

# OCTOBER 2011 GROUNDWATER SAMPLING AND ANALYSIS REPORT FOR CITY WELLS

•REVISED FINAL•

**BROWN & BRYANT SUPERFUND SITE  
600 S. DERBY STREET, ARVIN, CALIFORNIA**

**CONTRACT NO. W912PL-10-D-0014  
TASK ORDER 0009**

**Prepared For:  
U.S. Army Corps of Engineers, Albuquerque District  
4101 Jefferson Plaza, NE  
Albuquerque, NM 87109-3435**

**Prepared By:  
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*Environmental Excellence*





January 18, 2011

Ms. Cecilia Horner  
 U.S. Army Corps of Engineers, Albuquerque District  
 4101 Jefferson Plaza, NE  
 Albuquerque, NM 87109-3435

**SUBJECT: REVISED FINAL OCTOBER 2011 GROUNDWATER SAMPLING AND ANALYSIS  
 REPORT FOR CITY WELLS  
 BROWN & BRYANT SUPERFUND SITE, 600 S. DERBY STREET, ARVIN, CALIFORNIA  
 CONTRACT NO. W912PL-10-D-0014 TASK ORDER 0009**

Dear Ms. Horner:

This letter presents a summary of the October 2011 monthly sampling results for City well numbers CW-1, CW-5, CW-6, CW-8, and CW-10. This work has been conducted in general accordance with the contract (Number W912PP-10-D-0014 Task Order 0009) between United States Army Corps of Engineers (USACE), Albuquerque District, and Eco & Associates, Inc. (Eco).

## 1.0 WATER SAMPLING

The Arvin Water District operates 10 wells (CW-1 through CW-10) in the Arvin, California area; see Site Vicinity Map, Figure 1. The locations of the city wells are shown on Figure 2. During the October 2011 sampling event, five of the ten wells (CW-1, CW-5, CW-6, CW-8, and CW-10) were sampled. The remaining wells were not available for sampling because they were not operational. The wells were sampled by using a faucet at the well outlet.

The sample container type, size, and preservative for each specific analysis is provided in the following table:

**SAMPLE CONTAINER TYPE, SIZE, AND PRESERVATIVE**

Constituent	Analytical Method	Container Type	Container Size	Volume Required	Preservative
Chloroform 1,2-Dichloropropane 1,3-Dichloropropane	8260B	Glass (VOA vial)	40 mL	120 mL (3 vials)	HCl
1,2,3-Trichloropropane 1,2-Dibromo-3-chloropropane Ethylene dibromide	8260SIM	Glass (VOA vial)	40 mL	120 mL (3 vials)	HCl
Dinoseb	8151A	Amber glass	1 L	2 L	None

Notes: mL = milliliters; HCl = hydrochloric acid; VOA vial = volatile organic analysis vial

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At each sampling location, all bottles designated for a particular analysis were filled sequentially before bottles designated for the next analysis were filled. If a matrix spike and matrix spike duplicate sample was to be collected at this location, all bottles designated for a particular analysis for both sample designations were filled sequentially before bottles for another analysis were filled.

Groundwater samples were collected at each well location by turning the faucet on and letting it run for 30 to 60 seconds. The water was then put into the appropriate sample containers with preservative (if required). The samples were chilled and processed for shipment to the laboratory.

Vials for volatile organic compound (VOC) analyses were filled first to minimize aeration of water in the well. The vials were inverted and checked for air bubbles to ensure zero headspace. If any air bubbles appeared, the vial contents were emptied into the container and transferred to the portable on-site storage tank. The vial was discarded and a new sample collected.

## 2.0 SAMPLE ANALYSES

All groundwater samples collected were analyzed for the seven chemicals of concern (COCs) as well as any other constituents reported for each analytical method. EMAX Laboratories, Inc. (EMAX), accredited under the National Environmental Laboratory Accreditation Program (NELAP), performed the laboratory analytical services. The COCs and test methods are provided in the following table:

**CHEMICALS OF CONCERN AND TEST METHODS**

<b>Constituent</b>	<b>Analytical Method</b>
<b>Chloroform</b>	Method 8260B
<b>1,2-Dibromo-3-chloropropane</b>	Method 8260SIM
<b>1,2-Dichloropropane</b>	Method 8260B
<b>1,3-Dichloropropane</b>	Method 8260B
<b>1,2,3-Trichloropropane</b>	Method 8260SIM
<b>Ethylene dibromide</b>	Method 8260SIM
<b>Dinoseb</b>	Method 8151A

All samples were collected using approved techniques following proper chain-of-custody protocols.

## 3.0 QUALITY CONTROL SAMPLES

A field duplicate was collected for the samples collected from City well CW-1. The field duplicate is used to measure the sampling and analytical variability (precision) associated with the sample concentrations. The field duplicate was submitted as a “blind” sample to the laboratory. The relative percent difference (RPD) between the original sample and field duplicate was calculated for each parameter as part of the data evaluation.

A matrix spike and matrix spike duplicate (MS/MSD) was performed on the sample collected from CW-6. The MS/MSD is used to monitor the precision and accuracy of the results of laboratory’s analytical procedures. Analytical results for the MS/MSD were reviewed and the results were evaluated to be acceptable.

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A trip blank was also submitted along with the remaining samples of water collected during this sampling event.

#### 4.0 DATA VALIDATION

The water samples analytical results were subject to data validation. The data were delivered in one package as Level III and Level IV deliverables. Ten percent (10%) of the data were subjected to validation to the equivalent of EPA Level IV data validation. Raw data for one sample from this sample group (10-24-11-CW-5) was submitted at level IV for all the requested analytical methods. Level III data validation examines quality assurance/quality control (QA/QC) elements such as holding time, (both extraction and analysis), critical quality control measures, extraction logs, instrument injection logs, completeness of the results and summaries of initial and continuing calibrations for the analytical methods. The analytical results, QC results, initial calibration, and related continuing calibration data were then comprehensively compared with the corresponding raw data and chromatograms presented for Level IV data validation.

The Data Validation Report is presented in Attachment 3 of this report.

The sample analytical data were reported to be acceptable for all of the EPA analysis methods used. The data were found reliable for use on the project.

#### 5.0 SUMMARY OF THE ANALYTICAL RESULTS

The field notes taken during sampling are presented in Attachment 1, the laboratory analytical results in Attachment 2, and as stated above, the Data Validation and ADR information in Attachment 3. Site photographs taken during well sampling are presented in Attachment 4. A summary of the laboratory data results are provided in Table 1.

The following is a summary of the analytical results:

- Two COC compounds (1,2,3-TCP and chloroform) were reported in concentrations above their respective laboratory detection limits.
- 1,2,3-TCP was reported in above laboratory detection limits in all water samples except for the CW-8 sample for which it was “not detected”. The high concentration for 1,2,3-TCP was in CW-1 at 0.072 micrograms per liter ( $\mu\text{g/L}$ ). The concentrations reported for CW-1 and CW-5 exceed the Clean-up Level (notification level – 0.005  $\mu\text{g/L}$ ) for this compound.
- Chloroform was reported in three of the five wells: CW-1, CW-5, and CW-8. The high chloroform concentration was also in CW-1 at 0.63  $\mu\text{g/L}$  (J-flagged). This concentration is well below the Cleanup Level for chloroform (80  $\mu\text{g/L}$ ).

If you have any questions or wish to discuss this report, please feel free to contact me at (714) 228-1286.

Sincerely,  
ECO & ASSOCIATES, INC.



