



EA Engineering, Science, and Technology, Inc.

720 Sixth Street South, Suite 100  
Kirkland, Washington 98033  
Telephone: 425-451-7400  
Fax: 425-451-7800  
www.eaest.com

26 September 2012  
LN1289

Ms. Claire Hong  
U.S. Environmental Protection Agency, Region 10  
1200 Sixth Avenue  
Mail Code: ECL-111  
Seattle, Washington 98101

RE: Results of Quarterly Monitoring Well Sampling – Summer 2012  
Northern Plume Area, Hazel Dell, Washington  
EA Project No. 14495.28.0005

Dear Claire:

On behalf of Linde LLC, EA Engineering, Science, and Technology, Inc. (EA) is submitting the enclosed results of the Summer 2012 quarterly groundwater monitoring event in the Northern Plume area, north of the Boomsnub/Airco Superfund Site (Superfund Site). The general site area is shown on Figure 1. Locations of the monitoring wells sampled are shown on Figure 2. Brief summaries of the tasks performed and analytical results are provided herein. Copies of the field sampling logs and laboratory analytical results are included as Attachments A and B, respectively. An electronic copy of the report and a full copy of the laboratory report are included on the enclosed CD.

## **FIELD SAMPLING**

The Summer 2012 quarterly sampling event took place on 25 July 2012. Groundwater samples were collected from three monitoring wells within the Northern Plume; AMW-17, AMW-18, and AMW-64 (Figure 2). Sampling activities were conducted in compliance with the U.S. Environmental Protection Agency (EPA)-approved Quality Assurance and Sampling Plan (QASP) for the Superfund Site (EA 2004<sup>1</sup>) and the EPA-approved Monitoring Well Installation and Sampling Work Plan (EA 2012<sup>2</sup>). Health and safety procedures followed during field activities were in compliance with the EPA-approved Health and Safety Plan (HASP) for the Superfund Site (EA 2007<sup>3</sup>).

---

<sup>1</sup> EA. 2004. Quality Assurance and Sampling Plan for the Groundwater Treatment System Operation and Maintenance. Boomsnub/Airco Superfund Site, Hazel Dell, Washington. Revision 1. August.

<sup>2</sup> EA. 2012. Work Plan, Monitoring Well Installation and Sampling in the Northern Plume Area, Hazel Dell, Washington. Revision 1. January.

<sup>3</sup> EA. 2007. Health and Safety Plan for the Boomsnub/Airco Superfund Site, Hazel Dell, Washington. Revised. September.

Prior to sampling each well, the water level was measured to the nearest 0.01 foot relative to the top of the well casing using an electronic water level indicator. Groundwater samples were collected using electric submersible pumps with low-flow purging and sampling procedures. At each well, water quality parameters (pH, specific conductivity, temperature, dissolved oxygen, turbidity, and oxidation-reduction potential) were allowed to stabilize before sample collection, in accordance with the procedures outlined in the Superfund Site QASP (EA 2004). Water levels and field parameter measurements were recorded on the field sampling logs (Attachment A). A dedicated pump was used to sample well AMW-17. A non-dedicated pump was used to sample the other two wells; this pump was decontaminated prior to each use following the procedures outlined in the Superfund Site QASP.

Additional samples were collected for quality assurance/quality control, including a field duplicate (from well AMW-64), equipment rinsate blank, trip blank, and matrix spike/matrix spike duplicate. Groundwater samples were analyzed for volatile organic compounds (VOCs) by EPA Method 8260C. The analyses were performed by Columbia Analytical Services/ALS of Kelso, Washington.

## **SUMMARY OF RESULTS**

### **Volatile Organic Compounds**

A summary of the VOCs detected in the monitoring well groundwater samples is provided in Table 1. Trichloroethene (TCE) concentrations exceeded the Superfund Site cleanup level of 5 micrograms per liter ( $\mu\text{g/L}$ ) in groundwater samples from all three monitoring wells. The highest concentration was detected in groundwater from well AMW-17 (210  $\mu\text{g/L}$ ). The VOC 1,1-dichloroethene (1,1-DCE) exceeded the Superfund Site cleanup level of 1  $\mu\text{g/L}$  in wells AMW-17 (1.1  $\mu\text{g/L}$ ) and AMW-64 (2.7  $\mu\text{g/L}$ ). The remaining detected compounds were at concentrations below the respective cleanup levels (see Table 1).

### **Groundwater Elevation**

The groundwater elevation for each well was determined by subtracting the depth-to-groundwater measurement from the surveyed top-of-casing measurement. Groundwater elevations and well construction details are presented in Table 2.

The general direction of groundwater flow throughout the Superfund Site is to the west-northwest. The groundwater flow direction is impacted by the active groundwater extraction system at the Superfund Site. Based on only the groundwater elevations in the three Northern Plume wells, as measured on 25 July 2012, the groundwater flow in this area is to the northwest.

## **DISCUSSION/CONCLUSIONS**

The TCE concentration in groundwater samples from monitoring well AMW-17 continues to increase with the continued arrival of the Northern Plume in this area. Historical VOC results for well AMW-17 are provided in Table 3.

Increased TCE concentrations indicating the presence of the Northern Plume were observed in groundwater samples from well AMW-18 starting in 2006 and peaking in 2008. TCE concentrations in AMW-18 have since decreased, but remain at concentrations well above the cleanup level. The TCE concentration in monitoring well AMW-18 has remained essentially the same for the last three quarters. Historical VOC results for well AMW-18 are provided in Table 4.

Monitoring well AMW-64 was installed in February 2012. TCE concentrations in groundwater samples from this well have not changed significantly in the three quarters during which it has been sampled, ranging from 160 to 190 µg/L. Historical VOC results for well AMW-64 are provided in Table 5.

Monitoring wells AMW-17, AMW-18, and AMW-64 will be sampled next in October 2012, in conjunction with the Fall semiannual sampling event at the Superfund Site. Results for that sampling event will be included in the Fall semiannual groundwater monitoring report. If you have any questions or comments regarding this report, please call me at 425-451-7400.

Sincerely,  
EA ENGINEERING, SCIENCE,  
AND TECHNOLOGY, INC.



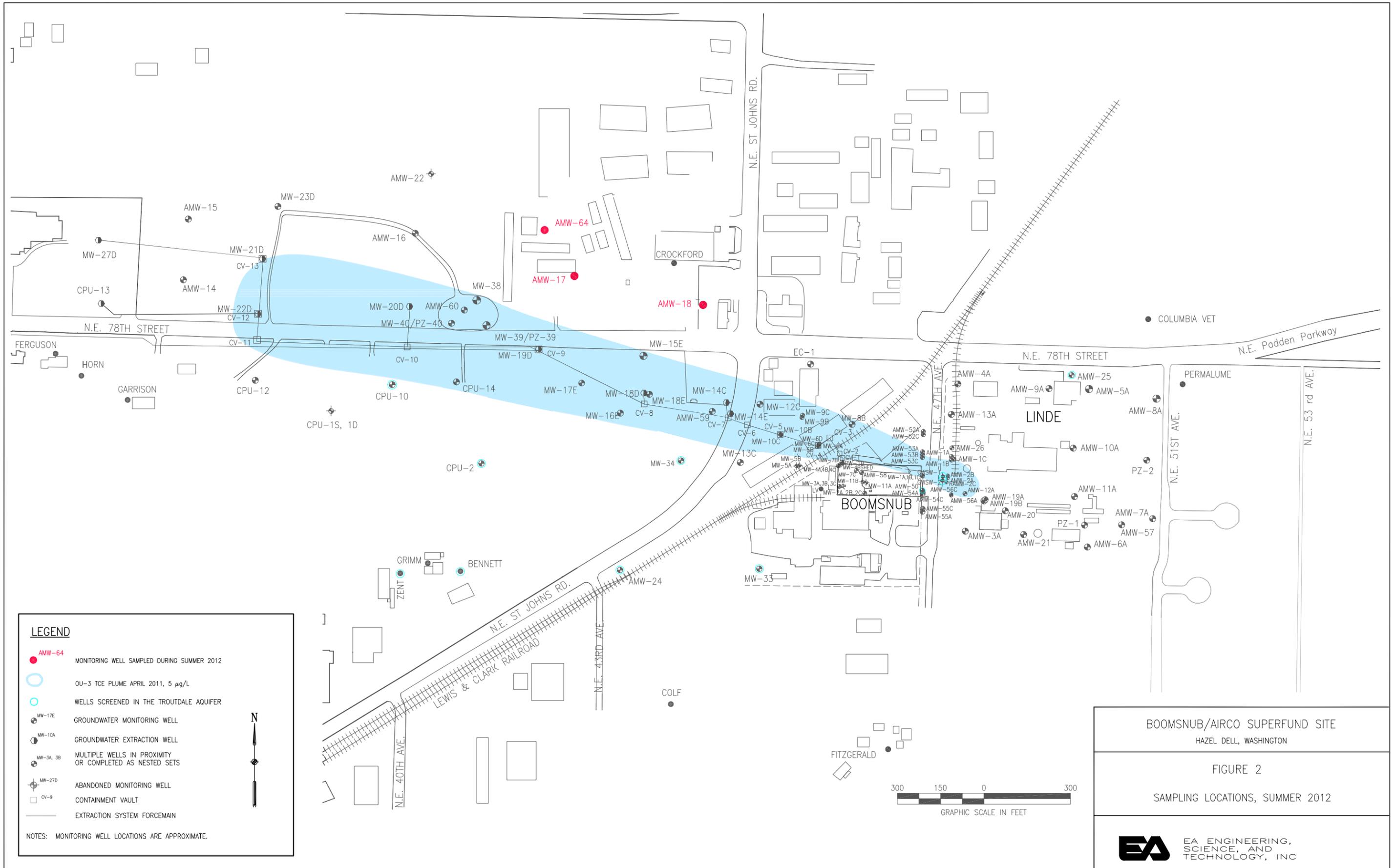
Catherine M. Böhlke, LHg  
Project Coordinator

