ug/L	11	
N-Nitrosodiphenylamine	ND	10	ug/L	1.6	
4-Bromophenyl phenyl ether	ND	10	ug/L	1.4	
Hexachlorobenzene	ND	10	ug/L	0.90	
Pentachlorophenol	ND	50	ug/L	8.6	
Phenanthrene	ND	10	ug/L	0.84	
Anthracene	ND	10	ug/L	0.83	
Carbazole	ND	10	ug/L	1.2	
Di-n-butyl phthalate	ND	10	ug/L	1.4	
Fluoranthene	ND	10	ug/L	1.3	
Pyrene	ND	10	ug/L	0.96	
Butyl benzyl phthalate	ND	10	ug/L	1.3	
3,3'-Dichlorobenzidine	ND	50	ug/L	1.2	
Benzo(a)anthracene	ND	10	ug/L	1.2	
Chrysene	ND	10	ug/L	0.98	
bis(2-Ethylhexyl) phthalate	2.5 J	10	ug/L	2.2	
Di-n-octyl phthalate	ND	10	ug/L	2.4	
Benzo(b)fluoranthene	ND	10	ug/L	2.1	
Benzo(k)fluoranthene	ND	10	ug/L	1.7	
Benzo(a)pyrene	ND	10	ug/L	1.6	
Indeno(1,2,3-cd)pyrene	ND	10	ug/L	2.1	
Dibenz(a,h)anthracene	ND	10	ug/L	2.5	
Benzo(ghi)perylene	ND	10	ug/L	2.1	

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2-Fluorophenol	47	(36 - 98)
Phenol-d5	64	(49 - 109)
Nitrobenzene-d5	76	(57 - 120)
2-Fluorobiphenyl	78	(56 - 118)
2,4,6-Tribromophenol	112	(55 - 134)
Terphenyl-d14	93	(33 - 142)

(Continued on next page)

# Report of Analysis

Client Sample ID:	DH3006	Date Sampled:	08/26/04
Lab Sample ID:	F26367-1	Date Received:	08/27/04
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	SW846 8270C SW846 3510C		
Project:	PBOW		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L023236.D	1	09/09/04	ME	09/02/04	OP11233	SL1237
Run #2							

Run #	Initial Volume	Final Volume
Run #1	990 ml	1.0 ml
Run #2		

ABN TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic Acid	ND	25	15	ug/l	
95-57-8	2-Chlorophenol	ND	5.1	2.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.1	2.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.1	2.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	5.1	2.0	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	10	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	5.1	ug/l	
95-48-7	2-Methylphenol	ND	5.1	2.0	ug/l	
	3&4-Methylphenol	ND	5.1	2.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.1	2.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	10	ug/l	
87-86-5	Pentachlorophenol	ND	25	10	ug/l	
108-95-2	Phenol	ND	5.1	2.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.1	2.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.1	2.0	ug/l	
83-32-9	Acenaphthene	ND	5.1	1.0	ug/l	
208-96-8	Acenaphthylene	ND	5.1	1.0	ug/l	
120-12-7	Anthracene	ND	5.1	1.0	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.1	1.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.1	1.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.1	1.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.1	2.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.1	1.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.1	1.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.1	2.0	ug/l	
100-51-6	Benzyl Alcohol	ND	5.1	1.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.1	1.0	ug/l	
106-47-8	4-Chloroaniline	ND	10	3.0	ug/l	
86-74-8	Carbazole	ND	5.1	1.0	ug/l	
218-01-9	Chrysene	ND	5.1	1.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.1	1.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.1	2.0	ug/l	

ND = Not detected      MDL - Method Detection Limit  
 RL = Reporting Limit  
 E = Indicates value exceeds calibration range

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound

## Report of Analysis

Client Sample ID:	DH3006	Date Sampled:	08/26/04
Lab Sample ID:	F26367-1	Date Received:	08/27/04
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	SW846 8270C SW846 3510C		
Project:	PBOW		

ABN TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q	Re. Qual
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.1	1.0	ug/l		
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.1	1.0	ug/l		
95-50-1	1,2-Dichlorobenzene	ND	5.1	1.0	ug/l		
541-73-1	1,3-Dichlorobenzene	ND	5.1	1.0	ug/l		
106-46-7	1,4-Dichlorobenzene	ND	5.1	1.0	ug/l		
121-14-2	2,4-Dinitrotoluene	ND	5.1	2.0	ug/l		
606-20-2	2,6-Dinitrotoluene	ND	5.1	2.0	ug/l		
91-94-1	3,3'-Dichlorobenzidine	ND	10	5.1	ug/l		
53-70-3	Dibenzo(a,h)anthracene	ND	5.1	2.0	ug/l		
132-64-9	Dibenzofuran	ND	5.1	1.0	ug/l		
84-74-2	Di-n-butyl phthalate	ND	5.1	2.0	ug/l		
117-84-0	Di-n-octyl phthalate	ND	5.1	2.5	ug/l		
84-66-2	Diethyl phthalate	ND	5.1	2.0	ug/l		
131-11-3	Dimethyl phthalate	ND	5.1	2.0	ug/l		
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.1	2.5	ug/l		
206-44-0	Fluoranthene	ND	5.1	1.0	ug/l		
86-73-7	Fluorene	ND	5.1	1.0	ug/l		
118-74-1	Hexachlorobenzene	ND	5.1	1.0	ug/l		
87-68-3	Hexachlorobutadiene	ND	5.1	2.0	ug/l		
77-47-4	Hexachlorocyclopentadiene	ND	5.1	2.0	ug/l		
67-72-1	Hexachloroethane	ND	5.1	2.0	ug/l		
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.1	2.0	ug/l		
78-59-1	Isophorone	ND	5.1	1.0	ug/l		
91-57-6	2-Methylnaphthalene	ND	5.1	1.0	ug/l		
88-74-4	2-Nitroaniline	ND	5.1	2.0	ug/l		
99-09-2	3-Nitroaniline	ND	5.1	2.0	ug/l		
100-01-6	4-Nitroaniline	ND	5.1	2.0	ug/l		
91-20-3	Naphthalene	ND	5.1	1.0	ug/l		
98-95-3	Nitrobenzene	ND	5.1	1.0	ug/l		
621-64-7	N-Nitroso-di-n-propylamine	ND	5.1	2.0	ug/l		
86-30-6	N-Nitrosodiphenylamine	ND	5.1	2.0	ug/l		
85-01-8	Phenanthrene	ND	5.1	1.0	ug/l		
129-00-0	Pyrene	ND	5.1	1.0	ug/l		
120-82-1	1,2,4-Trichlorobenzene	ND	5.1	1.0	ug/l		

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	36%		19-90%
4165-62-2	Phenol-d5	23%		10-68%
118-79-6	2,4,6-Tribromophenol	98%		36-137%

ND = Not detected      MDL - Method Detection Limit  
 RL = Reporting Limit  
 E = Indicates value exceeds calibration range