Mitra Fiuzat, Ph.D.  
Project Manager

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Table

Figures

Attachments: 1 – Field Notes

2 – Laboratory Analytical Results

3 – Data Validation and Automatic Data Review Reports

4 – Photographs of the City Wells

cc: Ms. Brunilda Davila, USEPA (1 copy)  
Mr. Glenn Bruck, USEPA (1 copy)  
Mr. Alejandro Diaz, USEPA (2 copies)  
Ms. Carol Wies-Brewer, USACE (1 copy)  
Mr. Thad Fukushige, USACE (1 copy)  
Mr. Richard Lainhart, USACE (1 copy)

# TABLE

**TABLE 1: CONTAMINANTS OF CONCERN IN CITY WELLS GROUNDWATER**

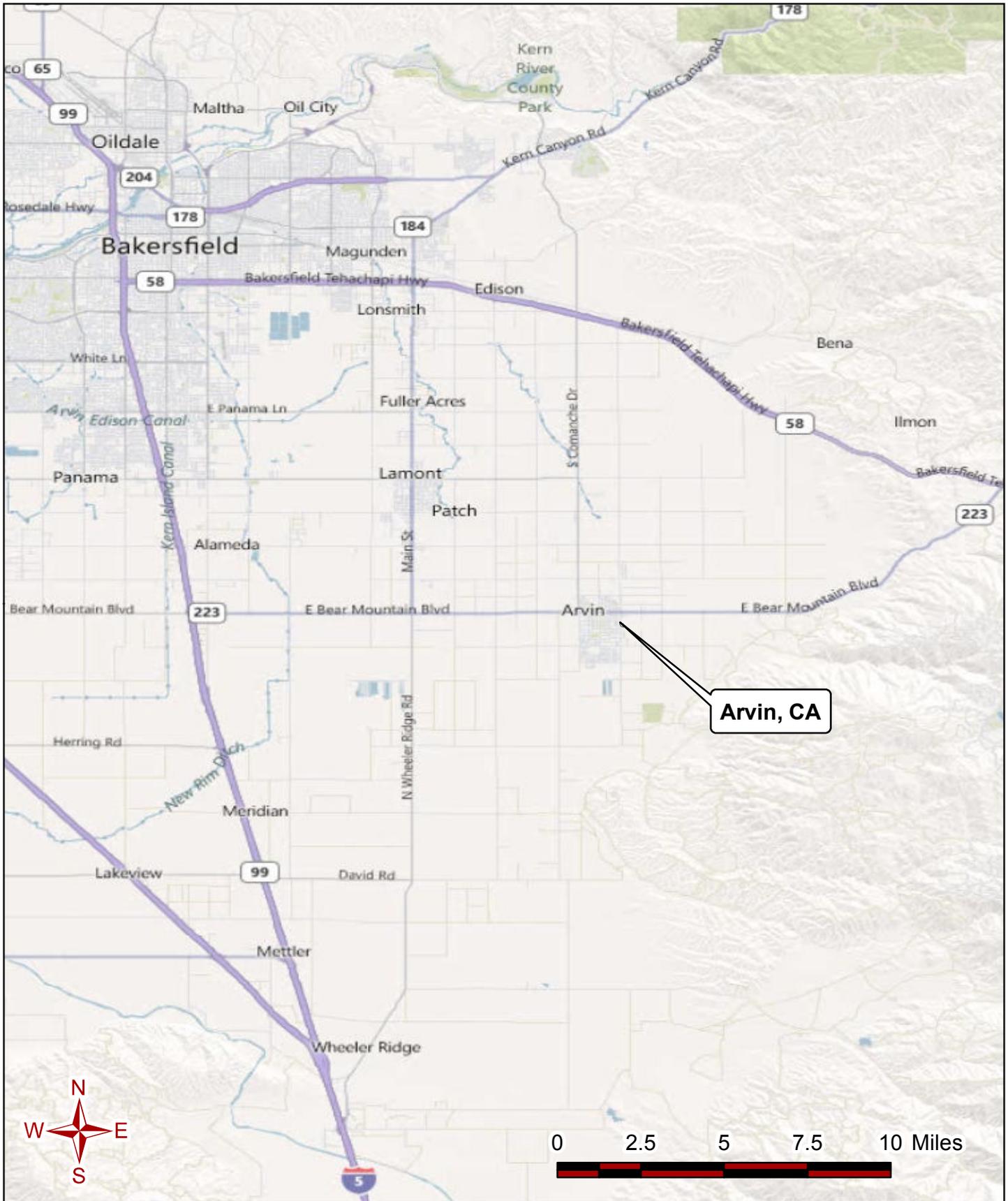
Well No.	Contaminants of Concern	Date Sampled & Concentration (µg/L)		B-zone Clean-up Levels (µg/L)
		October 2011		
CW-1	1,2-DCP	ND	<1.0	5
	1,3-DCP	ND	<0.5	0.5
	1,2,3-TCP	0.072		0.005
	Chloroform	0.63J		80
	Dinoseb	ND	<0.4	7
	DBCP	ND	<0.05	0.2
	EDB	ND	<0.05	0.05
CW-2	1,2-DCP	Not Sampled		
	1,3-DCP			
	1,2,3-TCP			
	Chloroform			
	Dinoseb			
	DBCP			
	EDB			
CW-3	1,2-DCP	Not Sampled		
	1,3-DCP			
	1,2,3-TCP			
	Chloroform			
	Dinoseb			
	DBCP			
	EDB			
CW-4	1,2-DCP	Not Sampled		
	1,3-DCP			
	1,2,3-TCP			
	Chloroform			
	Dinoseb			
	DBCP			
	EDB			
CW-5	1,2-DCP	ND	<1.0	5
	1,3-DCP	ND	<0.5	0.5
	1,2,3-TCP	0.068		0.005
	Chloroform	0.40J		80
	Dinoseb	ND	<0.4	7
	DBCP	ND	<0.05	0.2
	EDB	ND	<0.05	0.05
CW-6	1,2-DCP	ND	<1.0	5
	1,3-DCP	ND	<0.5	0.5
	1,2,3-TCP	0.022		0.005
	Chloroform	ND	<1.0	80
	Dinoseb	ND	<0.4	7
	DBCP	ND	<0.05	0.2
	EDB	ND	<0.05	0.05

**TABLE 1: CONTAMINANTS OF CONCERN IN CITY WELLS GROUNDWATER**

Well No.	Contaminants of Concern	Date Sampled & Concentration (µg/L)		B-zone Clean-up Levels (µg/L)
		October 2011		
CW-7	1,2-DCP	Not Sampled		
	1,3-DCP			
	1,2,3-TCP			
	Chloroform			
	Dinoseb			
	DBCP			
	EDB			
CW-8	1,2-DCP	ND <1.0	5	
	1,3-DCP	ND <0.5	0.5	
	1,2,3-TCP	ND <0.005	0.005	
	Chloroform	0.24J	80	
	Dinoseb	ND <0.4	7	
	DBCP	ND <0.05	0.2	
	EDB	ND <0.05	0.05	
CW-9	1,2-DCP	Not Sampled		
	1,3-DCP			
	1,2,3-TCP			
	Chloroform			
	Dinoseb			
	DBCP			
	EDB			
CW-10	1,2-DCP	ND <1.0	5	
	1,3-DCP	ND <0.5	0.5	
	1,2,3-TCP	0.0032J	0.005	
	Chloroform	ND <1.0	80	
	Dinoseb	ND <0.4	7	
	DBCP	ND <0.05	0.2	
	EDB	ND <0.05	0.05	

**Notes:**  
**Contaminants of Concern & Basis for Clean-up Levels:**  
 1,2-DCP = 1,2-Dichloropropane: *Clean-up level based on Federal National Primary Drinking Water Standards - 40 Code of Federal Regulations, Part 141 or 40CFR141*  
 1,3-DCP = 1,3-Dichloropropane: *California Safe Drinking Water Act (CCR, Title 22, Sec 64444)*  
 1,2,3-TCP = 1,2,3-Trichloropropane: *Notification level set by California Office of Environmental Health Hazard Assessment, August 2009*  
 Chloroform: *40CFR141 - total trihalomethanes (sum of bromodichloromethane, dibromochloromethane, bromoform and chloroform)*  
 Dinoseb: *40CFR141*  
 DBCP = 1,2-Dibromo-3-chloropropane: *40CFR141*  
 EDB = Ethylene dibromide, also called 1,2-Dibromoethane: *40CFR141*  
**Analytical Methods:**  
 Method 8260 – 1,2-DCP & 1,3-DCP  
 Method 8260SIM – 1,2,3-TCP, DBCP, & EDB  
 Method 8151 – Dinoseb  
**Results:**  
 Reported results in white font and highlighted dark blue are in excess of compound Clean-up Level.  
 Reported results in black font and highlighted light blue are laboratory reported results above detection limits.  
 "ND <" = non-detect analytes are reported as less than the method reporting limit (RL).  
 J = Laboratory reported qualifier: estimated concentration below the method reporting limit  
 µg/L = micrograms per liter  
**Analyses performed by EMAX Laboratories, Inc.**

## FIGURES



Arvin, CA



Eco & Associates, Inc.  
 1855 W. Katella Avenue, Suite 340  
 Orange, California 92867  
 Phone: 714.289.0995 Fax: 714.289.0965

**REGIONAL MAP**  
**Brown & Bryant Superfund Site**  
**600 South Derby Street, Arvin, CA**  
 Project No. Eco-11-482 Dated January 2012