cc:

Bernie Zavala, EPA  
Brian Thiesse, Linde LLC  
Dave Grupp, Linde LLC  
Mohsen Kourehdar, Ecology

## **FIGURES**





**LEGEND**

- AMW-64 MONITORING WELL SAMPLED DURING SUMMER 2012
- OU-3 TCE PLUME APRIL 2011, 5 µg/L
- WELLS SCREENED IN THE TROUTDALE AQUIFER
- GROUNDWATER MONITORING WELL
- GROUNDWATER EXTRACTION WELL
- MULTIPLE WELLS IN PROXIMITY OR COMPLETED AS NESTED SETS
- ABANDONED MONITORING WELL
- CONTAINMENT VAULT
- EXTRACTION SYSTEM FORCEMAIN

NOTES: MONITORING WELL LOCATIONS ARE APPROXIMATE.

BOOMSNUB/AIRCO SUPERFUND SITE  
HAZEL DELL, WASHINGTON

FIGURE 2  
SAMPLING LOCATIONS, SUMMER 2012

## **TABLES**

**Table 1. Volatile Organic Compounds Detected in Monitoring Well Groundwater Samples (in µg/L)  
Summer 2012 Sampling Event**

Well ID	Date Sampled	TCE	PCE	1,1,1-TCA	1,1-DCE	cis-1,2-DCE	CFC-11	Methylene Chloride <sup>1</sup>
AMW-17	7/25/2012	<b>210</b>	1	2.3	<b>1.1</b>	0.50 U	0.50 U	2.0 U
AMW-18	7/25/2012	<b>53</b>	0.22 J	0.30 J	0.50 U	0.50 U	0.60	2.0 U
AMW-64	7/25/2012	<b>170</b>	0.33 J	2.2	<b>2.5</b>	0.63	0.50 U	2.0 U
AMW-64 duplicate	7/25/2012	<b>160</b>	0.40 J	2.4	<b>2.7</b>	0.68	0.50 U	0.11 J
Cleanup Level		5	5	200	1	70	2,400	5

NOTES:  
 Only detected compounds are shown.  
 Results shown in **bold** are at or above the cleanup or guidance level for the compound.  
<sup>1</sup> Methylene chloride was also detected in the trip blank at a concentration of 0.14 J µg/L; this is a common laboratory contaminant.  
 CFC-11 = Trichlorofluoromethane  
 cis-1,2-DCE = cis-1,2-Dichloroethene  
 1,1-DCE = 1,1-Dichloroethene  
 J = The result is an estimated concentration that is less than the Method Reporting Limit but greater than or equal to the Method Detection Limit.  
 PCE = Tetrachloroethene  
 TCE = Trichloroethene  
 U = Analyte was not detected above the specified reporting limit.  
 µg/L = Micrograms per liter

**Table 2. Summary of Water Level Gauging Data and Groundwater Surface Elevations, 25 July 2012  
Summer 2012 Sampling Event**

<b>Well ID</b>	<b>Well Type</b>	<b>Total Depth (ft btoc)</b>	<b>Top of Screen (ft btoc)</b>	<b>Bottom of Screen (ft btoc)</b>	<b>Screen Length (ft)</b>	<b>TOC Elevation (ft MSL)</b>	<b>Depth to Water (ft btoc)</b>	<b>Groundwater Surface Elevation (ft MSL)</b>
AMW-17	M/D	92	81	91	10	261.87	8.78	253.09
AMW-18	M	103.27	92.6	102.6	10	278.80	24.29	254.51
AMW-64	M	98.79	88.4	98.4	10	266.13	13.59	252.54
<p>NOTES:</p> <p>btoc = Below top of casing</p> <p>ft = Feet</p> <p>M = Monitoring well</p> <p>M/D = Monitoring well with dedicated pump</p> <p>MSL = Mean sea level</p> <p>TOC = Top of casing</p> <p>Groundwater surface elevation is determined by subtracting the depth to water from the top-of-casing elevation.</p>								

**Table 3. Historical VOC Concentrations in Well AMW-17 Groundwater Samples (in µg/L)**

Date Sampled	TCE	PCE	1,1,1-TCA	1,1-DCE	Cis-1,2-DCE	CFC-11
Apr-95	<b>66.9</b>	1.0 U	5.8	<b>1.6 J</b>	21	10.6
Oct-95	<b>42.5</b>	1.0 U	36.1	<b>5.4</b>	12.7	19.2 J
May-96	<b>39.6</b>	1.0 U	52.6	<b>9.7</b>	9.2	10.1
Oct-96	<b>20.5</b>	1.0 U	169	<b>25.9</b>	3.5	19.7
May-97	<b>17.3</b>	1.0 U	89.6	<b>23.8</b>	2.1	23.3
Oct. 97	<b>12</b>	0.4 U	67	<b>9.0</b>	--	14.0
May-98	<b>7.0</b>	0.6 U	48	<b>9.0</b>	0.70 U	9.0
Sep-98	<b>8.0</b>	0.6 U	52	<b>9.0</b>	0.70 U	6.0
May-99	<b>5.0</b>	0.6 UJ	12 J	<b>8.0 J</b>	0.70 UJ	5.0 J
Oct-99	3.4	0.5 U	3	<b>1.2</b>	0.50 U	0.50
Oct-01	2.7	0.5 U	4.2	<b>1.8</b>	0.39 J	0.52
Oct-02	2.3	0.5 U	2.2	0.74	0.22 J	0.35 J
Oct-03	2.2	0.5 U	1.1	0.45 J	0.12 J	0.25 J
Oct-04	1.8	0.5 U	0.9	0.32 J	0.50 U	0.19 J
Oct-05	1.9	0.5 U	0.85	0.29 J	0.50 U	0.50 U
Oct-06	1.5	0.5 U	0.69	0.23 J	0.50 U	0.50 U
Oct-07	1.5	0.5 U	1.1	0.50 U	0.50 U	0.50 U
Oct-08	1.2	0.09 J	0.20 J	0.50 U	0.50 U	0.50 U
Jan-09	1.1	0.09 J	0.17 J	0.50 U	0.50 U	0.50 U
May-09	1.3	0.08 J	0.31 J	0.13 J	0.50 U	0.50 U
Oct-09	1.2	0.07 J	0.8	0.22 J	0.50 U	0.50 U
Apr-10	1.1	0.09 J	1.0	0.33 J	0.50 U	0.50 U
Oct-10	<b>28</b>	0.21 J	2.6	<b>1.4</b>	0.50 U	0.50 U
Apr-11	<b>29</b>	0.27 J	1.3	0.89	0.50 U	0.50 U
Oct-11	<b>140</b>	0.68	2.3	<b>1.0</b>	0.50 U	0.50 U
Mar-12	<b>160</b>	0.81	1.5	0.82	0.50 U	0.50 U
Apr-12	<b>160</b>	0.85	1.3	0.76	0.50 U	0.50 U
Jul-12	<b>210</b>	1.0	2.3	<b>1.1</b>	0.50 U	0.50 U
Cleanup Level	5	5	200	1	70	2,400

## NOTES:

**BOLD** results exceed the Boomsnub/Airco Site-specific cleanup level.

Concentrations presented are the highest of the sample and duplicate results, where applicable.