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound



**DATA VALIDATION WORKSHEETS  
SEMIVOLATILE ORGANICS**

Reviewer: Kitchings Date: 12/11

Project: Plum Brook SDG: H4H270215  
F26367 Matrix/No. Samples: W-3

<b>III. Initial Calibration</b>			
1. Were correct concentrations of standards used for initial calibration? Were samples analyzed within 12 hours of associated instrument performance check?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
2. Were initial calibration RRFs for all volatile target compounds and system monitoring compounds $\geq 0.05$ ? Do recalculations for RRFs agree with reported values?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
3. Were %RSDs $\leq 30\%$ for all volatile target compounds? Do recalculations for RSDs agree with reported values?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
4. Were any qualifications required based on this information?	<input type="radio"/> Yes	<input checked="" type="radio"/> No	<input type="radio"/> N/A
<b>Comments/Qualifications:</b> 7/27@14:40 RRE $> 0.05$ RSDs $< 15\%$			
<b>IV. Continuing Calibration</b>			
1. Were continuing calibration samples run at the required frequency, and compared to the correct initial calibration?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
2. Did calculations from raw data agree with laboratory reported values for RRF and %D?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
3. Were continuing calibration RRFs for volatile organic compounds and system monitoring compounds (surrogates) $\geq 0.05$ ?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
4. Were %D between initial calibration RRF and the continuing calibration RRFs within $\pm 25\%$ ?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
5. Were any qualifications required based on this information?	<input type="radio"/> Yes	<input checked="" type="radio"/> No	<input type="radio"/> N/A
<b>Comments/Qualifications:</b> CCAL 9/8 %D's $< 18\%$ 9/9 %D's $< 13\%$			

**DATA VALIDATION WORKSHEETS  
SEMIVOLATILE ORGANICS**

Reviewer: Kitchings Date: 12/11

Project: Plum Brook SDG: H4H270215 F26367 Matrix/No. Samples: W-3

V. Blanks			
1. Were any target or non-target compounds reported in laboratory prep or calibration blanks?	Yes	<input checked="" type="radio"/> No	N/A
2. Were method blank analyses performed at required frequency, and for each GC/MS system used to analyze samples for each type of analysis (i.e., matrix)?	<input checked="" type="radio"/> Yes	No	N/A
3. Were any qualifications required based on this information?	Yes	<input checked="" type="radio"/> No	N/A
<b>Comments/Qualifications:</b> 8/30 - 9/2 GNB931AA - all u's. 9/2 9/8, 9/9 11233-MB			

VI. System Monitoring Compounds (Surrogate Spikes)																											
1. Were laboratory surrogate recoveries calculated and reported correctly?	<input checked="" type="radio"/> Yes	No	N/A																								
2. Were surrogate recoveries within acceptable limits?	<input checked="" type="radio"/> Yes	No	N/A																								
3. Were any qualifications required based on surrogate spike QC information?	Yes	<input checked="" type="radio"/> No	N/A																								
<b>Comments/Qualifications:</b> <table border="1"> <tr> <td>2-fp</td> <td>46</td> <td>47</td> <td>36</td> </tr> <tr> <td>phenol</td> <td>73</td> <td>64</td> <td>23</td> </tr> <tr> <td>2,4,6-Tp</td> <td>78</td> <td>76</td> <td>98</td> </tr> <tr> <td>NB</td> <td>88</td> <td>78</td> <td>63</td> </tr> <tr> <td>2-fb</td> <td>119</td> <td>112</td> <td>76</td> </tr> <tr> <td>terpenyl</td> <td>90</td> <td>93</td> <td>81</td> </tr> </table>				2-fp	46	47	36	phenol	73	64	23	2,4,6-Tp	78	76	98	NB	88	78	63	2-fb	119	112	76	terpenyl	90	93	81
2-fp	46	47	36																								
phenol	73	64	23																								
2,4,6-Tp	78	76	98																								
NB	88	78	63																								
2-fb	119	112	76																								
terpenyl	90	93	81																								

VII. Matrix Spikes/Matrix Spike Duplicates			
1. Were MS/MSD samples analyzed at required frequency for each ample matrix?	<input checked="" type="radio"/> Yes	No	N/A
2. Were MS/MSD results for recovery and RPD within advisory limits?	<input checked="" type="radio"/> Yes	No	N/A
3. Were Samples used for MS/MSD field blanks?	Yes	<input checked="" type="radio"/> No	N/A
4. Were laboratory reported results correctly calculated from raw data?	Yes	No	<input checked="" type="radio"/> N/A
5. Were any qualifications required, based on results of MS/MSD samples in conjunction with other QC information?	Yes	<input checked="" type="radio"/> No	N/A

9/8, 9/9 Comments/Qualifications: GNB4JKIAJ/K  
 26403  
 2 MS - 2,4 dup low 72-111 → 75-114  
 MS/MSD  
 CSK - no qual.  
 MSD - 2,4 dup low  
 Pentach. 95.4 / 101 = 94.5  
 83.0 / 95.2 = 87.2  
 RPD  $\frac{12.4}{89.2} = 13.9\%$

RPDs → 8 high

**DATA VALIDATION WORKSHEETS  
SEMIVOLATILE ORGANICS**

Reviewer: Kitchings Date: 12/11

Project: Plum Brook SDG: 44 270215  
F 26367 Matrix/No. Samples: W-3

<b>VIII. Laboratory Control Sample (LCS)</b>			
1. Were LCS samples run at correct frequency for each matrix samples?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
2. Were LCS calculations performed correctly, and did laboratory reported values match raw data? Were recoveries within laboratory QC limits?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
4. Were any qualifications required based on LCS data in conjunction with other QC information?	<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> No	N/A
<b>Comments/Qualifications:</b> GNG931AC. 9/8 all w/in limits. 11233-BS 74-96 Pyrene $82.2/100 = 82.2\%$ Benzo(a)a $47.7/50 = 95.4\%$			
<b>IX. Internal Standards</b>			
1. Were standard area counts within a factor of two (-50% to +100%) from associated calibration standard?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
2. Were retention times of internal standard within + or - 30 seconds of retention time of associated calibration check?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
3. Were any qualifications required based on internal standard results?	<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> No	N/A
<b>Comments/Qualifications:</b> 3006 IS 3 $\frac{477400}{464772} = 102.7\%$ RTs $\frac{8.53}{8.53}$			
<b>X. Target Compound Identification</b>			
1. Are relative retention times (RRTs) within + or - 0.06 RRT units of standard RRT?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
2. Do sample compound spectra meet specified criteria in relation to laboratory standard spectra?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
3. Were all compounds accounted for on chromatogram?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
<b>Comments/Qualifications:</b> No raw data - level III			

**DATA VALIDATION WORKSHEETS  
SEMIVOLATILE ORGANICS**

Reviewer: Kitchings Date: 12/11

Project: Plum Brook SDG: H4H270215 F26367 Matrix/No. Samples: W3

<b>XI. Compound Quantitation and Reported Contract Required Quantitation Limits (CRQLs)</b>			
1. Were sample results correctly calculated and reported by laboratory?	Yes	No	<u>N/A</u>
2. Were correct internal standard quantitation ion and RRF used to quantify all compounds for all samples?	Yes	No	N/A
3. Were CRQLs adjusted to reflect sample dilutions and dry weight factors not accounted for by the method?	Yes	No	N/A
4. Were any laboratory QA/QC sample results calculated from peaks derived using manual integration?	Yes	No	N/A
5. Were any qualifications required based on this information?	Yes	No	<u>N/A</u>
<b>Comments/Qualifications:</b> <u>No raw data - level 116</u>			
<b>XII. Field QC</b>			
1. Were any Field Duplicates associated with this SDG?	<u>Yes</u>	No	N/A
a. If Yes, were RPDs acceptable ( <u>30%</u> for water samples, <u>50%</u> for soil samples)?	<u>Yes</u>	No	N/A
2. Were any field blanks or equipment rinsates associated with this SDG?	Yes	No	N/A
a. If yes, were any compounds reported in samples >IDL?	Yes	No	N/A
b. Were any qualifications required based on this information?	Yes	<u>No</u>	N/A
<b>Comments/Qualifications:</b> <u>302 305</u> <u>10u bis. 2.5J</u>			
<b>XIII. Overall Assessment of Data</b>			
1. Are there any specific concerns or limitations regarding the data in this SDG?	Yes	<u>No</u>	N/A
<b>Comments/Qualifications:</b>			