FIGURE  
 1



**Legend & Notes**

- City Wells Not Sampled
- City Wells Sampled



Eco & Associates, Inc.  
 1855 W. Katella Avenue, Suite 340  
 Orange, California 92867

Phone: 714.289.0995 Fax: 714.289.0965

**MUNICIPAL WATER SUPPLY WELLS  
 IN ARVIN AREA**  
 Brown & Bryant Superfund Site  
 600 South Derby Street, Arvin, California

Project No. Eco-11-482

Dated January 2012

FIGURE  
 2

# ATTACHMENT 1

FIELD NOTES

**Eco & Associates, Inc. – QUALITY CONTROL REPORT**  
**DAILY LOG OF CONSTRUCTION ACTIVITIES**

<b>PROJECT:</b> B&B Superfund Site Eco-11-482	<b>REPORT NO.:</b>
<b>PROJECT LOCATION:</b> Arvin, CA	<b>DATE:</b> 10/24/2011
<b>DESCRIPTION:</b> Monthly City Well Sampling	<b>CONTRACT NO.:</b> W912PP-10-D-0014
<b>ONSITE PERSONNEL:</b> CH, SS, OA, MF	<b>TASK ORDER NO.:</b> 0009
<b>SIGNATURE:</b> on file	<b>WEATHER CONDITION:</b> Clear, warm

1. ANY DELAYS IN WORK PROGRESS TODAY?  No  Yes If yes, explain:

2. ANY VERBAL INSTRUCTION GIVEN BY THE GOVERNMENT, REGULATOR, OR CLIENT?  No  Yes If yes, to whom and explain:

3. ANY CONDITION DEVELOPED WHICH MIGHT LEAD TO A CHANGE ORDER OR CLAIM OR FINDINGS OF FACTS?  
 No  Yes If yes, explain:

ANY POTENTIAL CHANGE ORDER OR CLAIM MUST BE REPORTED TO THE PROJECT DIRECTOR/MANAGER.

4. ANY DEFICIENCIES, ACTIONS TAKEN TO CORRECT THE DEFICIENCIES?  No  Yes If yes, explain:

5. SAFETY MEETING/TAILGATE MEETING HELD TODAY?  No  Yes

ANY LOST TIME ACCIDENT TODAY?  No  Yes If yes, attach an accident report.

**6. PRIME CONTRACTOR AND SUBCONTRACTOR WORK FORCE SIGN IN AND OUT IN THE SPACE BELOW.**

NAME	INITIAL	COMPANY	TRADE	IN	OUT	IN	OUT	TOTAL HOURS
Mitra Fiuzat	MF	Eco & Associates	PM	0830	1330			
Steve Saunders	SS	Eco & Associates	Geologist	0830	1200			
Omar Argueta	OA	Eco & Associates	Tech	0930	1200			
Carlos Hernandez	CH	Eco & Associates	Chemist	0830	1200			

## Eco & Associates, Inc. – QUALITY CONTROL REPORT

### DAILY LOG OF CONSTRUCTION ACTIVITIES

#### 8. VISITOR'S LOG

NAME	INITIAL	COMPANY	IN	OUT	IN	OUT	IN	OUT
Fernando Pantoja	FP	Arvin Community Services						

#### 9. MAJOR ITEMS OF EQUIPMENT.

TYPE / CAPACITY	NUMBER	STANDBY HOURS	OPERATING HOURS

#### 10. TIME AND ACTIVITY LOG

TIME	DESCRIPTION							
<b>0930</b>	Met with Mr. Pantoja at the Arvin Community Service District. He led us to CW-5							
<b>0940</b>	Onsite at CW-5. The well is located near the northwest corner of 5 <sup>th</sup> & Derby Street							
<b>0944</b>	First run the water 60 seconds, then	<u>PH</u>	<u>COND</u>	<u>TURB</u>	<u>DO</u>	<u>TEMP</u>	<u>SAL</u>	<u>ORP</u>
	measure parameters	--	MS/cm	ntu	Mg/L	°C	ppm	°C/°F
<b>0947</b>	First reading	7.92	0.368	200	6.78	24.2	0.01	
<b>0948</b>	Second reading	7.92	0.350	186	5.74	24.9	0.01	
<b>0949</b>	Third reading	7.82	0.349	188	5.81	24.4	0.01	
<b>0950</b>	Started sampling CW-5 Sample ID: 10-24-11-CW-5							
	<b>Comments:</b>							
<b>1010</b>	Arrived at CW-1. This will be our duplicate (FDUP-1, sample time is 1020).							
		<u>PH</u>	<u>COND</u>	<u>TURB</u>	<u>DO</u>	<u>TEMP</u>	<u>SAL</u>	<u>ORP</u>
		--	MS/cm	ntu	Mg/L	°C	ppm	°C/°F
<b>1011</b>	First reading	7.81	0.308	175	8.49	24.6	0.01	
<b>1013</b>	Second reading	7.63	0.306	172	10.49	26.2	0.01	
<b>1015</b>	Third reading	7.50	0.306	212	6.98	24.6	0.01	
<b>1016</b>	Started sampling							
	<b>Comments:</b>							

10. TIME AND ACTIVITY LOG CONTINUES								
TIME	DESCRIPTION							
1035	Arrive at CW-10							
	Blue Loop & Millux (Southeast corner)	<u>PH</u>	<u>COND</u>	<u>TURB</u>	<u>DO</u>	<u>TEMP</u>	<u>SAL</u>	<u>ORP</u>
		--	MS/cm	ntu	Mg/L	°C	ppm	°C/°F
1036	First reading	7.60	2.04	32	5.65	25.6	0.09	
1038	Second reading	7.55	2.03	88	4.70	25.7	0.09	
1040	Third reading	7.56	1.99	120	4.60	25.7	0.09	
1042	Started sampling							
	<b>Comments:</b> New pump at CW-10							
1051	Arrived at CW-8 (southwest corner of Charles & Freeman)							
		<u>PH</u>	<u>COND</u>	<u>TURB</u>	<u>DO</u>	<u>TEMP</u>	<u>SAL</u>	<u>ORP</u>
		--	MS/cm	ntu	Mg/L	°C	ppm	°C/°F
1056	First reading	8.19	1.13	106	3.21	27.0	0.05	
1058	Second reading	8.17	0.916	800	4.12	27.0	0.04	
1100	Third reading	8.24	0.918	220	4.05	26.9	0.04	
1102	Started sampling CW-8							
	<b>Comments:</b>							
1115	Arrive at CW-6 (Located at Smothermon Park)							
		<u>PH</u>	<u>COND</u>	<u>TURB</u>	<u>DO</u>	<u>TEMP</u>	<u>SAL</u>	<u>ORP</u>
		--	MS/cm	ntu	Mg/L	°C	ppm	°C/°F
1117	First reading	8.39	0.519	434	9.00	25.4	0.02	
1118	Second reading	8.17	0.513	490	9.40	25.4	0.02	
1119	Third reading	8.04	0.512	190	25.6	0.02		
1120	Started sampling CW-6 This is MS/MSD							
	<b>Comments:</b> Mr. Pantoju indicated this is our last well to sample. They have another well which is CW-9 but has not been in operation for 3 years because it has high nitrate concentration.							
1200	Lunch							
1230	After lunch called EMAX and asked them to send someone tomorrow to pick up the samples for the City wells.							
1300	Started to do the COC & QC the samples & re-ice them.							

# ATTACHMENT 2

## LABORATORY ANALYTICAL RESULTS

# ATTACHMENT 2 – LABORATORY ANALYTICAL RESULTS

The Laboratory Analytical Results are included on CD-ROM in PDF for this report.

# ATTACHMENT 3

## DATA VALIDATION AND AUTOMATED DATA REVIEW REPORTS

# ATTACHMENT 3 – DATA VALIDATION AND AUTOMATED DATA REVIEW REPORTS

*Note:* The **Automated Data Review Report** is included on CD-ROM in PDF with this Revised Final report.

# Data Validation Report

## Groundwater Monitoring Data

For  
**Brown & Bryant**

Arvin, CA  
Project No.: Eco-11-482

**SDG#: 11J256**

**LEVEL III & IV**

Prepared for:

**Eco & Associate, Inc.**  
1855 W. Katella Ave, Suite 340  
Orange, CA, 92867

By  
ZIBA HOSSEINI  
14343 Peach Hill Rd.  
Moorpark, California

October 2011

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## EXECUTIVE SUMMARY

This data validation report presents the evaluation and validation of the analytical data for seven (7) water samples collected on 10-24-2011 as part of monthly city wells groundwater monitoring at Brown and Bryant, Arvin, California (CA). EMAX Laboratory in Torrance, California performed the chemical analysis of the samples. The United States Army Corps of Engineers and the State of California have certified EMAX Laboratory to perform the analysis described within this project. (Eco & Associates Inc., April2011).