-- = Not available

CFC-11 = Trichlorofluoromethane

cis-1,2-DCE = cis-1,2-Dichloroethene

1,1-DCE = 1,1-Dichloroethene

J = The result is an estimated concentration that is less than the Method Reporting Limit but greater than or equal to the Method Detection Limit.

PCE = Tetrachloroethene

TCE = Trichloroethene

U = Analyte was not detected above the specified reporting limit.

UJ - The analyte was not detected, but the associated limit of quantitation is estimated.

µg/L = Micrograms per liter

VOC = Volatile organic compound

**Table 4. Historical VOC Concentrations in Well AMW-18 Groundwater Samples (in µg/L)**

Date Sampled	TCE	PCE	1,1,1-TCA	1,1-DCE	cis-1,2-DCE	CFC-11
Apr-95	0.73 J	1.0 U	2.9	0.87 J	1.0 U	1.0 UJ
Oct-95	0.3 J	1.0 U	1.0	0.53 J	1.0 U	1.0 U
May-96	1.0 U	1.0 U	0.52 J	1.0 U	1.0 U	1.0 U
Oct-96	0.31 J	1.0 U	0.48 J	1.0 U	1.0 U	1.0 U
May-97	0.43 J	1.0 U	0.44 J	1.0 U	1.0 U	1.0 UJ
Oct. 97	0.3 U	0.4 U	0.4 U	0.4 U	--	0.50 U
May-98	0.5 U	0.6 U	2.0 U	1.0 U	0.70 U	2.0 U
Oct-01	1.1	0.15 J	0.19 J	0.12 J	0.50 U	0.50 U
Oct-02	1.1	0.26 J	0.25 J	0.5 U	0.50 U	0.50 U
Oct-03	0.95	0.29 J	0.17 J	0.5 U	0.50 U	0.50 U
Oct-04	0.64	0.28 J	0.17 J	0.5 U	0.50 U	0.50 U
Oct-05	0.62	0.24 J	0.78	0.13 J	0.50 U	0.50 U
Oct-06	<b>5.1</b>	0.43 J	2.4	0.78	0.50 U	0.50 U
Oct-07	<b>330</b>	1.6	6.5	<b>2.7</b>	0.50 U	0.50 U
Dec-07	<b>410</b>	2.1	7.5	<b>2.9</b>	0.50 U	0.50 U
Jan-08 shallow <sup>a</sup>	<b>430</b>	1.9	6.9	<b>2.6</b>	1.0 U	1.0 U
Jan-08 deep <sup>a</sup>	<b>460</b>	1.9	6.9	<b>2.7</b>	1.0 U	1.0 U
May-08	<b>460</b>	2.3	6.0	<b>2.4</b>	0.50 U	0.50 U
Jul-08	<b>410</b>	1.4	4.8	<b>1.7</b>	1.0 U	1.0 U
Oct-08 <sup>b</sup>	<b>390</b>	1.4	4.5	<b>1.4</b>	1.0 U	1.0 U
Jan-09	<b>300</b>	1.5	3.2	<b>1.3</b>	0.50 U	0.50 U
May-09	<b>320</b>	1.4	2.6	<b>1.1</b>	0.50 U	0.50 U
Oct-09	<b>210</b>	0.75	1.8	0.75	0.50 U	0.50 U
Apr-10	<b>200</b>	0.66	2.1	0.61	0.50 U	0.50 U
Oct-10	<b>130</b>	0.47 J	0.85	0.35 J	0.50 U	0.50 U
Apr-11	<b>75</b>	0.31 J	0.71	0.18 J	0.50 U	0.50 U
Oct-11	<b>68</b>	0.29 J	0.56	0.18 J	0.50 U	0.22 J
Mar-12	<b>52</b>	0.20 J	0.37 J	0.09 J	0.50 U	0.50
Apr-12	<b>52</b>	0.19 J	0.29 J	0.09 J	0.50 U	0.53
Jul-12	<b>53</b>	0.22 J	0.30 J	0.50 U	0.50 U	0.60
Cleanup Level	5	5	200	1	70	2,400

## NOTES:

**BOLD** results exceed the Boomsnub/Airco Site-specific cleanup level.

Only detected compounds are included in this table.

Concentrations presented are the highest of the sample and duplicate results.

<sup>a</sup> = Two samples were collected using PDBs in January 2008 - one near the top of the screened interval (shallow) and one near the bottom (deep).

-- = Not available

CFC-11 = Trichlorofluoromethane

cis-1,2-DCE = cis-1,2-Dichloroethene

1,1-DCE = 1,1-Dichloroethene

J = The result is an estimated concentration that is less than the Method Reporting Limit but greater than or equal to the Method Detection Limit.

PCE = Tetrachloroethene

TCE = Trichloroethene

U = Analyte was not detected above the specified reporting limit.

UJ = The analyte was not detected, but the associated limit of quantitation is estimated.

µg/L = Micrograms per liter

VOC = Volatile organic compound

**Table 5. VOC Concentrations in Well AMW-64 Groundwater Samples (in µg/L)**

<b>Date Sampled</b>	<b>TCE</b>	<b>PCE</b>	<b>1,1,1-TCA</b>	<b>1,1-DCE</b>	<b>Cis-1,2-DCE</b>	<b>CFC-11</b>
Mar-12	<b>190</b>	0.27 J	3.5	<b>2.7</b>	0.11 J	0.50 U
Apr-12	<b>160</b>	0.31 J	1.7	<b>2.5</b>	0.43 J	0.50 U
Jul-12	<b>170</b>	0.40 J	2.4	<b>2.7</b>	0.68	0.50 U
Cleanup Level	5	5	200	1	70	2,400

## NOTES:

**BOLD** results exceed the Boomsnub/Airco Site-specific cleanup level.

Concentrations presented are the highest of the sample and duplicate results, where applicable.

CFC-11 = Trichlorofluoromethane

cis-1,2-DCE = cis-1,2-Dichloroethene

1,1-DCE = 1,1-Dichloroethene

J = The result is an estimated concentration that is less than the Method Reporting Limit but greater than or equal to the Method Detection Limit.

PCE = Tetrachloroethene

TCE = Trichloroethene

U = Analyte was not detected above the specified reporting limit.

µg/L = Micrograms per liter

VOC = Volatile organic compound

**ATTACHMENT A**

**GROUNDWATER PURGE AND SAMPLING FORMS**



# Ground Water Purge and Sampling Form

Well Identification	Site Location: Boomsnub										Date: 7/25/12
Well Diameter (inches)	Project Number: 14495.28										Personnel: KB/RR
Well Monument Locked and Good Condition?	Purge Method: <input checked="" type="checkbox"/> Low Flow <input type="checkbox"/> Conventional <input type="checkbox"/> None										
Inside Well Head and Outside Well Casing (D=dry); (WAC=Water above Casing), WBC=Water Below Casing)	Purge Equipment: <input type="checkbox"/> Extraction Well <input checked="" type="checkbox"/> Redi-flo Pump (Ded) <input type="checkbox"/> Other										
Well Casing Plug Locked and Good Condition?	Sampling Equipment: <input type="checkbox"/> Extraction Well <input checked="" type="checkbox"/> Redi-flo Pump <input type="checkbox"/> Diffusion Bag										
PID Reading in Well (ppm)	Weather Conditions:										
Well Total Depth (ft btoc)	Sunny ☀️										
Time	1017	1022	1027	1032	1037	1042	1047				
Depth to Ground water (ft btoc)	8.85	8.85	8.84	8.84	8.84	8.84	8.84				
Total Groundwater Purged (gallons (liters))	2	4	6	8	10	12	14				
Purge Rate (gpm, ft <sup>3</sup> /min (ml/min))	400	400	400	400	400	400	400				
pH	6.76	6.51	6.47	6.45	6.45	6.44	6.44				
Conductivity (mS/cm)	0.160	0.160	0.158	0.158	0.156	0.155	0.155				
Turbidity (NTU)	0.25	0.13	0.40	0.12	0.16	0.23	0.39				
Dissolved Oxygen (mg/L)	2.24	0.57	0.37	0.31	0.25	0.21	0.18				
Temperature (°C)	15.0	14.9	15.1	14.9	14.9	14.6	14.9				
ORP/eH (mV)	188	185	178	172	160	160	154				
Color of Purged Water (gray, brown, red, clear)	clear	clear	clear	clear	clear	clear	clear				
Sample Identification: 1230002	# of bottles/analysis										Comments:
Time Sampled: 1050	3										Initial DTW = 8.78'
Purge water disposed To: Boomsnub	=										Final DTW = 8.75'