SDG: H4H27021S - STL  
FZ6367

Project: PLUM BROOK ORDNANCE WORKS

TOTAL & DISSOLVED  
6010B  
Method: METALS 7470A

Matrix/No. of Samples: Water - 3

Validation Samples: DH 3002

DH 3005

DH 3006

### Data Validation Report Summary

	Status Code	Comments
1. Sample Preservation, Handling, and Transport	<u>A</u>	<u></u>
2. Chain of Custody	<u>A</u>	<u></u>
3. Holding Times	<u>A</u>	<u></u>
4. Calibrations	<u>A</u>	<u></u>
5. Blanks	<u>A</u>	<u></u>
6. ICP/ICS	<u>A</u>	<u></u>
7. Blank Spike/LCS	<u>A</u>	<u></u>
8. Duplicates	<u>A</u>	<u></u>
9. Matrix Spike	<u>X</u>	<u></u>
10. Furnace Atomic Absorption QC	<u>A</u>	<u></u>
11. ICP Serial Dilution	<u>X</u>	<u></u>
12. Sample Result Verification	<u>A</u>	<u></u>
13. Field QC Samples	<u>X</u>	<u></u>
14. Overall Assessment	<u>X</u>	<u></u>

Status Codes:

A = Acceptable

R = Data Rejected

X = Data acceptable but qualified due to problems

Qualifications:

- 17. The field duplicate comparison for total aluminum exceeded the 30% QC limit and the results for samples DH 3002 and DH 3005 were qualified as "J"
- 8a. The results for aluminum in the total fraction ms/msd exceeded the QC limits and were qualified as "J" in samples DH 3002 & DH 3005
- 13. K and Na had high RPD in the serial dilution in the total fraction and were qualified as "J" in sample DH 3004

Significant Findings/Recommendations:

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Overall Data Quality:

Acceptable as qualified.

Date: 12/11/2004

Validator's Signature:



Peer Reviewer:

## SHAW E &amp; I INC

Client Sample ID: DH3002

## TOTAL Metals

Lot-Sample #...: H4H270215-001  
Date Sampled...: 08/26/04

Date Received...: 08/27/04

Matrix.....: WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION- ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 4243085						
Aluminum	717	200	ug/L	SW846 6010B Dilution Factor: 1 Analysis Time...: 16:53	08/31-09/03/04 MDL.....: 41.3	GN4JK1A1
Antimony	ND	60.0	ug/L	SW846 6010B Dilution Factor: 1 Analysis Time...: 16:53	08/31-09/03/04 MDL.....: 4.0	GN4JK1A9
Arsenic	ND	10.0	ug/L	SW846 6010B Dilution Factor: 1 Analysis Time...: 16:53	08/31-09/03/04 MDL.....: 2.6	GN4JK1A7
Barium	695	200	ug/L	SW846 6010B Dilution Factor: 1 Analysis Time...: 16:53	08/31-09/03/04 MDL.....: 0.96	GN4JK1A9
Beryllium	ND	5.0	ug/L	SW846 6010B Dilution Factor: 1 Analysis Time...: 16:53	08/31-09/03/04 MDL.....: 0.56	GN4JK1A1
Cadmium	ND	5.0	ug/L	SW846 6010B Dilution Factor: 1 Analysis Time...: 16:53	08/31-09/03/04 MDL.....: 0.84	GN4JK1A4
Calcium	118000	5000	ug/L	SW846 6010B Dilution Factor: 1 Analysis Time...: 16:53	08/31-09/03/04 MDL.....: 58.2	GN4JK1A7
Chromium	ND	10.0	ug/L	SW846 6010B Dilution Factor: 1 Analysis Time...: 16:53	08/31-09/03/04 MDL.....: 2.8	GN4JK1CA
Cobalt	ND	50.0	ug/L	SW846 6010B Dilution Factor: 1 Analysis Time...: 16:53	08/31-09/03/04 MDL.....: 2.0	GN4JK1CE
Copper	ND	25.0	ug/L	SW846 6010B Dilution Factor: 1 Analysis Time...: 16:53	08/31-09/03/04 MDL.....: 3.0	GN4JK1CH
Iron	593	100	ug/L	SW846 6010B Dilution Factor: 1 Analysis Time...: 16:53	08/31-09/03/04 MDL.....: 45.8	GN4JK1CL
Lead	ND	3.0	ug/L	SW846 6010B Dilution Factor: 1 Analysis Time...: 16:53	08/31-09/03/04 MDL.....: 1.6	GN4JK1CP
Magnesium	36600	5000	ug/L	SW846 6010B Dilution Factor: 1 Analysis Time...: 16:53	08/31-09/03/04 MDL.....: 37.0	GN4JK1CT

(Continued on next page)

## SHAW E &amp; I INC

Client Sample ID: DH3002

## TOTAL Metals

Lot-Sample #....: H4H270215-001

Matrix.....: WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION- ANALYSIS DATE	WORK ORDER #
Manganese	57.5	15.0	ug/L	SW846 6010B Analysis Time...: 16:53 Dilution Factor: 1	08/31-09/03/04 MDL.....: 1.6	GN4JK1CW
Nickel	3.1 B	40.0	ug/L	SW846 6010B Analysis Time...: 16:53 Dilution Factor: 1	08/31-09/03/04 MDL.....: 2.8	GN4JK1C1
Potassium	3980 B,J	5000	ug/L	SW846 6010B Analysis Time...: 19:15 Dilution Factor: 1	08/31-09/09/04 MDL.....: 66.8	GN4JK1C4
Selenium	ND	5.0	ug/L	SW846 6010B Analysis Time...: 16:53 Dilution Factor: 1	08/31-09/03/04 MDL.....: 1.5	GN4JK1C7
Silver	ND	10.0	ug/L	SW846 6010B Analysis Time...: 16:53 Dilution Factor: 1	08/31-09/03/04 MDL.....: 1.9	GN4JK1DA
Sodium	18500	5000	ug/L	SW846 6010B Analysis Time...: 16:53 Dilution Factor: 1	08/31-09/03/04 MDL.....: 464	GN4JK1DE
Thallium	3.3 B	10.0	ug/L	SW846 6010B Analysis Time...: 16:53 Dilution Factor: 1	08/31-09/03/04 MDL.....: 2.4	GN4JK1DH
Vanadium	ND	50.0	ug/L	SW846 6010B Analysis Time...: 16:53 Dilution Factor: 1	08/31-09/03/04 MDL.....: 3.6	GN4JK1DL
Zinc	4.5 B	20.0	ug/L	SW846 6010B Analysis Time...: 16:53 Dilution Factor: 1	08/31-09/03/04 MDL.....: 2.4	GN4JK1DP
Prep Batch #....: 4244440						
Mercury	ND	0.20	ug/L	SW846 7470A Analysis Time...: 14:38 Dilution Factor: 1	09/01/04 MDL.....: 0.060	GN4JK1DT

**NOTE(S):**

- B Estimated result. Result is less than RL.  
 J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

## SHAW E &amp; I INC

Client Sample ID: DH3002

## DISSOLVED Metals

Lot-Sample #...: H4H270215-001  
 Date Sampled...: 08/26/04

Date Received...: 08/27/04

Matrix.....: WATER

PARAMETER	RESULT	REPORTING		METHOD	PREPARATION- ANALYSIS DATE	WORK ORDER #
		LIMIT	UNITS			
Prep Batch #...: 4243085						
Aluminum	63.6 B	200	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1EW
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 41.3	
Antimony	ND	60.0	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1E1
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 4.0	
Arsenic	ND	10.0	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1E4
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 2.6	
Barium	700	200	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1E7
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 0.96	
Beryllium	ND	5.0	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1FA
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 0.56	
Cadmium	ND	5.0	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1FE
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 0.84	
Calcium	117000	5000	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1FH
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 58.2	
Chromium	ND	10.0	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1FL
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 2.8	
Cobalt	ND	50.0	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1FP
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 2.0	
Copper	ND	25.0	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1FT
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 3.0	
Iron	ND	100	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1FW
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 45.8	
Lead	ND	3.0	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1F1
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 1.6	
Magnesium	37000	5000	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1F4
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 37.0	