On 10-24-2011, seven ground water samples, which included one field duplicate sample and one trip blank sample, were collected. EMAX Laboratory received samples on 10-25-2011. Trip blank sample accompanied the samples for volatile organic compounds analysis and was analyzed for EPA Method 8260B only. The data was delivered in one package as Level III and Level IV deliverables. 10% of the data was subjected to validation to equivalent of EPA Level IV data validation. Raw data for one sample from this sample group (10-24-11-CW-5) was submitted at level IV for all the requested analytical methods. Raw data for designated sample as MS/MSD (10-24-11-CW-6) together with all other QC samples were also submitted.

Level III data validation examined quality assurance/quality control (QA/QC) elements such as holding time, (both extraction and analysis), critical quality control measures, extraction logs, instrument injection logs, completeness of the results and summaries of initial and continuing calibrations for the following EPA methods of analysis:

Volatile Organic Compounds by EPA Method 8260B

Fumigants (EDB, DBCP and 1, 2, 3-Trichloropropane) by EPA Method 8260B SIM

Dinoseb by EPA Method 8151A

The analytical results, QC results, initial calibration and related continuing calibration data were comprehensively compared with the corresponding raw data and chromatograms presented for Level IV data validation.

All samples were analyzed for each of the components listed in the corresponding EPA Methods. The evaluation indicated that all the analytical work was performed as requested on

the chain of custodies. The extraction and analytical holding times were met for all samples in each method and subsequent dilutions.

Generally, data presented with this data package was considered acceptable and met quality control acceptance limits for each requested EPA Method, with some technical variations. The deviations are discussed in section 4.0 for each method. The results of sample analysis are tabulated in Appendix A.

## 1.0 INTRODUCTION

This report presents the evaluation and validation of analytical data collected as a part of the monthly groundwater monitoring at Brown and Bryant Superfund Site at Arvin, CA.

### 1.1 Objectives and Scope of Data Validation

The main objective of this report is to evaluate the acceptability of groundwater data. The data validation was performed according to the analytical requirements of the method in the *Quality Assurance Project Plan, final Draft, Brown and Bryant, Arvin, CA*, (Project No: Eco-11-482, Eco & Associates Inc. April 2011), EM 200-1-10 Guidance for Evaluation Performance-based Chemical Data, US Army Corps of Engineers (USACE), June 2005, *USEPA Analytical Operations/Data Quality Center (AOC) National Functional Guidelines for Organic Data Review* (USEPA, August 2002) and Department of Defense Quality Systems Manual (DoD QSM) Version 4.2, 2009 .

### 1.2 Organization of the Report

Section 2.0 describes the components of the data review. Section 3.0 provides the qualitative quality assurance objectives. Section 4.0 summarizes the findings and conclusions of the data validation.

## 2.0 DATA REVIEW AND VALIDATION

Data validation is a systematic method for reviewing and qualifying the presented analytical data for their intended use. The objective of this data validation report is to identify any unacceptable or faulty measurements, as reported by the laboratory.

EMAX Laboratory in Torrance, California performed the chemical analysis of the samples. Army Corps of Engineers and the State of California have certified EMAX laboratory to perform the EPA Methods of analysis described within this report.

Seven (7) ground water samples, which included one field duplicate sample and one trip blank sample, were collected on 10-24-11. EMAX Laboratory received the samples on 10-25-11.

### 2.1 Data Reporting

The data was delivered in one package as Level III and Level IV deliverables. Ten percent of the data was subjected to validation to the equivalent of EPA Level IV. EMAX Laboratory provided the following information in one data package for both LEVEL III and LEVEL IV deliverable.

- Sample identification number;
- Date of sample collection;
- Sample matrix type;
- Analysis method;
- Target lists and results of analysis;
- Quantitation limits and/or Reporting Limits;
- Laboratory qualifiers and qualifier definitions;
- Copies of sample logs and chain-of-custody logs;
- Sample preparation log (with the sample extraction date)
- Sample Analysis log (Instrument injection log)
- Summary of initial and continuing calibrations;
- Quality control results.

- Case narrative for each method.
- Raw data for all the initial calibrations, Initial calibration verification standard (ICV), continuing calibration standards, internal standard area counts and retention time window width, where applicable. Raw data for one sample (10-24-11-CW-5) and all the associated QC samples were also included.

Data validation was performed in three stages: first an initial review of the analytical reports and QA/QC information was performed to the equivalent of EPA level III using summary information only. Then, a full review of all the analytical reports, QA/QC information, as well as the corresponding raw and analytical data was carried out. Finally, the injection and extraction sequence log and summary and raw data of initial and continuing calibration standards were fully reviewed. Overall review assessed the effects of QA/QC results on the data usability. The review included such parameters as holding times, initial and continuing calibration method requirements, surrogate recoveries, lab control sample (LCS) and matrix spike/matrix spike duplicate (MS/MSD) for accuracy and precision.

Level IV review compared the reported analytical results with those obtained from the raw data. Raw data was submitted for one sample at Level IV data deliverable for all the analytical methods requested on the chain of custody. Calculations and corresponding equations, as well as analyte identification criteria were all verified.

## **2.2 Data Evaluation**

The following parameters were evaluated in the preliminary data review:

- Analysis performed and sample identifications were verified to be in accordance with the information provided on the chain-of-custody (COC);
- Technical holding times were confirmed for all samples with regard to the requested method of analysis (collection to extraction and extraction to analysis);
- Reported quantitation limits were compared with the project measurement objectives;
- Initial and continuing calibrations were evaluated;
- Field and laboratory blank results were evaluated;
- LCS/LCSD and MS/MSD results were evaluated; and

- Field and laboratory matrix duplicate results, trip blank results as well as surrogate recoveries, instrument performances check compounds, internal standard area counts and corresponding retention time windows were evaluated.

The following is a list of sample identifications and corresponding laboratory sample identification numbers:

CLIENT ID	EMAX ID#
10-24-11- CW-5	J256-01
10-24-11- CW-1	J256-02
10-24-11- TB-1	J256-03
10-24-11- FDUP-1	J256-04
10-24-11- CW-10	J256-05
10-24-11- CW-8	J256-06
10-24-11- CW-6	J256-07

Field duplicate and associated sample	
10-24-11-FDUP-1	10-24-11- CW-1

Table 2-1 below shows the specified analysis for constituents in the water samples, the corresponding Environmental Protection Agency (EPA) analytical method, the corresponding practical quantitation limits (PQL/RL), regulatory levels, and the effluent discharge limits of specific constituents if available.

**TABLE 2-1**  
Summary of Analytical Parameters  
Brown & Bryant, Arvin, California

MATRIX	CONSTITUENT	EPA METHOD	RLs (µg/L)	REGULATORY LEVEL (µg/L)	EFFLUENT DISCHARGE LIMITS (µg/L)
Water	Volatile Organic Compounds	8260B	1	NA	NA
	Fumigants (EDB, DBCP and 1,2,3-Trichloropropane)	8260B SIM	0.05-0.05 0.005(1,2,3-TCP)	NA	NA
	Herbicides (Dinoseb)	8151A	0.40	NA	NA

## Notes:

RL = Reporting Limit,

NA = Not Available

µg/L = microgram/Liter

**2.2.1 Holding Times**

Technical holding times are defined as the maximum time allowed between sample collection, extraction and analysis. A 14-day collection-to-analysis holding time was used for EPA Method 8260B and 8260B SIM. A 7-day holding time from collection to extraction, and 40-day holding time from extraction-to-analysis was met, for EPA Method 8151A. Table 2-2 presents the summary of holding time requirements with qualifications if applied.