# Ground Water Purge and Sampling Form

Well Identification	AMW-18	Site Location: Boomsnub	Date: 7/25/12					
Well Diameter (inches)	4	Project Number: 14495.28	Personnel: KB/RR					
Well Monument Locked and Good Condition?	Y	Purge Method: <input checked="" type="checkbox"/> Low Flow <input type="checkbox"/> Conventional <input type="checkbox"/> None						
Inside Well Head and Outside Well Casing (D=dry), (WAC=Water above Casing), WBC=Water Below Casing)	D	Purge Equipment: <input type="checkbox"/> Extraction Well <input type="checkbox"/> Redi-flo Pump (Ded) <input checked="" type="checkbox"/> Other						
Well Casing Plug Locked and Good Condition?	Y	Sampling Equipment: <input type="checkbox"/> Extraction Well <input checked="" type="checkbox"/> Redi-flo Pump <input type="checkbox"/> Diffusion Bag						
PID Reading in Well (ppm)	-	Weather Conditions: Sunny 75°						
Well Total Depth (ft btoc)	103.27	Well Volume Calculation: 2"=, 16, 4"=64, 6"=1.44 gallons						
Time	1412	1422	1427	1432	1437	1442	1447	1452
Depth to Ground water (ft btoc)	24.29'	24.47	24.47	24.47	24.47	24.47	24.49	24.49
Total Groundwater Purged (gallons/ liters)		4	0	8	10	12	14	16
Purge Rate (gpm, ft <sup>3</sup> /min, ml/min)	400	400	400	400	400	400	400	400
pH		6.40	6.32	6.22	6.10	6.01	5.95	5.92
Conductivity (mS/cm)		0.152	0.154	0.157	0.162	0.162	0.163	0.161
Turbidity (NTU)		12.1	7.88	5.99	4.67	4.33	3.93	4.07
Dissolved Oxygen (mg/L)		0.90	0.78	0.69	0.62	0.69	0.70	0.76
Temperature (°C)		16.5	16.4	16.3	16.2	16.2	16.1	16.2
ORP/eH (mV)		135	129	120	124	122	121	121
Color of Purged Water (gray, brown, red, clear)		clear	clear	clear	clear	clear	clear	clear
Sample Identification: 1230003 (1500)	# of bottles/analysis	Comments: Initial DTW = 24.29'						
Time Sampled: 1230003 MS (1500) 9	VOCs by 8260b	1412: Started pumping,						
1230003 MSD (1500) =	Total Chromium	Final DTW = 24.56'						
Purge water disposed To: Boomsnub		TD = 101.89						
		1.38						
		103.27						



# Ground Water Purge and Sampling Form

Well Identification	AMW-64		Site Location: Boomsnub	Date: 7/25/12					
Well Diameter (inches)	4		Project Number: 14495.28	Personnel: KB/RR					
Well Monument Locked and Good Condition?	Y		Purge Method: <input checked="" type="checkbox"/> Low Flow <input type="checkbox"/> Conventional <input type="checkbox"/> None						
Inside Well Head and Outside Well Casing (D=dry), (WAC=Water above Casing), WBC=Water Below Casing)	WAC		Purge Equipment: <input type="checkbox"/> Extraction Well <input type="checkbox"/> Redi-flo Pump (Ded) <input checked="" type="checkbox"/> Other						
Well Casing Plug Locked and Good Condition?	Y		Sampling Equipment: <input type="checkbox"/> Extraction Well <input checked="" type="checkbox"/> Redi-flo Pump <input type="checkbox"/> Diffusion Bag						
PID Reading in Well (ppm)	-		Weather Conditions: Sunny 82°						
Well Total Depth (ft btoc)			Well Volume Calculation: 2"=1.6, 4"=6.4, 6"=1.44 gallons						
Time	1639	1649	1659	1704	1709	1714	1719	1724	1729
Depth to Groundwater (ft btoc)	13.59	13.63	14.20	14.58	15.34	-	15.79	15.90	16.05
Total Groundwater Purged (gallons, (liters))		250	5.0	6.25	7.5	8.75	10	11.25	12.5
Purge Rate (gpm, ft <sup>3</sup> /min, (ml/min))			250	250	250	250	250	250	250
pH		7.18	6.97	6.90	6.81	6.74	6.68	6.65	6.65
Conductivity (mS/cm)		0.269	0.273	0.270	0.267	0.267	0.265	0.264	0.264
Turbidity (NTU)		4.34	6.90	4.44	2.91	2.50	2.54	2.32	2.91
Dissolved Oxygen (mg/L)		0.32	0.31	0.19	0.10	0.09	0.09	0.11	0.12
Temperature (°C)		18.4	19.5	19.2	17.0	17.2	17.6	18.3	19.3
ORP/eH (mV)		-27	-65	-76	-87	-93	-95	-95	-95
Color of Purged Water (gray, brown, red, clear)		Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
Sample Identification: 1230005 (1735)	# of bottles/analysis		Comments: Initial DTW: 13.59'						
Time Sampled: 1230000 (1740)	0		Final DTW: 17.40'						
Purge water disposed To: Boomsnub	=		TD: 47.41 + 1.38 = 48.79'						
			Pump set at about 48.4'						

**ATTACHMENT B**

**LABORATORY ANALYTICAL RESULTS**

**Sample Cross Reference Form**  
**Summer 2012 Quarterly Groundwater Sampling Event**

<b>Lab ID</b>	<b>Well/Sample ID</b>	<b>Sample Date</b>	<b>Sample Time</b>	<b>Comments</b>
1230001	Trip Blank	7/25/2012	--	
1230002	AMW-17	7/25/2012	1050	
1230003	AMW-18	7/25/2012	1500	MS/MSD collected
1230004	Rinsate	7/25/2012	1550	Equipment rinsate
1230005	AMW-64	7/25/2012	1735	
1230006	AMW-64	7/25/2012	1740	Duplicate



August 14, 2012

Analytical Report for Service Request No: K1207258

Cathy Bohlke  
EA Engineering, Science and Technology  
720 Sixth Street South, Suite 100  
Kirkland, WA 98033

**RE: Boomsnub/14495.28 0005**

Dear Cathy

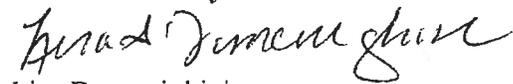
Enclosed are the results of the samples submitted to our laboratory on July 26, 2012. For your reference, these analyses have been assigned our service request number K1207258.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at [www.caslab.com](http://www.caslab.com). All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3363. You may also contact me via Email at [Lisa.Domenighini@alsglobal.com](mailto:Lisa.Domenighini@alsglobal.com).

Respectfully submitted,

**Columbia Analytical Services, Inc.**

  
Lisa Domenighini  
Project Chemist

LD/jw

Page 1 of 611



ADDRESS 1317 S. 13<sup>th</sup> Avenue, Kelso, WA 98626

PHONE +1 360 577 7222 FAX +1 360 636 1068

Columbia Analytical Services, Inc.

Part of the ALS Group A Campbell Brothers Limited Company

Environmental 

[www.caslab.com](http://www.caslab.com) ■ [www.alsglobal.com](http://www.alsglobal.com)

RIGHT SOLUTIONS. RIGHT PEOPLE. RIGHT TIME.

## Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

### Inorganic Data Qualifiers

- \* The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.  
*DOD-QSM 4.2 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

### Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.  
*DOD-QSM 4.2 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

### Organic Data Qualifiers

- \* The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.  
*DOD-QSM 4.2 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

### Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**Columbia Analytical Services, Inc. dba ALS Environmental (ALS) - Kelso  
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEC UST	<a href="http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx">http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx</a>	UST-040
Arizona DHS	<a href="http://www.azdhs.gov/lab/license/env.htm">http://www.azdhs.gov/lab/license/env.htm</a>	AZ0339
Arkansas - DEQ	<a href="http://www.adeq.state.ar.us/techsvs/labcert.htm">http://www.adeq.state.ar.us/techsvs/labcert.htm</a>	88-0637
California DHS (ELAP)	<a href="http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx">http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx</a>	2286
DOD ELAP	<a href="http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm">http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm</a>	L12-28
Florida DOH	<a href="http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm">http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm</a>	E87412
Georgia DNR	<a href="http://www.gaepd.org/Documents/techguide_pcb.html#cel">http://www.gaepd.org/Documents/techguide_pcb.html#cel</a>	881
Hawaii DOH	Not available	-
Idaho DIHW	<a href="http://www.healthandwelfare.idaho.gov/Health/Labs/CertificationDrinkingWaterLabs/tabid/1833/Default.aspx">http://www.healthandwelfare.idaho.gov/Health/Labs/CertificationDrinkingWaterLabs/tabid/1833/Default.aspx</a>	-
Indiana DOH	<a href="http://www.in.gov/isdh/24859.htm">http://www.in.gov/isdh/24859.htm</a>	C-WA-01
ISO 17025	<a href="http://www.pjllabs.com/">http://www.pjllabs.com/</a>	L12-27
Louisiana DEQ	<a href="http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx">http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx</a>	3016
Louisiana DHH	Not available	LA110003
Maine DHS	Not available	WA0035
Michigan DEQ	<a href="http://www.michigan.gov/deq/0,1607,7-135-3307_4131_4156---,00.html">http://www.michigan.gov/deq/0,1607,7-135-3307_4131_4156---,00.html</a>	9949
Minnesota DOH	<a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>	053-999-368
Montana DPHHS	<a href="http://www.dphhs.mt.gov/publichealth/">http://www.dphhs.mt.gov/publichealth/</a>	CERT0047
Nevada DEP	<a href="http://ndep.nv.gov/bsdw/labservice.htm">http://ndep.nv.gov/bsdw/labservice.htm</a>	WA35
New Jersey DEP	<a href="http://www.nj.gov/dep/oqa/">http://www.nj.gov/dep/oqa/</a>	WA005
New Mexico ED	<a href="http://www.nmenv.state.nm.us/dwb/Index.htm">http://www.nmenv.state.nm.us/dwb/Index.htm</a>	-
North Carolina DWQ	<a href="http://www.dwqlab.org/">http://www.dwqlab.org/</a>	605
Oklahoma DEQ	<a href="http://www.deq.state.ok.us/CSDnew/labcert.htm">http://www.deq.state.ok.us/CSDnew/labcert.htm</a>	9801
Oregon – DEQ (NELAP)	<a href="http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>	WA200001
South Carolina DHEC	<a href="http://www.scdhec.gov/environment/envserv/">http://www.scdhec.gov/environment/envserv/</a>	61002
Texas CEQ	<a href="http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html</a>	704427-08-TX
Washington DOE	<a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>	C1203
Wisconsin DNR	<a href="http://dnr.wi.gov/">http://dnr.wi.gov/</a>	998386840
Wyoming (EPA Region 8)	<a href="http://www.epa.gov/region8/water/dwhome/wyomingdi.html">http://www.epa.gov/region8/water/dwhome/wyomingdi.html</a>	-
Kelso Laboratory Website	<a href="http://www.caslab.com">www.caslab.com</a>	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at [www.caslab.com](http://www.caslab.com) or at the accreditation bodies web site. Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.

## **Case Narrative**

## ALS ENVIRONMENTAL

**Client:** EA Engineering Science and Technology      **Service Request No.:** K1207258  
**Project:** Bomsnub/14495.28.0005      **Date Received:** 07/26/12  
**Sample Matrix:** Water

### CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

#### Sample Receipt

Six water samples were received for analysis at ALS Environmental on 07/26/12. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

#### Volatile Organic Compounds by EPA Method 8260

##### **Calibration Verification Exceptions:**

The following analyte was flagged as outside the upper control criterion for Continuing Calibration Verification (CCV) J:\MS27\0803F003.D: Toluene-d8. In accordance with the EPA Method, 80% or more of the CCV analytes must pass within 20% of the true value. The CAS SOP allows for 40% difference for the remaining analytes. The CCV met these criteria. The quality of the sample data was not significantly affected. No further corrective action was required.

The following analytes were flagged as outside the upper control criterion for Continuing Calibration Verification (CCV) J:\MS27\0806F003.D: 1,2-Dibromo-3-chloropropane and Toluene-d8. In accordance with the EPA Method, 80% or more of the CCV analytes must pass within 20% of the true value. The CAS SOP allows for 40% difference for the remaining analytes. The CCV met these criteria. The quality of the sample data was not significantly affected. No further corrective action was required.

##### **Matrix Spike Recovery Exceptions:**

The matrix spike recovery of Hexachlorobutadiene and the duplicate matrix spike recoveries of 1,1,2,2-Tetrachloroethane, 1,2-Dibromo-3-chloropropane, and Hexachlorobutadiene for sample 1230003 was outside control criteria. Recovery in the Laboratory Control Sample (LCS) was acceptable, which indicated the analytical batch was in control. The matrix spike outlier suggested a potential high bias in this matrix. No further corrective action was appropriate.

The control criteria for matrix spike and duplicate spike recovery of Trichloroethene (TCE) for sample 1230003 were not applicable. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

##### **Calibration Range Exceedence:**

The result for Trichloroethene (TCE) was estimated in sample 1230003DMS KWG1208689-2 because the concentration exceeded the instrument calibration range due to the analyte in question being present in the sample matrix at an elevated amount.

No other anomalies associated with the analysis of these samples were observed.

Approved by *Dina A. Jaramila* Date 8/14/12

## **Chain of Custody**

PROJECT NAME: Boomsnuw  
 PROJECT NUMBER: 14495.28 0005  
 PROJECT MANAGER: Cathy Bonike  
 COMPANY ADDRESS: 720 6th St. South, Suite 100  
 CITY/STATE/ZIP: Kirkland, WA 98033  
 E-MAIL ADDRESS: cbonike@eaest.com  
 PHONE: (425) 451-7400 FAX: (425) 451-7800  
 ANALYST'S SIGNATURE: Kristin Beckwith

SAMPLE ID	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS
1230001	7/5/12	-	1	water	<input checked="" type="checkbox"/> Semivolatile Organics by GC/MS 625 <input type="checkbox"/> 8270 <input type="checkbox"/> 8270LL <input type="checkbox"/> <input checked="" type="checkbox"/> Volatile Organics 624 <input type="checkbox"/> 8260 <input checked="" type="checkbox"/> BK 8021 <input type="checkbox"/> BTEX <input type="checkbox"/> <input type="checkbox"/> Gas <input type="checkbox"/> Diesel <input type="checkbox"/> Oil <input type="checkbox"/> <input type="checkbox"/> Hydrocarbons (*see below) <input type="checkbox"/> Fuel Fingerprint (FIQ) <input type="checkbox"/> NW-HCID Screen <input type="checkbox"/> Oil & Grease/TRPH 1664 HEM <input type="checkbox"/> 1664 SGT <input type="checkbox"/> <input type="checkbox"/> PCB's <input type="checkbox"/> Aroclors <input type="checkbox"/> Congeners <input type="checkbox"/> <input type="checkbox"/> Pesticides/Herbicides 608 <input type="checkbox"/> 8081A <input type="checkbox"/> 8141A <input type="checkbox"/> 8151A <input type="checkbox"/> <input type="checkbox"/> Chlorophenolics - 8151M Tri <input type="checkbox"/> Tetra <input type="checkbox"/> PCP <input type="checkbox"/> <input type="checkbox"/> PAHS 8310 <input type="checkbox"/> SIM <input type="checkbox"/> <input type="checkbox"/> Metals, Total or Dissolved (See list below) <input type="checkbox"/> Cyanide <input type="checkbox"/> Hex-Chrom <input type="checkbox"/> <input type="checkbox"/> pH, Cond., Cl, SO4, PO4, F, NO2, NO3, BOD, TSS, TDS (circle) <input type="checkbox"/> NH3-N, COD, Total-P, TKN, TOC, DOC (circle) NO2+NO3 <input type="checkbox"/> TOX 9020 <input type="checkbox"/> AOX 1650 <input type="checkbox"/> 506 <input type="checkbox"/>
1230002			2		
1230003			3		
1230003 MS			3		
1230003 MSD			3		
1230004			4		
1230005			5		
1230006	7/5/12		6	water	<input checked="" type="checkbox"/>