(Continued on next page)

## SHAW E &amp; I INC

Client Sample ID: DH3002

## DISSOLVED Metals

Lot-Sample #...: H4H270215-001

Matrix.....: WATER

PARAMETER	RESULT	REPORTING		METHOD	PREPARATION-	WORK
		LIMIT	UNITS		ANALYSIS DATE	ORDER #
Manganese	47.0	15.0	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1F7
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 1.6	
Nickel	ND	40.0	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1GA
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 2.8	
Potassium	3730 B,J	5000	ug/L	SW846 6010B	08/31-09/09/04	GN4JK1GE
		Dilution Factor: 1		Analysis Time...: 18:47	MDL.....: 66.8	
Selenium	ND	5.0	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1GH
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 1.5	
Silver	ND	10.0	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1GL
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 1.9	
Sodium	18700	5000	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1GP
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 464	
Thallium	ND	10.0	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1GT
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 2.4	
Vanadium	ND	50.0	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1GW
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 3.6	
Zinc	4.2 B	20.0	ug/L	SW846 6010B	08/31-09/03/04	GN4JK1G1
		Dilution Factor: 1		Analysis Time...: 16:35	MDL.....: 2.4	
Prep Batch #...: 4244441						
Mercury	ND	0.20	ug/L	SW846 7470A	09/01/04	GN4JK1G4
		Dilution Factor: 1		Analysis Time...: 15:05	MDL.....: 0.060	

**NOTE(S):**

- B Estimated result. Result is less than RL.  
 J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

## SHAW E &amp; I INC

Client Sample ID: DH3005

## TOTAL Metals

Lot-Sample #...: H4H270215-002  
 Date Sampled...: 08/26/04

Date Received...: 08/27/04

Matrix.....: WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION- ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 4243085						
Aluminum	1080	200	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1AE
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 41.3	
Antimony	ND	60.0	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1AF
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 4.0	
Arsenic	ND	10.0	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1AG
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 2.6	
Barium	701	200	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1AH
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 0.96	
Beryllium	ND	5.0	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1AJ
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 0.56	
Cadmium	ND	5.0	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1AK
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 0.84	
Calcium	117000	5000	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1AL
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 58.2	
Chromium	ND	10.0	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1AM
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 2.8	
Cobalt	ND	50.0	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1AN
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 2.0	
Copper	ND	25.0	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1AP
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 3.0	
Iron	620	100	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1AQ
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 45.8	
Lead	ND	3.0	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1AR
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 1.6	
Magnesium	37100	5000	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1AT
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 37.0	

(Continued on next page)

## SHAW E &amp; I INC

Client Sample ID: DH3005

## TOTAL Metals

Lot-Sample #...: H4H270215-002

Matrix.....: WATER

PARAMETER	RESULT	REPORTING		METHOD	PREPARATION-	WORK
		LIMIT	UNITS		ANALYSIS DATE	ORDER #
Manganese	56.0	15.0	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1AU
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 1.6	
Nickel	ND	40.0	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1AV
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 2.8	
Potassium	4410 B,J	5000	ug/L	SW846 6010B	08/31-09/09/04	GN4KG1AW
		Dilution Factor: 1		Analysis Time...: 19:34	MDL.....: 66.8	
Selenium	ND	5.0	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1AX
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 1.5	
Silver	ND	10.0	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1A0
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 1.9	
Sodium	18700	5000	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1A1
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 464	
Thallium	4.1 B	10.0	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1A2
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 2.4	
Vanadium	ND	50.0	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1A3
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 3.6	
Zinc	5.2 B	20.0	ug/L	SW846 6010B	08/31-09/07/04	GN4KG1A4
		Dilution Factor: 1		Analysis Time...: 13:21	MDL.....: 2.4	
Prep Batch #...: 4244440						
Mercury	ND	0.20	ug/L	SW846 7470A	09/01/04	GN4KG1A5
		Dilution Factor: 1		Analysis Time...: 14:47	MDL.....: 0.060	

## NOTE (S) :

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

## SHAW B &amp; I INC

Client Sample ID: DH3005

## DISSOLVED Metals

Lot-Sample #...: H4H270215-002  
Date Sampled...: 08/26/04

Date Received...: 08/27/04

Matrix.....: WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION- ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 4243085						
Aluminum	64.1 B	200	ug/L	SW846 6010B Analysis Time...: 17:07	08/31-09/03/04	GN4KG1A7 MDL.....: 41.3
		Dilution Factor: 1				
Antimony	ND	60.0	ug/L	SW846 6010B Analysis Time...: 17:07	08/31-09/03/04	GN4KG1A8 MDL.....: 4.0
		Dilution Factor: 1				
Arsenic	ND	10.0	ug/L	SW846 6010B Analysis Time...: 17:07	08/31-09/03/04	GN4KG1A9 MDL.....: 2.6
		Dilution Factor: 1				
Barium	694	200	ug/L	SW846 6010B Analysis Time...: 17:07	08/31-09/03/04	GN4KG1CA MDL.....: 0.96
		Dilution Factor: 1				
Beryllium	ND	5.0	ug/L	SW846 6010B Analysis Time...: 17:07	08/31-09/03/04	GN4KG1CC MDL.....: 0.56
		Dilution Factor: 1				
Cadmium	ND	5.0	ug/L	SW846 6010B Analysis Time...: 17:07	08/31-09/03/04	GN4KG1CD MDL.....: 0.84
		Dilution Factor: 1				
Calcium	115000	5000	ug/L	SW846 6010B Analysis Time...: 17:07	08/31-09/03/04	GN4KG1CE MDL.....: 58.2
		Dilution Factor: 1				
Chromium	ND	10.0	ug/L	SW846 6010B Analysis Time...: 17:07	08/31-09/03/04	GN4KG1CF MDL.....: 2.8
		Dilution Factor: 1				
Cobalt	ND	50.0	ug/L	SW846 6010B Analysis Time...: 17:07	08/31-09/03/04	GN4KG1CG MDL.....: 2.0
		Dilution Factor: 1				
Copper	ND	25.0	ug/L	SW846 6010B Analysis Time...: 17:07	08/31-09/03/04	GN4KG1CH MDL.....: 3.0
		Dilution Factor: 1				
Iron	ND	100	ug/L	SW846 6010B Analysis Time...: 17:07	08/31-09/03/04	GN4KG1CJ MDL.....: 45.8
		Dilution Factor: 1				
Lead	ND	3.0	ug/L	SW846 6010B Analysis Time...: 17:07	08/31-09/03/04	GN4KG1CK MDL.....: 1.6
		Dilution Factor: 1				
Magnesium	36400	5000	ug/L	SW846 6010B Analysis Time...: 17:07	08/31-09/03/04	GN4KG1CL MDL.....: 37.0
		Dilution Factor: 1				

(Continued on next page)