**TABLE 2-2**  
Summary of Analytical Methods and Holding Time Requirements  
Brown & Bryant, Arvin, California

ANALYSIS Method	MATRIX	HOLDING TIME REQUIREMENT	DATA QUALIFIED AS "J"	DATA QUALIFIED AS "R"
EPA Method 8260B	Water	14 days to analysis	None. Holding times were met	None. Holding times were met
EPA Method 8260B SIM	Water	14 days to analysis	None. Holding times were met	None. Holding times were met
EPA Method 8151A	Water	7 days to extraction, 40 days to analysis	None. Holding times were met	None. Holding times were met

### **2.2.2 Laboratory and Field Blanks**

The objective of laboratory and field blanks is to determine the presence and extent of contamination resulting from laboratory or field activities. Blanks reported here included method and/or extraction blanks and trip blank. The result of analysis of method blank is discussed in section 4.0 for each method. All samples were transported in three ice preserved coolers and were stored in a refrigerator upon arrival to the laboratory. The temperatures of the coolers were recorded as 3.0°C to 3.8°C for each upon arrival. All samples were received intact and in good condition. Three trip blanks were associated with the samples for volatile organic compounds analysis by EPA method 8260B.

### **3.0 QUALITY ASSURANCE OBJECTIVES**

Quality assurance (QA) objectives define analytical parameters that validate the conclusions drawn from the results. Quality assurance was assessed through the following means: precision, accuracy, representativeness, completeness, and comparability (PARCC).

#### **3.1 Qualitative QA Objectives**

Qualitative aspects of QA for analytical data are characterized by completeness and representativeness.

##### **3.1.1 Comparability**

Comparability defines the level of confidence with which one data set can be compared with another. Comparability is related to accuracy and precision. It is also a measure of the data's reliability. All units for comparability are in accordance with standard procedures so that the results could be compared with other laboratories if necessary.

##### **3.1.2 Representativeness**

Representativeness is a quantity, which presents whether the results of analysis accurately portray the actual site conditions. Representativeness is a qualitative parameter, which signifies the extent of accuracy and precision, to which the data represent a characteristic population, parameter variations at a sampling point, process condition, or environmental conditions. The sampling procedures described within the approved QAPP (Eco & Associates, Inc., final version, April 2011) are designed to provide samples representative of the site conditions.

#### **3.2 Quantitative QA Objectives**

Quantitative QA Objectives for analytical data are defined as precision, accuracy, completeness, and method quantitation limits. These quantitative parameters are established in order to monitor the overall quality of analytical data produced by the laboratory. The laboratory performing the analytical methods specified in Table 2-1, and the case narratives, which is included in the data package from the laboratory, ensures the quality of the analytical data.

### 3.2.1 Precision

Precision is a measure of the closeness with which multiple analyses of a given sample agree with each other. It describes the agreement between two or more measurements that have been made in exactly the same way. Precision is measured through matrix spike/matrix spike duplicate samples, surrogate standards, and laboratory control samples. The relative percent difference (RPD) is calculated as a means of quantifying precision. The following equation is used for this purpose:

$$\text{RPD} = \frac{R_1 - R_2}{(R_1 + R_2)/2} \times 100$$

Where:

RPD = Relative percent difference

R<sub>1</sub> = Result of the first duplicate or measured sample concentration

R<sub>2</sub> = Result of the second duplicate or known sample or duplicate concentration

When analytes are present at concentrations below or near the quantitation limit, precision is measured, using MS/MSD, and/or LCS/LCSD results.

Precision results are discussed in Section 4.0 of this report.

### 3.2.2 Accuracy

Accuracy indicates the closeness of the measurement to its true or accepted value. Accuracy measures agreement between a result and its true value. Method-specific QA objectives for precision and accuracy were based on the quality control limits developed by the laboratory for the analytical methods, specified in Table 2-1. These procedures may affect the accuracy of the data presented. Additionally, initial and continuing calibrations were used to verify that the analytical instrument accurately measured the compound concentrations. Calculations were independently verified for the response factors and percent differences (%Ds).

### 3.2.3 Completeness

Completeness is defined as the percentage of total measurements, which are judged to be valid. The completeness objective is to obtain a sufficient amount of valid data to enable the goals and objectives of the project to be achieved.

Completeness is quantified by computing the fraction of reports, which remained valid after the sampling procedures were reviewed and the results conformed to QA/QC protocols. The following equation was used to calculate completeness:

$$\text{Completeness} = \frac{\text{Number of valid field samples analyzed}}{\text{Number of requested field samples collected}} \times 100$$

Completeness is affected by anything that reduces the number of samples analyzed (such as a sample bottle breaking), as well as acceptance or non-acceptance of analytical results.

#### 4.0 DATA VALIDATION

This data review covers seven (7) water samples listed on page 8 including dilutions and reanalysis if applicable. The analyses were according to the following EPA Methods:

EPA Method 8260B for volatile organic compounds

EPA Method 8260B SIM for fumigants (EDB, DBCP and 1, 2, 3-Trichloropropane)

EPA Method 8151A for Chlorinated Herbicides (Dinoseb)

This review follows USEPA Analytical Operations/Data Quality Center (*AOC National Functional Guidelines for Organic Data Review* (USEPA, August 2002); and EM 200-1-10 Guidance for Evaluating Performance-based Chemical Data, US Army Corps of Engineers (USACE), June 2005. The following subsections correlate to the above guidelines.

A summary table summarizing all data and qualification, if any is provided at the end of this report. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

**The following are definitions of the data qualifiers:**

- U Indicates the compound was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None indicates the finding did not significantly impact the data; therefore qualification was not required.

#### **4.1. VOC (EPA Method 5030B/8260B)**

##### **Technical Holding Times**

A 14-day technical holding time requirement was met for all the samples. A total of seven (7) samples were collected on 10-24-11. All samples and sample dilutions were analyzed on 10-26-11. Samples, QC samples and sample dilutions were analyzed with reference to one analytical batch (preparation batch: VO06J24).

The chain-of-custody was reviewed for documentation of sample information and method of analysis.

Table 1 in appendix A summarizes the list of samples with the results and qualification notations.

##### **Tuning criteria**

The performance of the instrument was checked by injection of a single component tune check standard (BFB: Bromofluorobenzene) prior to initial calibration on 10-21-11 and at the start of analytical batch on 10-26-11 before sample analysis. It passed all the method assigned criteria.

##### **Initial Calibration**

Ground water samples were analyzed with reference to one set of initial calibration using GC/MSD with instrument ID # T-O05. Initial calibration curve was generated on 10-21-11. A multilevel calibration curve ranging from 0.3 $\mu$ g/L to 100 $\mu$ g/L was used for this purpose. Internal standard curve type was used for initial calibration. Minimum response factor for system performance check compounds (SPCCs) were within the method acceptable limits. Response factors at each level were randomly recalculated and all agreed with the response factors submitted in the initial calibration summary table.

Minimum average response factors for the system performance check compounds (SPCCs) for each instrument were recognized according to the following tables:

**Table 4.1.1: System Performance Check Compounds (Initial calibration)**

<b>System Performance check compounds (SPCCs)</b>	<b>Min. Ave. Response Factor (Method limits)</b>	<b>Ave. Res. Factor 10-21-11 (Calculated) Instrument ID#: T-O05</b>
Chloromethane	≥ 0.10	0.383
1,1 -dichloroethane	≥ 0.10	0.583
Bromoform	≥ 0.10	0.364
Chlorobenzene	≥ 0.30	0.996
1,1,2,2-Tetrachloroethane	≥ 0.30	0.610

Average response factor curve fit was mainly used to show linearity within initial calibration levels for each compound. Maximum 15% RSD limit was met for most of the target compounds.

Least square linear regression curve fit was used for the following compounds where %RSD exceeded the maximum 15 percent limit.

<b>Target Analytes</b>	<b>Least Square Linear Regression (CCF) 10-21-11 Instrument ID#: T-O05</b>
Carbon disulfide	0.9996
2-Chloroethyl vinyl ether	0.9978
Bromoform	0.9994
1,2-Dibromo-3-chloropropane	0.9995
Naphthalene	0.9988

Calibration check compounds (CCCs) met the acceptance criteria for %RSD among the response factors calculated for each level. Table 4.1.2 lists the CCCs with the method requirement limits and the calculated %RSD among the response factors for each initial calibration.

**Table 4.1.2 Calibration Check Compounds (CCCs): Initial Calibration**

<b>Calibration Check Compounds (CCCs)</b>	<b>Response Factors %RSD (Limit)</b>	<b>Response Factors %RSD 10-21-11 Instrument ID#: T-O05</b>
1,1-Dichloroethene	≤ 30%	5.32
Chloroform	≤ 30%	6.06

Calibration Check Compounds (CCCs)	Response Factors %RSD (Limit)	Response Factors %RSD 10-21-11 Instrument ID#: T-O05
1,2-Dichloropropane	≤ 30%	6.04
Toluene	≤ 30%	4.36
Ethyl benzene	≤ 30%	4.71
Vinyl chloride	≤ 30%	9.77

### Initial Calibration Verification and Continuing Calibration (Daily Calibration)

The initial calibration was verified by a second source standard at the end of calibration on 10-21-11. Percent differences (%D) between initial calibration average response factors (RRFs) and the initial calibration verification response factors (RFs) were less than or equal to 20% for all target compounds.