REPORT REQUIREMENTS:  
 I. Routine Report: Method Blank, Surrogate, as required  
 II. Report Dup., MS, MSD as required  
 III. Data Validation Report (includes all raw data)  
 IV. CLP Deliverable Report  
 V. EDD

INVOICE INFORMATION  
 P.O. #: \_\_\_\_\_  
 Bill To: EA Engineering  
Kirkland, WA 98033

TURNAROUND REQUIREMENTS  
 24 hr \_\_\_\_\_ 48 hr \_\_\_\_\_  
 5 Day \_\_\_\_\_  
 Standard (110-115 working days)  
 Provide FAX Results

SPECIAL INSTRUCTIONS/COMMENTS:  
 \*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER: \_\_\_\_\_ (CIRCLE ONE)  
 Temperature Blank included.  
 Include PDF deliverable

RELINQUISHED BY: Kristin Beckwith Date/Time: 7/26/12 9:05  
 RECEIVED BY: Paul Duff Date/Time: 7/26/12 13:20

RELINQUISHED BY: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
 RECEIVED BY: \_\_\_\_\_ Date/Time: \_\_\_\_\_

RELINQUISHED BY: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
 RECEIVED BY: \_\_\_\_\_ Date/Time: \_\_\_\_\_



PC LISA

### Cooler Receipt and Preservation Form

Client / Project: EA Engineering Service Request K12 07768  
 Received: 4/26/12 Opened: 4/26/12 By: SMW Unloaded: 4/26/12 By: SMW

1. Samples were received via? Mail Fed Ex UPS DHL PDX Courier Hand Delivered  
 2. Samples were received in: (circle) Cooler Box Envelope Other NA  
 3. Were custody seals on coolers? NA Y N If yes, how many and where? 2 front + side  
 If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID	Tracking Number	NA	Filed
<u>4.1</u>	<u>0.9</u>	<u>287</u>	<u>NA</u>		<u>NA</u>	

7. Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves  
 8. Were custody papers properly filled out (ink, signed, etc.)? NA Y N  
 9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA Y N  
 10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N  
 11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N  
 12. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N  
 13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N  
 14. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N  
 15. Was Cl2/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head- space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions:  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## **Volatile Organic Compounds**

Organic Analysis:  
Volatile Organic Compounds

Summary Package

Sample and QC Results

COLUMBIA ANALYTICAL SERVICES, INC.  
Now part of the ALS Group

Client: EA Engineering, Science, and Technology  
Project: Boomsnub/14495.28 0005

Service Request: K1207258

Cover Page - Organic Analysis Data Package  
Volatile Organic Compounds

Sample Name	Lab Code	Date Collected	Date Received
1230001	K1207258-001	07/25/2012	07/26/2012
1230002	K1207258-002	07/25/2012	07/26/2012
1230003	K1207258-003	07/25/2012	07/26/2012
1230004	K1207258-004	07/25/2012	07/26/2012
1230005	K1207258-005	07/25/2012	07/26/2012
1230006	K1207258-006	07/25/2012	07/26/2012
1230003MS	KWG1208689-1	07/25/2012	07/26/2012
1230003DMS	KWG1208689-2	07/25/2012	07/26/2012

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Holly Butcher

Name: Holly Butcher

Date: 08-01-2012

Title: Scientist

HB 8/13/12

**COLUMBIA ANALYTICAL SERVICES, INC.**

Now part of the ALS Group

Analytical Results

**Client:** EA Engineering, Science, and Technology  
**Project:** Boomsnub/14495.28 0005  
**Sample Matrix:** Water

**Service Request:** K1207258  
**Date Collected:** 07/25/2012  
**Date Received:** 07/26/2012

**Volatile Organic Compounds**

**Sample Name:** 1230001 Trip Blank  
**Lab Code:** K1207258-001  
**Extraction Method:** EPA 5030B  
**Analysis Method:** 8260C

**Units:** ug/L  
**Basis:** NA  
**Level:** Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Vinyl Chloride	ND	U	0.50	0.075	1	08/03/12	08/03/12	KWG1208689	
Trichlorofluoromethane	ND	U	0.50	0.12	1	08/03/12	08/03/12	KWG1208689	
1,1-Dichloroethene	ND	U	0.50	0.080	1	08/03/12	08/03/12	KWG1208689	
Methylene Chloride	0.14	J	2.0	0.10	1	08/03/12	08/03/12	KWG1208689	
trans-1,2-Dichloroethene	ND	U	0.50	0.072	1	08/03/12	08/03/12	KWG1208689	
cis-1,2-Dichloroethene	ND	U	0.50	0.067	1	08/03/12	08/03/12	KWG1208689	
1,1,1-Trichloroethane (TCA)	ND	U	0.50	0.075	1	08/03/12	08/03/12	KWG1208689	
Carbon Tetrachloride	ND	U	0.50	0.096	1	08/03/12	08/03/12	KWG1208689	
1,2-Dichloroethane (EDC)	ND	U	0.50	0.080	1	08/03/12	08/03/12	KWG1208689	
Trichloroethene (TCE)	ND	U	0.50	0.10	1	08/03/12	08/03/12	KWG1208689	
Bromodichloromethane	ND	U	0.50	0.091	1	08/03/12	08/03/12	KWG1208689	
Tetrachloroethene (PCE)	ND	U	0.50	0.099	1	08/03/12	08/03/12	KWG1208689	
Dibromochloromethane	ND	U	0.50	0.14	1	08/03/12	08/03/12	KWG1208689	
1,1,2,2-Tetrachloroethane	ND	U	0.50	0.16	1	08/03/12	08/03/12	KWG1208689	
1,2-Dibromo-3-chloropropane	ND	U	2.0	0.20	1	08/03/12	08/03/12	KWG1208689	
Hexachlorobutadiene	ND	U	2.0	0.11	1	08/03/12	08/03/12	KWG1208689	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	117	73-122	08/03/12	Acceptable
Toluene-d8	120	65-144	08/03/12	Acceptable
4-Bromofluorobenzene	107	68-117	08/03/12	Acceptable

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

**COLUMBIA ANALYTICAL SERVICES, INC.**

Now part of the ALS Group

Analytical Results

**Client:** EA Engineering, Science, and Technology  
**Project:** Boomsnub/14495.28 0005  
**Sample Matrix:** Water

**Service Request:** K1207258  
**Date Collected:** 07/25/2012  
**Date Received:** 07/26/2012

**Volatile Organic Compounds**

**Sample Name:** 1230002 *AMW-17*  
**Lab Code:** K1207258-002  
**Extraction Method:** EPA 5030B  
**Analysis Method:** 8260C

**Units:** ug/L  
**Basis:** NA  
**Level:** Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Vinyl Chloride	ND	U	0.50	0.075	1	08/03/12	08/03/12	KWG1208689	
Trichlorofluoromethane	ND	U	0.50	0.12	1	08/03/12	08/03/12	KWG1208689	
1,1-Dichloroethene	1.1		0.50	0.080	1	08/03/12	08/03/12	KWG1208689	
Methylene Chloride	ND	U	2.0	0.10	1	08/03/12	08/03/12	KWG1208689	
trans-1,2-Dichloroethene	ND	U	0.50	0.072	1	08/03/12	08/03/12	KWG1208689	
cis-1,2-Dichloroethene	ND	U	0.50	0.067	1	08/03/12	08/03/12	KWG1208689	
1,1,1-Trichloroethane (TCA)	2.3		0.50	0.075	1	08/03/12	08/03/12	KWG1208689	
Carbon Tetrachloride	ND	U	0.50	0.096	1	08/03/12	08/03/12	KWG1208689	
1,2-Dichloroethane (EDC)	ND	U	0.50	0.080	1	08/03/12	08/03/12	KWG1208689	
Trichloroethene (TCE)	210	D	5.0	1.0	10	08/03/12	08/03/12	KWG1208689	
Bromodichloromethane	ND	U	0.50	0.091	1	08/03/12	08/03/12	KWG1208689	
Tetrachloroethene (PCE)	1.0		0.50	0.099	1	08/03/12	08/03/12	KWG1208689	
Dibromochloromethane	ND	U	0.50	0.14	1	08/03/12	08/03/12	KWG1208689	
1,1,2,2-Tetrachloroethane	ND	U	0.50	0.16	1	08/03/12	08/03/12	KWG1208689	
1,2-Dibromo-3-chloropropane	ND	U	2.0	0.20	1	08/03/12	08/03/12	KWG1208689	
Hexachlorobutadiene	ND	U	2.0	0.11	1	08/03/12	08/03/12	KWG1208689	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	115	73-122	08/03/12	Acceptable
Toluene-d8	123	65-144	08/03/12	Acceptable
4-Bromofluorobenzene	107	68-117	08/03/12	Acceptable