## SHAW B &amp; I INC

Client Sample ID: DH3005

## DISSOLVED Metals

Lot-Sample #...: H4H270215-002

Matrix.....: WATER

PARAMETER	RESULT	REPORTING		METHOD	PREPARATION-	WORK
		LIMIT	UNITS		ANALYSIS DATE	ORDER #
Manganese	46.2	15.0	ug/L	SW846 6010B	08/31-09/03/04	GN4KG1CM
		Dilution Factor: 1		Analysis Time...: 17:07	MDL.....: 1.6	
Nickel	ND	40.0	ug/L	SW846 6010B	08/31-09/03/04	GN4KG1CN
		Dilution Factor: 1		Analysis Time...: 17:07	MDL.....: 2.8	
Potassium	3750 B, J	5000	ug/L	SW846 6010B	08/31-09/09/04	GN4KG1CP
		Dilution Factor: 1		Analysis Time...: 19:29	MDL.....: 66.8	
Selenium	ND	5.0	ug/L	SW846 6010B	08/31-09/03/04	GN4KG1CQ
		Dilution Factor: 1		Analysis Time...: 17:07	MDL.....: 1.5	
Silver	ND	10.0	ug/L	SW846 6010B	08/31-09/03/04	GN4KG1CR
		Dilution Factor: 1		Analysis Time...: 17:07	MDL.....: 1.9	
Sodium	18500	5000	ug/L	SW846 6010B	08/31-09/03/04	GN4KG1CT
		Dilution Factor: 1		Analysis Time...: 17:07	MDL.....: 464	
Thallium	5.8 B	10.0	ug/L	SW846 6010B	08/31-09/03/04	GN4KG1CU
		Dilution Factor: 1		Analysis Time...: 17:07	MDL.....: 2.4	
Vanadium	ND	50.0	ug/L	SW846 6010B	08/31-09/03/04	GN4KG1CV
		Dilution Factor: 1		Analysis Time...: 17:07	MDL.....: 3.6	
Zinc	ND	20.0	ug/L	SW846 6010B	08/31-09/03/04	GN4KG1CW
		Dilution Factor: 1		Analysis Time...: 17:07	MDL.....: 2.4	
Prep Batch #...: 4244441						
Mercury	ND	0.20	ug/L	SW846 7470A	09/01/04	GN4KG1CX
		Dilution Factor: 1		Analysis Time...: 15:15	MDL.....: 0.060	

**NOTE(S):**

- B Estimated result. Result is less than RL.  
 J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

# Report of Analysis

Client Sample ID: DH3006	Date Sampled: 08/26/04
Lab Sample ID: F26367-1	Date Received: 08/27/04
Matrix: AQ - Ground Water	Percent Solids: n/a
Project: PBOW	

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed By	Method	Prep Method	<i>See spec</i>
Aluminum	368	200	20	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>
Antimony	3.5 U	10	3.5	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup> u
Arsenic	3.5 U	10	3.5	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup> u
Barium	679	200	1.1	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>
Beryllium	0.80 U	4.0	0.80	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup> u
Cadmium	0.30 U	5.0	0.30	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup> u
Calcium	122000	1000	42	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>
Chromium	2.4 U	10	2.4	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup> u
Cobalt	1.0 U	50	1.0	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup> u
Copper	1.4 U	25	1.4	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup> u
Iron	111 B	300	48	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup> J
Lead	2.9 U	5.0	2.9	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup> u
Magnesium	38100	5000	33	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>
Manganese	56.6	15	0.60	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>
Mercury	0.052 U	1.0	0.052	ug/l	1	09/14/04	09/16/04	SM	SW846 7470A <sup>1</sup>	SW846 7470A <sup>3</sup> u
Nickel	1.1 B	40	0.80	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup> J
Potassium	4610 B	5000	51	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup> u 13
Selenium	3.6 U	10	3.6	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup> u
Silver	1.9 U	10	1.9	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup> u
Sodium	16900	5000	200	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup> J 13
Thallium	2.9 U	10	2.9	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup> u
Vanadium	0.79 B	50	0.60	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup> J
Zinc	5.1 U	20	5.1	ug/l	1	09/17/04	09/20/04	DM	SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup> u

- (1) Instrument QC Batch: MA3973
- (2) Instrument QC Batch: MA3980
- (3) Prep QC Batch: MP7099
- (4) Prep QC Batch: MP7122

RL = Reporting Limit  
MDL = Method Detection Limit

U = Indicates a result < MDL  
B = Indicates a result > = MDL but < RL

Report of Analysis

Client Sample ID: DH3006	Date Sampled: 08/26/04
Lab Sample ID: F26367-1A	Date Received: 08/27/04
Matrix: AQ - Groundwater Filtered	Percent Solids: n/a
Project: PBOW	

Metals Analysis

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed By	Method	Prep Method	Review
Aluminum	33.0 B	200	20	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	J
Antimony	3.5 U	10	3.5	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Arsenic	3.5 U	10	3.5	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Barium	641	200	1.1	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Beryllium	0.80 U	4.0	0.80	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Cadmium	0.30 U	5.0	0.30	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Calcium	113000	1000	42	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Chromium	2.4 U	10	2.4	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Cobalt	1.0 U	50	1.0	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Copper	1.4 U	25	1.4	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Iron <sup>a</sup>	480 U	600	480	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Lead	2.9 U	5.0	2.9	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Magnesium	35800	5000	33	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Manganese	45.5	15	0.60	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Mercury	0.052 U	1.0	0.052	ug/l	1	09/14/04	09/16/04	SM SW846 7470A <sup>1</sup>	SW846 7470A <sup>3</sup>	u
Nickel	0.80 U	40	0.80	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	J
Potassium	4280 B	5000	51	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Selenium	3.6 U	10	3.6	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Silver	1.9 U	10	1.9	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Sodium	16000	5000	200	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Thallium	2.9 U	10	2.9	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Vanadium	0.60 U	50	0.60	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u
Zinc	5.1 U	20	5.1	ug/l	1	09/17/04	09/20/04	DM SW846 6010B <sup>2</sup>	SW846 3010A <sup>4</sup>	u

- (1) Instrument QC Batch: MA3973
- (2) Instrument QC Batch: MA3980
- (3) Prep QC Batch: MP7099
- (4) Prep QC Batch: MP7122

(a) Elevated reporting limits due to matrix interference.

RL = Reporting Limit  
MDL = Method Detection Limit

U = Indicates a result < MDL  
B = Indicates a result >= MDL but < RL

**DATA VALIDATION WORKSHEET  
METALS**

Reviewer: Kitchings Date: 12/11

Project: Plum Brook SDG: F26367 Matrix/No. Samples: W-3

<b>I. Sample Management</b>			
<b>A. Sample Preservation, Handling and Transport</b>			
1. Have all samples been preserved with HNO <sub>3</sub> to pH <2?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
2. Have sample temperatures been kept at 4° C (+ or - 2° C)?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
3. Were all samples received in proper condition?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
4. Were any qualifications required based on this information?	Yes	<input checked="" type="radio"/> No	N/A
Cooler @ 2.3° C <sup>3002</sup> 3005      3.2° C      3006			
<b>B. Chain of Custody</b>			
1. Were all samples properly recorded on COCs? <sup>3002 sample label</sup> <del>did not match coc</del>	<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> No	N/A
2. Were correct analyses performed on samples?	<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> No	N/A
<b>C. Holding Times</b>			
1. Were samples analyzed within acceptable holding times?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
2. Were any qualifications required based on this information?	Yes	<input checked="" type="radio"/> No	N/A
<b>SAMPLED</b>		<b>PREPPED/ANALYZED</b>	
3002      8/26			
3005			
3006      8/26			
<b>II. Calibrations</b>			
1. Were proper number of calibration standards used for each analytical instrument used?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
2. Is the calibration correlation coefficient >or = 0.995 for each analytical instrument used?	Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
3. Are initial and continuing calibration verification %R within 10% (+ or - 1%) acceptance window?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
4. Are CRDL Standard %R within 10% (+ or - 1%) acceptance window?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
5. Were any qualifications required based on this information?	Yes	<input checked="" type="radio"/> No	N/A
<b>Comments/Qualifications:</b> ICV      CCVs F26367      Hg 103.3      100% ICP's      20R's w/c limits			