One continuing calibration check standard was analyzed at the beginning of analytical shift on 10-26-11. Prior to analysis of continuing calibration standard, **instrument performance check standard** (BFB tune check) was carried out. It passed all the method tuning criteria.

The minimum average response factors for the system performance check compounds (SPCCs) for continuing calibration standard was within the method limits. The following table list average response factors for system performance check compounds.

**Table 4.1.3: System Performance Check Compounds: (Daily calibration)**

System Performance Check compounds (SPCCs)	Minimum response factor (Method limits)	Second source Std. Response factors (Calculated) 10-21-11	Continuing cal. Response factors (Calculated) CCRF 10-26-11
Chloromethane	≥ 0.10	0.354	0.264
1,1-Dichloroethane	≥ 0.10	0.589	0.517
Chlorobenzene	≥ 0.10	1.000	0.920
Bromoform	≥ 0.30	0.414	0.335
1,1,2,2-Tetrachloroethane	≥ 0.30	0.614	0.586

Calculated percent differences (%drift) between initial calibration RRFs (average response factors) and the continuing calibration response factors (CCRF) were less than or equal to 20% for all the Calibration Check Compounds (CCCs) and less than or equal to 20% for all

other target analytes. The area counts for all internal standards were within  $\pm$  50-150 percent of the same level in the initial calibration. The calculated % difference between RFs from continuing calibration and average response factors from initial calibration is summarized in Table 4.1.4 for continuing calibration compounds as follows:

**Table 4.1.4 Calibration Check Compounds (CCCs): ICV and Daily Calibration**

Calibration Check Compounds (CCCs)	%Deviation From Initial calibration (Acceptance Limit)	Deviation from Initial calibration 2 <sup>nd</sup> source (10-21-11)	Deviation from Initial calibration Daily calibration (10-26-11)
Vinyl chloride	$\leq 20\%$	1.5%	2.8%
1,1-Dichloroethene	$\leq 20\%$	1.8%	4.8%
Chloroform	$\leq 20\%$	3.2%	6.3%
1,2-Dichloropropane	$\leq 20\%$	5.0%	5.8%
Toluene	$\leq 20\%$	4.1%	5.4%
Ethyl benzene	$\leq 20\%$	0.5%	4.2%

Deviation from the initial calibration was less than 20 percent for the rest of target list (Non-CC compounds). However, percent difference exceeded maximum 20% for 2-Chloroethyl-vinyl ether.

**Quality Control:** The QC samples reported consisted of one method blank, one set of LCS/LCSD and MS/MSD. Client's designated sample (10-24-11-CW-6) was spiked for precision as MS/MSD. The full list of target compounds were spiked and reported for LCS/LCSD and MS/MSD. Percent recoveries and percent RPDs for all the QC samples reported were within the project acceptance limits for most of the reported compounds. The following compounds failed the lower acceptance limits in MS/MSD:

Target compound	10-24-11-CW-6MS %Recovery	10-24-11-CW-6MS %Recovery	Acceptante limits%
1,2-Dibromoethane	72*	75*	80-120
Vinyl acetate	57*	66	65-135

The results, percent recoveries and RPDs were recalculated randomly and all agreed with the reported QC summary table.

**Method blank:** One method blank was presented with the data package (analyzed on 10-26-11). Method blank was reported as non-detected for all the analytes in the target list.

**Field duplicate sample** and its associated sample: Sample 10-24-11-FDUP-1 was identified as field duplicate of sample 10-24-11-CW-1. Results of positive hits for each sample and its corresponding duplicate are shown in the following table:

	10-24-11-FDUP-1 µg/L	10-24-11-CW-1 µg/L	%RPD
Chloroform	0.61	0.63	<1%

**Surrogate** recoveries were all within the method's acceptance limits. The reported results for each sample are incorporated in table 1 in appendix A.

Raw data for one sample (10-24-11-CW-5) was submitted for level IV data validation. Raw data for all associated QC samples were also included as Level IV data deliverable. The results calculated from the raw data, agreed with all the results reported in data summary reports. The sample results together with the surrogate recoveries are tabulated in table 1 appendix A.

#### 4.2. EPA Method 5030B/8260B SIM (FUMIGANTS)

##### Technical Holding Times

A 14-day technical holding time requirement was met for all the samples. A total of six (6) ground water samples were collected on 10-24-11. All samples and QC samples were analyzed on 11-01-11. Samples, QC samples and sample dilutions were analyzed with reference to one preparation batch (VOF5K01).

The chain-of-custody was reviewed for documentation of sample information and method of analysis. Samples were analyzed for three fumigants; 1,2-Dibromomethane (EDB),

1,2,3-Trichloropropane (TCP), and 1,2-Dibromo-3-chloropropane (DBCP). A Mass detector at Selected Ion Monitoring mode (SIM) was used to achieve low detection limits required for the target compounds.

Table 2 in appendix A summarizes the list of samples with the results and qualification notations.

### **Tuning criteria**

The performance of the instrument was checked by injection of a single component tune check standard (BFB: Bromofluorobenzene) prior to analysis of initial calibration standards and at the start of analytical batch on 11-01-11, before sample analysis. It passed all the method assigned criteria.

### **Initial Calibration**

Ground water samples were analyzed with reference to one set of initial calibration using purge and trap together with GC/MSD at selected ion monitoring mode. Instrument ID # T-OF5 was used for the analysis. Initial calibration curve was generated on 05-11-11. A multilevel calibration curve ranging from 5.0ng/L (ppt) to 1000ng/L (ppt) was used for this purpose. Instrument performance check standard (BFB) was analyzed prior to initial calibration. It passed all the tuning criteria. Modified version of SW-846 8260B(SIM) was used for generation of calibration curve and data. Internal standard curve type was used for initial calibration. Minimum response factors for all the target compounds were within the method acceptable limits. Average response factor curve fit was used to show linearity. Percent relative standard deviation (%RSD) among response factors was less than 15% for all target analytes. Response factors at each level were randomly recalculated and all agreed with the response factors submitted in the initial calibration summary table.

### **Initial Calibration Verification and Continuing Calibration (Daily calibration)**

The initial calibration was verified by a second source standard at the end of calibration on 05-11-11. Quality control criteria regarding minimum response factors were within methods, acceptance limits. Percent differences (%D) between initial calibration average response factors

(RRFs) and the initial calibration verification response factors (RFs) were less than or equal to 20% for all target compounds.

Continuing calibration check standards were analyzed at the beginning of analytical shift on 11-01-11. Prior to each continuing calibration standard analysis, instrument performance check standard (BFB tune check) was injected and evaluated. It passed all the method tuning criteria.

The calculated % difference (%D) between response factors from continuing calibration (CCRF) and average response factors from initial calibration is summarized in Table 4.2.1 for the targets of interest in this method as follows:

**Table 4.2.1: Percent difference from initial calibration: (Daily calibration)**

<b>Target Compounds</b>	<b>% Deviation From Initial Calibration Method Criteria</b>	<b>% Deviation From Initial Calibration 2<sup>nd</sup> Source St. (Calculated) (05-11-11)</b>	<b>% Deviation From Initial Calibration Daily St. (Calculated) (11-01-11)</b>
1,2-Dibromomethane (EDB)	≤ 20%	5.7	1.8
1,2,3-Trichloropropane(TCP)	≤ 20%	10.2	9.6
1,2-Dibromo-3-chloropropane (DBCP)	≤ 20%	12.6	14.2

Calculated percent differences (%drift) between initial calibration RRFs (average response factors) and the continuing calibration response factors (CCRF) were less than or equal to 20% for all target analytes. The area counts for all internal standards were within ± 50-150 percent of the same level in the initial calibration.

**Quality Control:** The QC samples reported consisted of one method blank, one set of LCS/LCSD and MS/MSD. Client's designated sample (10-24-11-CW-6) was spiked for precision as MS/MSD. All three target compounds were spiked and reported for LCS/LCSD and MS/MSD. Percent recoveries and percent RPDs for all the QC samples reported were within the project acceptance limits for all reported compounds.

The results, percent recoveries and RPDs were recalculated randomly and all agreed with the reported QC summary table.