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

**COLUMBIA ANALYTICAL SERVICES, INC.**

Now part of the ALS Group

Analytical Results

**Client:** EA Engineering, Science, and Technology  
**Project:** Boomsnub/14495.28 0005  
**Sample Matrix:** Water

**Service Request:** K1207258  
**Date Collected:** 07/25/2012  
**Date Received:** 07/26/2012

**Volatile Organic Compounds**

**Sample Name:** 1230003 *AMW -18*  
**Lab Code:** K1207258-003  
**Extraction Method:** EPA 5030B  
**Analysis Method:** 8260C

**Units:** ug/L  
**Basis:** NA  
**Level:** Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Vinyl Chloride	ND	U	0.50	0.075	1	08/03/12	08/03/12	KWG1208689	
Trichlorofluoromethane	0.60		0.50	0.12	1	08/03/12	08/03/12	KWG1208689	
1,1-Dichloroethene	ND	U	0.50	0.080	1	08/03/12	08/03/12	KWG1208689	
Methylene Chloride	ND	U	2.0	0.10	1	08/03/12	08/03/12	KWG1208689	
trans-1,2-Dichloroethene	ND	U	0.50	0.072	1	08/03/12	08/03/12	KWG1208689	
cis-1,2-Dichloroethene	ND	U	0.50	0.067	1	08/03/12	08/03/12	KWG1208689	
1,1,1-Trichloroethane (TCA)	0.30	J	0.50	0.075	1	08/03/12	08/03/12	KWG1208689	
Carbon Tetrachloride	ND	U	0.50	0.096	1	08/03/12	08/03/12	KWG1208689	
1,2-Dichloroethane (EDC)	ND	U	0.50	0.080	1	08/03/12	08/03/12	KWG1208689	
Trichloroethene (TCE)	53		0.50	0.10	1	08/03/12	08/03/12	KWG1208689	
Bromodichloromethane	ND	U	0.50	0.091	1	08/03/12	08/03/12	KWG1208689	
Tetrachloroethene (PCE)	0.22	J	0.50	0.099	1	08/03/12	08/03/12	KWG1208689	
Dibromochloromethane	ND	U	0.50	0.14	1	08/03/12	08/03/12	KWG1208689	
1,1,2,2-Tetrachloroethane	ND	U	0.50	0.16	1	08/03/12	08/03/12	KWG1208689	
1,2-Dibromo-3-chloropropane	ND	U	2.0	0.20	1	08/03/12	08/03/12	KWG1208689	
Hexachlorobutadiene	ND	U	2.0	0.11	1	08/03/12	08/03/12	KWG1208689	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	116	73-122	08/03/12	Acceptable
Toluene-d8	120	65-144	08/03/12	Acceptable
4-Bromofluorobenzene	106	68-117	08/03/12	Acceptable

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

**COLUMBIA ANALYTICAL SERVICES, INC.**

Now part of the ALS Group

Analytical Results

**Client:** EA Engineering, Science, and Technology  
**Project:** Boomsnub/14495.28 0005  
**Sample Matrix:** Water

**Service Request:** K1207258  
**Date Collected:** 07/25/2012  
**Date Received:** 07/26/2012

**Volatile Organic Compounds**

**Sample Name:** 1230004 *Rinsate*  
**Lab Code:** K1207258-004  
**Extraction Method:** EPA 5030B  
**Analysis Method:** 8260C

**Units:** ug/L  
**Basis:** NA  
**Level:** Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Vinyl Chloride	ND	U	0.50	0.075	1	08/03/12	08/03/12	KWG1208689	
Trichlorofluoromethane	ND	U	0.50	0.12	1	08/03/12	08/03/12	KWG1208689	
1,1-Dichloroethene	ND	U	0.50	0.080	1	08/03/12	08/03/12	KWG1208689	
Methylene Chloride	ND	U	2.0	0.10	1	08/03/12	08/03/12	KWG1208689	
trans-1,2-Dichloroethene	ND	U	0.50	0.072	1	08/03/12	08/03/12	KWG1208689	
cis-1,2-Dichloroethene	ND	U	0.50	0.067	1	08/03/12	08/03/12	KWG1208689	
1,1,1-Trichloroethane (TCA)	ND	U	0.50	0.075	1	08/03/12	08/03/12	KWG1208689	
Carbon Tetrachloride	ND	U	0.50	0.096	1	08/03/12	08/03/12	KWG1208689	
1,2-Dichloroethane (EDC)	ND	U	0.50	0.080	1	08/03/12	08/03/12	KWG1208689	
Trichloroethene (TCE)	ND	U	0.50	0.10	1	08/03/12	08/03/12	KWG1208689	
Bromodichloromethane	ND	U	0.50	0.091	1	08/03/12	08/03/12	KWG1208689	
Tetrachloroethene (PCE)	ND	U	0.50	0.099	1	08/03/12	08/03/12	KWG1208689	
Dibromochloromethane	ND	U	0.50	0.14	1	08/03/12	08/03/12	KWG1208689	
1,1,2,2-Tetrachloroethane	ND	U	0.50	0.16	1	08/03/12	08/03/12	KWG1208689	
1,2-Dibromo-3-chloropropane	ND	U	2.0	0.20	1	08/03/12	08/03/12	KWG1208689	
Hexachlorobutadiene	ND	U	2.0	0.11	1	08/03/12	08/03/12	KWG1208689	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	116	73-122	08/03/12	Acceptable
Toluene-d8	118	65-144	08/03/12	Acceptable
4-Bromofluorobenzene	103	68-117	08/03/12	Acceptable

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

**COLUMBIA ANALYTICAL SERVICES, INC.**

Now part of the ALS Group

Analytical Results

**Client:** EA Engineering, Science, and Technology  
**Project:** Boomsnub/14495.28 0005  
**Sample Matrix:** Water

**Service Request:** K1207258  
**Date Collected:** 07/25/2012  
**Date Received:** 07/26/2012

**Volatile Organic Compounds**

**Sample Name:** 1230005 AMW-69  
**Lab Code:** K1207258-005  
**Extraction Method:** EPA 5030B  
**Analysis Method:** 8260C

**Units:** ug/L  
**Basis:** NA  
**Level:** Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Vinyl Chloride	ND	U	0.50	0.075	1	08/03/12	08/03/12	KWG1208689	
Trichlorofluoromethane	ND	U	0.50	0.12	1	08/03/12	08/03/12	KWG1208689	
1,1-Dichloroethene	2.5		0.50	0.080	1	08/03/12	08/03/12	KWG1208689	
Methylene Chloride	ND	U	2.0	0.10	1	08/03/12	08/03/12	KWG1208689	
trans-1,2-Dichloroethene	ND	U	0.50	0.072	1	08/03/12	08/03/12	KWG1208689	
cis-1,2-Dichloroethene	0.63		0.50	0.067	1	08/03/12	08/03/12	KWG1208689	
1,1,1-Trichloroethane (TCA)	2.2		0.50	0.075	1	08/03/12	08/03/12	KWG1208689	
Carbon Tetrachloride	ND	U	0.50	0.096	1	08/03/12	08/03/12	KWG1208689	
1,2-Dichloroethane (EDC)	ND	U	0.50	0.080	1	08/03/12	08/03/12	KWG1208689	
Trichloroethene (TCE)	170	D	5.0	1.0	10	08/03/12	08/03/12	KWG1208689	
Bromodichloromethane	ND	U	0.50	0.091	1	08/03/12	08/03/12	KWG1208689	
Tetrachloroethene (PCE)	0.33	J	0.50	0.099	1	08/03/12	08/03/12	KWG1208689	
Dibromochloromethane	ND	U	0.50	0.14	1	08/03/12	08/03/12	KWG1208689	
1,1,2,2-Tetrachloroethane	ND	U	0.50	0.16	1	08/03/12	08/03/12	KWG1208689	
1,2-Dibromo-3-chloropropane	ND	U	2.0	0.20	1	08/03/12	08/03/12	KWG1208689	
Hexachlorobutadiene	ND	U	2.0	0.11	1	08/03/12	08/03/12	KWG1208689	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	117	73-122	08/03/12	Acceptable
Toluene-d8	122	65-144	08/03/12	Acceptable
4-Bromofluorobenzene	106	68-117	08/03/12	Acceptable