**DATA VALIDATION WORKSHEET  
METALS**

Reviewer: Kitchings Date: 12/11

Project: Plum Brook SDG: F26367 Matrix/No. Samples: W-3

<b>III. Blanks</b>			
1. Are any analytes reported in laboratory prep or calibration blanks above the IDL?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
2. Are any analytes reported as negative values in laboratory prep or calibration blanks?	Yes	<input checked="" type="radio"/> No	N/A
3. Were any qualifications required based on this information?	Yes	<input checked="" type="radio"/> No	N/A
<p><b>Comments/Qualifications:</b></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>MB H4H300000-085 9/3 - Total K@ 73.8 ✓ smps &gt; 5X - no qualcs. - Dissolved. K@ 73.8 ✓</p> </div> <div style="width: 45%;"> <p>F26367 ICB/CCB Hg - &lt; 1.0 ICP's - ICB/CCB's - all nondetects. MB's - nondetects</p> </div> </div>			
<b>IV. ICP Interference Check Sample (ICS)</b>			
1. Were ICS samples run at the beginning and end of each sample analysis run?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
2. Are ICS %R within 80-120% acceptable control limits?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
3. Were any qualifications required based on this information?	Yes	<input checked="" type="radio"/> No	N/A
<p><b>Comments/Qualifications:</b> F26367 %R's → 92.6 - 109.2% ✓</p>			
<b>V. Blank Spike/Laboratory Control Sample (LCS)</b>			
1. Are all aqueous LCS %R within 80-120% control limits?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A
2. Are all solid LCS %R within control limits established by EPA?	Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
3. Were any qualifications required based on this information?	Yes	<input checked="" type="radio"/> No	N/A
<p><b>Comments/Qualifications:</b></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>MB H4H300000-085 9/3 Total Hg 98-109 103 DISSOLVED 98-109 Hg 101</p> </div> <div style="width: 45%;"> <p>MP7122 99.8 - 111.7</p> </div> </div>			

**DATA VALIDATION WORKSHEET  
METALS**

Reviewer: Kitchings Date: 12/11

Project: Plum Brook SDG: H4H270215 Matrix/No. Samples: F26367 W-3

VI. Duplicates			
1. Were samples used for duplicate sample analysis identified as field blanks?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
2. For duplicate samples >5x CRDL, were RPDs within control limits of + or - 20% for water, or + or - 35% for soil?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
3. For duplicate samples <5x CRDL, were duplicate samples within control limit of + or - CRDL for water, or + or - 2xCRDL for soil?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
4. Were any qualifications required based on this information?	<input type="radio"/> Yes	<input checked="" type="radio"/> No	<input checked="" type="radio"/> N/A
<b>Comments/Qualifications:</b> All w/in limits.			

VII. Matrix Spike			
1. Were samples used for matrix spike sample analysis identified as field blanks?	<input type="radio"/> Yes	<input checked="" type="radio"/> No	<input type="radio"/> N/A
2. Were spike recoveries within 75-125% limits (limits do not apply when original sample concentration exceeds spike concentration by a factor of 4)?	<input type="radio"/> Yes	<input checked="" type="radio"/> No	<input type="radio"/> N/A
3. Were any qualifications required based on this information?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
<b>Comments/Qualifications:</b> H4 H 270215-001 F26367 Hg @ 100.29 ug 96.9 RPD 3.3 MS → 94.4 - 107.8 MSB → 98.9 - 113.6 RPD → 0.7 - 5.6 TOTAL Al - high ME/MSD - J DISSOLVED, - all w/in limit			

VIII. ICP Serial Dilution			
1. Were %Ds for ICP serial dilution samples within 10% for analytes with concentrations greater than 50x IDL?	<input type="radio"/> Yes	<input checked="" type="radio"/> No	<input type="radio"/> N/A
2. Were any qualifications required based on this information?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
<b>Comments/Qualifications:</b> DRB006 K @ 32.7 - J Na @ 12.4 - J			



**Attachment 2**  
**Chain of Custody Forms**



ANALYSIS REQUEST AND  
CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: 2608 26 48STL-K

BILL TO: Accounting  
Shaw E & I  
312 Directors Drive  
Knoxville, TN 37923

PAGE 1 OF 2

44442701  
444270215  
4448-27-01

Project Name/No: PROV  
Sample Team Member: David Kessler  
Prof. Center: Knoxville  
Project Manager: Steve Downey  
Project No.: 843556  
Required Report Date: 21 DAYS

Sample Shipment Date: 8/26/04  
Laboratory Destination: STL - Knoxville  
Laboratory Contact: Jamie McKinney  
Project Contact/Phone: Maureen McMyler/865-690-3211  
Carrier Waybill No.: 8422255353610

Report To: Maureen McMyler  
Shaw E & I  
312 Directors Drive  
Knoxville, TN 37923

Sample Number	Sample Type/Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
DH-3002	WATER	8/26/04 1110	1 - Amber	1 L	Cool	Explosives by 8330	CIS TOXIN SPEC IS INACT EFFECTIVE TEMP. 27C 2 CANNOTS / 1 BULK THE BULK CONTAINS 5 BULK ADDF 083704	
			1 - HDPE	250 mL	HNO3	Total TAL Metals by 6010B/7470A		
			2 - Amber	1 L	Cool	Disolved TAL Metals by 6010B/7470A		
DH-3002-MS	WATER	8/26/04 1110	1 - HDPE	1 L	NaOH	TCL VOCs by 8260B	PH12	
			1 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	250 mL	HNO3	Total TAL Metals by 6010B/7470A		
DH 3002-MSD	WATER	8/26/04 1110	1 - HDPE	250 mL	HNO3	Disolved TAL Metals by 6010B/7470A	PH2	
			2 - Amber	1 L	Cool	TCL VOCs by 8270C		
			3 - Glass	40 mL	HCL	TCL VOCs by 8260B		
DH 5001	WATER	8/26/04	1 - HDPE	1 L	NaOH	Cyanide by 9010/9012	PH12	
Special Instructions: <u>Only analyze for SVOC for samples DH 3002 and DH 3002-MS.</u>			Level of QC Required: <u>X</u>			Sample Disposal:		
Possible Hazard Identification:			Unknown: <u>X</u>			Return to Client:		
Non-haz:			Flammable:			Disposal by Lab: <u>X</u>		
Turnaround Time:			Poison B:			Archive:		
Normal: <u>X</u> Rush:			Definitive: <u>X</u>			Project Specific:		
1. Relinquished by: <u>David Kessler - Shaw</u>			Date: <u>8/26/04</u>			1. Received by: <u>Maureen McMyler</u>		
2. Relinquished by:			Time: <u>1800</u>			Date: <u>08-27-04</u>		
3. Relinquished by:			Date:			Time: <u>09:00</u>		
Comments:			Date:			Time:		