**Method blank:** One method blank was presented with the data package (analyzed on 11-01-11). Method blank was reported as non-detected for all analytes in the target list.

**Surrogate** recoveries were all within the method's acceptance limits. The reported results for each sample are incorporated in table 2 in appendix A.

**Field duplicate sample** and its associated sample: Sample 10-24-11-FDUP-1 was identified as field duplicate of sample 10-24-11-CW-1. Results of positive hits for each sample and its corresponding duplicate are shown in the following table:

	10-24-11 FDUP-1 µg/L	10-24-11 CW-1 µg/L	%RPD
1,2-Dibromomethane (EDB)	ND	ND	<1%
1,2,3-Trichloropropane(TCP)	0.072	0.073	<1%
1,2-Dibromo- 3-chloropropene (DBCP)	ND	ND	<1%

Raw data for one sample (10-24-11-CW-5) was submitted for level IV data validation. Raw data for all associated QC samples were also included as Level IV data deliverable. The results calculated from the raw data, agreed with all the results reported in data summary reports. The sample results together with the surrogate recoveries are tabulated in table 2 Appendix A.

### 4.3 DINOSEB BY GC/ECD (EPA Method 8151A)

#### Technical Holding Times

A 7-day technical holding time from sample collection to extraction and 40-day from extraction to analysis was met for all samples. A total of six ground water samples were collected on 10-24-11. Samples were extracted with one preparation batch on 10-27-11 (preparation batch # HEJ007W). Sample extracts were analyzed on 10-28-11.

EPA Method 8151A uses GC equipped with two Electron Capture Detectors (ECDs) and two different columns. Columns are connected to the same injection port through a guard column for analysis. Results and raw data generated from both columns were submitted. Chlorinated Herbicides (Dinoseb) was determined by this method.

### **Initial Calibration**

Samples were analyzed with reference to one initial calibration generated on 10-11-11. Seven calibration levels (20-200 µg/L) were used in initial calibration. Channel A and B were both calibrated. External standard curve type was used for calibration. Calibration factor (area for each compound versus concentration) was used for calculation. Average response factor was used to show linearity for each channel. Percent relative standard deviation (%RSD) among calibration factors (CFs) for both channel A and B were less than 20%. Retention time window width was established by using initial calibration standards at each level. All further sample and QC analysis identification were based on the assigned time windows set by initial calibration for each peak. The instrument was calibrated for the full list of Herbicides, both for initial calibration and continuing (daily calibration), but the result of analysis was reported only for Dinoseb.

### **Initial Calibration Verification (ICV) and Continuing (Daily) Calibration**

Initial calibration was verified by a second source standard at the end of each calibration and prior to sample analysis on 10-11-11. Percent difference between mean calibration factors from initial calibration and calibration factors calculated from the second source were less than 20% for both Dinoseb and MCPPE as surrogate.

Three continuing calibration standards with intervals of 10 sample injections were analyzed with samples and all the QC samples. Analysis was carried out on 10-28-11. Percent difference between initial calibration average response factors and the response factors calculated for each analyte from continuing calibrations were less than 20% for all standards. Results for surrogate recoveries and QC samples were reported from both channel A and B.

**Quality Control** samples consisted of method blank, one lab control sample (LCS) and MS/MSD for preparation batch #HEJ007W. Client designated sample 10-24-11-CW-6 was

spiked for accuracy and precision. Full herbicide list was spiked for LCS and MS/MSD, but only Dinoseb and MCPP (as surrogate) were reported for precision and accuracy. Percent recoveries (%R) were within the project established QC limits for lab control sample (LCS) and MS/MSD. Calculated %RPD was less than 30% acceptance limit.

**Method blank** was reviewed for each component and no herbicide was found in the method blank for the extraction batch # HEJ007W.

**Surrogate** recoveries were all within the method's acceptable limits. The calculated result for each sample is incorporated in table 3 in Appendix A.

**Field duplicate sample** and its associated sample: Sample 10-24-11-FDUP-1 was identified as field duplicate of sample 10-24-11-CW-1. Both sample and corresponding field duplicate were reported as non-detected.

Raw data for one sample (10-24-11-CW-5) with related QC samples and were submitted at level IV deliverable. Raw data responses were used in recalculation and all verified the reported values.

## 5.0 Conclusion

Overall, the data presented is generally regarded as acceptable for all the EPA methods listed in the chain of custody. The data can reliably be used for the purpose of this project.

## 6.0 References

1. *USEPA Analytical Operations/Data Quality Center (AOC) National Functional Guidelines for Organic Data Review* (USEPA, August 2002).
2. *Quality Assurance Project Plan, final Draft, Brown & Bryant, CA*, (Project No. Eco-11-482, Eco & Associates Inc., April 2011)
3. U.S. Environmental Protection Agency, Dec. 1996, *SW846 Laboratory Manual Physical/Chemical Methods*. Revision 3, Washington, D.C. 20460.
4. EM 200-1-10 Guidance for Evaluation Performance-based Chemical Data, US Army Corps of Engineers (USACE), June 2005.
5. Department of Defense Quality System Manual (DOD QSM), Version 4.2, 2009
6. EPA Methods for Chemical Analysis of Water and Wastes. EPA -600-4-79-020. Revised; March 1983.

## 7.0 APPENDIX A

Table 1-Volatile Organic Compounds component List: EPA Method 8260B

ANALYTE	RLs µg/L	10-24-11- CW-5 µg/L	10-24-11- CW-1 µg/L	10-24-11- TB-1 µg/L	10-24-11- FDUP-1 µg/L	10-24-11- CW-10 µg/L
Acetone	10	U	U	U	U	U
Benzene	1.0	U	U	U	U	U
Bromobenzene	1.0	U	U	U	U	U
Bromochloromethane	1.0	U	U	U	U	U
Bromodichloromethane	1.0	U	U	U	U	U
Bromoform	1.0	U	U	U	U	U
Bromomethane	1.0	U	U	U	U	U
2-Butanone	10	U	U	U	U	U
n-Butylbenzene	1.0	U	U	U	U	U
sec-Butylbenzene	1.0	U	U	U	U	U
tert-Butylbenzene	1.0	U	U	U	U	U
Carbon Disulfide	1.0	U	U	U	U	U
Carbon Tetrachloride	1.0	U	U	U	U	U
Chlorobenzene	1.0	U	U	U	U	U
Chloroethane	1.0	U	U	U	U	U
2-ChloroethylVinylether	1.0	U	U	U	U	U
<b>Chloroform</b>	1.0	<b>0.40J</b>	<b>0.63J</b>	U	<b>0.61J</b>	U
Chloromethane	1.0	U	U	U	U	U
2-Chlorotoluene	1.0	U	U	U	U	U
4-Chlorotoluene	1.0	U	U	U	U	U
1,2Dibromo3Chloropropane	1.0	U	U	U	U	U
Dibromochloromethane	1.0	U	U	U	U	U
1,2-Dibromoethane(EDB)	1.0	U	U	U	U	U
Dibromomethane	1.0	U	U	U	U	U
1,2-Dichlorobenzene	1.0	U	U	U	U	U
1,3-Dichlorobenzene	1.0	U	U	U	U	U
1,4-Dichlorobenzene	1.0	U	U	U	U	U
Dichlorodifluoromethan	1.0	U	U	U	U	U
1,1-Dichloroethane	1.0	U	U	U	U	U
1,2-Dichloroethane	1.0	U	U	U	U	U
1,1-Dichloroethene	1.0	U	U	U	U	U
Cis-1,2-Dichloroethene	1.0	U	U	U	U	U
trans-1,2-Dichloroethene	1.0	U	U	U	U	U
1,2-Dichloropropane	1.0	U	U	U	U	U
1,3-Dichloropropane	1.0	U	U	U	U	U
2,2-Dichloropropane	1.0	U	U	U	U	U
1,1-Dichloropropene	1.0	U	U	U	U	U
cis-1,3-Dichloropropene	1.0	U	U	U	U	U
trans-1,3-Dichloropropene	1.0	U	U	U	U	U
Ethylbenzene	1.0	U	U	U	U	U
Hexachlorobutadiene	1.0	U	U	U	U	U
2-Hexanone	10	U	U	U	U	U
Isopropylbenzene	1.0	U	U	U	U	U