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

**COLUMBIA ANALYTICAL SERVICES, INC.**

Now part of the ALS Group

Analytical Results

**Client:** EA Engineering, Science, and Technology  
**Project:** Boomsnub/14495.28 0005  
**Sample Matrix:** Water

**Service Request:** K1207258  
**Date Collected:** 07/25/2012  
**Date Received:** 07/26/2012

**Volatile Organic Compounds**

**Sample Name:** 1230006 AMW-64 Dup.  
**Lab Code:** K1207258-006  
**Extraction Method:** EPA 5030B  
**Analysis Method:** 8260C

**Units:** ug/L  
**Basis:** NA  
**Level:** Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Vinyl Chloride	ND	U	0.50	0.075	1	08/06/12	08/06/12	KWG1208768	
Trichlorofluoromethane	ND	U	0.50	0.12	1	08/06/12	08/06/12	KWG1208768	
1,1-Dichloroethene	2.7		0.50	0.080	1	08/06/12	08/06/12	KWG1208768	
Methylene Chloride	0.11	J	2.0	0.10	1	08/06/12	08/06/12	KWG1208768	
trans-1,2-Dichloroethene	ND	U	0.50	0.072	1	08/06/12	08/06/12	KWG1208768	
cis-1,2-Dichloroethene	0.68		0.50	0.067	1	08/06/12	08/06/12	KWG1208768	
1,1,1-Trichloroethane (TCA)	2.4		0.50	0.075	1	08/06/12	08/06/12	KWG1208768	
Carbon Tetrachloride	ND	U	0.50	0.096	1	08/06/12	08/06/12	KWG1208768	
1,2-Dichloroethane (EDC)	ND	U	0.50	0.080	1	08/06/12	08/06/12	KWG1208768	
Trichloroethene (TCE)	160	D	5.0	1.0	10	08/06/12	08/06/12	KWG1208768	
Bromodichloromethane	ND	U	0.50	0.091	1	08/06/12	08/06/12	KWG1208768	
Tetrachloroethene (PCE)	0.40	J	0.50	0.099	1	08/06/12	08/06/12	KWG1208768	
Dibromochloromethane	ND	U	0.50	0.14	1	08/06/12	08/06/12	KWG1208768	
1,1,2,2-Tetrachloroethane	ND	U	0.50	0.16	1	08/06/12	08/06/12	KWG1208768	
1,2-Dibromo-3-chloropropane	ND	U	2.0	0.20	1	08/06/12	08/06/12	KWG1208768	
Hexachlorobutadiene	ND	U	2.0	0.11	1	08/06/12	08/06/12	KWG1208768	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	120	73-122	08/06/12	Acceptable
Toluene-d8	125	65-144	08/06/12	Acceptable
4-Bromofluorobenzene	108	68-117	08/06/12	Acceptable

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

**COLUMBIA ANALYTICAL SERVICES, INC.**

Now part of the ALS Group

Analytical Results

**Client:** EA Engineering, Science, and Technology  
**Project:** Boomsnub/14495.28 0005  
**Sample Matrix:** Water

**Service Request:** K1207258  
**Date Collected:** NA  
**Date Received:** NA

**Volatile Organic Compounds**

**Sample Name:** Method Blank  
**Lab Code:** KWG1208689-4  
**Extraction Method:** EPA 5030B  
**Analysis Method:** 8260C

**Units:** ug/L  
**Basis:** NA  
**Level:** Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Vinyl Chloride	ND	U	0.50	0.075	1	08/03/12	08/03/12	KWG1208689	
Trichlorofluoromethane	ND	U	0.50	0.12	1	08/03/12	08/03/12	KWG1208689	
1,1-Dichloroethene	ND	U	0.50	0.080	1	08/03/12	08/03/12	KWG1208689	
Methylene Chloride	ND	U	2.0	0.10	1	08/03/12	08/03/12	KWG1208689	
trans-1,2-Dichloroethene	ND	U	0.50	0.072	1	08/03/12	08/03/12	KWG1208689	
cis-1,2-Dichloroethene	ND	U	0.50	0.067	1	08/03/12	08/03/12	KWG1208689	
1,1,1-Trichloroethane (TCA)	ND	U	0.50	0.075	1	08/03/12	08/03/12	KWG1208689	
Carbon Tetrachloride	ND	U	0.50	0.096	1	08/03/12	08/03/12	KWG1208689	
1,2-Dichloroethane (EDC)	ND	U	0.50	0.080	1	08/03/12	08/03/12	KWG1208689	
Trichloroethene (TCE)	ND	U	0.50	0.10	1	08/03/12	08/03/12	KWG1208689	
Bromodichloromethane	ND	U	0.50	0.091	1	08/03/12	08/03/12	KWG1208689	
Tetrachloroethene (PCE)	ND	U	0.50	0.099	1	08/03/12	08/03/12	KWG1208689	
Dibromochloromethane	ND	U	0.50	0.14	1	08/03/12	08/03/12	KWG1208689	
1,1,2,2-Tetrachloroethane	ND	U	0.50	0.16	1	08/03/12	08/03/12	KWG1208689	
1,2-Dibromo-3-chloropropane	ND	U	2.0	0.20	1	08/03/12	08/03/12	KWG1208689	
Hexachlorobutadiene	ND	U	2.0	0.11	1	08/03/12	08/03/12	KWG1208689	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	116	73-122	08/03/12	Acceptable
Toluene-d8	120	65-144	08/03/12	Acceptable
4-Bromofluorobenzene	105	68-117	08/03/12	Acceptable

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

**COLUMBIA ANALYTICAL SERVICES, INC.**

Now part of the ALS Group

Analytical Results

**Client:** EA Engineering, Science, and Technology  
**Project:** Boomsnub/14495.28 0005  
**Sample Matrix:** Water

**Service Request:** K1207258  
**Date Collected:** NA  
**Date Received:** NA

**Volatile Organic Compounds**

**Sample Name:** Method Blank  
**Lab Code:** KWG1208768-4  
**Extraction Method:** EPA 5030B  
**Analysis Method:** 8260C

**Units:** ug/L  
**Basis:** NA  
**Level:** Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Vinyl Chloride	ND	U	0.50	0.075	1	08/06/12	08/06/12	KWG1208768	
Trichlorofluoromethane	ND	U	0.50	0.12	1	08/06/12	08/06/12	KWG1208768	
1,1-Dichloroethene	ND	U	0.50	0.080	1	08/06/12	08/06/12	KWG1208768	
Methylene Chloride	ND	U	2.0	0.10	1	08/06/12	08/06/12	KWG1208768	
trans-1,2-Dichloroethene	ND	U	0.50	0.072	1	08/06/12	08/06/12	KWG1208768	
cis-1,2-Dichloroethene	ND	U	0.50	0.067	1	08/06/12	08/06/12	KWG1208768	
1,1,1-Trichloroethane (TCA)	ND	U	0.50	0.075	1	08/06/12	08/06/12	KWG1208768	
Carbon Tetrachloride	ND	U	0.50	0.096	1	08/06/12	08/06/12	KWG1208768	
1,2-Dichloroethane (EDC)	ND	U	0.50	0.080	1	08/06/12	08/06/12	KWG1208768	
Trichloroethene (TCE)	ND	U	0.50	0.10	1	08/06/12	08/06/12	KWG1208768	
Bromodichloromethane	ND	U	0.50	0.091	1	08/06/12	08/06/12	KWG1208768	
Tetrachloroethene (PCE)	ND	U	0.50	0.099	1	08/06/12	08/06/12	KWG1208768	
Dibromochloromethane	ND	U	0.50	0.14	1	08/06/12	08/06/12	KWG1208768	
1,1,2,2-Tetrachloroethane	ND	U	0.50	0.16	1	08/06/12	08/06/12	KWG1208768	
1,2-Dibromo-3-chloropropane	ND	U	2.0	0.20	1	08/06/12	08/06/12	KWG1208768	
Hexachlorobutadiene	ND	U	2.0	0.11	1	08/06/12	08/06/12	KWG1208768	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	116	73-122	08/06/12	Acceptable
Toluene-d8	120	65-144	08/06/12	Acceptable
4-Bromofluorobenzene	107	68-117	08/06/12	Acceptable

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