ANALYSIS REQUEST AND  
CHAIN-OF-CUSTODY RECORD

REFERENCE COC NO.: EB08 26 04STLJK

PAGE 2 OF 2

Sample Number	Sample Type/Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
DIA 3005	WATER	8/26/04	1 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	250 mL	HNO3	Total Metals by 6010B/7470A		
			1 - HDPE	250 mL	HNO3	Dissolved Metals by 6010B/7470A		
DIA 3000	WATER	8/26/04	2 - Amber	1 L	Cool	SVOCs by 8270C		
			3 - Glass	40 mL	HCL	VOCs by 8260B		
			1 - HDPE	1000 mL	NaOH	Cyanide by 9010A		
DIA 3000	WATER	1/15	1 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	250 mL	HNO3	Total Metals by 6010B/7470A		
			1 - HDPE	250 mL	HNO3	Dissolved Metals by 6010B/7470A		
DIA 3000	WATER	8/26/04	2 - Amber	1 L	Cool	SVOCs by 8270C		
			3 - Glass	40 mL	HCL	VOCs by 8260B		
			1 - HDPE	1000 mL	NaOH	Cyanide by 9010A		
DIA 3000	WATER	8/26/04	1 - Amber	1 L	Cool	Explosives by 8330		
			1 - HDPE	250 mL	HNO3	Total Metals by 6010B/7470A		
			1 - HDPE	250 mL	HNO3	Dissolved Metals by 6010B/7470A		
DIA 3000	WATER	8/26/04	2 - Amber	1 L	Cool	SVOCs by 8270C		
			3 - Glass	40 mL	HCL	VOCs by 8260B		
			1 - HDPE	1000 mL	NaOH	Cyanide by 9010A		



ANALYSIS REQUEST AND CHAIN-OF-CUSTODY RECORD

F26367

REFERENCE COC NO.: PB08 24 04ACC

PAGE 1 OF 1

Project Name/No: PB08  
Sample Team Member: David Kessler  
Profit Center: Knoxville  
Project Manager: Steve Downey  
Project No.: 843056  
Required Report Date: 21 days

Sample Shipment Date: 8/26/04  
Laboratory Destination: Accutest  
Laboratory Contact: Sue Bell  
Project Contact/Phone: Maureen McMyler:865-560-5271  
Carrier Waybill No.: 84225535394

Bill To: Accounting  
Shaw E & I  
312 Directors Drive  
Knoxville, TN 37923  
Report To: Maureen McMyler  
Shaw E & I  
312 Directors Drive  
Knoxville, TN 37923

①

②

Sample Number	Sample Type/Description	Date/Time Collected	Container Type	Sample Volume	Pre-servative	Requested Testing Program	Condition on Receipt	Disposal Record
DH3006	WATER	8/26/04 11:00	1 - Amber	1 L	Cool	Explosives by 8830		
			2 - Amber	1 L	Cool	Semivolatiles by 8270C		
			3 - Vial	40 mL	HCl	Volatiles by 8260B		
DH5002	WATER	8/26/04	1 - HDPE	250 mL	HNO3	TAL Metals (Total) by 6010B:7471A		
			1 - HDPE	250 mL	HNO3	TAL Metals (Dis) by 6010B:7471A		
			2 - Vial	40 mL	HCl	Volatiles by 8260B		

~~DKK 8/26/04~~

Special Instructions:

Possible Hazard Identification:  
 Non-haz: \_\_\_\_\_ Flammable: \_\_\_\_\_ Poison B: \_\_\_\_\_ Unknown:  \_\_\_\_\_  
 Return to Client: \_\_\_\_\_ Disposal by Lab:  \_\_\_\_\_ Archive: \_\_\_\_\_

Turnaround Time: \_\_\_\_\_ Level of QC Required: \_\_\_\_\_  
 Normal:  Rush: \_\_\_\_\_ Definitive:  \_\_\_\_\_

1. Relinquished by: David Kessler - Shaw Date: 8/26/04 Time: 1800  
 2. Relinquished by: FX Date: \_\_\_\_\_ Time: \_\_\_\_\_  
 3. Relinquished by: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

1. Received by: FX Date: \_\_\_\_\_ Time: \_\_\_\_\_  
 2. Received by: (Signature) Date: 8/27/04 Time: 09:00  
 2. Received by: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Comments: \_\_\_\_\_

32

313

## **Attachment 3**

### **Project Data**

GW

Volatiles	PB-BED-MW22			PB-BED-MW22		PB-BED-MW22	
	Parameter	Units	Filtered	Result	Qual	Result	Qual
				DH3002		DH3005	
				26-Aug-04		26-Aug-04	
				REG		FD	
				REG		FS	
Acetone	ug/L	N		10	U	10	U
Benzene	ug/L	N		0.21	J	0.18	J
Bromodichloromethane	ug/L	N		1	U	1	U
Bromoform	ug/L	N		1	U	1	U
Bromomethane	ug/L	N		2	U	2	U
Butanone, 2-	ug/L	N		5	U	5	U
Carbon disulfide	ug/L	N		0.19	J	0.22	J
Carbon tetrachloride	ug/L	N		1	U	1	U
Chlorobenzene	ug/L	N		1	U	1	U
Chloroethane	ug/L	N		2	U	2	U
Chloroform	ug/L	N		1	U	1	U
Chloromethane	ug/L	N		2	U	2	U
Dibromochloromethane	ug/L	N		1	U	1	U
Dichloroethane, 1,1-	ug/L	N		1	U	1	U
Dichloroethane, 1,2-	ug/L	N		1	U	1	U
Dichloroethene, 1,1-	ug/L	N		1	U	1	U
Dichloroethene, 1,2-	ug/L	N		1	U	1	U
Dichloroethene, cis-1,2-	ug/L	N					2 U
Dichloroethene, trans-1,2-	ug/L	N					2 U
Dichloropropane, 1,2-	ug/L	N		1	U	1	U
Dichloropropene, cis-1,3-	ug/L	N		1	U	1	U
Dichloropropene, trans-1,3-	ug/L	N		1	U	1	U
Ethylbenzene	ug/L	N		1	U	1	U
Hexanone, 2-	ug/L	N		5	U	5	U
Methyl-2-pentanone, 4-	ug/L	N		5	U	5	U
Methylene chloride	ug/L	N		2	U	2	U
Styrene	ug/L	N		1	U	1	U
Tetrachloroethane, 1,1,1,2,2-	ug/L	N		1	U	1	U
Tetrachloroethene	ug/L	N		1	U	1	U
Toluene	ug/L	N		0.11	J	1	U
Trichloroethane, 1,1,1-	ug/L	N		1	U	1	U
Trichloroethane, 1,1,2-	ug/L	N		1	U	1	U
Trichloroethene	ug/L	N		1	U	1	U
Vinyl chloride	ug/L	N		1	U	1	U
Xylenes, total	ug/L	N		1	U	1	U

GW

Explosives			PB-BED-MW22 DH3002 26-Aug-04 REG		PB-BED-MW22 DH3005 26-Aug-04 FD		PB-BED-MW22 DH3006 26-Aug-04 FS	
Parameter	Units	Filtered	Result	Qual	Result	Qual	Result	Qual
Amino-2,6-dinitrotoluene, 4-	ug/L	N	0.2	U	0.2	U	0.2	U
Amino-4,6-dinitrotoluene, 2-	ug/L	N	0.2	U	0.2	U	0.2	U
Dinitrobenzene, 1,3-	ug/L	N	0.2	U	0.2	U	0.2	U
Dinitrotoluene, 2,4-	ug/L	N	0.2	U	0.2	U	0.2	U
Dinitrotoluene, 2,6-	ug/L	N	0.2	U	0.2	U	0.2	U
HMX	ug/L	N	0.5	U	0.5	U	0.2	U
Nitrobenzene	ug/L	N	0.2	U	0.2	U	0.2	U
Nitrotoluene, 2-	ug/L	N	0.2	U	0.2	U	0.2	U
Nitrotoluene, 3-	ug/L	N	0.2	U	0.2	U	0.2	U
Nitrotoluene, 4-	ug/L	N	0.2	U	0.2	U	0.2	U
RDX	ug/L	N	0.5	U	0.5	U	0.2	U
Tetryl	ug/L	N	0.2	U	0.2	U	0.2	U
Trinitrobenzene, 1,3,5-	ug/L	N	0.2	U	0.2	U	0.2	U
Trinitrotoluene, 2,4,6-	ug/L	N	0.2	U	0.2	U	0.2	U