ANALYTE	RLs	10-24-11- CW-5	10-24-11- CW-1	10-24-11- TB-1	10-24-11- FDUP-1	10-24-11- CW-10
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
p-Isopropyltoluene	1.0	U	U	U	U	U
MTBE	1.0	U	U	U	U	U
4-Methyl-2-Pentanone	10.0	U	U	U	U	U
Methylene chloride	1.0	U	U	U	U	U
Naphthalene	1.0	U	U	U	U	U
n- Propylbenzene	1.0	U	U	U	U	U
Styrene	1.0	U	U	U	U	U
1,1,1,2-Tetrachloroethane	1.0	U	U	U	U	U
1,1,2,2-Tetrachloroethane	1.0	U	U	U	U	U
Tetrachloroethene	1.0	U	U	U	U	U
Toluene	1.0	U	U	U	U	U
1,2,3-Trichlorobenzene	1.0	U	U	U	U	U
1,2,4-Trichlorobenzene	1.0	U	U	U	U	U
1,1,1-Trichloroethane	1.0	U	U	U	U	U
1,1,2-Trichloroethane	1.0	U	U	U	U	U
Trichloroethene	1.0	U	U	U	U	U
Trichlorofluoromethane	1.0	U	U	U	U	U
1,2,3-Trichloropropane	1.0	U	U	U	U	U
1,2,4-Trimethylbenzene	1.0	U	U	U	U	U
1,3,5-Trimethylbenzene	1.0	U	U	U	U	U
Vinyl Chloride	1.0	U	U	U	U	U
o-Xylene	1.0	U	U	U	U	U
m- & p-Xylenes	1.0	U	U	U	U	U
<b>Surrogate (Limits)</b>	<b>(Limits)</b>	<b>% Recovery</b>	<b>% Recovery</b>	<b>% Recovery</b>	<b>% Recovery</b>	<b>% Recovery</b>
1,2Dichloroeth-d4	70-120	112	111	114	108	91.4
4-Bromofluorbenze	75-120	104	105	104	107	110
Toluene-d8	85-120	103	103	103	104	109
Dibromofluoromethane	85-115	111	111	110	110	102

Table 1-Volatile Organic Compounds component List: EPA Method 8260B

ANALYTE	RLs µg/L	10-24-11- CW-8 µg/L	10-24-11- CW-6 µg/L			
Acetone	10	U	U			
Benzene	1.0	U	U			
Bromobenzene	1.0	U	U			
Bromochloromethane	1.0	U	U			
Bromodichloromethane	1.0	U	U			
Bromoform	1.0	U	U			
Bromomethane	1.0	U	U			
2-Butanone	10	U	U			
n-Butylbenzene	1.0	U	U			
sec-Butylbenzene	1.0	U	U			
tert-Butylbenzene	1.0	U	U			
Carbon Disulfide	1.0	U	U			
Carbon Tetrachloride	1.0	U	U			
Chlorobenzene	1.0	U	U			
Chloroethane	1.0	U	U			
2-ChloroethylVinylether	1.0	U	U			
<b>Chloroform</b>	1.0	<b>0.24J</b>	U			
Chloromethane	1.0	U	U			
2-Chlorotoluene	1.0	U	U			
4-Chlorotoluene	1.0	U	U			
1,2Dibromo3Chloropropane	1.0	U	U			
Dibromochloromethane	1.0	U	U			
1,2-Dibromoethane(EDB)	1.0	U	U			
Dibromomethane	1.0	U	U			
1,2-Dichlorobenzene	1.0	U	U			
1,3-Dichlorobenzene	1.0	U	U			
1,4-Dichlorobenzene	1.0	U	U			
Dichlorodifluoromethan	1.0	U	U			
1,1-Dichloroethane	1.0	U	U			
1,2-Dichloroethane	1.0	U	U			
1,1-Dichloroethene	1.0	U	U			
Cis-1,2-Dichloroethene	1.0	U	U			
trans-1,2-Dichloroethene	1.0	U	U			
1,2-Dichloropropane	1.0	U	U			
1,3-Dichloropropane	1.0	U	U			
2,2-Dichloropropane	1.0	U	U			
1,1-Dichloropropene	1.0	U	U			
cis-1,3-Dichloropropene	1.0	U	U			

ANALYTE	RLS µg/L	10-24-11- CW-8	10-24-11- CW-6			
		µg/L	µg/L			
trans-1,3-Dichloropropene	1.0	U	U			
Ethylbenzene	1.0	U	U			
Hexachlorobutadiene	1.0	U	U			
2-Hexanone	10	U	U			
Isopropylbenzene	1.0	U	U			
p-Isopropyltoluene	1.0	U	U			
MTBE	1.0	U	U			
4-Methyl-2-Pentanone	10.0	U	U			
Methylene chloride	1.0	U	U			
Naphthalene	1.0	U	U			
n- Propylbenzene	1.0	U	U			
Styrene	1.0	U	U			
1,1,1,2-Tetrachloroethane	1.0	U	U			
1,1,2,2-Tetrachloroethane	1.0	U	U			
<b>Tetrachloroethene</b>	1.0	U	<b>0.22J</b>			
Toluene	1.0	U	U			
1,2,3-Trichlorobenzene	1.0	U	U			
1,2,4-Trichlorobenzene	1.0	U	U			
1,1,1-Trichloroethane	1.0	U	U			
1,1,2-Trichloroethane	1.0	U	U			
Trichloroethene	1.0	U	U			
Trichlorofluoromethane	1.0	U	U			
1,2,3-Trichloropropane	1.0	U	U			
1,2,4-Trimethylbenzene	1.0	U	U			
1,3,5-Trimethylbenzene	1.0	U	U			
Vinyl Chloride	1.0	U	U			
o-Xylene	1.0	U	U			
<b>m- &amp; p-Xylenes</b>	1.0	U	U			
<b>Surrogate (Limits)</b>		% <b>Recovery</b>	% <b>Recovery</b>			
1,2Dichloroeth-d4	70-120	87.5	89.4			
4-Bromofluorbenze	75-120	113	112			
Toluene-d8	85-120	110	110			
Dibromofluoromethane	85-115	99.2	101			

**Table 2-Fumigants (EDB, DBCP & 1, 2, 3-Trichloropropane): EPA Method 8260B (SIM)**

<b>ANALYTE</b>	<b>RLs µg/L</b>	10-24-11- CW-5 µg/L	10-24-11- CW-1 µg/L	10-24-11- FDUP-1 µg/L	10-24-11- CW-10 µg/L	10-24-11- CW-8 µg/L	10-24-11- CW-6 µg/L
EDB	0.05	ND	ND	ND	ND	ND	ND
DBCP	0.05	ND	ND	ND	0.068	ND	ND
<b>1,2,3-Trichloropropane</b>	0.005	<b>0.068</b>	<b>0.072</b>	<b>0.073</b>	<b>0.0032J</b>	ND	<b>0.022</b>
<b>Surrogate parameters</b>	<b>Limits</b>	<b>% Recovery</b>	<b>% Recovery</b>	<b>% Recovery</b>	<b>% Recovery</b>	<b>% Recovery</b>	<b>% Recovery</b>
Toluene d8	80-120	86.6	91.4	85.1	80.8	88.8	82.1

**Table 3-Herbicides (Dinoseb): EPA Method 8151A**

<b>ANALYTE</b>	<b>RLs µg/L</b>	10-24-11- CW-5 µg/L	10-24-11- CW-1 µg/L	10-24-11- FDUP-1 µg/L	10-24-11- CW-10 µg/L	10-24-11- CW-8 µg/L	10-24-11- CW-6 µg/L
Dinoseb	0.4	ND	ND	ND	ND	ND	<b>ND</b>
<b>Surrogate parameters</b>	<b>Limits</b>	<b>% Recovery</b>	<b>% Recovery</b>	<b>% Recovery</b>	<b>% Recovery</b>	<b>% Recovery</b>	<b>% Recovery</b>
MCP (Surrogate)	40-140	76.9	80.1	80.6	91.0	81.1	79.7

# ATTACHMENT 4

## PHOTOGRAPHS OF THE CITY WELLS

# Arvin City Well Sampling - October 2011



Figure 1: CW - 1 pump



Figure 2: Another view of the CW-1 well pump.



Figure 3: CW-5



Figure 4: Another view of CW-5.

# Arvin City Well Sampling - October 2011



Figure 5: CW-06 showing the sampling port.



Figure 6: Another view of CW-6.



Tanks near CW-8.



Figure 8: Another view of CW-08 showing treatment system in the rear right.

Arvin City Well Sampling - October 2011



Figure 9: CW-10 showing sampling at the port,



Figure 10: CW-10 housed inside a well house.