GW

Semivolatiles	PB-BED-MW22			PB-BED-MW22		PB-BED-MW22		
			DH3002		DH3005		DH3006	
			26-Aug-04		26-Aug-04		26-Aug-04	
			REG		FD		FS	
<u>Parameter</u>	<u>Units</u>	<u>Filtered</u>	<u>Result</u>	<u>Qual</u>	<u>Result</u>	<u>Qual</u>	<u>Result</u>	<u>Qual</u>
3-Methylphenol and 4-Methylphenol	ug/L	N					5.1 U	
Acenaphthene	ug/L	N	10 U		10 U		5.1 U	
Acenaphthylene	ug/L	N	10 U		10 U		5.1 U	
Anthracene	ug/L	N	10 U		10 U		5.1 U	
Benzo(a)anthracene	ug/L	N	10 U		10 U		5.1 U	
Benzo(a)pyrene	ug/L	N	10 U		10 U		5.1 U	
Benzo(b)fluoranthene	ug/L	N	10 U		10 U		5.1 U	
Benzo(ghi)perylene	ug/L	N	10 U		10 U		5.1 U	
Benzo(k)fluoranthene	ug/L	N	10 U		10 U		5.1 U	
Benzoic acid	ug/L	N					25 U	
Benzyl alcohol	ug/L	N					5.1 U	
Bis(2-chloroethoxy)methane	ug/L	N	10 U		10 U		5.1 U	
Bis(2-chloroethyl)ether	ug/L	N	10 U		10 U		5.1 U	
Bis(2-chloroisopropyl)ether	ug/L	N	10 U		10 U		5.1 U	
Bis(2-ethylhexyl)phthalate	ug/L	N	10 U		2.5 J		5.1 U	
Bromophenyl phenyl ether. 4-	ug/L	N	10 U		10 U		5.1 U	
Butyl benzyl phthalate	ug/L	N	10 U		10 U		5.1 U	
Carbazole	ug/L	N	10 U		10 U		5.1 U	
Chloro-3-methylphenol. 4-	ug/L	N	10 U		10 U		5.1 U	
Chloroaniline. 4-	ug/L	N	10 U		10 U		10 U	
Chloronaphthalene. 2-	ug/L	N	10 U		10 U		5.1 U	
Chlorophenol. 2-	ug/L	N	10 U		10 U		5.1 U	
Chlorophenyl phenyl ether. 4-	ug/L	N	10 U		10 U		5.1 U	
Chrysene	ug/L	N	10 U		10 U		5.1 U	
Dibenz(a,h)anthracene	ug/L	N	10 U		10 U		5.1 U	
Dibenzofuran	ug/L	N	10 U		10 U		5.1 U	
Dichlorobenzene. 1,2-	ug/L	N	10 U		10 U		5.1 U	
Dichlorobenzene. 1,3-	ug/L	N	10 U		10 U		5.1 U	
Dichlorobenzene. 1,4-	ug/L	N	10 U		10 U		5.1 U	
Dichlorobenzidine. 3,3'-	ug/L	N	50 U		50 U		10 U	
Dichlorophenol. 2,4-	ug/L	N	10 U		10 U		5.1 U	
Diethyl phthalate	ug/L	N	10 U		10 U		5.1 U	
Dimethyl phthalate	ug/L	N	10 U		10 U		5.1 U	
Dimethylphenol. 2,4-	ug/L	N	10 U		10 U		5.1 U	
Di-n-butyl phthalate	ug/L	N	10 U		10 U		5.1 U	
Dinitro-2-methylphenol. 4,6-	ug/L	N	50 U		50 U		10 U	
Dinitrophenol. 2,4-	ug/L	N	50 U		50 U		25 U	
Dinitrotoluene. 2,4-	ug/L	N	10 U		10 U		5.1 U	
Dinitrotoluene. 2,6-	ug/L	N	10 U		10 U		5.1 U	
Di-n-octyl phthalate	ug/L	N	10 U		10 U		5.1 U	
Fluoranthene	ug/L	N	10 U		10 U		5.1 U	
Fluorene	ug/L	N	10 U		10 U		5.1 U	
Hexachlorobenzene	ug/L	N	10 U		10 U		5.1 U	
Hexachlorobutadiene	ug/L	N	10 U		10 U		5.1 U	
Hexachlorocyclopentadiene	ug/L	N	50 U		50 U		5.1 U	
Hexachloroethane	ug/L	N	10 U		10 U		5.1 U	
Indeno(1,2,3-cd)pyrene	ug/L	N	10 U		10 U		5.1 U	
Isophorone	ug/L	N	10 U		10 U		5.1 U	
Methylnaphthalene. 2-	ug/L	N	10 U		10 U		5.1 U	
Methylphenol. 2-	ug/L	N	10 U		10 U		5.1 U	
Methylphenol. 4-	ug/L	N	10 U		10 U		5.1 U	
Naphthalene	ug/L	N	10 U		10 U		5.1 U	
Nitroaniline. 2-	ug/L	N	50 U		50 U		5.1 U	
Nitroaniline. 3-	ug/L	N	50 U		50 U		5.1 U	
Nitroaniline. 4-	ug/L	N	50 U		50 U		5.1 U	
Nitrobenzene	ug/L	N	10 U		10 U		5.1 U	
Nitrophenol. 2-	ug/L	N	10 U		10 U		5.1 U	
Nitrophenol. 4-	ug/L	N	50 U		50 U		25 U	
n-Nitroso-di-n-propylamine	ug/L	N	10 U		10 U		5.1 U	

GW

n-Nitrosodiphenylamine	ug/L	N	10 U	10 U	5.1 U
Pentachlorophenol	ug/L	N	50 U	50 U	25 U
Phenanthrene	ug/L	N	10 U	10 U	5.1 U
Phenol	ug/L	N	10 U	10 U	5.1 U
Pyrene	ug/L	N	10 U	10 U	5.1 U
Trichlorobenzene, 1,2,4-	ug/L	N	10 U	10 U	5.1 U
Trichlorophenol, 2,4,5-	ug/L	N	10 U	10 U	5.1 U
Trichlorophenol, 2,4,6-	ug/L	N	10 U	10 U	5.1 U

GW

Metals-total and dissolved	PB-BED-MW22			PB-BED-MW22		PB-BED-MW22	
	Parameter	Units	Filtered	Result	Qual	Result	Qual
				0.01	U		
				717		1080	
				63.6	B	64.1	B
				60	U	60	U
				60	U	60	U
				10	U	10	U
				10	U	10	U
				695		701	
				700		694	
				5	U	5	U
				5	U	5	U
				5	U	5	U
				5	U	5	U
				118000		117000	
				117000		115000	
				10	U	10	U
				10	U	10	U
				50	U	50	U
				50	U	50	U
				25	U	25	U
				25	U	25	U
				593		620	
				100	U	100	U
				3	U	3	U
				3	U	3	U
				36600		37100	
				37000		36400	
				57.5		56	
				47		46.2	
				0.2	U	0.2	U
				0.2	U	0.2	U
				3.1	B	40	U
				40	U	40	U
				3980	B J	4410	B J
				3730	B J	3750	B J
				5	U	5	U
				5	U	5	U
				10	U	10	U
				10	U	10	U
				18500		18700	
				18700		18500	
				3.3	B	4.1	B
				10	U	5.8	B
				50	U	50	U
				50	U	50	U
				4.5	B	5.2	B
				4.2	B	20	U